Humboldt County Regional Climate Action Plan

Public Draft

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Cities and County

- County of Humboldt
- City of Arcata
- City of Blue Lake
- City of Eureka
- City of Ferndale
- City of Fortuna
- City of Rio Dell
- City of Trinidad

Regional Partners

- Redwood Coast Energy Authority (RCEA)
- Humboldt Transit Authority (HTA)
- Humboldt County Association of Governments (HCAOG)
- Humboldt Waste Management Authority (HWMA)
- Recology

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Glossary

Term	Definition
Active Transportation	A means of transportation that is powered by human energy, for example walking or biking.
Adaptation	Adjustment or preparation of natural or human systems to a new or changing environment which moderates harm or exploits beneficial opportunities.
Anthropogenic	Made by people or resulting from human activities; usually used in the context of emissions that are produced as a result of human activities.
Bus headway	The amount of time between two vehicles (e.g., buses) on the same route. The amount of headway on a bus route dictates the length of time a rider will wait between buses.
CALGreen	An abbreviated reference to the California Green Building Standards code, which sets minimum requirements for sustainable practices for construction (residential and commercial) projects throughout the state. It is updated every three years in accordance with the building cycle.
CALGreen Tier 1 & 2	Requirements beyond the mandatory measures laid out by CALGreen: Tier 1 adds additional requirements to the mandatory sustainability requirements, and Tier 2 further increases those sustainability requirements.
CalRecycle	Agency that administers and provides oversight for all of California's state-managed non-hazardous waste handling and recycling programs.
California Air Resources Board (CARB)	The lead agency for climate change programs that also oversees all air pollution control efforts in California to attain and maintain health-based air quality standards.
Carbon-free Energy	Energy produced by a resource that generates no carbon emissions, for example, wind power, solar, large hydropower, and nuclear. Not all carbon-free energy sources are considered eligible renewable by California's Renewable Portfolio Standard defined below.
Carbon-neutrality/ Net-Zero Emissions	Balancing anthropomorphically generated emissions out by removing GHGs from the atmosphere in a process known as carbon sequestration.
Carbon sequestration	The long-term storage or capture of carbon dioxide and other forms of carbon from the atmosphere through biological, chemical, and physical processes.
CH_4	Methane, a hydrocarbon that is a greenhouse gas produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
Climate	The average of weather patterns over a long period of time (usually 30 or more years).
Climate Change	A change in the average conditions — such as temperature and rainfall — in a region over a long period of time.
Complete Streets	Are designed and operated to enable safe use and support mobility for all users. Complete Streets approaches address a range of elements including sidewalks, bicycle lanes, bus lanes, public transportation stops, and median islands.
CO_2	Carbon dioxide, a naturally occurring gas and a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes.
CO_2e	Carbon dioxide equivalent, a metric measure used to compare the emissions from various greenhouse gases based upon their GWP.
Decarbonization	Replacing technologies and services that run on fossil fuels (ex. natural gas) with ones that run on zero-carbon sources of energy (for example electricity from renewable energy like solar or wind power), ideally from renewable sources.

Term	Definition
Disadvantaged Communities	Refers to the areas throughout California disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure or environmental degradation. This includes areas with concentrations of people that are of low income, high unemployment, low levels of home ownership, high rent burden, or low levels of educational attainment.
Electric Vehicle (EV)	Refers to Battery Electric Vehicles (BEVs) and Plug-In Hybrid Electric Vehicles (PHEVs). BEV refers to any vehicle that operates solely by use of a battery or battery pack, or that is powered primarily through the use of an electric battery or battery pack but uses a flywheel or capacitor that stores energy produced by the electric motor or through regenerative braking to assist in vehicle operation. PHEV refers to a hybrid electric vehicle with the capability to charge a battery from an off-vehicle electric energy source that cannot be connected or coupled to the vehicle in any manner while the vehicle is being driven.
Energy Storage	Can provide frequency regulation to maintain balance between the network's load and detected power generated, achieving more reliable power supplies. Batteries are an example of energy storage.
Fossil Fuel	A general term for fuel formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the Earth's crust.
Greenhouse Gas (GHG)	A gas that absorbs infrared radiation, traps heat in the atmosphere, and contributes to the greenhouse effect.
Global Warming Potential (GWP)	Total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.
Greywater	Graywater refers to water that has been used domestically, commercially, and industrially.
Local Governments for Sustainability (ICLEI)	A global network of more than 1,750 local and regional governments committed to sustainable urban development – emissions estimates were calculated using ICLEI's best available methodologies.
Mitigation	An action that will reduce or prevent greenhouse gas emissions, such as electrifying buildings that previously ran on natural gas.
Metric Tons (MT)	Common international measurement for the quantity of greenhouse gas emissions – one metric ton is equal to 2205 pounds or 1.1 short tons.
Metric tons carbon dioxide equivalent (MT CO_2e)	Metric/unit that GHG emissions are reported per standard practice; when dealing with an array of emissions, the gases are converted to their carbon dioxide equivalents for comparison purposes.
Microgrid	A group of interconnected loads and distributed energy resources that act as a single controllable entity in respect to the grid. A microgrid can operate in 'island mode' and disconnect from the wider grid, or operate while connected to the wider grid.
Mode Shift	Changing from one form of transportation to another, specifically, switching from traveling via car to traveling via bicycle or public transport.
N_2O	Nitrous Oxide, a powerful GHG with a high global warming potential; major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Organic Material	Natural or organic materials, for example food scraps and yard waste.
Reach Code	A building code which requires a higher level of energy efficiency than the standard statewide code. Reach codes are allowed and encouraged under Title 24.
Regional Housing Needs Allocation (RHNA)	Refers to the first two steps (Determination and Allocation) of a multi-step process that California governments utilize to plan for housing needs in each region of the state. The RHNA is a minimum projection of additional housing units needed to accommodate projected household growth of all income levels.

Term	Definition
Remodels/Alterations	A building update that changes the exterior detail of a structure, but not its basic shape or size.
Renewable Energy	Energy derived from natural sources that are replenished at a higher rate than they are consumed (ex. wind, biomass); sources qualifying as renewable in California are listed in the State's Renewables Portfolio Standard.
Resilience	Ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate.
Supportive Measure or Action	One which has not been quantified and does not provide a direct or easily quantified GHG reduction; however, these measures are expected to contribute to overall GHG reductions and/or provide co-benefits.
Transportation Demand Management (TDM)	Transportation Demand Management focuses on how people make their transportation decisions, and facilitates greater usage of infrastructure for transit, ridesharing, walking, biking, and telework.
Vehicle Miles Traveled (VMT)	The amount of total miles traveled by motor vehicle that are generated over a population over a given timeframe (Ex. 1 year).
Vehicle to Grid Charging	A device that absorbs electricity from a car battery and pushes it back to the grid, allowing EVs to function as backup storage cells for the electrical grid.
Vulnerable Community	Communities that experience heightened risk and increased sensitivity to climate change and have less capacity and fewer resources to cope with, adapt to, or recover from climate impacts. These disproportionate effects are caused by physical (built and environmental), social, political, and/ or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality. In Humboldt, this includes low-income families, fixed-income seniors, agricultural workers, etc
Zero-Emissions-Vehicle (ZEV)	A vehicle that produces zero exhaust emissions of any criteria pollutant (or precursor pollutant) or greenhouse gas, excluding emissions from air conditioning systems, under any possible operational modes or conditions.
Zero Waste	The conservation of all resources by means of responsible production, consumption, reuse, and recovery of materials and packaging, without burning, and with no discharges to land, water, or air that threaten human health. CalRecycle defines Zero Waste as a circular economy that collects and reuses items or remakes them into new products, SB 1383 established specific State goals for waste reduction.

1 Introduction

1.1 Vision

Humboldt County is a diverse region made up of communities, rural areas, ecosystems, and infrastructure that are impacted by climate change and acknowledges that to avoid the most catastrophic effects of climate change, greenhouse (GHG) emissions must be reduced significantly over the next two decades. Recognizing the strength in collaboration, the County of Humboldt, City of Arcata, City of Blue Lake, City of Eureka, City of Ferndale, City of Fortuna, City of Rio Dell, and City of Trinidad, collectively referred to as Humboldt hereafter, have crafted this Regional Climate Action Plan (RCAP) as a regional approach for addressing climate change. This RCAP is a starting place for a regional coalition focused on change and details a set of strategies to reduce GHG emissions, increase climate resiliency, and strengthen the growing regional green economy.

1.2 Purpose

Climate Action

The Humboldt RCAP is a long-range planning document that guides the Humboldt region towards long-term GHG emission reduction in accordance with the State's goal to reduce GHG emissions by 40 percent below 1990 levels by 2030 and achieve carbon neutrality by 2045.[1] See Appendix A for a written description of regulations related to climate action planning. This RCAP focuses on creating a climate coalition to maximize regional efficiencies, overcome challenges facing rural areas, attract funding, build a green economy, mitigate emissions, and increase resilience. By prioritizing collaborative efforts and tailored strategies, this RCAP aims to address the unique needs of the rural communities in the region while advancing comprehensive GHG reduction and economic development goals.

CEQA GHG Emissions Analysis Streamlining

California Environmental Quality Act (CEQA) Guidelines Section 15183.5(b) provides a methodology for agencies to analyze and mitigate the significant impacts of GHGs at a programmatic level using a qualified CAP. This methodology allows project-specific environmental documents to tier from that programmatic review. A qualified CAP is one that clearly demonstrates that GHG emissions within a defined geographic area will be reduced over time in a manner consistent with State reduction targets. State guidance and recent CEQA case law makes it clear that tiering from a qualified CAP provides a defensible method of achieving GHG CEQA clearance for new development proposals.

This RCAP fulfills the requirements of California Environmental Quality Act (CEQA) Guidelines Section 15183.5(b) to be considered a "qualified" GHG reduction plan.[2] In compliance with CEQA and State CEQA Guidelines, local agencies must evaluate the environmental impacts of new development projects or plans, including impacts related to GHG emissions associated with the construction and operation of projects or plans. This process can be cumbersome for local agencies

[1] The State carbon neutrality goal established by Assembly Bill 1279 considers carbon neutrality to be at least an 85 percent reduction in GHG emissions with the remaining fraction achieved through removals such as carbon sequestration.

[2] Governor's Office of Planning and Research (OPR) (2019). *General Plan Guidelines - Chapter 8: Climate Change*. Accessed May 20, 2024 from https://opr.ca.gov/docs/OPR_C8_final.pdf

and developers alike and can result in project delays. The CEQA Guidelines provide an option for new projects to streamline the CEQA analysis of GHG emissions by tiering from a qualified GHG reduction plan.

The RCAP is consistent with the criteria set forth in CEQA Guidelines Section 15183.5 (b) as outlined in Table 1. For jurisdictions that adopt the RCAP, CEQA analysis of GHGs can be streamlined for projects by establishing consistency with the RCAP and GHG emissions may be considered to have a less than significant impact.[3]

Table 1 CEQA Guidelines Section 15183.5(b) Criteria Addressed in RCAP

CEQA Criteria	RCAP Chapter Addressing Criteria
1. Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area	Chapter 3 Appendix B
2. Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable	Chapter 3
3. Identify and analyze sector specific GHG emissions from specific actions or categories of actions anticipated within the geographic area	Chapter 3 Appendix C
4. Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level	Chapters 4 Appendix C
5. Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels	Chapter 5
6. Adopt in a public process following environmental review	Pending Adoption

1.3 Background

The Humboldt region is a geographic area that has long been committed to sustainability initiatives focused on environmental conservation, renewable energy, and sustainable agriculture. There are strong environmental conservation efforts, with numerous protected areas and initiatives aimed at preserving the county's natural beauty and biodiversity. Many local businesses and organizations focus on sustainable tourism and promoting activities that do not harm the environment.

The Humboldt region is most vulnerable to sea level rise, extreme weather events, and wildfire. In recent years the region has experienced a growing frequency and intensity of precipitation events leading to flooding that regularly closes the primary routes into Humboldt County. This further isolates communities in the region, impacts the movement of goods across the region, and results in economic losses that the region counts on.[4]

Humboldt jurisdictions came together in 2019 and began preparing the RCAP to tackle climate change regionally, recognizing that a regional approach best leverages limited resources in the region. Further, regional coordination maximizes the effectiveness and benefit of GHG reduction strategies. Humboldt obtained a Regional Early Action Planning (REAP) grant from the US

[3] Governor's Office of Planning and Research (OPR) (2019). *General Plan Guidelines - Chapter 8: Climate Change*. Accessed May 20, 2024 from https://opr.ca.gov/docs/OPR_C8_final.pdf

[4] Governor's Office of Planning and Research (OPR), California Energy Commission (CEC), and California Natural Resources Agency (CNRA) (2018). *California's Fourth Climate Change Assessment - North Coast Region Report*. Accessed June 10, 2024, from https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-001_NorthCoast_ADA.pdf

Department of Housing and Community Development (HCD) to prepare the RCAP.

Humboldt Community

Located on the northern coast of California, Humboldt County is 270 miles north of San Francisco. Humboldt is known for its natural beauty with rugged coastlines, pristine rivers, mountainous terrain, and for being home to one of the largest densities of old-growth coast redwood forests in the world. Historically, logging and the timber industry were the backbone of the county's economy. However, the timber industry has been in decline over the past few decades. Other drivers of the economy in the region include agriculture, particularly dairy farming and specialty crops, tourism, and in recent decades cannabis production.

The county is approximately 4,052 square miles and has a population of approximately 135,010 people, with over half the population living in the unincorporated county. There are seven incorporated cities including Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Dell, and Trinidad that range in population size from a few hundred residents to just under 30,000 residents. Per the U.S. Census Bureau 81.7 percent of the population are white and 5.7 percent are Native American. The median household income in the region is $57,000 with much of the region denoted as low-income as defined for California Climate Investments. Approximately 18 percent of residents are living in poverty, compared to 11.6 percent national average. The combination of geographic isolation, economic disparities, and demographic diversity in the region contribute to varied vulnerabilities to climate change impacts. Vulnerable populations, including low-income communities, may face heightened risks from climate-related hazards such as wildfires, sea level rise, and extreme weather events.

Though the community is largely rural and faces significant economic constraints, the unique community characteristics and ample natural resources provide climate action opportunities that may not be possible in other communities. The region has a strong sense of community, a vibrant local culture, and is passionate about their natural heritage contributing to a strong sense of environmental stewardship and conservation. The RCAP seeks to maintain the values of the Humboldt community and region while leveraging these opportunities with solutions that are impactful and feasible in Humboldt.

Regional Constraints

While addressing climate change and implementing climate change policies it is critical to understand the constraints facing the region both at a jurisdictional and community level. The Humboldt region faces unique obstacles that must be overcome for effective climate change. The primary constraints in the region for climate action policy implementation include:

1. ***Geographic Isolation and Accessibility:*** Humboldt's rural character presents challenges in terms of achieving population densities needed for cost effective public transportation, reducing vehicle miles traveled (VMT), and developing infrastructure economically. Limited economic opportunities due to geographic and social isolation further complicate these efforts. Implementing projects over a geographically dispersed population can be costly and logistically complex. For example,

   a. Jurisdictions have historically lacked integration of public transit in long range land use planning efforts. Combined with dispersed population centers and low populations densities, implementing effective public transit systems under current federal, state and local funding structures is difficult.
   b. The region's remote and rural location requires long-distance transportation of waste to processing facilities, increasing both costs and emissions.
   c. The large area, dispersed communities and geographic isolation limits the region's ability to bring in and rely upon current ZEV technologies and reduce VMT.

2. ***Limited Infrastructure:*** The region lacks local waste management facilities such as recycling, composting, or processing centers, which diminishes local control, hinders compliance with state mandates, and necessitates long-distance transportation of waste out of the county. Additionally, being on the periphery of natural gas and electrical infrastructure presents challenges for developing renewable energy projects and electrification efforts due to transmission and distribution limitations. Building and maintaining infrastructure like roads, utilities, and telecommunications networks can be more expensive and challenging in remote areas.
3. ***Economic Dependence and Limited Resources:*** Recently Humboldt has lost some of the major economic engines the region had historically relied on like logging and fishing. Beyond being economically constrained, due to the low population, Humboldt also faces limited human resources to dedicate to obtaining funding and implementing climate mitigation and adaptation efforts. Converting infrastructure and transitioning to more sustainable practices can be challenging without adequate staffing, funding support, and incentives.
4. ***Social Vulnerability:*** Approximately 40 percent of the Humboldt population is either at or below the 80th percentile of the statewide median income[5,6], categorizing them as low-income and increasing their social vulnerability to climate change.

Despite these challenges, Humboldt also has strengths that can support climate action, including a strong tradition of regional collaboration and environmental stewardship, active community organizations, and a growing interest in sustainable agriculture and renewable energy.

Regional Opportunities

Humboldt, with its rich natural resources and an environmentally conscious and engaged community, offer several opportunities to overcome the constraints the region faces:

1. ***Partnerships and Collaboration:*** No single agency is responsible for mitigating GHG emissions, just as no community can avoid impacts related to climate change. One of the benefits of isolated areas like the Humboldt region is the recognized need to establish capable agencies and to foster collaboration to overcome challenges. This recognition has helped the region establish strong cross agency coordination and partnerships. Continuing

[5] California Air Resources Board (2021). Identification of Low-Income Communities under AB 1550 Methodology and Documentation for Maps. Accessed May 20, 2024, from https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/kml/ab1550_maps_documentation.pdf

[6] U.S. Census Bureau (2022). American Community Survey (ACS) 5 Year Estimates (2017-2022) S1901. Accessed June 10, 22024, from https://data.census.gov/table/ACSST1Y2022.S1901?g=050XX00US06023

to work together through a formal coalition to implement the RCAP is a powerful way for the region to make rapid progress with GHG mitigation and increased resilience.

2. ***Green Economic Growth:*** Transitioning to a low-carbon economy presents opportunities for new green industries and job creation in Humboldt. Investments in clean energy, sustainable agriculture, eco-tourism, composting, and green infrastructure projects can stimulate economic growth while reducing GHG emissions.
3. ***Funding Opportunities:*** There are several funding opportunities for rural and low-income areas in California. This includes state and federal funding, incentives, and partnerships to implement climate-related projects in Humboldt.
4. ***Abundant Renewable Energy Resources:*** Humboldt has significant potential for renewable energy generation, particularly from wind, solar, and biomass sources. Expanding renewable energy infrastructure can reduce greenhouse gas emissions and create local jobs and stimulate economic development. Recently, the Bureau of Ocean Energy Management (BOEM) has auctioned two lease areas for potential commercial wind energy development in Federal waters off the coast of Humboldt County, referred to as the Humboldt Wind Energy Area (WEA).[7]
5. ***Carbon Sequestration in Natural Ecosystems:*** Humboldt's diverse ecosystems, including forests, wetlands, and coastal habitats, provide valuable opportunities for carbon sequestration. Protecting and restoring these natural areas can enhance resilience to climate change impacts while mitigating carbon emissions. With its extensive natural lands there are significant opportunities to implement sustainable land practices that sequester carbon, protect biodiversity, and support local economies.

Overcoming the obstacles to climate change policy implementation will require collaboration, innovation, and commitment. Coalition building is a core concept of the RCAP as collaboration between stakeholders in rural areas will be the key to successful implementation of climate action policies and improving climate resiliency in Humboldt. Several resources including the California Climate Adaptation Strategy, Community Organization Boards (COBs), and the California Air Resources Board (CARB) 2022 Scoping Plan for Achieving Carbon Neutrality offer partnership strategies to reduce GHG emissions. Collaboration efforts have the potential to increase green jobs and provide other economic resources to mitigate GHG emissions and build increased resilience across the Humboldt region.

Past GHG Reduction Efforts

Humboldt has been committed to increasing sustainable operations and policies for many years and strives to reduce GHG emissions throughout the region. There are numerous community-based groups and advocacy groups established that focus on initiatives to address climate change through policy-change. For example, North Coast Resource Partnership (NCRP) collaborates on various efforts to reduce GHG emissions across the North Coast which includes Humboldt County. This collaboration works to obtain grant funding, provide educational and promotional events, and implement a variety of programs across the region such as energy efficiency programs and land use and conservation projects that reduce GHG emissions and increase climate resilience. They are also

[7] Bureau of Ocean Energy Management (BOEM) (2024). *Humboldt Winde Energy Area*. Accessed June 6, 2024, from https://www.boem.gov/renewable-energy/state-activities/humboldt-wind-energy-area

involved in transporting, planning and supporting the development of renewable energy sources in the region to create an independent energy system.[8]

Additionally, Redwood Coast Energy Authority (RCEA), a local not for profit government agency that procures electricity for the Humboldt region as a community choice aggregator is implementing several initiatives to reduce GHG emissions through the energy sector. RePower Humboldt[9], RCEA's Comprehensive Action Plan for Energy in the region, lays out a strategy to provide 100 percent clean and renewable energy by 2027. Based on community input, the final report outlines policies and goals to lower utility rates and offer clean energy from local sources. RCEA's long-term energy portfolio aims to be 100 percent renewable by 2030. In addition, RCEA offers several energy efficiency, fuel switching, and clean transportation programs to convert household and vehicle energy use from fossil fuels to renewable (low-carbon) sources.

Redwood Community Action Agency (RCAA) also offers a Weatherization Program that provides home repair services to increase energy efficiency for low-income households. Implementation of energy efficiency efforts and a continual increase of renewable and carbon-free energy on the grid through such efforts have led to a significant decrease in GHG emissions associated with electricity use in the region.

The Humboldt region is also dedicated to reducing vehicle miles traveled in the community and consequentially GHG emissions in its transportation sector. The Humboldt County Association of Governments (HCAOG) has developed numerous planning documents to decrease VMT in the region and is currently funding the County-led development of VMT thresholds for the region that would establish what amount of VMT change from development would be considered a significant impact and would require mitigation. This helps to limit increasing VMT. Additionally, HCAOG has secured numerous grants for the region for a variety of programs that aim to reduce VMT.[10] Several communities are planning and developing with climate change and GHG impacts in mind. For example, the City of Arcata recently adopted the Gateway Area Plan that focuses on a high-density mixed-use development that is in close access to the City's center and key amenities of the city to reduce the need to drive.[11] The City adopted the Gateway Area Code to establish the specific requirements and standards to implement the Gateway Area Plan.[12] Land use decisions and developments such as this reduce VMT by placing residents near amenities, economic centers and access to other modes of transportation that is less GHG emitting.

The Humboldt Transit Authority (HTA) is committed to fully transitioning their fleet to zero emission in compliance with the Innovative Clean Transit regulation. In 2022 HTA was awarded a $38.7 million grant funded by the California Climate Investment fund through California State Transportation Agency's Transit and Intercity Rail Capital Program (TICRP) to introduce 11 New Flyer fuel cell electric buses (FCEBs) and a hydrogen fueling station at HTA's facility in Eureka. With 11

[8] North Coast Resource Partnership (NCPA) (n.d.).Homepage. Accessed June 15, 2024, from https://northcoastresourcepartnership.org

[9] Redwood Coast Energy Authority (RCEA) (2019). *RePower Humboldt*. Accessed May 5, 2024, from https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

[10] Humboldt County Association of Governments (HCAOG) (2023). *HCAOG 2023 Highlights*. Accessed May 21, 2024, from https://www.hcaog.net/sites/default/files/HCAOG%202023%20Highlights%20(Canva).pdf

[11] City of Arcata (2024). *Resolution No. PC-24-05, Gateway Area Plan 2024*. Accessed May 15, 2024, from https://www.cityofarcata.org/DocumentCenter/View/14232/25_Gateway20240514PC

[12] City of Arcata (2024). *Arcata Municipal Code Chapter 9.110 - Gateway Area Districts*. Accessed May 15, 2024, from https://www.cityofarcata.org/DocumentCenter/View/14200/Gateway-FBC20240514_PC-Adopted

new zero-emission FCEBs added to the fleet and the hydrogen station, this project will help kick-start a hydrogen supply chain on the North Coast.[13]

Numerous community planning documents have been adopted in the Humboldt region that include a number of policies, goals, and projects that are focused on the reduction of GHG emissions including the County and local General Plans, City of Arcata Community GHG Reduction Plan[14], RePower Humboldt[15], Humboldt County Transit Development Plan 2023 - 2028,[16] HCAOG Humboldt Bay Area Bike Map, HCAOG RTP[17], and RCEA North Coast Medium-Duty and Heavy -Duty ZEV Blueprint Plan[18].

1.4 Regional Climate Action Plan Development Process

Process

The RCAP was built off the completed 2022 GHG emissions inventory calculated for activities within the geographic area of Humboldt County and included future GHG emissions forecasts and analysis of GHG emission reduction targets in support of state reduction goals. After the targets were analyzed, GHG emission reduction measures and supporting actions were designed based on the success of the work done previously in Humboldt, current best practices, and information gathered from interested parties including the County, incorporated Cities, regional partners (e.g., HTA, RCEA, HCAOG), and community groups. Feedback from interested parties were considered to establish a list of priority projects and measures that were then further refined based on feasibility and substantial evidence for GHG reduction capacity. Figure 1 shows the iterative nature of the RCAP development process.

[13] California Climate Investments (2023). *Kick-Starting Zero-emission Fleets and Expanding Transit on California's North Coast*. Accessed June 10, 2024, from https://www.caclimateinvestments.ca.gov/2023-profiles/hta

[14] City of Arcata(2006). *Community Greenhouse Gas Reduction Plan*. Accessed June 7, 2024, from https://www.ca-ilg.org/sites/main/files/file-attachments/resources__Greenhouse_Gas_Reduction_Plan_0.pdf?1460653786

[15] Redwood Coast Energy Authority (RCEA) (2019). *RePower Humboldt*. Accessed May 5, 2024, from https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

[16] Humboldt County Association of Governments (HCAOG) (2023). *Humboldt County Transit Development Plan 2023-2028.* Accessed May 10, 2024, from https://www.hcaog.net/sites/default/files/humboldt_county_transit_development_plan_-_final_report_no_appendices_compressed_0.pdf

[17] Humboldt County Association of Governments (HCAOG). *Regional Transportation Plan, VROOM 2022-2042*. Accessed May 10, 2024, from https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

[18] Redwood Coast Energy Authority (RCEA) (2023). *North Coast Medium-Duty and Heavy-Duty ZEV Blueprint Plan*. Provided by the County via SharePoint on March 15, 2023.

Figure 1 RCAP Development Process

Developing a comprehensive strategy to tackle climate change requires collaboration among various interested parties, community members, decision-makers, County and incorporated City staff. By working together, a plan that is representative of the needs of the community at large was developed.

Jurisdictional Collaboration

The RCAP was developed to encompass the geographical region of Humboldt County and will be implemented across all the incorporated Cities and County. Success with implementation and achievement of the GHG reduction targets will require coordination and cooperation between different jurisdictions and commitment and effort from all levels of the Cities and County administration. The RCAP was developed through collaboration among the County, all incorporated Cities, RCEA, HTA, HCAOG, and HWMA. The goals and measures presented in the RCAP were developed in close collaboration with department heads and regional partners. This approach

supported the development of measures and actions that were feasible and provided a clear roadmap to address potential barriers to implementation. By incorporating insights from across the region, the RCAP struck a balance between Humboldt's operational capabilities and what needs to occur to reach the 2030 GHG reduction target. While the RCAP is regional in scope, each individual jurisdiction will need to adopt the RCAP through their City Councils or the County Board of Supervisors for the County.

Information Sharing with the Community

During the initial drafting of the RCAP that began in 2019, the County and incorporated Cities hosted numerous community outreach events and campaigns. As part of the initial work on the CAP presentations were made to each of the City Councils for Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Del and Trinidad, and to the Board of Supervisors. Other public presentations were held with the Farm Bureau, RCEA Board of Directors, a public forum at Cal Poly Humboldt and in McKinleyville, Redway and Willow Creek. To better address transportation related issues and Transportation Advisory Group was formed to provide input on the RCAP.

During the development of the RCAP, an interactive community survey was published on the public RCAP website to inform the community of the updates to the RCAP and gain an understanding of what measures and actions the community would like to see prioritized by the County and incorporated jurisdictions during implementation. The primary goal of the survey was to share information on 1) the Humboldt regions' GHG emissions inventory, forecast, and targets; 2) how Measures and Actions are structured; and 3) the level of potential GHG emissions reduction based on the Measures. The survey was viewed over 1,000 times with a total of 160 submissions. Survey results indicated that the respondents prioritized efforts to reduce organic waste sent to landfills, increase zero-emission vehicle use, and increase public transit use the highest. Responses from public officials prioritized efforts to increase zero-emission vehicle use and establish a region-wide Climate Committee to implement the RCAP as the highest with reducing organic waste and increasing public transit use tied as the third highest priority. These responses indicated high alignment between what public officials felt should be prioritized compared with the community respondents.

2 Scientific Context for Climate Change

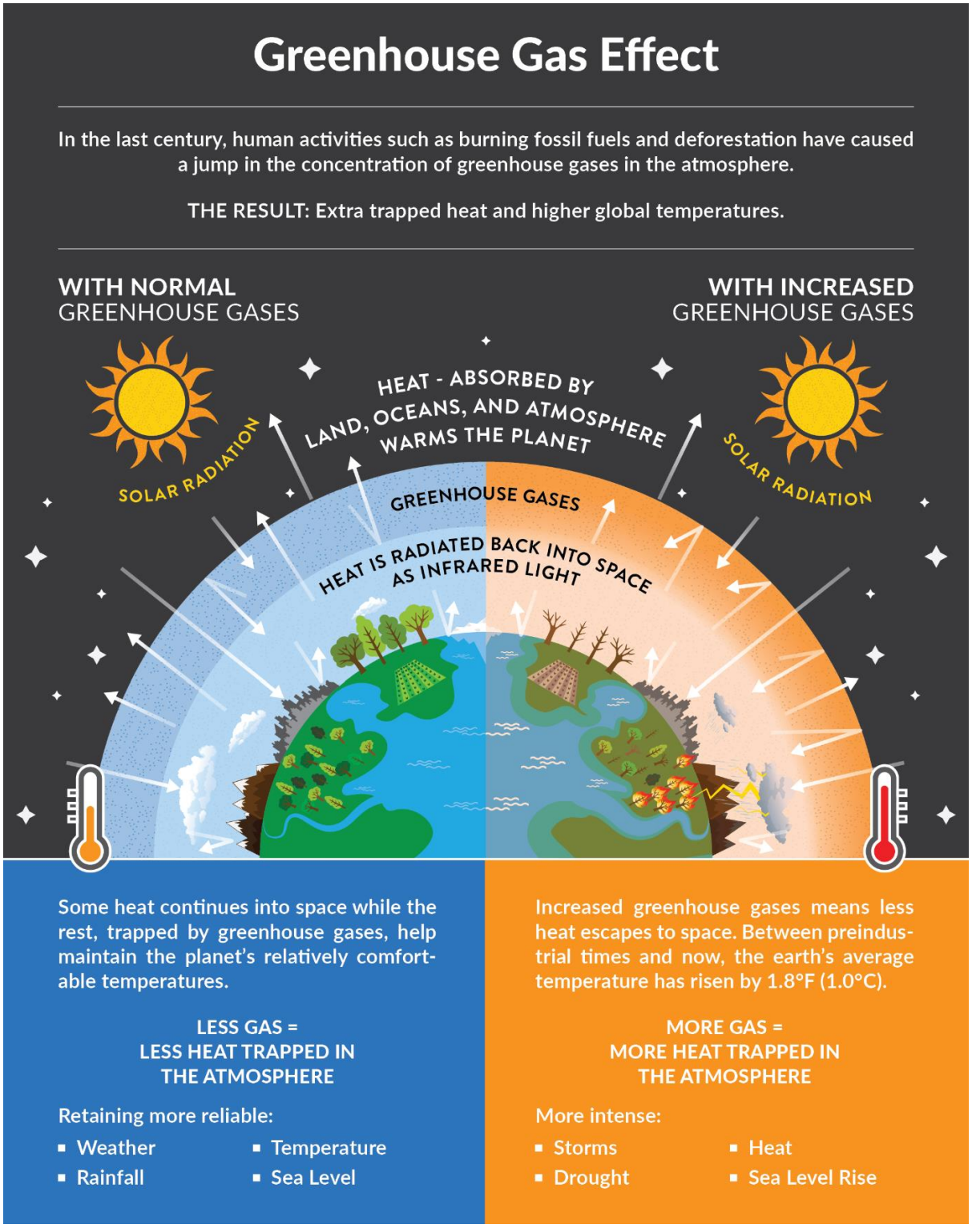
Climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other substantial changes in climate intensity (such as wind patterns, precipitation, and storms) over an extended period of time. The baseline against which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. However, scientists have observed acceleration in the rate of warming during the past 150 years. Per the United Nations Intergovernmental Panel on Climate Change (IPCC), the understanding of anthropogenic warming and cooling influences on climate has led to a high confidence (95 percent or greater chance) that the global average net effect of human activities has been the dominant cause of warming since the mid-20th century.[19]

2.1 Background on Greenhouse Gas Emissions

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHGs). The accumulation of GHGs in the atmosphere regulates the Earth's temperature is known as the "greenhouse gas effect". The greenhouse effect, shown in Figure 2, is integral to sustaining life on Earth. However, human activities emit GHGs more than natural ambient concentrations, thereby contributing to the enhancement of the natural greenhouse effect. This enhanced greenhouse effect contributes to global warming, an accelerated rate of warming of earth's average surface temperature. More specifically, by burning fossil fuels to power homes, businesses, and automobiles, we increase the amount of GHGs emitted into the atmosphere, which, in turn, leads to increased absorption of infrared radiation by the earth's atmosphere and increasing temperatures near the surface.

[19] Intergovernmental Panel on Climate Change (IPCC) (1995). *Climate Change 1995, The Science of Climate Change*. Accessed May 1, 2024, from https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_sar_wg_I_full_report.pdf

Figure 2 Greenhouse Gas Effect



Types of GHGs

The United Nations Intergovernmental Panel on Climate Change's (IPCC) list of GHG emissions include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), as well as chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, which are collectively called fluorinated gases.[20] Fluorinated gases are man-made gases that can stay in the atmosphere for centuries and contribute to the GHG effect. Ninety-seven percent of the annual GHG emissions generated in the United States consist of CO_2, CH_4, and N_2O,[21] while fluorinated gases[22] result in the remaining three percent of emissions. Most fluorinated gases come from industrial sources, of which there are relatively few in Humboldt. Due to CO_2, CH_4, and N_2O comprising the large majority of GHG emissions in Humboldt, the RCAP focuses on these three gases for its GHG emissions inventory, forecast, and reduction strategy, consistent with the ICLEI – Local Governments for Sustainability's U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol).

Each type of GHG has a differing ability to trap heat in the Earth's atmosphere over a specified timescale (generally, 100 years), referred to as the gas's global warming potential (GWP).[23] The reference point to compare the potential impact of different GHGs is CO_2, and therefore CO_2 has a GWP of 1, whereas CH_4 has a GWP of 28. This means that each metric ton (MT) of methane causes 28 times more warming than 1 MT of CO_2. Even more potent, N_2O has a GWP of 265, or 265 times the GWP of 1 MT of CO_2.[24]

Sources of GHGs

GHGs are emitted by both natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and decomposition of organic waste in landfills. These activities release GHGs into the atmosphere and contribute to climate change. With the accelerated increase in fossil fuel combustion and deforestation since the Industrial Revolution of the 19th century, concentrations of GHG emissions in the atmosphere have increased exponentially. The United States Environmental Protection Agency (U.S. EPA) tracks the country-wide emissions and publishes an annual report: Inventory of U.S. Greenhouse Gas Emissions and Sinks.[25] The Inventory of U.S. Greenhouse Gas Emissions and Sinks is a comprehensive account of total GHG emissions for all man-made sources in the U.S. including CO_2 removal from the atmosphere by "sinks," (e.g., through the uptake of carbon and storage in forests, vegetation, and soils) from management of lands in their current use, or as lands are converted to other uses. In 2020, the most recent year in which GHG emissions have been calculated nationally, emissions in the U.S. totaled 5,222 million metric tons (MMT) of CO_2e after accounting for sequestration from the land sector. Emissions decreased from 2019 to 2020 by 11

[20] Center for Climate and Energy Solutions (2019). *Main Greenhouse Gases*. Accessed June 12, 2024, from https://www.c2es.org/content/main-greenhouse-gases/

[21] World Resources Institute (WRI) (2020). *4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors*. Accessed June 12, 2024, from https://www.wri.org/insights/4-charts-explain-greenhouse-gas-emissions-countries-and-sectors

[22] Fluorinated gases, which includes four main types: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3), are man-made gases that can stay in the atmosphere for centuries and contribute to the GHG effect.

[23] Intergovernmental Panel on Climate Change (IPCC) (2014). *Climate Change 2014, Synthesis Report*. Accessed May 12, 2024, from https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

[24] ibid.

[25] United States Environmental Protection Agency (EPA) (2024). *Inventory of U.S. Greenhouse Gas Emissions and Sinks*. Accessed May 12, 2024, from https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

percent due to the COVID-19 pandemic, however, preliminary estimates show that emissions rebounded in 2021 after the height of the pandemic.[26]

Effects of Climate Change

In California, the impacts of climate change are already being felt, and will continue to become more severe throughout the twenty-first 21st century. Higher temperatures, more extreme heat events and wildfires, and rising sea levels are all effects of climate change experienced in California. The California Office of Environmental Health Hazard Assessment reported in 2018 that despite annual variations in weather patterns, California has seen a trend of increased average temperatures, more extreme heat days, higher acidity in the Pacific Ocean, earlier snowmelt, and lesser rainwater runoff.[27] From 1895 to 2011, average temperatures have increased by about 1.7˚F statewide, and a smaller proportion of annual precipitation is falling as snow instead of rain. During 1972-2018, California experienced a fivefold increase in the annual area burned, largely attributable to climate change-induced atmospheric temperature rises.

Humboldt and its residents have not been immune from the impacts of climate change. In the last five years the County has experienced the highest rate of sea level rise on the west coast.[28] This has led to coastal erosion and flooding events along coastal communities. Elevated temperatures can harm agriculture, strain water resources, and heighten the risk of heat-related illnesses. Similar to other regions in California, Humboldt is also vulnerable to more frequent and severe wildfires due to climate change where dry and hot conditions contribute to the spread of wildfires, posing risks to communities, ecosystems, and infrastructure. The risk of wildfires is even greater in Humboldt due to the abundant stock of vegetation, which over the last decades have increased in density as vegetative clearing and prescribed burning have reduced.[29] The forested land in Humboldt provides a natural sink to GHG emissions for the region and the state; a loss of this natural sink would be devasting. These climate hazards are expected to intensify if GHG emissions continue to increase. Likewise, Humboldt is likely to face direct impacts from climate change.

While everyone will be impacted, the effects of these environmental hazards will vary depending on factors such as age, health, and socioeconomic status. The most vulnerable individuals will bear the greatest burden from the potential impacts of climate change. It is crucial that the development of this RCAP benefits all community members and does not disproportionately burden or harm vulnerable populations.

[26] United States Environmental Protection Agency (EPA) (2024*). Climate Change Indicators: U.S. Greenhouse Gas Emissions*. Accessed June 1, 2024, from https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions

[27] Office of Environmental Health Hazard Assessment, California Environmental Protection Agency (2018). *Indicators of Climate Change in California.* Accessed May 21, 2024, from https://oehha.ca.gov/media/downloads/climate-change/report/2018caindicatorsreportmay2018.pdf

[28] California Sea Level Rise Science Task Force, California Ocean Protection Council, California Ocean Science Trust (2024). *California Sea Level Rise Guidance: 2024 Science and Policy Update*. Accessed July 10, 2024, from https://opc.ca.gov/wp-content/uploads/2024/05/Item-4-Exhibit-A-Final-Draft-Sea-Level-Rise-Guidance-Update-2024-508.pdf

[29] Humboldt Planning & Building (n.d). *Wildfire Hazard*. Accessed June 10, 2024, from https://humboldtgov.org/3407/Wildfire-Hazard

2.2 Public Policy Context

California Climate Policy

California is recognized globally as a leader on climate change, having established a variety of ambitious GHG reduction targets and associated strategies. The primary policies that have driven statewide GHG emissions reductions are Executive Order (EO) S-3-05, Assembly Bill (AB) 32, Senate Bill (SB) 32, EO B-55-18, and most recently AB 1279. Signed in 2005, EO S-3-05 established statewide GHG emission reduction targets to achieve long-term climate stabilization as follows: by 2020, reduce GHG emissions to 1990 levels and by 2050, reduce GHG emissions to 80 percent below 1990 levels. In 2016, SB 32 set a target for achieving a 40 percent reduction in GHG emissions below 1990 levels by 2030. In 2018, EO S-3-05 was accelerated by EO B-55-18, which established a goal of achieving carbon neutrality by 2045 and was codified by AB 1279. Carbon neutrality refers to emitting net zero carbon emissions, which can be achieved by either eliminating all GHG emissions, or balancing carbon emissions with carbon removal (which can be achieved through carbon sequestration or carbon neutral technologies). AB 1279 requires the direct reduction in GHG emissions by 85 percent below 1990 levels by 2045. The remaining 15 percent of emissions would be removed via carbon removal technology or natural working lands.

To meet the state's 2045 goal of carbon neutrality, CARB recommends that local agencies long-term targets align with AB 1279. Specifically, CARB guidance is for jurisdictions to first strive to meet the SB 32 targets of reducing GHG emissions 40 percent below 1990 levels by 2030, while establishing a policy framework to achieve the long-term target of carbon neutrality by 2045.

Other Key California Climate Policies

California's GHG-emissions-reduction strategies that will help achieve these reduction targets are developed through its Scoping Plan updates and various Sustainable Communities Strategies passed by local Metropolitan Planning Organizations. Other important climate legislation that will help California achieve its GHG-reduction targets include the state's green building code (Title 24), SB 1383, which set targets for reducing organic waste to landfills, and SB 100, which mandated 100 percent renewable and carbon-free electricity by 2045.

Regional and Local Goals

In the transportation sector, the HCAOG released a County Transit Development Plan for the years 2023-2028 that includes targeted sustainability goals for each jurisdiction. These include integrating solar power PV systems in the Arcata Intermodal Transit Facility and securing funding for the Sustainable Communities Program to fund green capital improvement projects. HCAOG 2022 RTP has set ambitious goals to increase public and active transit mode share by a combined 30 percent by 2030, and 40 percent by 2050. [30] Additionally, HTA is committed to fully transitioning their fleet to zero emission in compliance with the Innovative Clean Transit regulation. These efforts will reduce emissions of greenhouse gases, vehicle miles traveled, and congestion.

RCEA, the local Community Choice Energy provider, has set several goals focused on energy procurement and reducing emissions in the region as they are related to energy consumption. RCEA

[30] Humboldt County Association of Governments (HCAOG). *Regional Transportation Plan, VROOM 2022-2042*. Accessed May 10, 2024, from https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

goals include: expand existing energy efficiency, conservation and electrification programs to reduce GHG emissions from fossil fuel use in buildings by 20 percent by 2030 and maintain a trajectory to reduce emissions from natural gas by 90 percent by 2050; accelerate the adoption of electric vehicles, with a target of over 6,000 electric vehicles on the road in Humboldt County by 2025 and 22,000 vehicles by 2030; by 2025 100 percent of RCEA's power mix will be from a combination of state-designated renewable energy sources; and by 2030 Humboldt County will be a net exporter of renewable electricity and RCEA's power mix will consist of 100 percent local, net-zero-carbon-emission renewable sources.[31]

Cal Poly Humboldt launched an initiative called the Redwood Region RISE (Resilient Inclusive Sustainable Economy) that includes Tribal Lands, Del Norte, Humboldt, Lake, and Mendocino Counties. This is an effort to increase the number of green jobs in the region to align with sustainable economic growth and California's goals to achieve carbon neutrality. With a focus on equity, RISE aims to bring together different stakeholders to understand the needs for each region and develop projects in various sectors. County of Humboldt's Economic Development Department (GoHumCo) has developed a Comprehensive Economic Development Strategy (CEDS) that is updated every five years to provide an implementation plan for policies, programs and investments that will strengthen the economy in the Humboldt region. The 2018 – 2023 CEDS initiatives included attracting and growing industry and local workforce development.[32]

[31] Redwood Coast Energy Authority (RCEA) (2019). *RePower Humboldt*. Accessed May 5, 2024, from https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

[32] Humboldt County (2018). *Prosperity! 2018, Comprehensive Economic Development Strategy 2018 -2013*. Accessed May 11, 2024, from https://www.gohumco.com/DocumentCenter/View/137/2018-to-2023-Comprehensive-Development-Strategy-PDF

3 GHG Emissions Levels

An important part of the RCAP process is the development of a GHG inventory. A GHG emissions inventory identifies the major sources and quantities of GHG emissions produced by community wide activities within a defined geographic area for a given year. Estimating GHG emissions enables local governments to establish an emissions baseline, track emissions trends, identify the greatest sources of GHG emissions within a defined geographic area, and set targets for future reductions.

For this RCAP a 2022 Humboldt County Regional GHG emissions Inventory was developed to comprehensively cover the entire county excluding those territories beyond local government jurisdiction, incorporating emissions data from both the incorporated cities and the unincorporated regions of Humboldt. The 2022 GHG emissions inventory was used to identify the greatest sources of GHG emissions within Humboldt and establish a GHG emissions baseline for the RCAP from which a forecast and reduction targets were established. The 2022 GHG emissions inventory identifies the major sources and quantities of GHG emissions produced by communitywide activities within the Humboldt region defined by the county geographical limits.

Emissions estimates were calculated using the International Council for Local Environmental Initiatives (ICLEI) methodologies, specifically, the United States Community Protocol for Accounting and Reporting Greenhouse Gas Emissions Version 1.2 (Community Protocol) is used for community-wide emissions. To allow for comparison among GHG emissions sources, all emissions are translated to the equivalent of one metric ton of carbon dioxide, or MT CO_2e. One MT CO_2e is the equivalent of using 113 gallons of gasoline or driving 2,558 miles in a standard combustion vehicle.[33]

3.1 Humboldt GHG Emissions Inventory

The 2022 GHG emissions inventory covers the relevant emissions sources within the boundary of Humboldt County, including all incorporated and unincorporated areas. The inventory thereby reflects emissions sectors resulting from Humboldt community activities over which the local governments (i.e., County and partnering jurisdictions) have jurisdictional control and influence. Sectors where the local government has limited influence are excluded from the 2022 GHG emissions inventory as the local governments do not have jurisdictional control to develop measures to impact associated emissions. In alignment with Community Protocol, the 2022 GHG emission inventory includes emissions from the five basic reporting activities that must be reported: residential and commercial energy usage, on-road transportation, off-road transportation, landfilled waste, and water and wastewater.

As part of the energy sector, electricity[34] and natural gas consumption from industrial operations are included as most industrial facilities in the area are not subject to regulations under the State's Cap and Trade program which typically governs industrial emissions. Further, local jurisdictions are considered to have some influence over the energy use at industrial land uses through zoning and building codes and therefore are included in the inventory. Emissions from industrial point source

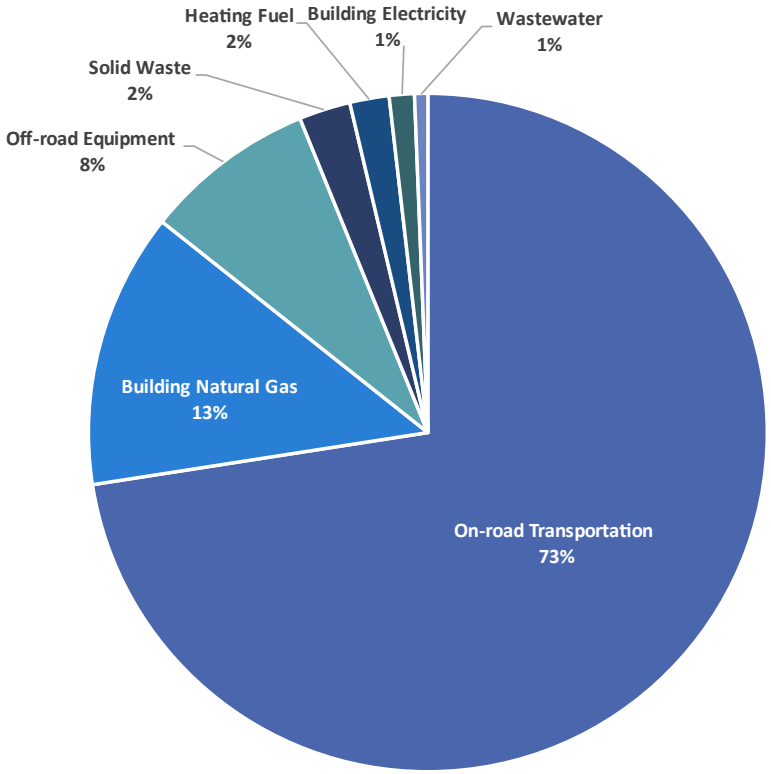
[33] United States Environmental Protection Agency (EPA) (2024). *Greenhouse Gas Equivalencies Calculator*. Accessed June 20, 2024, from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

[34] Electricity is supplied to the region by PG&E and RCEA. GHG emissions associated with electricity use is based on the emission factor (i.e., MT CO_2e/kwh) determined by the energy portfolio for each utility provider and quantity of electricity provided to the region by each provider.

discharge have been excluded due to lack of local jurisdictional control over this emissions source and because industrial point sources are regulated by the state under the Cap-and-Trade program and by the local air district. Water sector emissions, arising from electricity use in water delivery and treatment, are accounted for under electricity sector emissions as the entirety of water supplied to Humboldt community members occurs within Humboldt geographic and jurisdictional boundaries.[35] Emissions associated with agricultural land use practices (e.g., land management, livestock emissions) are excluded from the inventory because the County and local jurisdictional governments have limited control over these type of agricultural emissions. Further, the state has not yet issued guidance on methodology for quantifying GHG emission impacts associated with natural working lands. Therefore, GHG emission impacts and carbon sequestration of natural working lands are not included in the inventory.

Humboldt's total GHG emissions for 2022 were estimated to be 1,531,167 MT CO_2e, as depicted in Figure 3. For more information on the data and methodologies used, refer to Appendix B. According to the results of the 2022 GHG inventory, the largest source of GHG emissions in Humboldt was from on-road transportation, which accounted for 73 percent of the inventoried emissions. The second largest source of GHG emissions was from natural gas usage in buildings, which accounted for 13 percent of total emissions. Natural gas is used to heat water, homes, and businesses and to power gas-powered appliances. Off-road equipment accounted for the third largest source of emissions, for a total of 8 percent of total emissions in Humboldt as seen in Figure 3 below.

Figure 3 Humboldt GHG Emissions 2022 Inventory



[35] Water sector operation information is based on feedback provided by the County and water districts which supply water to the Humboldt community.

3.2 GHG Emissions Forecast

While GHG inventories provide data on Humboldt's current emissions, GHG-emissions forecasts (forecast) estimate the community's projected GHG emissions into the future. Forecasts are developed from the most recent GHG inventory and provide an estimate of how Humboldt's emissions might change over time due to factors such as population and job growth as well as new technologies and policies. A GHG emissions forecast estimates future GHG emission changes by accounting for projected community growth and changes. Calculating the difference between the GHG emissions forecast and GHG emissions reduction targets determines the gap in GHG emissions that needs to be closed through the implementation of local GHG reduction policies.

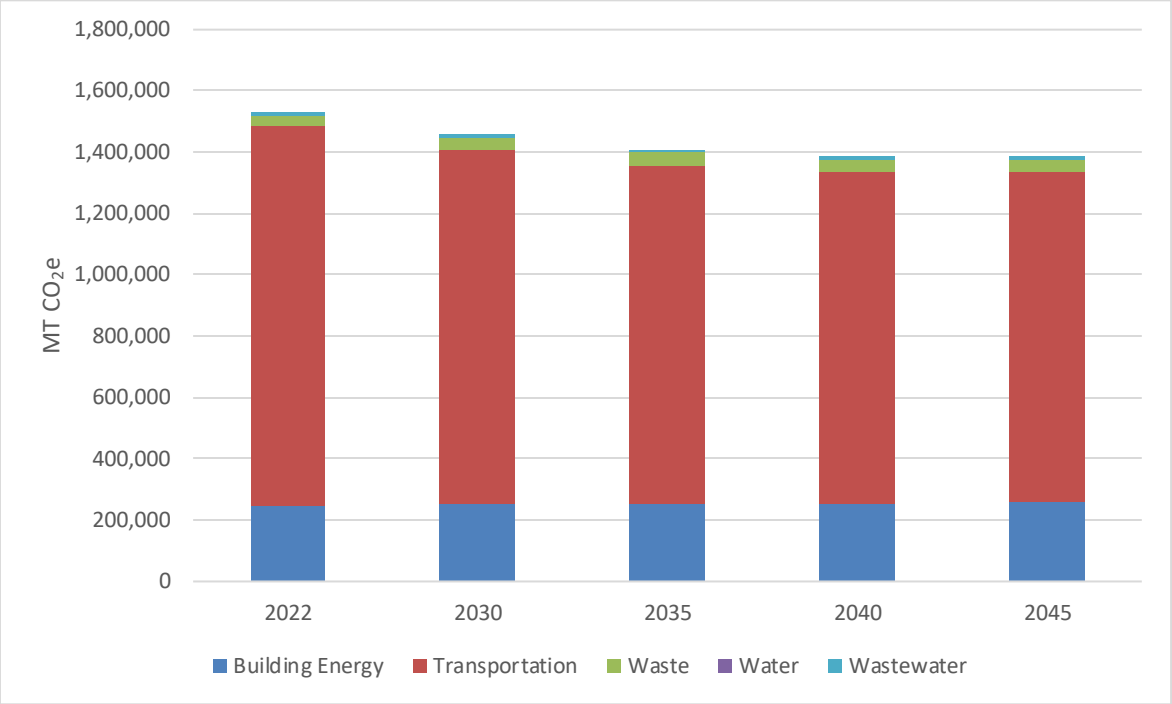
The 2022 GHG emission inventory was selected to serve as the baseline for the forecast as it is considered the most recent emission inventory representative of typical conditions in the community. To provide a comprehensive, forward-looking projection of demographic trends in the Humboldt community, the GHG emissions forecast utilized the Regional Housing Needs Allocation (RHNA) 6th cycle data and the U.S. Census data to estimate anticipated household growth in the region per year. RHNA data accounts for housing needs across the region based on demographic trends. Projected household estimates were used to project population and employment growth in Humboldt. These projections align with the anticipated growth reflected in the Humboldt County Association of Governments (HCAOG) Regional Transportation Plan (RPT) which projects a 1 percent population growth rate per year in the region in consideration of local project developments, growth analysis from local jurisdictions, climate trends, and State-wide population movement trends.[36]

Two scenarios were forecast to estimate the future emissions for Humboldt in the years 2030, 2035, 2040 and 2045. This includes a *business-as-usual scenario* (BAU) forecast that estimates how future GHG emissions would change if consumption trends continued as they did in 2022 without consideration of any local or state regulations. Additionally, a *legislative adjusted scenario* (adjusted) forecast was developed that accounts for how currently adopted state legislation, such as the California Renewable Portfolio Standards, Title 24 building energy efficiency standards, and transportation legislation, would reduce GHG emissions from the *business-as-usual scenario*. More information on these regulations and how they were accounted for in the forecast can be found in Appendix B.

Humboldt's adjusted forecast projects the community's GHG emissions will decrease through 2040 and then increase slightly in 2045. This is due to State legislation, including Title 24 and California's GHG vehicle emission standards, being fully phased in and then being offset by population, job growth, and levels of vehicles miles traveled. A summary of Humboldt's adjusted GHG forecast through 2045 is shown in Figure 4.

[36] Humboldt County Association of Governments (HCAOG). *Regional Transportation Plan, VROOM 2022-2042*. Accessed May 10, 2024, from https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

Figure 4 Humboldt GHG Emissions Adjusted Forecast, 2022- 2045



3.3 Humboldt GHG Emissions Targets

GHG reduction targets are used to establish measurable metrics intended to guide the community's commitment to achieve GHG emissions reduction and help gauge progress with reducing emissions over time. GHG targets are developed relative to a baseline emissions level. California has established Statewide GHG reduction goals for 2030 and 2045. The State has encouraged communities to adopt their own plans consistent with these goals in the CARB 2022 Scoping Plan.[37] Thus, local agencies are recommended to establish at a minimum, equivalent reduction targets at the local level by establishing community wide GHG reduction goals for climate action that will help California achieve its 2030 and 2045 GHG emissions goals.

Due to lack of available and accurate 1990 activity data, Humboldt does not have a 1990 GHG emissions inventory from which to develop GHG reduction targets consistent with SB 32, however, 1990 GHG emissions can be estimated for the community relative to Humboldt's updated 2022 inventory using a state-level emissions change metric. The calculation is developed using the published Statewide emissions results from CARB[38], after removing emissions from sectors not included in Humboldt's inventory (e.g., non-specified, industrial point sources, agricultural land management practices). This approach assumes that Humboldt's community activities and associated GHG emissions have generally tracked with the State's activity trends and associated GHG emissions. However, since 1990, electricity and natural gas consumption and associated GHG emissions in Humboldt have declined at a much more rapid rate than the Statewide trend reflected

[37] California Air Resources Board (CARB) (2022). *2022 Scoping Plan for Achieving Carbon Neutrality*. Access February 19th, 2024, from https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf

[38] California Air Resources Board (CARB) (2024). *Current California GHG Emission Inventory Data*. Accessed May 2, 2024, from https://ww2.arb.ca.gov/ghg-inventory-data

in the Statewide inventory. This is because Humboldt has experienced a significant decline in industrial operations leading to a significant decrease in electricity and natural gas consumption. Further, RCEA has emerged as the main alternative electricity provider in the region offering since 2017 an alternative to PG&E, the sole utility provider to the Humboldt region in 1990. Because RCEA has a more renewable and carbon-free energy profile than PG&E, GHG emissions associated with building electricity use in the region have declined to a greater extent than Statewide trends reflect. Since these trends are specific to the Humboldt region and do not track with Statewide trends reflected in the Statewide inventory, electricity and natural gas emissions were also removed from the Statewide emissions to back-cast Humboldt's 1990 emissions associated with the following included inventory sectors: transportation (on and off-road), solid waste, wastewater, and heating fuel. GHG emissions from electricity and natural gas consumption in Humboldt in 1990 was quantified using 1990 county-wide activity data obtained from the California Energy Commission (CEC) and PG&E 1990 electricity emissions factor provided in the PG&E Community Report. This approach for developing a 1990 back-cast for Humboldt assumes that Humboldt's community GHG emissions associated with transportation, solid waste, wastewater, and heating fuel consumption have generally tracked with Statewide trends, while taking into consideration the more regionally applicable changes in electricity and natural gas consumption in the county.

The purpose of target setting is to develop the trajectory toward achieving the State's 2030 goal (SB 32) and prepare for the deep decarbonization needed by 2045 in a cost-effective manner by setting an incremental path toward achieving AB 1279 targets. CARB guidance is for jurisdictions to first strive to exceed the SB 32 targets of reducing GHG emissions 40 percent below 1990 levels, while establishing a policy framework to achieve the long-term target of carbon neutrality by 2045. This RCAP establishes a mass emissions target of 40 percent reduction in GHG emissions below 1990 levels by 2030 in alignment with SB 32. Additionally, the RCAP establishes strategies to make substantial progress towards carbon neutrality by 2045 in alignment with AB 1279. The pathway to achieve Humboldt targets in alignment with the state's targets is shown in Figure 5.

The emissions gap between the forecast and the target pathway represents the amount of GHG emissions that Humboldt is committed to reducing through local GHG reduction strategies and projects. As shown in Table 2, to achieve the RCAPs' 2030 goal, Humboldt emissions will need to be reduced by approximately 218,000 MT CO_2e by 2030.

Emission reductions will be achieved by implementing specific policies and programs at the local level. These activities are referred to as "measures" and "actions" and they should be clear, attainable, measurable, and equitable to help achieve the desired emission reductions. The GHG emissions reductions associated with the measures in the RCAP are sufficient to meet the state-level target established by SB 32 and meet Humboldt's 2030 climate action target. The RCAP also makes substantial progress towards Humboldt's 2045 target, which aligns with the state-level carbon neutrality target established by AB 1279.

Figure 5 Humboldt GHG Emission Reduction Goals

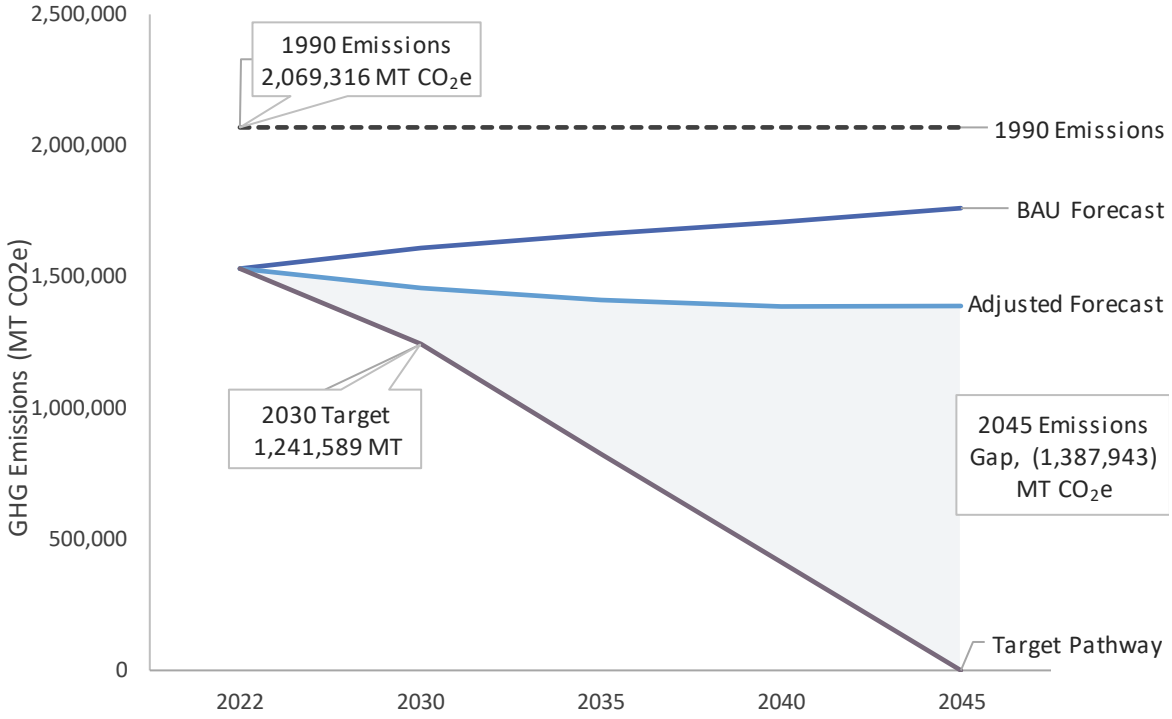


Table 2 Humboldt Region GHG Emissions Reduction Pathway

Emissions Forecast or Pathway	2030	2035	2040	2045
Adjusted Forecast	1,459,598	1,408,160	1,386,924	1,387,943
SB 32 Mass Emissions Target Pathway[1]	1,241,589	827,726	413,863	0
Remaining Emissions Gap	218,008	580,434	973,061	1,387,943

Notes: All values are presented in metric tons of carbon dioxide equivalent (MT CO_2e)

Emissions have been rounded to the nearest whole number and therefore sums may not match.

1. The target pathway is calculated by reducing 1990 mass emissions by 40 percent in 2030 and to 0 in 2045. This target pathway is consistent with both SB 32 and a trajectory set forth to achieve AB 1279.

4 GHG Emission Reduction Strategy

4.1 Strategy Development

The RCAP sets forth a roadmap for how Humboldt will reduce GHG emissions in the near term to meet the established 2030 goals and make progress towards carbon neutrality in 2045. This RCAP builds upon Humboldt's previous efforts with actions that are equitable, achievable, and implementable. The measures and actions in the RCAP were developed through a collaborative process between County staff, incorporated jurisdictions, key stakeholders, and interested parties.

The following sections detail Humboldt's mitigation strategies and the considerations made to develop them. The Measures are organized around a set of eleven Strategies to reduce GHG emissions. Each Measure is then supported by a set of Actions. The structure of the mitigation Strategies, Measures, and Actions are as follows:

- **Strategies**: Strategies describe an overall approach for reducing GHG emissions within a given sector
- **Measures**: Measures are long-range policies that the Humboldt region has established to ultimately reduce GHG emissions in line with the State. Some Measures may be further disaggregated to set goals for "urban" or "rural" regions, defined as follows:
    - **Urban:** Urban areas in Humboldt are more densely developed areas in the region with greater access to energy and transportation infrastructure.
    - **Rural:** Rural areas in Humboldt represent the dispersed communities in the region with limited access to energy and transportation infrastructure. This includes the unincorporated County as well as some incorporated cities that have similar constraints.
- **Actions:** Actions identify the programs, policies, funding pathways, and other specific commitments that will be implemented within the region. Each measure contains a suite of actions, which together have been designed to accomplish the measure goal and metrics.

4.2 Type of GHG Reduction Measures

The Measures and Actions can be either quantitative or supportive, defined as follows:

- **Quantitative:** Quantitative Measures result in direct and measurable GHG emissions reductions when their Actions, backed by substantial evidence, are implemented. GHG emissions reductions from these Measures and Actions are justified by case studies, scientific articles, calculations, and other third-party substantial evidence that establish the effectiveness of the reduction actions. Quantitative Measures can be summed to quantify how the region will meet its 2030 GHG emission reduction target and demonstrate progress towards the 2045 target.
- **Supportive:** Supportive Measures may also be quantifiable and have substantial evidence to support their overall contribution to GHG emission reductions. However, due to one of several factors – including a low GHG emission reduction benefit, indirect GHG emission reduction benefit, or potential for double-counting– they have not been quantified and do not contribute directly to achieving and making progress towards the region's GHG emission reduction targets. Despite not being quantified, supportive Measures are nevertheless critical to the overall

success of the RCAP and provide support so that the quantitative Measures will be successfully implemented.

4.3 Key Strategy Attributes

Successful implementation of climate action requires behavioral changes and community buy-in which means balancing various factors beyond reducing GHG emissions. To best position the RCAP to achieve the Humboldt region's targets, measures are designed to embody six key attributes crucial for effective climate policy. Each key attribute emphasizes specific criteria that play an essential role in the implementation of climate action. The key attributes are:

- **Structural Change:** Establishing a program/policy/ordinance that will allow the Humboldt region to reach the target established by the Measure (e.g., ordinance or code)
- **Engagement**: Development of promotional materials to inform the community and interested parties, gain buy-in, and raise awareness of new and existing programs and opportunities.
- **Equity**: Actions that engage and consider vulnerable communities (low-income families, fixed-income seniors, agricultural workers, etc.) that may experience secondary impacts or not benefit directly from the Measure's objective (e.g., actions that ensure the overall community benefit).
- **Feasibility Study**: Used to understand more about the details/obstacles/feasibility or implementation of a program (e.g., analysis necessary to identify the best path or the feasibility of implementing a specific measure).
- **Funding**: The financial backing to get a program going such as general funds, local income generation, bonds as well as pursuing external sources including grant funding or financing opportunities (e.g., grants or rebates that help pay for the implementation of a measure, funding to adequately staff the program).
- **Partnerships:** Looking at outside non-profits or agencies that can help with implementation of a measure's actions (e.g., community organizations that are best positioned to move a measure forward consistently or sustainably)

The Cornerstone Strategy and Measure (C-1) illustrates how these key attributes integrate into a cohesive strategy designed for long-term implementation. The other Strategies and Measures within this RCAP follow the same structure as the Cornerstone Measure, embodying the key attributes that are essential to successful implementation of the Measure and achieving GHG emissions reductions.

4.4 Co-Benefits of GHG Reduction Measures

The Humboldt region's commitment to reduce GHG emissions means the community will benefit from various co-benefits that will have lasting positive impacts on the community residents and help the Humboldt region reach its goals. The co-benefits identified for each Measure include:

Natural Resource Enhancement: Protects and enhances regional natural resources, safeguarding biodiversity and ecosystem services like cleaner air and water. Healthy ecosystems mitigate pollution, sequester carbon, provide species habitat, and offer recreational spaces for the community. They also help manage extreme weather effects by absorbing rainwater and reducing strain on infrastructure.

Resource Efficiency: Many GHG reduction strategies improve resource use efficiency while minimizing waste. Efficient resource use reduces environmental impact and often results in economic savings, freeing up funds for other community needs.

Public Health and Equity: Vulnerable communities are disproportionately affected by climate change. Implementing GHG reduction strategies reduces emissions, leads to cleaner air, promotes healthier lifestyles, and mitigates climate hazards like extreme heat. Ensuring equitable access to these benefits supports the health, safety, and resilience of all community members, particularly those most at risk.

Increased Resilience: Certain GHG reduction strategies enhance community resilience to climate change, and vice versa. These initiatives increase the community's ability to prepare for, mitigate, and recover from climate hazards such as extreme heat, sea level rise, flooding, wildfires, landslides, and drought.

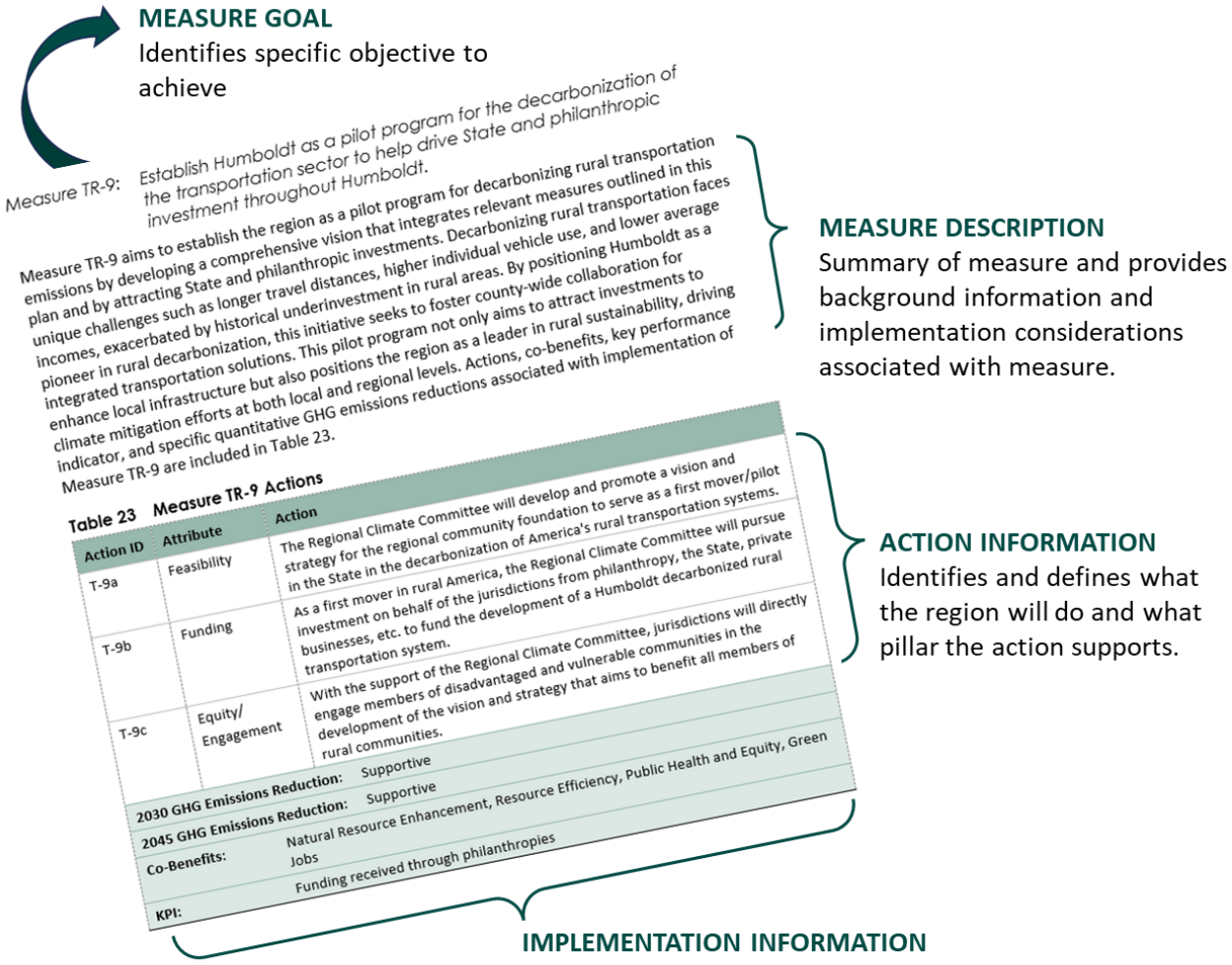
Green Jobs: Creates or advances employment opportunities in sectors contributing to sustainability or improving environmental quality. Initiatives aimed at clean energy adoption and sustainable business practices foster well-compensated and inclusive employment opportunities. These efforts support Humboldt region's climate targets and sustained economic well-being, contributing to financial stability.

4.5 Measures

The Strategies and Measures are organized by sector (e.g., Cornerstone, Building Energy, Transportation, Waste, Water & Wastewater, Carbon Sequestration). Each topic identifies the measures and goals the region will strive to meet by 2030 and make substantial progress toward 2045 targets. The RCAP's overarching approach emphasizes leveraging a formal coalition to implement region-wide measures for impactful reduction of GHG emissions. The Cornerstone Measure exemplifies the importance of integrating key attributes outlined in the previous section, demonstrating how each attribute contributes to comprehensive measures. All measures within the RCAP adhere to the framework established by the Cornerstone Measure.

The following sections including background information on the Strategy, a description of the Measure, a summary table that includes the specific actions that make up the measure as well as several additional details such as GHG reduction potential, co-benefits, and key performance indicators (KPI) to measure progress of implementation. Figure 6 provides an overview of how to read this section.

Figure 6 How to Read this Section



Cornerstone

A cornerstone strategy in a CAP refers to a foundational approach or key initiative that is essential for achieving the plan's overall goals. It serves as a primary focus and supports the implementation of other strategies by providing a solid framework, significant impact, or critical support. Cornerstone strategies are typically characterized by their broad scope, potential for high impact, and their role in facilitating or enabling other actions within the climate action plan.

The Humboldt Regional Cornerstone Strategy focuses on the establishment of a coalition between jurisdictions and key organizations to guide a regional approach to climate-related challenges through coordinated efforts. Given the rural nature of the region and its dispersed population, individual municipalities and even the larger incorporated cities face significant constraints in their efforts to reduce GHG emissions due to limited resources (e.g. staffing and funding). These constraints can be overcome through a coordinated and collaborative approach to RCAP implementation. Through a collaborative approach the region can more effectively identify and build efficiencies, attract and share resources (e.g., funding, staff time), and undertake regional infrastructure initiatives needed to enhance capacity and interconnectivity in sectors such as solid waste and transportation, thereby reducing GHG emissions as outlined in the RCAP Measures.

Strategy 1: Development of a regional climate coalition

Collaboration between jurisdictions in rural areas is crucial for leveraging limited resources and accessing state and federal funding earmarked for climate-related projects. Humboldt recognizes that a regional approach to implementing the RCAP is essential to achieving the significant GHG reductions needed to meet both regional and individual municipality goals. This Strategy is considered the cornerstone of the RCAP and will be the first to be implemented. As the region's first RCAP, establishing a collaborative approach to expanding and improving shared infrastructure, such as an interconnected energy and transportation system and regional waste management solutions, is necessary to successfully achieve GHG reductions in each sector.

Measure C-1: Establish a Regional Climate Committee comprised of representatives from each jurisdiction, HTA, HCAOG, HWMA, and RCEA.

Measure C-1 commits the region to establishing a Regional Climate Committee and governance to serve as a regional coalition. This committee would include representatives from municipalities across Humboldt County as well as representatives from regional agencies such as the HTA, HCAOG, HWMA, and RCEA, and other partner organizations. The purpose of this coalition is to foster collaboration and coordination among the region to address climate-related challenges and implement effective climate action strategies. By bringing together key parties from various sectors and jurisdictions, Measure C-1 leverages collective expertise, resources, and efficiencies to tackle climate change at a regional level. The committee would support RCAP implementation through information sharing, coordination of RCAP efforts, development of joint initiatives to reduce GHG emissions, support and pursue funding, and promote sustainable development practices. The Regional Climate Committee is integral to the implementation of all RCAP Measures detailed in the following sections. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure C-1 are included in Table 3.

Table 3 Measure C-1 Actions

Action ID	Attribute	Action
C-1a	Structural	Pursue and obtain funding to create a Climate Program Manager position to lead the coordination efforts of the Regional Climate Committee. The Regional Climate Committee will be responsible for implementing RCAP measures and actions. The Climate Program Manager will facilitate the work of the Regional Climate Committee made up of responsible parties from each of the region's jurisdictions and agencies. The Manager will work with the Committee to utilize the RCAP as a strategic plan outlining the goals of the Coalition. The Manager will coordinate with staff of the participating jurisdictions and agencies to undertake the work directed by the Committee. Finally, the Manager will develop an annual progress report on RCAP implementation annually to City Councils and County Supervisors to measure progress and establish accountability in achieving RCAP emissions reduction goals.
C-1b	Structural	The Regional Climate Committee will develop and provide models, pilot programs, and template policies or ordinances that enable each jurisdiction in the region to implement uniform changes and facilitating local communities in making the necessary structural adjustments to reduce GHG emissions. This will reduce inefficiencies and duplication of effort while ensuring a coordinated regional approach.
C-1c	Engagement	Develop and distribute promotional materials and programs across the region to inform the community, gain buy-in, and promote awareness of new and existing programs and opportunities. Leveraging the Regional Climate Committee to prepare such materials will allow for limited resources in the region to be pooled on such efforts thereby reducing strain on jurisdictional staff.
C-1d	Equity	Leverage regional programs to engage and support frontline communities that may experience secondary impacts or not benefit directly from the measures' objectives. Ensure these communities can access regional resources or funding opportunities to mitigate identified impacts and benefit the entire community. The Regional Climate Committee will be charged with engaging with regional programs and identifying appropriate community-based organizations to lead and guide such engagement efforts to ensure voices of vulnerable communities are involved in RCAP implementation and planning.
C-1d	Feasibility Study	Utilize regional resources to conduct efficient regional studies, avoiding redundancy, that provide a clear understanding of the details, obstacles, and feasibility of proposed programs. This includes necessary analyses to identify the best path forward or the feasibility of implementing specific measures. The Regional Climate Committee will aid in identifying the regional expertise and coordinating studies across the region to limit duplication of efforts.
C-1e	Funding	Collaborate regionally to identify and pursue relevant and impactful grants and financial backing to facilitate RCAP implementation across the region. Ensure resources and efforts are directed towards securing funds that can be distributed across the region, such as grants or rebates to support measure implementation and adequate program staffing. Direct the Regional Climate Committee to pursue 3-5 grants for regional efforts to meet RCAP goals per year.
C-1f	Partnership	Use the collaborative network of local jurisdictions, agencies, and community-based organizations (CBOs) to attract additional internal and external support

Action ID	Attribute	Action
		and expertise. This includes engaging community organizations that are well-positioned to consistently and sustainably advance specific measures. Leverage the Regional Climate Committee to identify and provide assistance to local jurisdictions' high priority project pursuits which support the RCAP.
2030 GHG Emissions Reduction:		Supportive/Critical
2045 GHG Emissions Reduction:		Supportive/Critical
Co-Benefits:		Public Health & Equity, Increased Resilience, Green Jobs
KPI:		Establishment of Committee; Progress reports

Building Energy

RCAP measures for the building energy sector focus on transitioning to renewable energy sources, carbon-free electricity, and building decarbonization. California is transitioning to 100 percent renewable and zero-carbon electricity by 2045, thus, when all-electric buildings are fully electrified, they will be powered by carbon-free electricity, and their operating energy footprint becomes carbon-free. Building energy makes up approximately 14 percent of Humboldt's GHG profile. Of that, approximately 13 percent of building energy emissions are due to the use of natural gas and 1 percent due to indirect emissions associated with electricity use. In California, two of the primary strategies for reducing building energy GHG emissions are decarbonization of the electricity grid and electrification of buildings. The State has implemented several regulations to decarbonize energy including Senate Bill (SB) 100 and SB 1020 aimed towards shifting the electricity grid to 100 percent renewable and zero-carbon power sources by 2045 and the Title 24 building code that is regularly updated to increase energy efficiency and accelerate the electrification of buildings.

Strategy 2: Increase carbon-free electricity

GHG emissions associated with electricity consumption are related to the source used to generate the electricity (i.e., combustion of natural gas, solar, geothermal). Currently, retail electricity providers, like PG&E and RCEA, are required by SB 100 to procure at least 60 percent of the electricity from eligible renewable energy sources (i.e., solar, wind, geothermal, small hydroelectric, and biomass) by 2030 and 100 percent eligible renewable resources and zero-carbon resources by 2045. PG&E offers several rate plans that ranged from consisting of 38 percent eligible renewables in the base rate to 100 percent solar in the Green Saver rate in 2022. In 2022, RCEA's RePower electricity option sourced 50 percent of its supply from eligible renewable sources, while the RePower+ option supplied 100 percent from solar, wind, and eligible hydroelectric at a GHG emissions rate of zero.[39] RCEA is currently on track to provide all customers with electricity that is sourced from 100 percent net-zero-carbon emission renewable sources by 2030, exceeding the state requirements by 15 years.[40] GHG emission reductions related to this strategy would result from exceeding state requirements for and removing the use of fossil-fuel powered electricity from the electricity mix. Switching an electricity grid to renewable and zero-carbon sources has significant GHG reduction potential; however, it does include significant investment and some supply and technological limitations. For example, certain renewable electricity sources such as solar and wind

[39] California Energy Commission (CEC) (2022). *2022 Power Content Label: Redwood Coast Energy Authority*. Accessed May 12, 2024, from https://www.energy.ca.gov/filebrowser/download/6060.

[40] Redwood Coast Energy Authority (RCEA) (2019). *RePower Humboldt*. Accessed May 5, 2024, from https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

are zero-carbon and can be supplied in abundance, however, they are not consistently supplied throughout the day and the supply is often mis-matched with the demand, straining the electricity grid. However, recently California exceeded 100 percent of energy demand with renewables for a record 30 days.[41] Renewable electricity sources such as geothermal and biomass are reliable and consistent sources of power, however, these sources generate a small amount of GHG emissions and there are capacity limitations in terms of maximum output of power supplied. Some solutions include diversifying the electricity grid to ensure electricity can be always provided when needed at a reasonable cost and installation or use of energy storage systems (e.g., battery banks). As technologies continue to improve and more infrastructure is developed, an increasing and more consistent supply of renewable energy will be available.

Measure BE-1: By 2030, source 90% of grid-supplied electricity from renewable and carbon-free sources.

Measure BE-1 aims to increase the share of electricity-supplied to the region that is sourced from renewable and carbon-free sources such that 90 percent of all electricity consumed in the Humboldt region is carbon-free. Currently, electricity customers in the Humboldt region are automatically enrolled in RCEA's RePower electricity option that is 50 percent eligible renewable but may choose to 1) opt-up to the RePower+ option that is 100 percent eligible renewable, 2) opt-out to receive electricity directly from PG&E at the standard rate which is 38 percent eligible renewable, or 3) opt-out to procure electricity at wholesale directly from electricity generators (i.e., direct access which range in the emission factor depending on the energy profile). Direct access is only available to a limited number of utility customers. Based on electricity data provided by RCEA and region wide electricity use from the CEC, RCEA currently supplies 77 percent of all electricity consumed in the region. RCEA currently offers electricity options with a GHG emission rate lower than the standard electricity options offered in the region. As RCEA is on track to provide 100 percent renewable electricity to all customers by 2030, this Measure would significantly aid in decarbonizing the region's building energy sector. Increasing the percentage of community electricity supplied by RCEA or a comparable 100 percent renewable program in the region would reduce GHG emissions associated with electricity consumption. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-1 are included in Table 4.

Table 4 Measure BE-1 Actions

Action ID	Attribute	Action
BE-1a	Feasibility	Coordinate and support Redwood Coast Energy Authority (RCEA) in developing an effective energy strategy. Strategy should include conducting an assessment to identify the potential obstacles and detail the steps to providing renewable and carbon-free power and decarbonization programs outlined in the RePower Humboldt plan such as: 1. Future Capacity constraints 2. Customer solar installations 3. Customer electrification support 4. EV charging infrastructure buildout 5. Building electrification

[42] By 2045, all electricity providers are expected to be entirely carbon-free and use eligible renewable sources, thus no further emissions reduction are attributed to increasing the procurement of carbon-free electricity in 2045.

Action ID	Attribute	Action
		6. Advanced biofuel infrastructure 7. Evaluate enrollment rates in RCEA programs annually to understand why residents and businesses opt out or opt to procure standard grid electricity. Use results to adjust strategy for increasing enrollment accordingly
BE-1b	Structural	Through the Regional Climate Committee develop a template policy or ordinance for regional jurisdictions to use to require new commercial and industrial developments to acquire electricity from renewable and carbon-free energy sources such as enrolling with RCEA, incorporating on-site renewable generation, or enrolling in PG&E's 100 percent renewable rate. For each jurisdiction, adapt the templated policy or ordinance as necessary and adopt by 2026.
BE-1c	Partnership	Collaborate across the region with interested parties including tribes, labor unions, workforce development boards, State agencies, colleges, universities, industries, and community organizations to increase local energy workforce development. Partner with RCEA, Humboldt State University, and College of the Redwoods to actively develop education and certifications for electrical and construction trades by 2027 to ensure develop a skilled workforce ready to meet the region's energy needs.
BE-1d	Engagement	Leverage the Regional Climate Committee to work with RCEA to reduce opt-out rate for new customers to no more than 2 percent. Develop promotional educational materials to inform community members on available incentives and benefits of clean energy and energy efficiency.
BE-1e	Equity	Engage with the community and partner with community organizations to facilitate increased communication, technical assistance, and access to energy incentives through the California Alternative Rates for Energy (CARE), Family Electric Rate Assistance (FERA), and Low-Income Home Energy Assistance Program (HEAP) programs for low/moderate income households.
BE-1f	Funding	Work with RCEA to expand and advertise regional energy funding programs as described in the RePower Humboldt plan. Facilitate Humboldt residents and businesses in utilizing energy finance programs such as the Property Assessed Clean Energy (PACE) program. Conduct targeted outreach to public entities, such as public schools, that are eligible for the California Energy Commission Energy Conservation Assistance Act (ECAA) Program loans.
BE-1g	Funding	Coordinate through the Regional Climate Committee to establish and administer a multi-jurisdictional staff position dedicated to identifying and pursuing funding opportunities to support County-wide educational programs, assisting in equitable energy workforce expansion outreach, and providing RCEA with additional funds to expand incentives or subsidies for the community to increase community enrollment. If establishing a dedicated staff position is not feasible, work with the Regional Climate Committee and regional partners to identify resource sharing opportunities for pursuing funding opportunities such as rotating the responsibility across designated agency employees.
2030 GHG Emissions Reduction: 15,403 MT CO_2e		

Action ID	Attribute	Action
2045 GHG Emissions Reduction:	0 MT CO_2e[42]	
Co-Benefits:	Public Health and Equity	
KPI:	Change in Humboldt Electric emission factor (%)	

Measure BE-2: Increase the development of micro-grids and energy storage across the region to support RCEA's RePower Humboldt goals of enhancing grid capacity and facilitating the electrification of buildings and transportation.

A primary energy challenge faced in the region is having sufficient infrastructure capacity to support initiatives such as electrification. This limitation is exacerbated by slow PG&E response and the inability to meet requested capacity upgrades throughout the county. In spite of these challenges, RCEA has made significant strides to increase electricity generation, connectivity, and capacity in the region through development of nano-grids, micro-grids, and battery storage space. Micro-grids can operate independently from the traditional grid, combined with energy storage, improve grid reliability and resilience by storing excess energy during low demand and supplying it during peak periods. Measure BE-2 calls for the regional enhancement of energy grid capacity by developing micro-grids and energy storage systems, supporting RCEA's goals established in the RePower Humboldt Plan. Micro-grids, which can operate independently from the traditional grid, combined with energy storage, improve grid reliability and resilience by storing excess energy during low demand and supplying it during peak periods. This measure provides increased support to RCEA's goals to facilitate greater energy flexibility, resilience, and allow for future electrification initiatives. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-2 are included in Table 5.

Table 5 Measure BE-2 Actions

Action ID	Attribute	Action
BE-2a	Structural/ Engagement	Develop permit streamlining programs that can be adopted by local jurisdictions to facilitate the streamlined implementation of renewable energy projects as identified in regional energy feasibility study and RCEA RePower Humboldt goals such as energy storage projects, residential and commercial solar installation, and microgrid development.
BE-2b	Partnership	Direct the Regional Climate Committee to work with RCEA to develop a plan for leveraging CPUC's recently passed Limited Generation Profile option to maximize solar installation developments in alignment with RCEA's RePower Humboldt goals throughout the region.
BE-2c	Engagement	Engage with the local community, key interested parties, and local-based community organizations representing disadvantaged and vulnerable communities to raise awareness about alternative renewable energy and nano-grid opportunities available through RCEA. Emphasize the increased accessibility to electrification as well as the economic and environmental advantages of electrification while addressing concerns related to emergency

[42] By 2045, all electricity providers are expected to be entirely carbon-free and use eligible renewable sources, thus no further emissions reduction are attributed to increasing the procurement of carbon-free electricity in 2045.

Action ID	Attribute	Action
		response to minimize exceptions. Publicize the connection between RCEA nano-grid efforts and the increased ability to electrify leading to cost savings, funding opportunities, environmental benefits, and flexibility of electrification through jurisdiction websites and permit counters.
BE-2d	Partnerships	As part of Regional Climate Committee responsibilities identified in Measure C-1, engage with RCEA to track progress toward targets set in RCEA's RePower Humboldt plan and identify additional opportunities for local jurisdictions to alleviate barriers to goals set in RCEA's RePower Humboldt plan.
BE-2f	Feasibility Study	As part of Regional Climate Committee responsibilities work with RCEA and the Schatz Energy Research Center to identify locations throughout the county that are priority for utility-scale, nano-grid, and micro-grid solar, hydropower, and/or wind energy generation based on aspects such as land availability and suitability, infrastructure needs, resilience, and energy access equity. Coordinate with PG&E on interconnection needs and identify strategies with PG&E of how to best support capacity building on the grid related to micro-grid projects.
BE-2g	Equity	Conduct an equity assessment across the region that includes the identification of potential cost barriers to residential solar development, particularly for low income and rural communities at the end of PG&E distribution infrastructure and identify feasible sites for solar and battery installation and potential funding sources.
BE-2h	Partnership/ Equity	Identify facilities that are suitable to operate as regional resilience hubs to protect people from climate related issues. Create a priority list of these facilities with particular focus on servicing disadvantaged and vulnerable communities and work with RCEA to prioritize implementation of on-site microgrid and energy storage on identified.
BE-2i	Funding	Regional Climate Committee will work with RCEA to pursue regional funding opportunities that can be used to develop resilient microgrids and incentivize new housing developers to install solar and on-site batteries, particularly for affordable housing developments. Aim to pursue 3 grant or funding opportunities annually focused on microgrids and/or energy storage expansion.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Resource Efficiency, Public Health and Equity, Increased Resilience
KPI:		Micro-grid project completion (#)

Measure BE-8: Advocate for Off-shore Wind developers and PG&E to build electrical infrastructure to supply Humboldt with energy produced by the future off-shore wind project which will increase regional supply and resilience.

While the Humboldt Bay Offshore Wind project is expected to provide economic growth benefits to the region, there is concern that energy generated by the project will not be accessible by the region due to infrastructure limitations. Measure BE-8 focuses on advocating for the development of appropriate electrical infrastructure by offshore wind developers and PG&E so that the community can benefit from the Humboldt Bay Offshore Wind project. Receiving access to this

electricity would increase the region's energy resilience and increase capacity to meet the RCAP electrification goals. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-8 are included in Table 6.

Table 6 Measure BE-8 Actions

Action ID	Attribute	Action
BE-8a	Partnership	Dedicate Regional Climate Committee staff time to work with local organizations (e.g. 350Humboldt, Redwood Region Climate & Community Resilience Hub, COREHub) to petition the CEC and Humboldt Bay Off-shore Wind developers to include electricity transmission and distribution to the Humboldt region as a legally enforceable community benefit as stipulated in the Community Benefit Program to be completed as part of the Nationally Significant Multimodal Freight & Highway Projects (INFRA) grant program.
BE-8b	Equity	Have the Regional Climate Committee advocate to the CEC and State to allow for an equitable rate tiering law to provide affordable rates for LIDAC communities in Humboldt County.
BE-8c	Partnership	Leverage the Regional Climate Committee to work with California Independent System Operator (ISO), California Public Utilities Commission (CPUC), the Humboldt Bay Offshore Wind project and PG&E to identify pathways to establish equitable regional access to electricity produced by the off-shore wind project. This may include supporting permitting and development processes necessary for the proposed new Humboldt 500 kV substation as well as advocating to include distribution capacities at the substation for Humboldt County.
BE-8d	Funding	Direct the Regional Climate Committee to evaluate and pursue opportunities for the Environmental and Climate Justice Community Change Grant through the Inflation Reduction Act to advance clean energy from the wind-farm projects.
2030 GHG Emissions Reduction: Supportive		
2045 GHG Emissions Reduction: Supportive		
Co-Benefits: Public Health and Equity, Increased Resilience, Green Jobs		
KPI: Obtaining funding, development plans including interconnection		

Strategy 3: Decarbonization of existing construction

Approximately 92 percent of GHG emissions from building energy usage are related to natural gas consumption. Electrifying existing buildings requires the replacement of natural gas appliances with electric equipment. The GHG reduction potential of this strategy is dependent on the degree to which the existing building stock can be electrified or otherwise decarbonized. Actions that rely on voluntary replacement of natural gas equipment or ordinances requiring decarbonization at end-of-life replacements have been shown to reduce GHG emissions by approximately 10-30 percent, whereas the adoption of an end of natural gas flow date that requires all existing buildings to convert to electric equipment would eliminate all emissions associated with natural gas consumption in buildings. Since electric appliances are approximately three to four times more efficient than similar natural gas burning equipment and appliances, the use of electric equipment instead of natural gas would result in improved energy efficiency. RCEA currently promotes energy efficiency and efficient electrification with rebates and informational resources.

Measure BE-3 Urban: Reduce existing residential building natural gas consumption by 4% by 2030 and 74% by 2045.

Humboldt currently experiences limitations with electrification initiatives due to electric grid constraints, limited development access, and old housing stock. Moreover, not all residential properties in Humboldt are connected to the natural gas infrastructure or electrical infrastructure. Those residents that are tied into the electrical grid have an opportunity for decarbonization due to grid available renewable electricity. Therefore, Measure BE-3 aims to assess and implement currently viable opportunities for electrification in the region's urban areas (i.e. all incorporated cities with natural gas infrastructure). This measure charts the path to reduce existing residential natural gas consumption by approximately 4 percent by 2030 and 74 percent by 2045 to reduce GHG emissions in urban areas. The measure also focuses on setting a pathway for success for future electrification initiatives through household weatherization upgrades, particularly in low-income households. Weatherization will aid in decreasing energy consumption, reducing utility costs, and increasing future cost benefits of electrification. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-3 Urban are included in Table 7.

Table 7 Measure BE-3 Urban Actions

Action ID	Attribute	Action
BE-3a Urban	Feasibility Study/ Equity	Leverage the Regional Climate Committee to lead the development of a decarbonization plan for urban areas that assesses the feasibility and cost for electrification retrofitting for residential buildings as well as identifies potential equity concerns/impacts. The plan should identify strategies and/or specific projects to decarbonize 4 percent of existing residential and multi-family buildings by 2030 and strategies for increasing infrastructure readiness to electrify through 2045. The plan should give consideration for increased electricity capacity needs and RCEA's RePower Humboldt goals to meet increased capacity need. The plan should also identify a variety of equitable decarbonization solutions and potential projects such as partial electrification and increased energy efficiency options for mixed-fuel residences that face barriers to full electrification. The study should also identify the funding and financing requirements necessary to support the community in this transition.

Action ID	Attribute	Action
BE-3b Urban	Engagement	As part of Regional Climate Committee responsibilities identified in Measure C-1, petition PG&E to help identify priority areas for electric grid expansion projects to increase regional electric grid capacity and islanding capabilities to allow for increased building electrification capacity.
BE-3c Urban	Structural	Develop a home energy advisory service administered by the Regional Climate Committee that assists existing homeowners to better understand the cost of building decarbonization options including partial and full home electrification, identifies service providers, and provides support for homeowners to access electrification incentives from the Energy Smart Homes program.
BE-3d Urban	Funding	Work with the Regional Climate Committee to identify and pursue funds through CARB, the Inflation Reduction Act, and the Infrastructure Investment and Jobs Act including: 1. DOE block grants 2. On Bill financing through PG&E 3. Green bonds 4. Grant Anticipation Notes or Short-Term Loans 5. Tax exempt lease purchases 6. Energy as a service 7. Energy Performance Contracting from Energy Service Companies (ESCOs)
BE-3e Urban	Engagement	Work with the Regional Climate Committee to develop and manage educational/promotional materials that each jurisdiction can use to educate the community on ways to finance home decarbonization. Materials should include information and links to existing available rebates for Heat Pumps, Weatherization, Smart Thermostats, Appliances, and Pool Pumps as well as other rebates offered through RCEA of the local jurisdiction if applicable.
BE-3f Urban	Partnership	Work with the local contractors, realtors, homeowner associations, landlords, and labor unions to develop a comprehensive training program, including hosting workforce development trainings discussing the benefits and technical requirements of electrification as well as addressing interested party concerns regarding electrification.
BE-3g Urban	Equity	Develop a fund for low income and affordable housing electrification pilot projects in collaboration with affordable housing owners, utilities, and the community. Work with RCEA to develop a program to offset cost for occupants using financing and through the sourcing of grant funds to subsidize cost.
2030 GHG Emissions Reduction: 2,603 MT CO_2e		
2045 GHG Emissions Reduction: 55,866 MT CO_2e		
Co-Benefits: Resource Efficiency, Public Health and Equity		
KPI: Reduction in natural gas consumption		

Measure BE-3 Rural: Reduce existing residential fossil-fuel consumption in households not connected to natural gas infrastructure by 2% by 2030

Much of rural Humboldt lies at the edge of natural gas infrastructure, and experiences reduced electric grid capacity compared to other areas in the county. These households typically rely on other fossil fuels such as propane or diesel, in place of natural gas. Measure BE-3 Rural aims to reduce fossil fuel usage in residential households not connected to natural gas infrastructure by 2 percent by 2030. Reducing fossil-fuel use in rural areas not only helps decrease GHG emissions but also encourages the adoption of alternative energy sources such as electricity or renewable fuels. Off grid solar is legal and the technology is improving. However, there are complications associated with permitting related to building, health and environmental codes. The decarbonization transition in rural communities supports the overall decarbonization efforts and aligns with other measures aimed at decarbonizing the regional energy supply. This measure also provides rural areas with weatherization assistance that will help reduce consumption rates and provide community benefits such as decreased utility costs. By focusing on these rural households, this measure seeks to make the benefits of a low-carbon transition accessible to all segments of the community. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-3 Rural are included in Table 8.

Table 8 Measure BE-3 Rural Actions

Action ID	Attribute	Action
BE-3a Rural	Feasibility Study	Regional Climate Committee to conduct a feasibility study to establish local low-carbon fuel alternative, such as renewable propane, sourced from local resources such as forest biomass which can be used as direct substitutes for propane or diesel building fuel. The feasibility study should consider procurement and cost considerations with a focus on equity for low-income households, and map communities with significant propane and wood fuel use to identify accessibility strategy for acquiring alternative fuels (e.g. renewable propane, sustainably harvested wood products, renewable diesel) and/or undergoing home electrification.
BE-3b Rural	Structural	As part of Regional Climate Committee responsibilities identified in Measure C-1, petition PG&E to help identify priority areas for rural electric grid expansion projects to increase regional electric grid capacity and islanding capabilities to allow for increased building electrification capacity.
BE-3c Rural	Engagement	Promote existing available rebates to rural communities for Heat Pumps, Weatherization, Smart Thermostats, Appliances, and Pool Pumps to educate the community on ways to finance electrification or otherwise decarbonize their residences. Provide assistance to rural homeowners in assessing the viability and permitting of installing off-grid solar and battery alternative energy sources on their homes and finance options.
BE-3d Rural	Structural	For viable alternative fuel sources identified in a feasibility study, establish procurement and distribution supply centers within easy access of rural communities.
BE-3e Rural	Funding	The Regional Climate Committee will lead the effort to identify, access, and provide funding assistance for the procurement of alternative fuels, such as biomethane, in alignment with SB 1383 procurement requirements. Advocate to the California Public Utilities Commission (CPUC) for inclusion of alternative

Action ID	Attribute	Action
		low-carbon fuels substitution, such as renewable propane, to be allowed in ratepayer funded programs including energy efficiency programs.
2030 GHG Emissions Reduction:		Supportive[43]
2045 GHG Emissions Reduction:		Supportive
Total GHG Emission Reductions from Measure: Supportive		
Co-Benefits:		Resource Efficiency, Public Health and Equity
KPI:		Reduction in fossil fuel use for residences

Measure BE-4: Reduce existing nonresidential building natural gas consumption by 5% by 2030 and 79% by 2045.

In the region there is an opportunity to reduce natural gas consumption in the nonresidential sector through building code or permitting requirements. To achieve greater reductions in natural gas consumption, this measure aims to require electrification of feasible equipment in association with major renovations, as defined by local jurisdictions. Measure BE-4 puts the Humboldt region on a path to reduce commercial and mixed-use natural gas consumption by 5 percent by 2030 and 79 percent by 2045 to reduce GHG emissions. This is in alignment with RCEA initiatives and experience in building out alternative electricity sources which can aid in electrification of commercial businesses. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-4 are included in Table 9

Table 9 Measure BE-4 Actions

Action ID	Attribute	Action
BE-4a	Feasibility Study	As part of the development of the decarbonization plan led by the Regional Climate Committee referenced in Measure BE-3 Urban, identify nonresidential building electrification barriers and develop a nonresidential building decarbonization strategy with analysis supporting future adoption of a nonresidential building decarbonization ordinance. The plan should give consideration for increased electricity capacity needs and for other decarbonization strategies that would be needed to reduce nonresidential natural gas consumption by at least 5 percent. As part of strategy development, conduct outreach to small businesses to understand potential equity impacts of a decarbonization policy. The plan should also assess ordinance parameters for including large scale renovation as part of the new commercial building ordinance requirements established for each organization (Measure BE-6).
BE-4b	Structural	Work with the Regional Climate Committee to develop a template Commercial Energy Performance Assessment and Disclosure Ordinance for commercial and multi-family buildings to be adopted within each jurisdiction by 2027. The ordinance should require energy use disclosure consistent with State law (AB 1103) and the use of the ENERGY STAR Portfolio Manager benchmarking tool. nclude regulatory mechanism (e.g., permitting and

[43] Emissions reductions associated with this measure were conservatively not quantified due to data limitations. See Appendix C for further details.

Action ID	Attribute	Action
		approval requirements, building codes and standards modification) that limits expansion of natural gas infrastructure and incentivizes appliance replacement.
BE-4c	Structural	Establish streamlined permitting in each jurisdiction for energy efficiency technologies, onsite renewable energy, and battery storage in buildings and critical facilities that require power during emergencies or power outages. Incorporate equity considerations into permitting process for all other building battery storage including prioritization, rebates, and outreach.
BE-4d	Engagement/ Funding	As part of Regional Climate Committee responsibilities identified in Measure C-1, develop an outreach campaign to promote building decarbonization and include items in the program such as: 1. Conduct engagement efforts for the commercial and industrial sector to identify ways jurisdictions and the Regional Climate Committee can support commercial energy storage installations and neighborhood scale microgrid opportunities 2. Facilitate funding opportunities for commercial business electrification by identifying and supporting grant opportunities available to the community, prioritizing small and frontline community owned businesses 3. Use feedback provided during the community outreach process for small businesses to mitigate potential equity impacts of a future building performance program 4. Distribute utility bill inserts to advertise the incentive programs or grants available and the cost benefits of electric appliances 5. Target outreach to businesses, builders, developers, local contractors, and property managers with information describing the financial benefits of replacing natural gas appliances with all electric appliance when they apply for permits 6. Provide informational webinars and an updated website to advertise and promote All-Electric Building Initiative rebates and incentives 7. Promote the use of the Energy Star Portfolio Manager program and energy benchmarking training programs for nonresidential building owners
2030 GHG Emissions Reduction:		3,821 MT CO_2e
2045 GHG Emissions Reduction:		42,887 MT CO_2e
Co-Benefits:		Resource Efficiency, Public Health and Equity
KPI:		Reduction in natural gas consumption in nonresidential buildings

Measure BE-7: Decarbonize 30% municipal buildings and facilities by 2030.

Measure BE-5 commits the jurisdictions within the region to lead by example through decarbonizing municipal buildings and facilities. Local government leadership in building electrification plays a crucial role by setting a standard for the community, developing a clear understanding of hurdles and opportunities, demonstrating the feasibility of reducing fossil fuel reliance, and building trust among residents and businesses. These initiatives also provide practical insights for policymaking, drive technological advancements, and can serve as educational tools. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-7 are included in Table 10.

Table 10 Measure BE-7 Actions

Action ID	Attribute	Action
BE-7a	Structural	Regional Climate Committee to develop a template resolution for each jurisdiction to decarbonize 30 percent of municipal buildings and facilities by 2030 and 100 percent by 2045 by retrofitting natural gas appliances with electric alternatives and install on-site electricity generation and storage capacity. Include in the resolution an 'electric first' purchasing policy for any equipment or appliances in need of replacement.
BE-7b	Feasibility Study	Coordinate with the Regional Climate Committee and RCEA to conduct energy audits of municipal buildings to establish a baselines of current energy consumption and identify the largest energy users or municipal buildings with the greatest natural gas consumption. Utilize audit results to prioritize municipal buildings to decarbonize. Conduct follow-up energy audits every 3 years to track progress. Leverage data from buildings reporting to the Building Energy Benchmarking Program established under AB 802[44] where possible to reduce labor.
BE-7c	Feasibility Study	Develop a study through the Regional Climate Committee which estimates renewable energy generation on County and local jurisdiction facilities, identifies a priority list of sites which may serve as regional resilience hubs, and a proposed schedule for implementing the prioritized energy projects. The study should also seek to understand barriers to installing additional distributed energy resources such as solar and battery storage, or other renewable energy generation infrastructure, at municipal facilities.
BE-7d	Partnership/ Funding	Identify and pursue funding sources and partnerships needed for successful implementation as well as plan for directing resources through each jurisdiction for funding.
2030 GHG Emissions Reduction: Supportive[45]		
2045 GHG Emissions Reduction: Supportive		
Total GHG Emission Reductions from Measure: Supportive		
Co-Benefits:	Resource Efficiency, Public Health and Equity	
KPI:	Reduction in natural gas consumption in municipal buildings	

[44] Assembly Bill (AB) 802 became effective in 2016 and established California's energy benchmarking program requiring that both commercial and multi-family buildings over 50,000 square feet submit an energy benchmark report to the California Energy Commissions annually by June 1st.

[45] Emissions from municipal building energy are included as a subset of the nonresidential building energy sector and therefore associated GHG emission reductions are included within the community mitigation Measures for nonresidential building energy. Therefore, emissions reduction from this measure is not quantified to avoid double counting of reductions.

Strategy 4: Decarbonization of new construction

The adjusted forecast projects that natural gas usage in the community related to new buildings would increase by approximately 5 percent by 2030 and 15 percent by 2045 in residential and nonresidential buildings. Additional GHG emissions from new buildings are best combated by implementing some form of ordinance, such energy design ratings (EDR), which promote implementation of electric equipment and avoiding new natural gas connections where feasible. As such, evaluating and establishing an appropriate ordinance has the potential to avoid an increase of approximately15 percent of GHG emissions from new buildings. RCEA also currently promotes energy efficiency and efficient electrification with rebates and informational resources.

Measure BE-5: Decarbonize 95% of new residential building construction by 2027.

Electrification poses a challenge in the residential sector due to grid capacity limitations. However, electric buildings are cheaper to build than those which require natural gas and can be significantly more efficient. This measure seeks to require new construction to decarbonize and encourage developers of new residential construction to install more efficient electric equipment along with solar to meet increased EDR requirements and avoid installing natural gas meters and connections. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-5 are included in Table 11.

Table 11 Measure BE-5 Actions

Action ID	Attribute	Action
BE-5a	Structural	Regional Climate Committee to develop an energy performance ordinance, EDR, reach code, or zero NO_x threshold for new residential construction that can be modified by each jurisdiction as necessary to conserve staff resources. Adopt the ordinances within each jurisdiction to decarbonize 95 percent of new residential buildings by 2027 and update every 3 years thereafter if not included within State building codes. As part of building decarbonization ordinance development and subsequent updates, consider the following: 1. Minimize the exemptions associated with the ordinance, while allowing for health and safety exemptions as necessary and exploring potential exemptions for specific use cases determined to have substantial economic development or business impacts 2. Require the submittal of an infeasibility waiver to review specific end uses where electrification is technologically infeasible 3. Require that any end-use deemed infeasible for electrification exceeds existing Title 24 energy efficiency standards and be electric ready for future electrification 4. Specify that affordable housing developments will be all-electric to ensure no stranded assets 5. Establish substantial remodel and improvement definitions to be included in the ordinance 6. Track and enforce requirement compliance through a permitting compliance program managed by each jurisdiction 7. Revise ordinance during update cycle as necessary to meet 95 percent goal
BE-5b	Feasibility	Conduct feasibility study(s) to identify local decarbonization barriers for new residential developments and develop a residential building decarbonization strategy with analysis. The feasibility study should include developing a new

Action ID	Attribute	Action
		residential building decarbonization plan that assesses the grid feasibility and cost for electrification at certain legislative threshold requirements in consideration of leveraging RCEA residential nano-grid and battery storage options. The feasibility study should assess the potential cost impacts to multifamily and affordable housing new developments and identify potential strategies for mitigating negative impacts for equitable electrification.
BE-5c	Funding/ Equity	Leverage the Regional Climate Committee to lead engagement efforts with affordable housing developers to leverage incentives for new all-electric and efficient low-income residential buildings through the California Energy Commission Building Initiative for Low-Emissions Development (BUILD) Program, the Affordable Housing and Sustainable Communities (AHSC) Program, and the California Electric Homes Program (CalEHP). Regularly investigate and leverage other incentive programs available for electrification of new buildings.
BE-5d	Engagement	Through the Regional Climate Committee, work with local contractors, realtors, homeowner associations, landlords, and labor unions to develop a comprehensive training program, including hosting workforce development trainings discussing the benefits and technical requirements of local municipality building decarbonization legislation and the most effective pathways to achieving requirements. Include information on load calculations to avoid service upgrade requirements.
BE-5e	Partnership	Partner with RCEA and PG&E to circumvent or mitigate electric utility infrastructure capacity constraints. Collaborate RCEA to develop and fund locally implemented programs to help customers in accessing financing options for energy projects and rebates for cleaner, energy efficient technology.
2030 GHG Emissions Reduction:		2,252 MT CO_2e
2045 GHG Emissions Reduction:		13,907 MT CO_2e
Co-Benefits:		Resource Efficiency, Public Health and Equity, Increased Resilience, Green Jobs
KPI:		Change in number of residential buildings; reduction in natural gas consumption in residential buildings

Measure BE-6: Decarbonize 95% of new nonresidential building construction by 2027.

More opportunities exist to electrify new nonresidential buildings than existing due to greater opportunities to establish on-site energy sources and to build for electrification at the onset of development. This measure seeks to establish EDR requirements to require new buildings to be decarbonized and encourage developers of new nonresidential construction to install more efficient electric equipment and avoid installing natural gas meters and connections. This measure also includes workforce training to highlight the benefits, applicability, and cost-effectiveness of building electrification. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure BE-6 are included in Table 12.

Table 12 Measure BE-6 Actions

Action ID	Attribute	Action
BE-6a	Structural	Adopt within each jurisdiction an energy performance ordinance, energy design rating (EDR), reach code, or zero NO_x threshold to decarbonize 95 percent of new nonresidential buildings by 2027 and update every 3 years thereafter if not included within State building codes. As part of building decarbonization legislation development and subsequent updates, consider the following: 1. Direct the Regional Climate Committee to develop a template ordinance that can be modified by each jurisdiction as necessary to conserve staff resources 2. Minimize the exemptions associated with the ordinance, while allowing for health and safety exemptions as necessary and exploring potential exemptions for specific use cases determined to have substantial economic development or business impacts 3. Require the submittal of an infeasibility waiver to review specific end uses where electrification is technologically infeasible 4. Require that any end-use deemed infeasible for electrification exceeds existing Title 24 energy efficiency standards and be electric ready for future electrification 5. Establish substantial remodel and improvement definitions to be included in the ordinance 6. Enforce requirement compliance through the same permitting compliance program as for residential building decarbonization 7. Establish EDR requirements for new non-residential buildings that incentivize electrification and, in a case, where electrification is infeasible, requires higher energy efficient and low emissions equipment to meet the EDR 8. Track effectiveness of ordinance through permitting compliance program and revise ordinance during update cycle as necessary to meet 95 percent goal
BE-6b	Feasibility	Conduct feasibility study(s) to identify decarbonization barriers for commercial buildings and develop a commercial building decarbonization strategy with analysis supporting future adoption of commercial decarbonization legislation. The feasibility study should include a comprehensive nonresidential building electrification plan that assesses the grid feasibility and cost for electrification and opportunities to mitigate grid and cost barriers by leveraging RCEA microgrid and battery storage options. The feasibility study should assess potential decarbonization legislation exemptions for commercial and industrial operations that are significantly restricted by available technology for electrification.
BE-6c	Funding	Connect developers with RCEA to identify applicable incentive programs in line with RCEA RePower goals that could benefit new building developments such as microgrids which can aid businesses in overcoming restrictions to electrification or decarbonization of processes.
BE-6d	Engagement	Through the Regional Climate Committee, work with local contractors, realtors, homeowner associations, landlords, and labor unions to develop a comprehensive training program, including hosting workforce development trainings to discuss the benefits and technical requirements of decarbonization.

Action ID	Attribute	Action
BE-6e	Partnership	Partner with RCEA and PG&E to establish a clear path for electrification of new nonresidential buildings which meet EDR requirements and circumvent or mitigate electric utility infrastructure capacity.
2030 GHG Emissions Reduction:		1,374 MT CO_2e
2045 GHG Emissions Reduction:		8,492 MT CO_2e
Co-Benefits:		Resource Efficiency, Public Health and Equity, Green Jobs
KPI:		Change in number of nonresidential buildings; reduction in natural gas consumption in nonresidential buildings

Transportation

On- and off-road transportation makes up approximately 81 percent of Humboldt's regional GHG profile. Of that, approximately 90 percent of transportation GHG emissions are due to on-road transportation. The primary strategies to reduce transportation involve mode shift away from single-occupancy vehicles to reduce VMT and decarbonizing the remaining vehicle miles traveled (VMT). Reducing VMT consists of transitioning residents and visitors out of single-occupancy vehicles and into active transportation mode options (i.e., walking and biking) and public and shared transit options (e.g., public buses, rail, carpools) by improving these mode options and safety and adopting policies to discourage single-occupancy vehicle commutes. Additionally, land use changes such as promoting jobs and amenities to be located near residents can help reduce the region's average trip length as well as encourage mode shifts to active or public transit. Working with local businesses and governments to develop flexible work policies that promote working from home in conjunction with improved telecommunication to accommodate remote work can also reduce VMT. VMT reduction is further supported by the use of VMT thresholds consistent with the achievement of the state's climate goals. The remaining VMT will then be decarbonized by increasing the adoption of zero-emission vehicles (ZEVs). When combined with renewable and carbon-free electricity, electric vehicles (EVs) eliminate GHG emissions from fossil fuel combustion and transition commutes to a zero-emission operational footprint.

Strategy 5: Shift driving to walking and biking

The region currently supports active transportation through emphasis of complete streets to continue increasing bicycle and pedestrian routes and maintenance of existing routes. Increasing the mode shift from single-occupancy vehicles to active transportation options is largely dependent on safe routes and a behavior shift within the region. Increasing the available safe bicycle and pedestrian routes, the connectivity of such routes to locations of interest, and increasing the benefit of using such options can initiate change. Bicycle and walking trips primarily replace short vehicle trip types, not long distances. Studies have shown that a mode shift to active transportation can be increased up to 15 percent, though this level of change requires extensive change in infrastructure and behavior. Behavior change is commonly driven by education, or incentives and disincentives, such as implementing paid parking, which promote a change.

Measure TR-1 Urban: Implement programs, such as those identified in HCAOG's RTP, to increase the mode share of active transportation in urbanized

areas from 9% to 12% by 2030 thereby achieving a regional active transportation mode share of 8%.

Community members' use of active transportation differ in urban areas that are more densely populated and near city centers or amenities compared with rural areas that are more dispersed. Though a large part of the region is considered rural, the community and local jurisdictions generally have a higher density of people and high interest in improved infrastructure for walking and biking, particularly for greater infrastructure interconnectivity between jurisdictions. Additionally, tourism in the community also uses the active transportation infrastructure. Measure TR-1 Urban focuses on strategies and targets designed for the economic and city center hubs in the region which includes the incorporated cities such as Arcata, Fortuna, and Eureka. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-1 are included in Table 13.

Table 13 Measure TR-1 Urban Actions

Action ID	Attribute	Action
T-1a Urban	Funding/ Partnerships	Regional Climate Committee to aid the urbanized areas of Humboldt by partnering with HCAOG and HTA to identify and pursue grant opportunities such as the Active Transportation Program, AARP Community Challenge, CalEPA's Environmental Justice Action Grants, and Caltrans Sustainable Transportation Planning Grants, etc., to fund active transportation projects identified in the Regional Transportation Plan. Aim to apply for at least 3 grants annually.
T-1b Urban	Engagement	In urbanized areas with high alternative transit expansion potential work with the Regional Climate Committee to facilitate community outreach on transportation alternatives and promote infrastructure improvements and expansion identified in HCAOG's Regional Transportation Plan. Continually improve methods for engaging the community, gathering input, and utilizing it to prioritize projects.
T-1c Urban	Engagement	Leverage the Regional Climate Committee to pursue and access funding to develop and maintain regional webpage and app showing pedestrian and bike trails, bike lanes and bus times and routes. Distribute active transportation maps and promotional materials to hotels and tourism centers to increase visitor use of active transportation. Advertise and promote Humboldt Bikeshare program managed by the City of Arcata, Cal Poly Humboldt, and Tandem Mobility.
T-1d Urban	Feasibility Study/ Equity	Identify equity barriers to safe bike and pedestrian infrastructure through community outreach and use of big data driven analysis as well as targeted community outreach to better understand nuanced barriers. Include prompts in outreach around ways to improve social and modal equity the active transportation systems and programs. Develop a priority list of active transportation projects from HCAOG's Regional Transportation Plan based on level of impact, expansion of inter-jurisdictional connectivity, and historically under-invested communities.
T-1e Urban	Structural	Increase inter-connectivity across the region working with HCAOG and the Regional Climate Committee representatives to: 1. Evaluate and prioritize land use projects and active transportation projects for their impact on increased regional connectivity

Action ID	Attribute	Action
		2. Identify hurdles limiting connectivity and use, such as last-mile commute limitations 3. Facilitate coordination across jurisdictions and rural and urban areas to plan development in a coordinated and most strategic manner 4. Apply for regional funding opportunities focused on increased inter-connection and VMT reduction 5. Implement the VMT mitigation measures associated with VMT thresholds
2030 GHG Emissions Reduction:		1,147 MT CO_2e
2045 GHG Emissions Reduction:		2,594 MT CO_2e
Co-Benefits:		Public Health and Equity
KPI:		Change in active transportation mode share and VMT in urbanized areas

Measure TR-1 Rural: Implement programs, such as those identified in HCAOG's RTP, that increase access to safe active transportation, to increase the mode share of active transportation in rural areas from 5% to 6% by 2030 thereby achieving a regional active transportation mode share of 9%.

There are more constraints for community members in rural dispersed regions to switch to active transportation in place of vehicle trips as they are often further from amenities and job centers and have less access to safe infrastructure (i.e., bikeways). Safe infrastructure that connects rural communities to economic hubs and amenities is crucial to facilitate a switch and encourage active transportation mode share. Measure TR-1 Rural focuses on strategies and targets designed for rural areas within the County and small incorporated cities such as Blue Lake, Ferndale, Rio Dell, and Trinidad. Actions primarily focus interconnectivity of active transportation networks across the region and obtaining funding for infrastructure build out. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-1 Rural are included in Table 14.

Table 14 Measure TR-1 Rural Actions

Action ID	Attribute	Action
T-1a Rural	Structural/ Partnerships	Regional Climate Committee to conduct a feasibility study evaluating existing bike parking facilities in rural areas and what improvements can be made to increase supply, reduce theft, and increase rider attraction. Include in the study an analysis of current and future land use trends and identify active transportation facility development which would result in high inter-connectivity impact. The study should focus on needs to better connect rural communities to city centers, job centers, and amenities.
T-1b Rural	Equity	Develop a priority list of active transportation projects from HCAOG's Regional Transportation Plan based on level of impact, expansion of inter-connectivity, and historically under-invested communities where there is currently no, or limited pedestrian and bicycle infrastructure as informed by feasibility study.
T-1c Rural	Funding	The Regional Climate Committee will work with the regions jurisdictions, HCAOG, and CalTrans to obtain funding for the construction of bikeway and

Action ID	Attribute	Action
		pedestrian systems to improve interconnection within Humboldt County. Focus areas will be projects that connect rural communities to high employment areas such as City of Eureka, Arcata, and Fortuna as well as nearby counties, State, and federal infrastructure through integration of bicycle facilities as part of other roadway construction projects (e.g. CalTrans mobility hub and highway projects).
T-1d Rural	Partnership	Partner with California Department of Transportation (CalTrans) District 1 Pedestrian and Bicycle Advisory Committee (PBAC) to track progress on implementation of bicycle and pedestrian projects in the region, ensure that projects being planned are consistent with the District Active Transportation Plan, and to represent the regions rural jurisdictions needs to the PBAC.
T-1e Rural	Structural	Regional Climate Committee to work with jurisdictions in rural regions that have planned land use development to establish standards for when and how new residential subdivisions, multi-family, and mixed-use developments shall provide inter- connected bicycle and pedestrian facilities and amend local codes accordingly.
T-1f Rural	Engagement	Increase community awareness of active transportation infrastructure projects occurring and those completed. Work with HCAOG to continue to fund, develop, and maintain regional webpages and apps showing pedestrian and bike trails, bike lanes, and bus times and routes. Distribute active transportation maps and promotional materials to hotels and tourism centers to increase visitor use of active transportation.
T-1g Rural	Partnerships	Partner with the tourism and business sectors of larger tourism and employment regions of the county to identify pathways to increase active transportation from tourists and employees.
T-1h Rural	Funding	Regional Climate Committee to identify and apply for grant opportunities such as the Active Transportation Program, AARP Community Challenge, CalEPA's Environmental Justice Action Grants, and Caltrans Sustainable Transportation Planning Grants, etc., to fund rural active transportation projects identified in the Regional Transportation Plan.
T-1i Rural	Funding/ Equity	Leverage the Regional Climate Committee to fund the development of local subsidies for low-income residents across the region for bicycles, helmets, pumps, and other bicycle equipment. Continue to offer e-bike rebates with increased rebate opportunities for low-income customers. Implement an income-qualified coupon for the e-bike share program, in addition to the available 50 percent discounted e-bike share rate.
2030 GHG Emissions Reduction: 1,080 MT CO_2e		
2045 GHG Emissions Reduction: 4,405 MT CO_2e		
Co-Benefits: Public Health and Equity		
KPI: Change in active transportation mode share and VMT in rural areas		

Strategy 6: Shift driving to public transit or car-share

To increase the mode shift from single-occupancy vehicles to using public transit or other car-share options is largely a behavior shift that relies on the initiative of community members. Increasing the access and convenience of such transportation options or increasing the benefit of using such options can initiate change. Due to the rural nature of communities in Humboldt, public transit options are currently limited and require different considerations in urbanized centers vs rural areas. The low population density and vast geographic spread of communities in rural areas of the region lead to limitations in frequency of service and have limited route options that may not serve the needs of the rural residents. Consequently, residents in rural areas rely more heavily on personal vehicles as they are more convenient and reliable. On the other hand, urban centers in the region have a more robust public transit system that has greater accessibility, connects riders to urban centers and runs at a greater frequency. However, the transit system's current frequency even in urban centers is not at a level that allows riders to view transit as more convenient than a personal vehicle. Increasing bus headway decreases the average wait time for passengers and has been shown to increase ridership.[46] Greater connectivity across rural and urbanized centers as well as offering other transit options or services to make transit in rural regions more convenient and reliable will be key to increasing public transit use in the region. Studies have shown that public transit use can be increased up to approximately 25 percent, though this level of change requires extensive change in infrastructure and offered services that meet the needs of the riders (e.g., commuting, local travel, travel for regional visitors). At this time, HCAOG and HTA have set goals to increase public and active transit to 30 percent of trips by 2030 and are seeking funding sources to expand access and frequency to attain a 10-minute headway to promote help achieve this goal through ease of community access.

Measure TR-2 Urban: Expand the public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 2% to 20% public transit mode share in urbanized areas to achieve a regional 13% public transit mode share by 2030

Urbanized areas offer greater opportunities for increasing public transit use due to higher population densities, more developed infrastructure, shorter trips and concentrated economic activities. Public transit can more efficiently serve urban centers where there are more people that live closer together and there is a higher demand for transportation options. Urban centers are ideal for public transit expansion because they can provide a high return on investment, with each improvement potentially benefiting a large number of residents and reducing overall VMT more effectively. Measure TR-2 Urban aligns with HCAOG's VROOM 2022-2042 plan and supports aggressive mode share shift projects by focusing on expanding transit services and increasing reliability in the urbanized areas of Humboldt, such as Arcata, Eureka, and Fortuna, where most job centers are located. Actions include collaborating with HCAOG and Humboldt Transit Authority (HTA) to achieve a 10-minute headway and secure funding and improving access, particularly in low-income communities. The introduction of 11 zero-emissions buses by HTA further enhances the GHG reduction potential of public transit. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-2 Urban are included in Table 15.

[46] Advancing Public Transport (UTIP) (Last updated March 3, 2024.). "*What is bus headway? (And how it impacts public transport quality*". Accessed May 20th, from https://www.uitp.org/news/what-is-bus-headway-and-how-it-impacts-public-transport-quality/

Table 15 Measure TR-2 Urban Actions

Action ID	Attribute	Action
T-2a Urban	Structural/ Partnership	Regional Climate Committee to work with Humboldt Transit Authority (HTA) and HCAOG to support implementation of measures to increase use of public transportation services in the region as specified in HCAOG's Regional Transportation Plan, and work toward a 10-minute headway in urban areas. This should include, but is not limited to: 1. Improving passenger transfer among local routes and between local and intercity routes (e.g., Greyhound and Amtrak) 2. Improving shelters at bus stops 3. Electronic signage and/or real-time updates of wait time until next bus
T-2b Urban	Feasibility Study	For areas with significant tourism industry, conduct a feasibility study to inform the development of a tourism-based mobility plan aimed at decreasing tourism-based single passenger vehicle use. In this study: 1. Identify community boundary locations for tourism designated parking and optimal route connectivity 2. Identify opportunities for town shuttle services and park-and-ride locations for residents and tourists 3. Gauge potential of partnerships with big tourism destinations and local businesses to implement direct public transit routes between park and ride and the relevant tourist destinations 4. Identify opportunities for dogs to be included in a shuttle service to locations that allow dogs
T-2c Urban	Engagement	Leverage the Regional Climate Committee to conduct local transportation surveys to better understand the community's needs and motivation for traveling by car versus other alternatives such as the bus. Use survey results to inform policy development and outreach campaigns that are transit focused. Develop marketing materials and provide them to the local jurisdictions to publicize public transportation improvements as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use and success of improvement.
T-2d Urban	Equity/ Partnership	Work with HTA to plan facility upgrades that include design improvements of seating and weather protection at bus stops and along transportation routes. Implementation should also include consideration of climate change impacts and increasing micro-transit access to the improved public transit network facility. Incorporate design changes throughout infrastructure modifications, including real-time updates of bus arrival.
T-2e Urban	Equity	Work with HTA to prioritize public transportation access and improvements in low-income areas of the region and at major destinations. This could include surveying existing transportation routes, schedules, and facilities throughout each jurisdiction as part of HCAOG's Sustainable Transportation Planning Grant Program and improving public transportation facilities and expand access to transit (i.e., first and last-mile access).
T-2f Urban	Funding	Regional Climate Committee to collaborate with HTA and HCAOG in obtaining grant funding for service expansion and improvements particularly in underserved and marginalized areas. Also include assistance for working with the appropriate State agencies to petition for updates to the farebox ratio to allow HTA greater access to using funds for self- advertisement.

Action ID	Attribute	Action
2030 GHG Emissions Reduction:	18,055 MT CO_2e	
2045 GHG Emissions Reduction:	26,482 MT CO_2e	
Co-Benefits:	Resource Efficiency, Public Health and Equity, Increased Resilience	
KPI:	Change in transit mode share and VMT reduction	

Measure TR-2 Rural: Develop a robust public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 1% to 10% in rural areas and achieve a regional 13% public transit mode share by 2030

Expanding public transit use in rural communities is challenging due to lower population densities, greater travel distances, and limited infrastructure. However, improving connectivity between rural and urban centers can facilitate access to jobs, education, healthcare, and other essential services without relying on personal vehicles. Increasing the frequency and reliability of public transit makes it a more viable and convenient option for rural residents. Establishing park-and-ride facilities can make it more convenient to use public transit for parts of trips, and enhancing access to micro-mobility options like bike shares or car shares can provide a solution for the "first" and "last" mile. Measure TR-2 Rural focuses on enhancing connectivity between rural incorporated and unincorporated regions of Humboldt County, such as Blue Lake, Ferndale, Rio Dell, Trinidad, and Unincorporated Humboldt County and economic centers by pursuing funding to expand transit network services and establishing policies and programs to better connect rural residents to public transit. These efforts align with the with HCAOG's RTP program, VROOM 2022-2042, to achieve significant increased public transit mode share across the region. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-2 Rural are included in Table 16.

Table 16 Measure TR-2 Rural Actions

Action ID	Attribute	Action
T-2a Rural	Structural/ Partnership	Regional Climate Committee to work with HTA and HCAOG to support implementation of measures to increase use of public transportation services in the region as specified in HCAOG's Regional Transportation Plan and work toward a 30-minute headway in rural areas. This should include, but is not limited to: 1. Improving passenger transfer among local routes and between local and intercity routes (e.g., Greyhound and Amtrak) 2. Improving shelters at bus stops 3. Prioritizing infrastructure improvements in existing communities that enable people better access and use of public transit 4. Electronic signage and/or real-time updates of wait time until next bus
T-2b Rural	Feasibility Study	For areas with significant tourism industry, conduct a feasibility study to inform the development of a tourism-based mobility plan aimed at decreasing tourism-based single passenger vehicle use. In this study: 1. Identify community boundary locations for tourism designated parking and optimal route connectivity

Action ID	Attribute	Action
		2. Identify opportunities for town shuttle services and park-and-ride locations for residents and tourists 3. Gauge potential of private partnerships with big tourism destinations and local businesses to implement direct public transit routes between park and ride and the relevant tourist destinations
T-2c Rural	Feasibility Study	Work with HCAOG and HTA to conduct a feasibility study to explore alternative forms of public transit, such as micro transit including on-demand shuttles, car share programs, bike share programs, and scooter share programs. Micro transit is a type of on-demand, shared transportation service that typically operates with smaller vehicles, such as vans or mini-buses, and offers flexible routes and schedules. The analysis should include identification of potential funding sources (e.g., grants, local taxes, local business sponsorship, discretionary funds, etc.) and identification of barriers and opportunities for how such a micro-mobility program may enhance active transportation or public transit use. Evaluate the effectiveness of the micro transit pilot program in McKinleyville to determine opportunities for implementing a similar program in other rural locations of the county.
T-2d Rural	Structural	Based on the findings of the feasibility study, work with the Regional Climate Committee to develop a template micro-mobility policy that establishes a deployment protocol and permitting process, identifies any restrictions for use for safety reasons, and promotes equitable access through requirements for consistent placement of micro-mobility devices (e-scooters, e-bikes, etc.) in underserved areas or reductions in usage fees for lower-income users.
T-2e Rural	Structural	Require large nonresidential and mixed-use developments to participate in Transportation Demand Management strategies, including providing shuttle services between employment centers and key transit centers, offering telecommuting, and encouraging use of pre-tax commute benefits.
T-2f Rural	Engagement	Market and publicize public transportation improvements as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use.
T-2g Rural	Equity/ Partnership	Work with HTA in the implementation of facility improvements to rural transportation stops to include design improvements of seating and weather protection. Implementation should also include consideration of increasing access to the improved public transit network facility.
2030 GHG Emissions Reduction:		20,180 MT CO_2e
2045 GHG Emissions Reduction:		29,703 MT CO_2e
Co-Benefits:		Resource Efficiency, Public Health and Equity, Increased Resilience
KPI:		Change in transit mode share and VMT reduction

Measure TR-4: Develop and implement regional mobility hubs and ZEV car-share programs to support mode shift from single occupancy vehicles

Measure TR-4 focuses on creating regional mobility hubs and implementing ZEV car-share programs to promote a shift away from single-occupancy vehicle use. This measure aims to expand transportation options across urban and rural communities, facilitating residents' adoption of zero emissions and efficient travel modes. Regional mobility hubs consolidate various transportation services, including public transit, bike-sharing, and car-sharing, at centralized locations to improve

convenience and connectivity between different modes of transport. Introducing ZEV car-share programs enhances this initiative by offering clean transportation alternatives and reducing dependence on fossil fuels. Additionally, Caltrans is currently developing mobility hubs along the State highway that traverses the county, which can enhance residents' access to these services and facilitate the transition to active or public transportation for last-mile commutes. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-4 are included in Table 17.

Table 17 Measure TR-4 Actions

Action ID	Attribute	Action
T-4a	Feasibility Study	Regional Climate Committee to work with HCAOG on the Sustainable Transportation Planning Grant Program efforts to assess regional transportation characteristics and work with regional agencies to identify multimodal land use opportunities throughout the county. As part of this program, conduct a background review of options for purchasing, operating, and maintaining shared mobility assets such as ZEVs, electric bikes, and electric scooters. The program should include identification of potential funding sources (e.g., grants, local taxes, local business sponsorship, discretionary funds, etc.) and identification of barriers and opportunities for how expanding mobility hub facilities beyond state highways access may enhance active transportation or public transit use. Also include in the feasibility study an assessment of alternative powering options in partnership with RCEA (e.g. microgrids) to support ZEV car-share infrastructure with the mobility hubs.
T-4b	Structural/ Partnership	In areas where Caltrans plans to implement mobility hubs along the state highway, local jurisdictions with support from the Regional Climate Committee will work with Caltrans to facilitate successful implementation and use the project to inform decisions on expanding mobility hub options throughout the region that will expand jurisdictional interconnectivity and provide public EV charging to the communities.
T-4c	Structural/ Equity	Regional Climate Committee will develop guidance for jurisdictions to implement mobility hub policies that establishes a deployment protocol and permitting process, identifies any restrictions for use for safety reasons, and promotes equitable access through requirements for consistent placement of mobility hub facilities in underserved areas or reductions in usage fees for lower income users. The guidance is to be developed based on the regional feasibility study above.
T-4d	Partnership	The Regional Climate Committee will coordinate with the City of Arcata in their efforts to bring in commercial autonomous EVs for car-share programs in association with regional mobility hubs.
T-4e	Funding	Dedicate staff time or leverage the Regional Climate Committee to work with work with HCAOG on the Sustainable Transportation Planning Grant Program and Caltrans in identifying and pursuing funding opportunities identified in the feasibility study with focus on linking mobility hub programs with the current Caltrans project to facilitate greater community interconnectivity and adoption of mobility services provided.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive

Action ID	Attribute	Action
Co-Benefits:		Resource Efficiency, Public Health and Equity, Green Jobs
KPI:		Reduction in VMT and change in mode shift

Strategy 7: Shift land use to reduce VMT

Land-use patterns are highly correlated with VMT where higher sprawl outside of urban areas is known to increase more travel. In recognition of that, the State passed the Sustainable Communities and Climate Protection Act (SB 375) which supports the State's climate goals by helping to reduce GHG emission through coordinated transportation, housing, and land use planning. While the communities in the County are largely dispersed and well established, there are still opportunities to implement land-use strategies in areas where development is expected to occur. By concentrating on new residential development near job and amenity centers and enhancing connectivity across the region, VMT can be reduced. Further, improving land-use patterns makes measures focused on mode shift even more effective.

Measure TR-3: Reduce regional VMT by increasing mixed-use development in infill priority areas in alignment with HCAOG's baseline connectivity score included in the RTP.

Population density presents challenges for public transit and active transportation across the region, as dispersed populations have limited access to transit and decreased public transit ridership. Measure TR-3 addresses this issue by emphasizing mixed-use development in designated infill priority areas within incorporated cities, in alignment with HCAOG's VROOM 2022-2042 connectivity goals. Encouraging mixed-use development optimizes land use by integrating residential, commercial, and recreational spaces, which can alleviate traffic congestion, lower transportation emissions, and discourage urban sprawl. Urban areas within the region have already begun increasing mixed-use developments, with ongoing zoning updates offering further opportunities for infill expansion. This measure enhances community livability by fostering walkable neighborhoods that provide easy access to essential services and amenities. By aligning with regional transportation priorities outlined in the RTP, these infill projects are strategically planned to improve connectivity and accessibility. Increased population density through infill development supports transit networks, aids in meeting RHNA requirements, and reduces VMT by single-passenger vehicles. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-3 are included in Table 18.

Table 18 Measure TR-3 Actions

Action ID	Attribute	Action
T-3a	Structural	Work with the Regional Climate Committee to develop template land use and development policy to enable and encourage infill development and streamline zoning changes that allow for higher density housing development. Work with urban areas to rezone for higher residential density and mixed use, reduced parking requirements, and expedited planning and permitting processes in the downtown core, along transit corridors, and within future planned development areas that is compact, pedestrian friendly, and transit oriented where applicable.

Action ID	Attribute	Action
T-3b	Feasibility/ Equity	Leverage feasibility studies conducted by HCAOG to identify opportunities for mixed-use and infill development, map current and future planned transit networks, and establish a priority list of development that encourages regional growth to be in alignment with HCAOG and HTA transit goals. If not already included in previously conducted HCAOG studies, assess equity considerations with regards to location and distribution of developments, and potential transit access equity impacts.
T-3c	Partnership	Work with HCAOG, HTA, RCEA and CBOs to plan prospective mixed-use and infill projects so that they include design considerations with regards to alternative energy access/generation, EV charging infrastructure, and local public transit facilities. Promote development that increases walkability and is bikeable in neighborhoods.
T-3d	Engagement	Direct the Regional Climate Committees to develop promotional materials and manage a central webpage on local jurisdiction's websites for planned projects detailing the benefits of mixed-use and/or infill developments.
T-3e	Funding	Dedicate staff time or create multi-jurisdictional staff position to be administered by the Regional Climate Committee to identify and pursue funding opportunities to support mixed-use and infill developments.
2030 GHG Emissions Reduction: Supportive		
2045 GHG Emissions Reduction: Supportive		
Co-Benefits: Resource Efficiency, Public Health and Equity, Increased Resilience		
KPI: Reduction in VMT		

Measure TR-5: Require commercial and industrial employers with 25 employees or more to develop a Transportation Demand Management Plan

Measure TR-5 commits jurisdictions, particularly high employment areas, to require that commercial and industrial employers with 25 or more employees create a Transportation Demand Management (TDM) Plan. This measure aims to lower GHG emissions and better accommodate employees living far from their place of work by further incentivizing alternative commuting options through employer-based subsidies for alternative modes of travel, which can also reduce their commuting costs. TDM plans can include strategies such as promoting carpooling, offering public transit incentives, supporting telecommuting, and providing facilities for cycling and walking. Employer-based TDM plans with these types of strategies which combine incentives with improved commute alternatives can lead to a 25 percent reduction in employee trips. By requiring these plans, Measure TR-5 encourages employers to actively participate in reducing their transportation footprint, improving air quality, and enhancing the overall efficiency of the transportation network. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-5 are included in Table 19.

Table 19 Measure TR-5 Actions

Action ID	Attribute	Action
T-5a	Structural	Across all jurisdictions, and particularly in high employment cities, require employers to develop a Transportation Demand Management (TDM) Plan through a new ordinance and/or as a requirement to obtain a business

Action ID	Attribute	Action
		license. TDM plans should include money-based incentives for employees to bike, walk, carpool, take the bus to work, or remote work where suitable. Require large employers (more than 25 employees) to subsidize biking, walking, or bus travel. The TDM should also include a ride-sharing program and membership within a transportation management association. The ride-sharing program will consist of designated parking spaces for ridesharing vehicles, passenger loading, unloading, and waiting zones; and a website, message board, or app for coordinating ridesharing. The program will include a provision to allow employees to work remotely 2 days per week when feasible and should include consideration for increasing broadband internet access to provide adequate service for those working remote.
T-5b	Feasibility Study	Leverage the Regional Climate Committee and partnership with HCAOG to conduct local transportation surveys within each jurisdiction to better understand the community's needs and motivation for traveling by car versus other alternatives such as the bus. Use survey results to inform policy development and outreach campaigns that are transit focused.
T-5c	Engagement	Have the Regional Climate Committee prepare marketing materials that each jurisdiction may modify and use to market and publicize public and active transportation improvements to local businesses as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use and success of improvement.
T-5e	Partnership/ Engagement	Work with local businesses to understand employee engagement with alternative transportation methods and barriers to entry and provide workshops to local businesses to address questions or concerns in developing TDM plans.
T-5f	Funding	Through the Regional Climate Committee, employ a multi-jurisdictional representative to support HTA and local jurisdictions in pursuing grants such as the Sustainable Communities Competitive, Caltrans Sustainable Transportation Planning Grant Program, State Transportation Improvement Program, etc., to expand public and active transit services and infrastructure.
2030 GHG Emissions Reduction: Supportive		
2045 GHG Emissions Reduction: Supportive		
Co-Benefits: Resource Efficiency, Public Health and Equity		
KPI: Implementation of TDM plans and reduction in VMT		

Strategy 8: Increase zero-emission vehicle adoption

The state has adopted Executive Order N-79-20 requiring that 100 percent of new sales of passenger vehicles be zero-emissions by 2035. Additionally, the state has as invested billions of dollars into programs developed to support the expansion of zero-emission vehicle (ZEV) and electric vehicle (EV) infrastructure throughout the state and increase access to ZEVs for all Californians including low- or moderate-income consumers. There are several rules accelerating the penetration of commercial ZEVs as well, including the Innovative Clean Transit regulation, the Advanced Clean Trucks regulation, and the Advanced Clean Fleet rule. Based on consumer choice models and regulatory drivers, California's Motor Vehicle Emission Factor model has conservatively estimated that by 2030 there will be about a 6 percent and 5 percent penetration of passenger and commercial EVs, respectively. Accelerating this rate is primarily driven by increasing access to EVs and charging infrastructure and developing a connective network. The State has also established the Low Carbon Fuel Standard, to reduce the carbon intensity of transportation fuels by spurring more investment in alternative fuels such as biodiesel and biomethane made from waste as well as green hydrogen. The use of alternative fuels provides an opportunity to decarbonize vehicles that do not yet have the technology to be electric as well as provides an opportunity for decarbonization for regions that have limited access to adequate electricity infrastructure for electric vehicles, like the Humboldt region.

Measure TR-6: Decarbonize 15% of passenger vehicle miles traveled by 2030 and 100% by 2045 through increased adoption of low and zero-emission vehicles and development of a regional electric vehicle charging and hydrogen fueling network.

Measure TR-6 aims to decarbonize VMT across the region through increased ZEV adoption and implementation of hydrogen hubs as an alternative to electric ZEVs. Though jurisdictions in Humboldt are expected to aid in aligning regional ZEV adoption with state goals, Humboldt's electricity infrastructure, and rural nature poses challenges with matching the State's goals or anticipated ZEV market rate. In recognition of these challenges as well as the pressing need to decarbonize the transportation sector this measure establishes a conservative target focused on ZEV adoption and increased electric utility capacity, which is consistent with RCEA efforts. Additionally, the measures includes promoting and informing residents of opportunities to offset cost of ZEVs and EV charging equipment installation such as those provided by the Inflation Reduction Act (IRA) tax credit opportunities for consumers. The IRA offers several tax credit opportunities for residents, businesses, and fleets to accelerate the electrification of the transportation sector. This includes tax credits for new clean vehicles (section 30D), used clean vehicles (section 25E), commercial clean vehicles (section 45W), alternative fuel vehicle refueling (section 30C), and an allocation of $1 billion to states, municipalities, Indian tribes and non-profit transportation associations to replace class 6 and 7 heavy-duty vehicles and school buses.[47] Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-6 are included in Table 20.

[47] Inflation Reduction Act of 2022, H.R.5376, 117th Congress (2021-2022).

Table 20 Measure TR-6 Actions

Action ID	Attribute	Action
T-6a	Engagement	Through the Regional Climate Committee partner with local organizations and community groups throughout the county to distribute outreach and promotional materials to residents and local businesses on the financial, environmental, and health and safety benefits of ZEVs and alternative fueling options. Provide information on available funding opportunities.
T-6b	Structural	Regional Climate Committee will identify jurisdictions or land-use zones, such as the Coastal Zone, that may benefit from a streamlined public and private EV infrastructure permitting process or Categorical Exemption and draft an ordinance in accordance with AB 1236. The Regional Climate Committee will develop the program as a template to be distributed to applicable jurisdictions for a coordinated approach and relieve individual jurisdiction workload on program development.
T-6c	Structural	The Regional Climate Committee with work with local jurisdictions to amend the Municipal Code to promote EV chargers in new development, redevelopment, and existing parking spaces. This may include requiring: ▪ Multifamily – CalGreen Tier 2 provisions ▪ Non-Residential – CalGreen Tier 2 provisions ▪ Designate 10 percent of parking spaces in urbanized areas as EV charging spaces ▪ Require that employers with over 25 employees designate preferred parking spaces for zero emission vehicles or hybrids only ▪ Require that new private parking lots grant ZEVs access to preferred parking spaces. ▪ Require larger residential rental building owners (more than 15 tenants) and large commercial building owners (more than 10,000 square feet) to install working electric vehicle chargers in 10 percent of parking spaces for new and existing buildings at time of renovation if projects are valued at $1,000,000 or greater
T-6d	Equity	Support ZEV car share companies in coming to the region. In jurisdictions with prevalent or planned development of multifamily housing, identify private sector partnerships and develop affordable, zero-emission vehicle car share programs with a priority to target vulnerable communities across all jurisdictions, promoting an accessible ZEV network.
T-6e	Partnership	For high employment areas, work with RCEA to develop new public access charging stations. Work with RCEA to develop partnerships with other charging companies (e.g. Go Station) as needed to accommodate charging station needs. Apply for Federal Charging and Fueling Infrastructure (CFI) grant to install electric vehicle chargers at community centers and in high employment areas.
T-6f	Funding	Partner with RCEA to provide an EV Monthly Bill Discount Program with increased discount opportunities for low-income customers in each jurisdiction. Promote affordable EV charging rates at jurisdiction-owned EV charging stations and adjust rates as necessary to cover program costs. Explore methods for charging different rates for different user groups or other programs to offset charging costs at public stations for low-income residents.

Action ID	Attribute	Action
T-6g	Structural	Regional Climate Committee will work with interested parties and RCEA to expand home and public fueling/charging station ZEV infrastructure in alignment with RCEA RePower Plan goals and address barriers to ZEV adoption which are not related to electric grid capacity limitations as outlined in the "North Coast and Upstate FCEV Readiness Plan." Evaluate opportunities for curbside street level II chargers in urbanized residential areas where off-street parking is limited to provide equitable access to at home chargers.
T-6h	Feasibility Study/ Funding	Regional Climate Committee, in partnership HCAOG, to lead the development of a Hydrogen Vehicle Infrastructure Implementation Plan for public access hydrogen facilities by 2030 which includes the following: 1. Evaluate a list of prioritized locations for hydrogen fueling stations across the county 2. Consideration of procurement needs and potential sourcing from the Redding Rancheria perspective green hydrogen facility 3. Identifies grant funding opportunities (e.g. LCFS)
T-6i	Structural	Based on the results of the Hydrogen Vehicle Implementation Plan, applicable jurisdictions with opportunities identified as high priority hydrogen fueling station locations will evaluate and promote public access hydrogen fuel station development. Leverage the Regional Climate Committee and other regional partnerships to explore funding opportunities for hydrogen fueling infrastructure through the LCFS or PG&E EV Fast Charge Program as well as develop public-private partnerships to attract private developers to the region to build out ZEV infrastructure.
T-6j	Funding	Identify and promote incentives and financing options for residential EV charger installations such as applying for Inflation Reduction Act (IRA) funding.
2030 GHG Emissions Reduction:		55,726 MT CO_2e
2045 GHG Emissions Reduction:		590,124 MT CO_2e
Co-Benefits:		Resource Efficiency, Public Health and Equity
KPI:		Increase in passenger vehicle ZEV adoption

Measure TR-7: Increase commercial zero-emission vehicle use and adoption to 10% by 2030 and 100% by 2045 through a regional charging network and development of hydrogen hubs

Measure TR-7 aims to boost commercial ZEV adoption across Humboldt County, focusing on EVs and hydrogen hubs for medium- and heavy-duty (MDHD) vehicles and trucks. Key actions under this measure include refining and implementing the North Coast MDHD ZEV Readiness Blueprint in collaboration with RCEA and SERC, engaging employers and fleet owners on Advanced Clean Fleet requirements and funding opportunities, and securing state and federal funding to expand ZEV procurement and charging infrastructure. These efforts align with California's mandates for achieving 100 percent ZEV populations in commercial fleets by 2045, as set forth in Executive Order N-79-20 and regulations like the Advanced Clean Trucks and Fleets. The region also plans to leverage infrastructure funding through state and federal programs to enhance electric and hydrogen fueling along Highway 101. By also investing in hydrogen refueling infrastructure, the region is able to better diversify the fleets and continue to move towards fleet ZEV transition even with electricity infrastructure barriers. Similar to Measure TR-6, this measure directs the Regional Climate Committee to pursue funding for commercial vehicle electrification through state and

federal programs such as the IRA described in the previous section. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-7 are included in 9.

Table 21 Measure TR-7 Actions

Action ID	Attribute	Action
T-7a	Structural	Through the Regional Climate Committee work with RCEA and the Schatz Energy Research Center (SERC) to refine and implement the North Coast Medium-Duty/Heavy-Duty Zero Emission Vehicle Readiness Blueprint for Humboldt County. As part of the refinement: 1. Conduct in depth study of physical siting opportunities and prioritize locations and a schedule to follow 2. Identify opportunities for local jurisdiction-supported accelerated fleet ZEV adoption and establish a strategy to promote ZEV/EV adoption within business fleets 3. For high priority fleets, establish a strategy and protocol to collaborate with PG&E 4. For high priority fleets, conduct a grid planning study to identify necessary infrastructure upgrades to support a fully built-out fleet and coordinate with PG&E regarding needs
T-7b	Funding	Work with the Regional Climate Committee and RCEA to secure funding from state and utility programs (such as the California Air Resources Board's Clean Vehicle Rebate Project, the Truck and Bus Voucher Incentive Program, LCFS, and the PG&E EV Fast Charge Program) and federal sources to increase procurement of EV or ZEV cars, trucks, and other vehicles and installation of EV/ZEV charging/fueling infrastructure. Additionally, provide information to businesses on state and federal programs to help businesses pursue conversion of fleets to ZEVs.
T-7c	Feasibility study	Conduct an inventory of business vehicle fleets in each jurisdiction and identify and engage with employers and businesses subject to the Advanced Clean Fleets rule as well as those to target for accelerating ZEV/EV adoption. As part of the study, identify private trucking company or manufacturer partnership opportunities for piloting new ZEV technology in the region.
T-7d	Engagement	Direct the Regional Climate Committee to partner with RCEA and SERC to work with local fleet operators, vehicle operators, and fleet maintenance staff to develop a comprehensive training program, including hosting workforce development trainings to discussing the benefits and technical requirements of ZEV fleets and supporting infrastructure. In addition to retraining the existing workforce, advertise and promote opportunities in the area to attract additional workforce support such as ZEV technicians and mechanics, and charging and fueling technicians.
2030 GHG Emissions Reduction:		17,441 MT CO_2e
2045 GHG Emissions Reduction:		279,775 MT CO_2e
Co-Benefits:		Public Health and Equity, Increased Resilience, Green Jobs
KPI:		Increase in commercial vehicle ZEV adoption

Measure TR-8: Electrify or otherwise decarbonize 12% of applicable small off-road engines (SOREs) off-road equipment by 2030 and 100% by 2045 and replace fossil diesel consumption with renewable diesel in 55% of applicable large diesel in alignment with EO N-79-20 by 2030.

The State is regularly updating mandates for off-road equipment. CARB's regulations specifically impact the sale and use of SOREs powered by gasoline or diesel, affecting equipment such as lawn mowers, generators, and pressure washers by 2024. State initiatives are focused on limiting sales of these engines and providing resources to replace current models. Additionally, amendments to CARB's Off-Road Diesel-Fueled Fleets Regulation require the majority of large, in-use off-road diesel equipment to use renewable diesel. Measure TR-8 aims to achieve significant emissions reductions from off-road equipment by electrifying where feasible and increasing access to renewable diesel, aligning with CARB's off-road equipment mandates. These efforts target reductions in local fossil fuel use and aim to decarbonize the off-road sector through regulatory measures, incentives, and community outreach. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-8 are included in Table 22.

Table 22 Measure TR-8 Actions

Action ID	Attribute	Action
T-8a	Engagement	Align with AB 1346 and develop and circulate educational materials regarding CARB's Small-Off Road Engines regulations requiring most newly manufactured small off-road engines such as those found in leaf blowers, lawn mowers, and other equipment to be zero emission starting in Model Year 2024. Phase 2 of the regulations will be implemented in Model Year 2028, when the emission standards for generators and large pressure washers will be zero. In addition, work with Humboldt Chamber of Commerce to disseminate information regarding the regulation to impacted businesses (e.g., lawn equipment dealers, commercial landscapers, construction companies) and promote transition of equipment sales and equipment use to electric alternatives.
T-8b	Structural	Regional Climate Committee to identify pathways to enforce CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation and the Commercial Harbor Craft Regulation requiring that diesel vehicles over 25 horsepower to procure and only use R99 or R100 renewable diesel. This should include establishing a means to track compliance and developing partnerships with fuel suppliers in the region to promote and support the increased procurement of renewable diesel in the region.
T-8c	Structural	Work with the Regional Climate Committee to develop and implement a plan to replace all jurisdiction owned end-of-life off-road equipment with zero-emission equipment as feasible. Procure renewable diesel for applicable jurisdiction owned diesel equipment that doesn't have available replacement equipment. Plan should include evaluation of current jurisdiction-owned equipment, alternative low or zero-emission options, prioritize equipment to replace first (e.g., largest GHG emission reduction potential), and a timeline for replacements that align with goals and feasibility of replacement.
T-8d	Engagement	The Regional Climate Committee will develop and manage an Off-road Equipment Replacement Program and Outreach Campaign that provides information to contractors, residents, and fleet operators in the region regarding alternatives to fossil-fueled off-road equipment, local fuel suppliers

Action ID	Attribute	Action
		with renewable diesel for sale, public health and safety benefits of alternative equipment technology, and funding opportunities available (i.e., Clean Off-Road Equipment Voucher Incentive Program), Zero-Emission Landscaping Equipment Incentive Programs).
T-8e	Funding/ Partnership	Through the Regional Climate Committee, Partner with North Coast Unified Air Quality Management District to identify funding opportunities to encourage residents to replace gas-powered landscaping equipment and off-road engines with zero emission equipment. This could include a rebate and incentive program for upgrading off-road equipment and switching to renewable diesel, or the development of an off-road zero emission landscaping equipment rental share program for county residents and businesses.
T-8f	Funding	Leverage the Regional Climate Committee to source State funding to decarbonize off-road equipment as a result of Executive Order N-79-20 and State Climate Funding Package.
2030 GHG Emissions Reduction: 49,143 MT CO_2e		
2045 GHG Emissions Reduction: 139,645 MT CO_2e		
Co-Benefits: Natural Resource Enhancement, Resource Efficiency, Public Health and Equity, Green Jobs		
KPI: Reduction of fossil fuel consumption in off-road vehicles		

Measure TR-9: Establish Humboldt as a pilot program for the decarbonization of the transportation sector to help drive State and philanthropic investment throughout Humboldt.

Measure TR-9 aims to establish the region as a pilot program for decarbonizing rural transportation emissions by developing a comprehensive vision that integrates relevant measures outlined in this plan and by attracting State and philanthropic investments. Decarbonizing rural transportation faces unique challenges such as longer travel distances, higher individual vehicle use, and lower average incomes, exacerbated by historical underinvestment in rural areas. By positioning Humboldt as a pioneer in rural decarbonization, this initiative seeks to foster county-wide collaboration for integrated transportation solutions. This pilot program not only aims to attract investments to enhance local infrastructure but also positions the region as a leader in rural sustainability, driving climate mitigation efforts at both local and regional levels. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-9 are included in Table 23.

Table 23 Measure TR-9 Actions

Action ID	Attribute	Action
T-9a	Feasibility	The Regional Climate Committee will develop and promote a vision and strategy for the regional community foundation to serve as a first mover/pilot in the State in the decarbonization of America's rural transportation systems.
T-9b	Funding	As a first mover in rural America, the Regional Climate Committee will pursue investment on behalf of the jurisdictions from philanthropy, the State, private businesses, etc. to fund the development of a Humboldt decarbonized rural transportation system.

Action ID	Attribute	Action
T-9c	Equity/ Engagement	With the support of the Regional Climate Committee, jurisdictions will directly engage members of disadvantaged and vulnerable communities in the development of the vision and strategy that aims to benefit all members of rural communities.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Natural Resource Enhancement, Resource Efficiency, Public Health and Equity, Green Jobs
KPI:		Funding received through philanthropies

Measure TR-10: Work with the State and renewable fuel industry to establish a renewable fuel network within Humboldt thereby funding new green industry and job growth to support the decarbonization of the transportation sector

Measure TR-10 aims to establish a biofuel network in Humboldt by collaborating with the State and the renewable fuel industry, focusing on green hydrogen, renewable diesel, and renewable natural gas (RNG) production. This network supports the decarbonization of transportation fuels and promotes economic development in the region. Due to challenges with electric infrastructure, biofuels serve as a transitional solution, enabling Humboldt to progress towards decarbonization goals. Hydrogen is particularly beneficial in rural areas like Humboldt, providing extended travel range compared to EVs and contributing to California's goal of establishing 200 hydrogen fueling stations by 2025. Bringing renewable diesel to the region is crucial for implementing Measure TR-8 and complying with CARB regulations. Renewable fuel production has the potential to help address wildfire risks by using existing forest biomass resulting from forest thinning projects that could otherwise fuel fires. Biofuels reduce emissions by substituting fossil fuels with renewable organic materials, which absorb CO_2 during growth. When combusted, biofuels release biogenic CO_2, minimizing net atmospheric carbon emissions compared to traditional fuels. This measure promotes alternative energy solutions and economic growth. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-10 are included in Table 24.

Table 24 Measure TR-10 Actions

Action ID	Attribute	Action
T-10a	Feasibility	The Regional Climate Committee will lead establishing a memorandum of understanding with RCEA, PG&E, CARB, CAL FIRE, the California Department of Agriculture, forest owners, and waste management companies to establish a plan to manage biomass and organic waste through the development of biofuel infrastructure in the region to position Humboldt as a first mover in active forest management to support a carbon-free future for California.
T-10b	Structural	The Regional Climate Committee will work jurisdiction to identify and help zone and entitle opportunity locations and specific areas throughout the region for streamlined development of renewable generation facilities where applicable. As part of effort, develop guidelines for evaluating renewable opportunities that meet sustainability criteria such as those set in the Natural

Action ID	Attribute	Action
		Resources Defense Council's "Biofuel Sustainability Performance Guidelines" to limit environmental impacts related to renewable production.
T-10c	Partnerships	The Regional Climate Committee will work with RCEA, PG&E, and State agencies to explore funding opportunities including grants and green bonds to help fund the development of renewable fuel infrastructure in the region and explore revenue options through the Low Carbon Fuel Standard.
T-10d	Structural	Establish Humboldt as a hydrogen hub by: 1. Promoting the pending The U.S. Department of Energy funded HTA hydrogen fueling station to attract additional hydrogen fueling station developers to the region 2. Partner with RCEA, SERC, and CalTrans, where applicable, to identify sites for hydrogen fueling stations that build off the North Coast and Upstate Regional Hydrogen Infrastructure Plan 3. Pursue partnerships with private developers to develop additional hydrogen fueling stations in the region 4. Pursue funding opportunities for hydrogen fueling infrastructure, such as through LCSF, AB 8 program, and the CEC Clean Transportation Program
T-10e	Funding	The Regional Climate Committee, in partnership with applicable incorporated cities will work with local utilities and State agencies to pursue grants earmarked for biofuel infrastructure from the Inflation Reduction Act.
T-10f	Partnerships	The Regional Climate Committee will establish partnerships with organic waste haulers to establish a consistent feedstock of biomass from forests and biowaste from residential and agricultural sources and forest service businesses/property owners.
T-10g	Engagement	Partner with the forestry services and waste haulers to host an Outreach Campaign informing the community on the economic and wildfire risk benefits of active forest management for bioenergy. Establish a working group/committee to involve local community members and businesses in the planning processes related to biomass and biowaste management locally.
T-10h	Equity/ Engagement	Leverage the Regional Climate Committee to create a region-wide workforce development programs to train the local workforce for biofuel jobs. Specifically target training towards members of disadvantaged communities and establish criteria in the planning process that prioritizes/requires the employment of local residents and businesses in the industry.
2030 GHG Emissions Reduction: Supportive		
2045 GHG Emissions Reduction: Supportive		
Co-Benefits: Resource Efficiency, Green Jobs, Increased Resilience		
KPI: Increased biofuel infrastructure and access in the region		

Measure TR-11: Lead by example and electrify or otherwise decarbonize 50% of municipal fleets by 2030 in alignment with the State's Advanced Clean Fleet Rule.

Measure TR-11 commits each jurisdiction to lead by example by electrifying or otherwise decarbonizing its municipal fleet in line with the State's Advanced Clean Fleet Rule. Under the rule 50 percent of vehicles added to fleets subject to the regulation from 2024- 2026 must be ZEVs with 100 percent of vehicles added to the fleet after 2026 must be ZEV. Alternatively, fleets may opt-in to the Milestones Option. If the Milestone Option is selected, fleet owners must continuously meet or exceed the ZEV Fleet Milestone percentage as defined by the regulation. Compliance reporting would be required annually and within 30 days of adding vehicles to the fleet. This Measure aims to exceed State requirements by decarbonizing 50 percent of the municipal fleets by 2030. This measure will reduce GHG emissions from municipal operations and demonstrate to the community the feasibility and benefits of transitioning to clean transportation technologies. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure TR-11 are included in Table 25.

Table 25 Measure TR-11 Actions

Action ID	Attribute	Action
T-11a	Structural	Regional Climate Committee will develop a Zero-emission Fleet Conversion and Purchase Policy to be adopted by each jurisdiction that requires new, and replacement of, municipal fleet vehicle purchases to be EVs or ZEVs. The policy will also include a schedule for replacement of fleet vehicles to comply with the State's Advanced Clean Fleet rule requiring 50 percent of medium and heavy-duty vehicle purchases be zero-emissions beginning in 2024 and 100 percent beginning in 2027. Report annually to CARB on fleet status as required per the Advanced Clean Fleets Regulation.
T-11b	Feasibility	Leverage the Regional Climate Committee conduct a feasibility and cost assessment to determine the number of EV/ZEV chargers and funds needed to support the fleet transition to 50 percent EV/ZEV by 2030.
T-11c	Funding	The Regional Climate Committee will secure funding from programs such as the California Air Resources Board's Clean Vehicle Rebate Project and the Clean Truck and Bus Voucher Incentive Program to increase procurement of EV or ZEV cars, trucks, and other vehicles and installation of EV/ZEV charging/fueling infrastructure at municipal facilities. Evaluate credit generation opportunities within the LCFS program for ZEV/EV fueling and charging stations for the municipal fleet to offset cost of infrastructure development needed to support transition.
T-11d	Structural	Install additional ZEV chargers/fueling stations in municipal parking lots for fleet, employees, and public use to meet projected demand in alignment with feasibility study.
T-11e	Structural	Leverage the Regional Climate Committee to develop a resolution in alignment with Measure T-8a, to replace jurisdiction-owned end-of-life small off-road equipment with electric equipment (e.g., lawn equipment and leaf blowers) at time of replacement and to procure renewable diesel for all applicable jurisdiction owned equipment. Each jurisdiction will need to adopt

Action ID	Attribute	Action
		the resolution while the Regional Climate Committee will support implementation.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Resource Efficiency, Public Health and Equity
KPI:		Reduction in fossil fuel consumption by municipal fleets

Waste

GHG emissions associated with solid waste generated by the community make up approximately 2 percent of Humboldt's regional GHG profile. A majority of emissions associated with waste generation are associated with the decomposition or organic material in the landfill. Therefore, the primary strategy for reducing emissions associated with solid waste generation is the diversion from the landfill and reuse of materials.

Strategy 8: Reduce organic waste

Senate Bill 1383 that took effect in 2022, requires all persons and entities to divert generated organic materials (e.g., food waste, green waste, etc.) from the garbage sent to the landfill. Entities that provide food are also required to donate excess food. Humboldt Waste Management Authority (HWMA) is the primary waste service provider in the region and is responsible for transferring solid and organic waste to processing facilities outside of the County. HWMA partners with waste haulers such as Recology to provide solid waste, recycling, and compost services to residents and business in the region in accordance with the solid waste recycle and diversion legislation. It is the responsibility of businesses and residents to comply with the requirements of Senate Bill 1383 through proper sorting and disposal of waste materials. Currently, waste produced in the region is sorted and trucked long distances to processing facilities which are outside of county boundaries. This not only limits the community's influence over waste management, but also contributes to regional transportation emissions to haul waste outside of the county. The Strategy for Humboldt solid waste focuses on bolstering regional infrastructure to allow for expanded organic and inorganic materials collection and separation services and providing local organic processing.

Measure SW-1: Establish a local waste separation facility and organics management to be able to reduce waste sent to landfills by 75% by 2030. Reduce GHG emissions by limiting truck trips required to ship waste out of the county and import compost from out of the county

HWMA is highly invested in reducing organic waste sent to landfill, though there are significant challenges in the local infrastructure that require monetary support and land use access necessary to achieve State goals. This measure primarily seeks to achieve SB 1383 requirements by providing support to HWMA through partnerships and funding and establishing a regional organic waste processing facility to better handle capacity and eliminate shipping costs. In the landfill, organic waste decays without access to light or oxygen and produces methane (CH4) gas. Diverting organic waste from the landfill reduces the occurrence of this anaerobic decomposition, providing the region with an important opportunity to reduce solid waste GHG emissions. Diverted organic waste can be further processed and repurposed into an array of different types of products, such as compost or renewable natural gas, which can serve to sequester or offset carbon emissions. Thus,

managing organic waste provides an important opportunity to employ circular economy methods to reduce GHG emissions and sequester carbon. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure SW-1 are included Table 26.

Table 26 Measure SW-1 Actions

Action ID	Attribute	Action
SW-1a	Feasibility	Regional Climate Committee to work with Humboldt Waste Management Authority (HWMA) and Recology to develop a SB 1383 waste management plan which assesses county-wide waste diversion needs, current capacity, and land-use opportunities for developing organic waste processing facilities within Humboldt County that will meet regional requirements. The assessment should also include an analysis of green bond funding opportunities, applicable green bond programs, and a strategic plan for pursuing funding through green bond programs.
SW-1b	Structural/Funding	The Regional Climate Committee will work with HWMA and an underwriter at a desired green bond program identified in the feasibility study to develop a green bond focused on providing funding for HWMA to construct a regional organics processing facility that will be used to meet SB 1383 diversion and procurement requirements.
SW-1c	Funding	Through the Regional Climate Committee, partner with Recology and/or HWMA to pursue funding, such as the Organics Grant Program from CalRecycle or for projects through California Climate Investment, to reduce generated organic waste from multi-family homes and expand waste diversions programs within the county.
SW-1d	Structural	Meet the requirements of SB 1383 to reduce organics in the waste stream by 75 percent below 2014 levels by 2030 and work towards 90 percent solid waste diversion by 2040 in applicable jurisdictions by leveraging the Regional Climate Committee to provide implementation support. Include activities such as: 1. Implement enforcement and fee for incorrectly sorted materials with sensitivity to shared collection. Utilize funding to implement programs and efforts to increase communitywide organic waste diversion 2. Assure adequate bin signage across commercial and residential areas of acceptable landfill, recyclable, and compostable materials 3. Identify public areas for adding organics collection and recycling bins where needed 4. Work with Recology and HWMA to conduct free food scrap collection pail giveaways and promote curbside organics collection service offered in applicable communities 5. Evaluate opportunities to have community compost hubs throughout the county that is easily accessible for community members. Partner with regional community gardens to increase community wide access to local compost bins 6. Identify long-term and alternate solutions for the community's wastewater bio-solids to avoid long hauling distances and develop local, beneficial reuse
SW-1e	Structural	Leverage Regional Climate Committee to draft a templated edible food recovery ordinance for individual jurisdictions to modify and adopt as needed. Alternatively utilize the County's adopted ordinance, HCC 521-13 as a template

Action ID	Attribute	Action
		or guide for drafting ordinances in individual jurisdictions that do not currently have such an ordinance. The ordinance will target edible food generators, food recovery services, or organizations that are required to comply with SB 1383. Ordinance requires all residential and commercial customers to subscribe to an organic waste collection program and/or report self-hauling or backhauling of organics. To support implementation of the ordinance, include the following activities: 1. Work with community food pantries, food suppliers, HWMA, and Recology to identify infrastructure needs to ensure edible food reuse infrastructure in Humboldt is sufficient to accept capacity needed to recover 20 percent of edible food disposed of within Humboldt 2. Regional Climate Committee to work with jurisdictions to establish an edible food recovery program where they are not currently present to minimize food waste 3. Leverage CalRecycle funding opportunities to support projects that prevent food waste or rescue edible food 4. Partner with existing food pantries that are locally appropriate for each jurisdiction to identify and advertise locations for surplus food to be taken in the community
SW-1f	Partnership	The Regional Climate Committee will work with HWMA, Recology and individual jurisdictions to implement structural changes listed above and increase service to jurisdictions without organics collection. This is applicable to both jurisdictions subject to SB 1383 and SB 1383 exempt jurisdictions to prepare for future needs to comply with SB 1383.
SW-1g	Feasibility Study	The Regional Climate Committee will coordinate between HWMA and regional wastewater treatment facilities to evaluate the opportunities to process/co-digest food waste at the wastewater treatment plants. Study should include evaluating existing infrastructure and ability to process food waste, an evaluation of necessary infrastructure upgrades needed to process food waste that would comply with SB 1383 standards for recovered organic products, and a return-on-investment evaluation. Study should also include recommendations of viable opportunities and identification of funding opportunities to support implementation and facility upgrades as necessary.
SW-1h	Engagement	The Regional Climate Committee in partnership with Recology and HWMA, will develop and conduct a conduct a Bring Your Own (BYO) education and outreach training for each jurisdiction community on reusables and implementing more sustainable packaging into daily use. The Regional Climate Committee will develop and provide information resources on HWMA and jurisdiction's websites. Partner with libraries and other existing facilities to market campaigns about waste reductions, reuse and repair.
SW-1i	Equity	Leverage the Regional Climate Committee to provide technical and outreach support to jurisdictions with organics and/or recycling services, by establishing relationships with multi-family property owners/managers to develop signage for their properties and to go door-to-door at each multi-family unit yearly to provide supplies and promote proper sorting.
SW-1j	Equity	HWMA to add extra bulky-item pick up service in all jurisdictions to low- and medium-income residents at a subsided cost to help minimize illegal dumping.

Action ID	Attribute	Action
SW-1k	Feasibility Study	The Regional Climate Committee will facilitate conducting waste characterization studies every 3 years to inform programs and policies. Leverage study to understand the waste stream and create a plan to increase diversion and reduce contamination. Work with contracted waste haulers and HWMA to develop and implement a comprehensive monitoring and quality control program with a focus on consumer behavior change. This should include tracking of weight or volume of waste produced; consider including information on billing to inform customers of their waste production and including incentives for reduction. Explore reducing frequency of service for residential and commercial waste to least often possible pick up to reduce truck miles/trips.
SW-1l	Equity/ Engagement	Through the Regional Climate Committee create a multi-lingual training/outreach program that can be used in all jurisdictions that is free and accessible to all residents and employees to learn about circular economy practices and diversion strategies and effects of overconsumption. Conduct targeted, multi-lingual, culturally appropriate, and geographically diverse circular economy educational and technical assistance campaigns based on outcomes of waste characterization studies and comprehensive monitoring and quality control program. Topics could include reuse, prolonging the life of common materials and items, and sustainable purchasing. Focus outreach campaign on food waste not going to landfill.
SW-1m	Partnership	Utilize the Regional Climate Committee to partner with schools, retirement communities, and other large institutions throughout the county to create waste diversion and prevention program/procedure/plan.
2030 GHG Emissions Reduction: 29,689 MT CO_2e		
2045 GHG Emissions Reduction: 32,568 MT CO_2e		
Co-Benefits:		Resource Efficiency
KPI(s):		Change in total tonnage of landfilled waste (%) Change in landfilled organic waste compared with 2014 baseline levels using waste characterization studies (%)

Water & Wastewater

Emissions associated with water are due to indirect emissions from the electricity consumption for water conveyance, treatment, and delivery to consumers. As such, the GHG emissions from water consumption are included in building electricity GHG emissions in Humboldt's regional inventory. GHG emissions associated with wastewater make up 1 percent of Humboldt's regional GHG profile. Emissions associated with wastewater are due to the direct fugitive emissions from wastewater treatment.

Strategy 9: Conserve water and reduce wastewater emissions

Water and wastewater infrastructure can be managed to reduce the energy needed to transport water and wastewater, and associated GHG emissions. Residential and commercial buildings use water both indoors for cooking, cleaning, bathing, and toilet flushing, and outdoors to irrigate landscaping and maintain pools and fountains. Water efficiency measures not only reduce the amount of water used but also reduce the amount of energy needed to convey, treat, and distribute water. Additionally, water consumption and wastewater generation are interconnected, therefore water conservation efforts will lead to decreases in wastewater generated, as less water is treated through the wastewater system. Primary strategies for reducing emissions associated with wastewater generation are to reduce water consumption and wastewater generation and implement less GHG intensive processing technologies.

Measure WW-1: Expand regional opportunities for implementation of wastewater decarbonization technologies such as anaerobic digesters to reduce GHG and produce renewable fuel sources.

The community relies on several wastewater facilities and septic systems throughout the county, of which a couple utilize anaerobic digester systems for the capture and utilization of biogas. Additionally, one anaerobic digester in the region is not able to operate 100 percent of the time. Measure WW-1 focuses on expanding regional opportunities for the implementation of wastewater decarbonization technologies, including anaerobic digesters, throughout the Humboldt region. This measure aims to reduce GHG emissions from wastewater treatment processes and generate renewable fuel sources that can be used to decarbonize wastewater facility building energy or provide a supply of decarbonized energy to the community. It also investigates opportunities for expanding wastewater treatment capabilities to process organic waste that would otherwise go to landfill, supporting solid waste diversion and GHG reduction efforts. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure WW-1 are included Table 27.

Table 27 Measure WW-1 Actions

Action ID	Attribute	Action
WW-1a	Feasibility Study	Regional Climate Committee to conduct a feasibility study(s) in jurisdictions with wastewater processing facilities or community primary reliance on septic systems identifying improved wastewater technologies which could be used to mitigate wastewater processing emissions and generate renewable fuel such as RNG or offset on-site process energy use via electricity generated with an anaerobic digester, particularly in relation to septic system improvements. The study should include an in-depth analysis of the current wastewater treatment methods utilized throughout the region, identification of upgrade opportunities

Action ID	Attribute	Action
		and potential co-benefits to the community, and technological restrictions based on regional water quality and discharge requirements. The study should also specifically consider expanding wastewater treatment capabilities to process food waste that would otherwise go to landfill.
WW-1b	Partnership	The Regional Climate Committee will partner with regional wastewater service providers to understand current methods, areas for improvement, and whether there is interest in upgrading their wastewater treatment processes.
WW-1c	Funding	The Regional Climate Committee, with input from the wastewater treatment providers, will research and pursue grants to wastewater facility upgrades or home septic system improvements (where applicable), such as applying to the California State Water Board for Clean Water State Revolving Fund grants, or the Community Development Block Grant Program.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Natural Resource Enhancement, Resource Efficiency
KPI:		Reduction in wastewater generation and wastewater emissions

Measure WW-2 Reduce per capita potable water consumption by 15% by 2030.

Emissions associated with water are due to electricity usage. Because all water providers for the Humboldt region are located within the County boundaries, the energy use associated with water treatment is captured in the building sector and would be addressed with improvements in energy efficiency and acquiring carbon-free energy. However, water conservation efforts also have the added benefit of putting less pressure on water resources across California during times of drought and ensuring more long-term resilience of this vital resource. Measure WW-2 focuses on promoting water conservation by reducing per capita potable water consumption and increasing access to and use of recycled water. The State is currently finalizing the Making Water Conservation a Way of Life regulation, which will set water conservation standards and objectives for certain categories with targets set for each urban water retailer. This measure's primary focus is providing support to water retail provides in the region to align with the regulation as well as providing educational and outreach materials to promote water conservation in the community and from large water users. Additionally, the Measure encourages local water providers and wastewater services to work together to identify opportunities for expanding the recycled water network in the region. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure WW-2 are included Table 28.

Table 28 Measure WW-2 Actions

Action ID	Attribute	Action
WW-2a	Structural	The Regional Climate Committee will work with regional water providers to update their Urban Water Management Plan every 5 years, as required by the State, and implement the identified demand reduction actions to ensure compliance with the State's Making Water Conservation a Way of Life regulations. Include new actions in the UWMPs as needed to achieve State regulations, which may include:

Action ID	Attribute	Action
		1. Develop or amend Water Shortage Contingency Plans in the region to develop water waste restrictions for households, businesses, industries, and public infrastructure 2. Work with large water users and other stakeholders to develop an On-Site Water Reuse Plan to maximize utilization of local water supplies decreasing energy intensity of distribution 3. Revisit and update the Model Water Efficient Landscape Ordinance as needed. Engage, through regional partnerships, with builders and developers to provide information on the requirements for development projects 4. Develop an ordinance for installation of dual-plumbing water systems that utilize greywater or recycled water for irrigation at new residential and commercial construction 5. Increase engagement with the community, specifically low-to-moderate income residents, to understand available incentives or rebates, options, and programs to reduce per capita water use. Leverage regional programs and partnerships with local organizations to expand water conservation outreach 6. Revise water and wastewater rates as necessary to ensure cost of service is covered
WW-2b	Engagement	Through the Regional Climate Committee work with the Humboldt County Resource Conservation District (HCRCD) to develop water conservation promotional materials, programs and outreach efforts are in multiple languages and accessible for low-income or disadvantaged and vulnerable communities. Continue to offer and expand water conservation programs to the community including educational programs like water education program for schools and water wise landscape classes as well as incentives like free water conserving deceives, and rebates for rainwater collection systems and turf replacement.
WW-2c	Feasibility Study	The Regional Climate Committee will work with the local water and wastewater providers in the region to develop a Recycled Water Master Plan to assess the feasibility of expanding the recycled water system in the region and establish a roadmap for a recycled water expansion program. The plan will identify locations available for recycled water use and establish a schedule for potable water replacement with recycled water in appropriate applications residentially, commercially, and municipally, and determine recycled water user fees.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Natural Resource Enhancement, Resource Efficiency
KPI:		Reduction in per capita water consumption

Carbon Sequestration

While the region will reduce GHG emissions across all sectors to achieve as close to zero GHG emissions as possible, some GHG emissions are expected to remain under each jurisdiction's control in 2045. These GHG emissions are expected to be from hard-to-decarbonize sectors, such as long-haul transportation, which have technological limitations or are costly to decarbonize. They can also be expected from sectors that require significant behavior change to decarbonize, such as VMT reduction, because it takes time to normalize new behaviors. Carbon sequestration will offset these remaining GHG emissions to help Humboldt achieve carbon neutrality.

Carbon sequestration is the process of removing carbon from the atmosphere using technology and natural solutions. Carbon can be removed from the atmosphere both naturally by trees and the carbon cycle as well as industrially via carbon capture equipment. The State recognizes that while on-the-ground action for local carbon sequestration and Natural Working Lands (NWL) management will largely be executed and managed by the local government, State agencies must support these communities to implement such actions which includes providing resources, developing implementation frameworks, and providing the increased capacity and technical assistance to the local and regional partners. The State plans to support local governments and partners through various initiatives, including the development of funding programs.

Strategy 10: Increase Carbon Sequestration

The State goal of reaching carbon neutrality by 2045 relies on up to 15 percent of total emissions being removed via carbon sequestration. At this time, the technology is not available to achieve this level of carbon removal and further analysis would need to be conducted to determine the possibility of achieving this through improved natural land management in Humboldt's forests and wetlands. This Strategy emphasizes the identification and funding of both industrial and nature based physical removal of carbon from the atmosphere to store it in long-term forms, playing a crucial role in achieving regional carbon neutrality by 2045. It focuses on obtaining resource support from the State to obtain NWL objectives and developing private partnerships to explore alternative solutions for carbon sequestration, such as direct air carbon capture and sequestration.

Measure CS-1: Research and implement feasible carbon sequestration technology opportunities to support growth and expansion of green jobs industry within the region

Measure CS-1 focuses on research needed to understand the viability of carbon sequestration technologies for future regional development to aid in the reduction of GHG emissions and stimulate the growth of the green jobs industry in the area. Artificial (i.e. non-biological processes) carbon capture and sequestration technologies typically capture CO2 from the atmosphere, or from point source emissions, and store the captured CO2 in the natural environment. However, with advancing need for solutions, other methods of carbon capture have begun to emerge, such as CO2 capture from seawater. By assessing the feasibility of the carbon capture technologies available, the region will set the groundwork for later implementation of technologies which suit the areas and the community's needs. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure CS-1 are included Table 29.

Table 29 Measure CS-1 Actions

Action ID	Attribute	Action
CS-1a	Feasibility Study	Conduct a carbon sequestration feasibility study facilitated by the Regional Climate Committee to identify emergent technology for carbon sequestration and regional viability of implementation, including consideration of identified carbon sequestration technology facilities (e.g. ocean carbon capture, agriculture methane capture, forest biomass to biochar soil amendment, biochar wastewater filtration, forest biomass as green hydrogen fuel, etc.).
CS-1b	Partnerships/ Engagement	As part of Regional Climate Committee responsibilities established in Measure C-1, work with RCEA, HWMA, wastewater facilities, local tribes, businesses, and other applicable interested parties as appropriate to address potential carbon sequestration technologies available to the region, understand limitations and barriers, and develop solution pathways to implementation.
CS-1c	Partnerships/ Structural	Based on feasibility study, leverage the Regional Climate Committee to explore partnerships with technology providers and regional research laboratories (e.g. Cal Poly) for viable carbon sequestration technologies to deploy carbon sequestration pilot projects in the region.
CS-1d	Funding	The Regional Climate Committee shall dedicate staff time or a representative for researching emergent carbon sequestration technologies and potential grant funding sources.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Resource Efficiency, Increase Resilience, Green Jobs
KPI:		Identification of viable technologies

Measure CS-2: Offset fossil-based emissions and increase carbon sequestration in the community by achieving SB 1383 procurement requirements (0.08 tons recovered organic waste per person) by 2030.

SB 1383 requires each jurisdiction in California to procure recovered organics waste products to meet annual procurement targets developed by CalRecycle. Recovered organic waste products include compost, mulch, renewable energy generated from anaerobic digestion (e.g., transportation fuel, electricity, and gas for heating), and electricity generated from biomass conversion. While a jurisdiction has the option to procure any combination of recovered organic waste products to fulfill 100 percent of its procurement target, jurisdictions in Humboldt currently aim to meet their procurement targets primarily through sourcing of compost to leverage the carbon sequestration benefits it provides when applied to community lands. Measure CS-2 puts the region on a path to meeting the SB 1383 procurement targets by 2030 and maintain it thereafter. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure CS-2 are included Table 30.

Table 30 Measure CS-2 Actions

Action ID	Attribute	Action
CS-2a	Structural Change	Leverage the Regional Climate Committee to support jurisdictions in enforcing compliance with SB 1383 and aim to exceed the baseline requirement by establishing a minimum level of compost application per year on

Action ID	Attribute	Action
		applicable/appropriate land throughout the region. Maintain procurement policies to comply with SB 1383 requirements for jurisdictions to purchase recovered organic waste products.
CS-2b	Structural Change	Regional Climate Committee to facilitate the establishment of a compost broker program primarily in rural jurisdictions central to agricultural industries which provides agricultural communities with incentives such as subsidies or community shared compost application equipment to aid in the procurement and distribution of high-quality compost.
CS-2c	Engagement	The Regional Climate Committee will work with Recology to provide residents, businesses, and developers with promotional material on where compost can be taken and how it can be used (i.e., landscaping).
CS-2d	Equity	The Regional Climate Committee will work with Recology, HWMA, and community-based organizations to provide free compost procurement services to low-income households and small businesses in all jurisdictions.
CS-2e	Feasibility Study	The Regional Climate Committee will facilitate a soil assessment study to identify applicable locations and quantity of compost that can be applied within each jurisdiction to help meet the procurement requirements of SB 1383 and provide household incentives for small-scale implementation. As part of study, evaluate other carbon sequestration opportunities associated with soil amendments such as biochar.[48]
CS-2f	Feasibility Study	Leverage the Regional Climate Committee to identify viable alternative opportunities for achieving SB 1383 compliance based on activities which are already occurring within the region (e.g. diversion of wastewater biosolids from landfill for agricultural application), or activities which provide co-benefits to the community (e.g. sourcing RNG to replace natural gas consumption, diversion of lumber or yard waste from landfill to be used to produce green hydrogen).
CS-2g	Funding	The Regional Climate Committee with dedicate staff time for researching alternative pathways for achieving SB 1383 compliance and obtaining grant funding for procurement and distribution incentive programs across all jurisdictions.
CS-2h	Partnerships	Through the Regional Climate Committee collaborate with local schools, Public Works, and Parks and Recreation to identify opportunities to apply compost to landscaping, potentially in addition to open space land conservation efforts.
CS-2i	Partnerships	In jurisdictions currently subject to SB 1383 requirements, utilize the Regional Climate Committee to work with regional organic waste haulers (Recology) and local small-scale commercial composters (e.g. The Local Worm Guy) to identify opportunities for a regional compost procurement program to help meet and exceed the organics procurement provisions of SB 1383 as well as streamline hauler routes through regional collaboration.
2030 GHG Emissions Reduction:		1,532 MT CO_2e
2045 GHG Emissions Reduction:		1,681 MT CO_2e

[48] Note that biochar is not considered SB 1383 recovered waste product; however, biochar is a known soil amendment opportunity with enhanced carbon sequestration which is why it should also be considered as part of the soil amendment study.

Action ID	Attribute	Action
Co-Benefits:		Natural Resource Enhancement, Resource Efficiency, Increase Resilience, Green Jobs
KPI:		Procurement of SB 1383 compliant recovered organic products

Measure CS-3: Develop a County-wide Natural and Working Lands GHG Inventory baseline by 2027 to better understand the existing and future GHG sequestration and help obtain resources to protect and increase natural carbon sequestration occurring in the region as well as promote biodiverse forests and wetlands resistant to wildfire

The region is anticipated to contribute significantly to the State's carbon sequestration efforts and may even serve as a larger sink than contributor, but this cannot be verified without a comprehensive inventory of carbon stocks in the region. Establishing a baseline will aid the county in pursuing State funding to protect the county's forestland assets and receive credit for aiding in State goals to protect natural working lands. Measure CS-3 directs the County to build off of North Coast Resource Partnership's 2017 Northern California regional natural working lands study to establish an updated County-wide Natural and Working Lands GHG Inventory baseline by 2027. This initiative seeks to provide a comprehensive understanding of current and future potential GHG sequestration within the county's natural and working lands. The Natural and Working Lands inventory baseline will be folded into future RCAP updates and used to establish GHG sequestration tracking metrics and monitor resiliency efforts. Developing this Natural and Working Lands inventory will identify key areas where natural carbon sequestration is occurring and highlight opportunities to protect and expand these areas. By promoting biodiverse forests and wetlands that are resilient to wildfire, Measure CS-3 supports the dual goals of enhancing carbon sequestration and mitigating climate risks. This measure will help the region obtain funding and resources necessary for conservation and restoration projects, ultimately contributing to long-term climate resilience, biodiversity, and the health of natural ecosystems. Actions, co-benefits, key performance indicator, and specific quantitative GHG emissions reductions associated with implementation of Measure CS-3 are included Table 31.

Table 31 Measure CS-3 Actions

Action ID	Attribute	Action
CS-3a	Feasibility Study	The County will partner with the North Coast Resource Partnership and other interested parties to develop an updated, Humboldt specific natural and working lands GHG Inventory which builds off of the 2017 northern California regional study conducted by the North Coast Resource Partnership. Development of the GHG Inventory should include consideration of requirements specified by prospective grant programs the region would like to pursue.
CS-3b	Funding	The Regional Climate Committee will apply for at least one grant (e.g. Sustainable Agricultural Lands Conservation Program) every three years for obtaining grant funding for restoration and preservation activities with a focus on projects that have been unable to be fully completed due to funding constraints.
CS-3c	Equity/ Partnership	The Regional Climate Committee will work with interested parties, local tribes, and agricultural communities to identify opportunities for expanding wetland

Action ID	Attribute	Action
		conservation areas in a manner that equitably addresses tribal and agricultural interests.
CS-3d	Structural	The Regional Climate Committee and County will work with CalFire and Humboldt County Resource Conservation District to increase necessary equipment and infrastructure resources to better maintain public and private forested area with focus on understory clearing to prevent wildfire.
CS-3e	Partnership	The Regional Climate Committee and the County will work with Humboldt County Resource Conservation District and interested parties to identify challenges and barriers for private sector landowners to implement forest best management practices as identified by CalFire and the Humboldt County Resource Conservation District.
CS-3f	Engagement	The Regional Climate Committee will support rural communities with the development of a community-based volunteer program supporting restoration project activity to create a maintained restoration process. This may involve partnering with local community organizations to communicate sequestration opportunities and facilitate volunteer maintenance projects.
CS-3g	Feasibility Study	Through County efforts, facilitate annual reporting as part of the restoration plan mapping the existing restoration projects and open space lands to gauge progress in restoration activities over time as well as identify any gaps in maintenance activities related to ongoing projects. Incorporate GHG calculations into this monitoring plan to report on the region's contribution as a GHG source or sink.
CS-3h	Structural/ Funding	Engage with third-party to audit the Natural and Working Lands inventory and monitoring reports. Update County-wide inventory to include GHG emissions and sinks from Natural and Working lands in the region. Leverage this data to pursue State funding to protect the region's resource as a GHG sink for the State.
2030 GHG Emissions Reduction:		Supportive
2045 GHG Emissions Reduction:		Supportive
Co-Benefits:		Natural Resource Enhancement, Resource Efficiency, Increase Resilience, Green Jobs
KPI:		NWL Baseline Inventory

5 Implementation

Based on substantial evidence and RCAP specific data, the measures and actions detailed in the previous section have been developed to be capable of reducing a specific quantity of GHG emissions within a reasonable period of time, considering economic, environmental, legal, social, and technological factors. Humboldt will continue to engage the community, provide informative progress updates, and create ongoing opportunities to solicit and incorporate community feedback as policies and programs are developed and infrastructure is constructed. See Appendix C for details on the substantial evidence used to quantify the emissions reduction attributable to each measure. The following section establishes an implementation plan that has been developed based on feasibility given budget and staff capacity.

5.1 CEQA Streamlining

As discussed at the beginning of this document, the CEQA Guidelines provide an option for new projects to streamline the CEQA analysis of GHG emissions by tiering off of a "qualified" GHG reduction plan. The RCAP is a long-term programmatic plan consistent with CEQA Guidelines (See Table 1) that will be implemented through regular monitoring and updates to meet the State's SB 32 GHG emission reduction goals and demonstrate substantial progress towards the State's AB 1279 carbon-neutrality goals. Because the RCAP meets these requirements, if projects and plans within the Humboldt region in jurisdictions that have adopted the RCAP are consistent with the RCAP, CEQA analysis can be streamlined by presuming the project's GHG emissions are not significant. These projects and plans can utilize a CEQA GHG Emissions Analysis Compliance Checklist to demonstrate consistency in a streamlined process. Projects and plans within the Humboldt region that are not consistent with the RCAP, must complete a different assessment utilizing quantitative thresholds of significance to evaluate GHG emissions impacts.

5.2 Tracking, Monitoring, and Reporting

A key to successful implementation is monitoring progress and tracking implementation over time. Therefore, this RCAP should be viewed as a strategic framework that will be reevaluated on a bi-annual basis. As part of the RCAP, Measures will be implemented using a phased approach with progress reports prepared on a bi-annual basis starting in 2026. The bi-annual progress reports will include the preparation of a regional community-wide GHG emissions inventory, as well as status update on implementation of RCAP Measures and Actions. Tracking implementation of the plan in conjunction with the inventory updates will demonstrate the progress the region is making in reducing GHG emissions and achieving its 2030 goal.

Successful implementation of a long-range planning document, like this RCAP, requires detailed tracking that will be completed by the lead responsible party indicated in the Implementation Plan provided in Table 32. This approach relies on individual expertise with collective vigilance instead of placing the onus on one person or department. This approach is essential to successful implementation because it gives everyone a seat at the table and demonstrates that climate action requires collective participation to result in real change. The Regional Climate Committee will oversee the progress monitoring and facilitate progress report preparation with each responsible party indicated. Each responsible party will be responsible for tracking implementation and sharing

data with the Regional Climate Committee. The progress report will include an evaluation of the prepared regional inventory against the regionals 2030 and 2045 targets to assess if the region is on track to achieve the 2030 GHG emissions reduction goal.

5.3 Implementation Plan

In order to achieve the 2030 GHG emissions reductions goals discussed in Chapter 4 and make substantial progress to the 2045 goals, Humboldt will begin implementing the measures and actions as soon as possible to make real progress over the next few years. The RCAP takes a phased approach to implementation beginning with Phase 1, which will occur in the short-term over the next two years (2024-2026). Phase 2 would include implementation of mid-term measures that should begin no later than 2026, while Phase 3 would include implementation of longer-term measures that should begin no later than 2028, that are anticipated to occur after feasibility studies are complete and initial measures are implemented. The RCAP identifies the Phase in which to begin implementation of a specific action. Additionally, actions already in progress are denoted as such and actions that will be ongoing, such as an education program, will have a start date and indicate that the action is ongoing.

Some Measures, such as establishment of the Regional Climate Committee to facilitate the implementation of the RCAP is critical to implement first and quickly. Additionally, some actions such as adopting ordinances to decarbonize building stock, preparing educational materials, or conducting the initial feasibility studies can be accomplished on a short timetable; while others, such as implementation of strategies to increase infrastructure for active transportation or ZEVs may require longer timelines to conduct a feasibility assessment, obtain funding, and rollout any required infrastructure change.

If the actions identified in the RCAP to meet the 2030 GHG emissions reduction milestone goal are not implemented or if the bi-annual inventory and progress report indicates that the region is off-track from achieving the 2030 goal, additional actions may need to be developed to meet the 2030 goals. The longer taking action is delayed, the more significant actions need to be taken to achieve the longer-term GHG emissions reduction targets. Table 32 outlines the implementation timeframe of each RCAP action and the responsible party for leading the implementation and monitoring.

Implementation Team

Humboldt recognizes that to reduce the impacts of climate change and meet the State goals and regional GHG reduction targets, it will take collaboration for successful implementation. The establishment of a Regional Climate Committee will provide significant support in facilitating implementation of the RCAP and in reporting out progress, however it is imperative that there is participation at the jurisdictional and regional partner level. The Implementation Plan shown in Table 32 designates responsible parties for each Action, ensuring that those with relevant expertise are involved in implementation. As the RCAP includes efforts from all jurisdictions within the Humboldt County area, titles and responsibilities of municipal departments by jurisdiction may vary. To provide a common understanding of the types of jurisdictional departments and department responsibilities intended to oversee implementation of a particular action, the following definitions have been established:

- **Municipal Public Works**: city and county departments, as applicable, which oversee infrastructure and utilities management

- **Municipal Community Development**: city and county departments, as applicable, which is responsible for community engagement
- **Municipal Facility Management**: city and county departments, as applicable, which oversees municipal fleets and the operation and management of municipal buildings
- **Municipal Planning/Building**: city and county departments, as applicable, which oversees permitting, permit compliance, and building codes

In addition to governmental staff, there are Joint Powers Agencies (e.g., HWMA, HCAOG), regional partners (e.g., RCEA, HTA), and community-based organizations that also play a role in implementation of RCAP Actions and Measures and will be indicated as a responsible party in the Implementation Plan.

5.4 Looking Forward

Humboldt will conduct ongoing implementation and monitoring of the RCAP GHG emissions reduction measures and report on this progress to jurisdictions City Councils, the County Board of Supervisors, and the public on a bi-annual basis beginning in 2026. A comprehensive RCAP update for GHG emissions reduction targets beyond 2030 will be required. In 2029, it is expected that Humboldt will commence the process to review and update the RCAP to augment or develop new measures and actions to meet the 2045 GHG emissions reduction target. As new technologies and State guidelines are made available and State regulations are adopted, Humboldt will need to augment the RCAP to facilitate further GHG emissions reduction and meet the 2045 carbon neutrality goal.

If, prior to 2029, Humboldt is not making satisfactory advancements toward its 2030 GHG emissions reduction targets, it may be necessary to revise the RCAP. This update would set new or stronger goals for emissions reduction, aiming to increase the reduction efforts and maintain its status as a CEQA-qualified GHG emissions reduction plan. Updating the RCAP could require additional implementation of the existing actions and/or additional actions such as shifting incentive and educational programs to mandatory requirements for the latter Phases of Implementation.

Table 32 Implementation Work Plan

Action ID	Action	Responsible Parties	Timeframe
Measure C-1: Establish a Regional Climate Committee comprised of elected officials from each jurisdiction, HTA, HCAOG, HWMA, and RCEA to be administered by the County.			
C-1a	Pursue and obtain funding to create a Climate Program Manager position to lead the coordination efforts of the Regional Climate Committee. The Regional Climate Committee will be responsible for implementing RCAP measures and actions. The Climate Program Manager will facilitate the work of the Regional Climate Committee made up of responsible parties from each of the region's jurisdictions and agencies. The Manager will work with the Committee to utilize the RCAP as a strategic plan outlining the goals of the Coalition. The Manager will coordinate with staff of the participating jurisdictions and agencies to undertake the work directed by the Committee. Finally, the Manager will develop an annual progress report on RCAP implementation annually to City Councils and County Supervisors to measure progress and establish accountability in achieving RCAP emissions reduction goals.	Municipal Planning/Building (County)	Phase 1 - ongoing
C-1b	The Regional Climate Committee will develop and provide models, pilot programs, and template policies or ordinances that enable each jurisdiction in the region to implement uniform changes and facilitating local communities in making the necessary structural adjustments to reduce GHG emissions. This will reduce inefficiencies and duplication of effort while ensuring a coordinated regional approach.	Climate Committee	Phase 1 - ongoing
C-1c	Develop and distribute promotional materials and programs across the region to inform the community, gain buy-in, and promote awareness of new and existing programs and opportunities. Leveraging the Regional Climate Committee to prepare such materials will allow for limited resources in the region to be pooled on such efforts thereby reducing strain on jurisdictional staff.	Climate Committee Municipal Community Development	Phase 1 - ongoing

Action ID	Action	Responsible Parties	Timeframe
C-1d	Leverage regional programs to engage and support frontline communities that may experience secondary impacts or not benefit directly from the measures' objectives. Ensure these communities can access regional resources or funding opportunities to mitigate identified impacts and benefit the entire community. The Regional Climate Committee will be charged with engaging with regional programs and identifying appropriate community-based organizations to lead and guide such engagement efforts to ensure voices of vulnerable communities are involved in RCAP implementation and planning.	Climate Committee	Phase 1 - ongoing

Action ID	Action	Responsible Parties	Timeframe
C-1d	Utilize regional resources to conduct efficient regional studies, avoiding redundancy, that provide a clear understanding of the details, obstacles, and feasibility of proposed programs. This includes necessary analyses to identify the best path forward or the feasibility of implementing specific measures. The Regional Climate Committee will aid in identifying the regional expertise and coordinating studies across the region to limit duplication of efforts.	Climate Committee	Phase 1 - ongoing
C-1e	Collaborate regionally to identify and pursue relevant and impactful grants and financial backing to facilitate RCAP implementation across the region. Ensure resources and efforts are directed towards securing funds that can be distributed across the region, such as grants or rebates to support measure implementation and adequate program staffing. Direct the Regional Climate Committee to pursue 3-5 grants for regional efforts to meet RCAP goals per year.	Climate Committee	Phase 1 - ongoing
C-1f	Use the collaborative network of local jurisdictions, agencies, and community-based organizations (CBOs) to attract additional internal and external support and expertise. This includes engaging community organizations that are well-positioned to consistently and sustainably advance specific measures. Leverage the Regional Climate Committee to identify and provide assistance to local jurisdictions' high priority project pursuits which support the RCAP.	Climate Committee	Phase 1 - ongoing
Measure BE-1:	***By 2030, source 90% of grid-supplied electricity from renewable and carbon-free sources.***		

Action ID	Action	Responsible Parties	Timeframe
BE-1a	Coordinate and support Redwood Coast Energy Authority (RCEA) in developing an effective energy strategy. Strategy should include conducting an assessment to identify the potential obstacles and detail the steps to providing provide renewable and carbon-free power and decarbonization programs outlined in the RePower Humboldt plan such as: 1. Future Capacity constraints 2. Customer solar installations 3. Customer electrification support 4. EV charging infrastructure buildout 5. Building Electrification 6. Advanced biofuel infrastructure 7. Evaluate enrollment rates in RCEA programs annually to understand why residents and businesses opt out or opt to procure standard grid electricity. Use results to adjust strategy for increasing enrollment accordingly	Municipal Public Works RCEA	Phase 1
BE-1b	Through the Regional Climate Committee develop a template policy or ordinance for regional jurisdictions to use to require new commercial and industrial developments to acquire electricity from renewable and carbon-free energy sources such as enrolling with RCEA, incorporating on-site renewable generation, or enrolling in PG&E's 100 percent renewable rate. For each jurisdiction, adapt the templated policy or ordinance as necessary and adopt by 2026.	Climate Committee Municipal Planning/Building Board of Supervisors	Phase 1
BE-1c	Collaborate across the region with interested parties including tribes, labor unions, workforce development boards, State agencies, colleges, universities, industries, and community organizations to increase local energy workforce development. Partner with RCEA, Humboldt State University, and College of the Redwoods to actively develop education and certifications for electrical and construction trades by 2027 to ensure develop a skilled workforce ready to meet the region's energy needs.	Climate Committee Municipal Public Works	Phase 1 – 2
BE-1d	Leverage the Regional Climate Committee to work with RCEA to reduce opt-out rate for new customers to no more than 2 percent. Develop promotional educational materials to inform community members on available incentives and benefits of clean energy and energy efficiency.	Municipal Public Works RCEA Climate Committee	Phase 1 - ongoing

Action ID	Action	Responsible Parties	Timeframe
BE-1e	Engage with the community and partner with community organizations to facilitate increased communication, technical assistance, and access to energy incentives through the California Alternative Rates for Energy (CARE), Family Electric Rate Assistance (FERA), and Low-Income Home Energy Assistance Program (HEAP) programs for low/moderate income households.	Municipal Public Works Municipal Community Development	Phase 1 - ongoing
BE-1f	Work with RCEA to expand and advertise regional energy funding programs as described in the RePower Humboldt plan. Facilitate Humboldt residents and businesses in utilizing energy finance programs such as the Property Assessed Clean Energy (PACE) program. Conduct targeted outreach to public entities, such as public schools, that are eligible for the California Energy Commission Energy Conservation Assistance Act (ECAA) Program loans.	Municipal Public Works RCEA	Phase 1 - ongoing
BE-1g	Coordinate through the Regional Climate Committee to establish and administer a multi-jurisdictional staff position dedicated to identifying and pursuing funding opportunities to support County-wide educational programs, assisting in equitable energy workforce expansion outreach, and providing RCEA with additional funds to expand incentives or subsidies for the community to increase community enrollment. If establishing a dedicated staff position is not feasible, work with the Regional Climate Committee and regional partners to identify resource sharing opportunities for pursuing funding opportunities such as rotating the responsibility across designated agency employees.	Municipal Public Works Climate Committee	Phase 1
Measure BE-2: Increase the development of micro-grids and energy storage across the region to support RCEA's RePower Humboldt goals of enhancing grid capacity and facilitating the electrification of buildings and transportation.			
BE-2a	Develop permit streamlining programs that can be adopted by local jurisdictions to facilitate the streamlined implementation of renewable energy projects as identified in regional energy feasibility study and RCEA RePower Humboldt goals such as energy storage projects, residential and commercial solar installation, and microgrid development.	Climate Committee Municipal Public Works	Phase 1 - ongoing
BE-2b	Direct the Regional Climate Committee to work with RCEA to develop a plan for leveraging CPUC's recently passed Limited Generation Profile option to maximize solar installation developments in alignment with RCEA's RePower Humboldt goals throughout the region.	Climate Committee RCEA	Phase 1 - ongoing

Action ID	Action	Responsible Parties	Timeframe
BE-2c	Engage with the local community, key interested parties, and local-based community organizations representing disadvantaged and vulnerable communities to raise awareness about alternative renewable energy and nano-grid opportunities available through RCEA. Emphasize the increased accessibility to electrification as well as the economic and environmental advantages of electrification while addressing concerns related to emergency response to minimize exceptions. Publicize the connection between RCEA nano-grid efforts and the increased ability to electrify leading to cost savings, funding opportunities, environmental benefits, and flexibility of electrification through jurisdiction websites and permit counters.	Climate Committee Municipal Planning/Building	Phase 2
BE-2d	As part of Regional Climate Committee responsibilities identified in Measure C-1, engage with RCEA to track progress toward targets set in RCEA's RePower Humboldt plan and identify additional opportunities for local jurisdictions to alleviate barriers to goals set in RCEA's RePower Humboldt plan.	Climate Committee Municipal Community Development	Phase 1 - ongoing
BE-2f	As part of Regional Climate Committee responsibilities work with RCEA and the Schatz Energy Research Center to identify locations throughout the county that are priority for utility-scale, nano-grid, and micro-grid solar, hydropower, and/or wind energy generation based on aspects such as land availability and suitability, infrastructure needs, resilience, and energy access equity. Coordinate with PG&E on interconnection needs and identify strategies with PG&E of how to best support capacity building on the grid related to micro-grid projects.	Climate Committee RCEA	Phase 2- ongoing
BE-2g	Conduct an equity assessment across the region that includes the identification of potential cost barriers to residential solar development, particularly for low income and rural communities at the end of PG&E distribution infrastructure, and identify feasible sites for solar and battery installation and potential funding sources.	Climate Committee RCEA	Phase 1
BE-2h	Identify facilities that are suitable to operate as regional resilience hubs to protect people from climate related issues. Create a priority list of these facilities with particular focus on servicing disadvantaged communities and work with RCEA to prioritize implementation of on-site microgrid and energy storage on identified.	Climate Committee Municipal Public Works	Phase 1

Action ID	Action	Responsible Parties	Timeframe
BE-2i	Regional Climate Committee will work with RCEA to pursue regional funding opportunities that can be used to develop resilient microgrids and incentivize new housing developers to install solar and on-site batteries, particularly for affordable housing developments. Aim to pursue 3 grant or funding opportunities annually focused on microgrids and/or energy storage expansion.	Municipal Public Works	Phase 1
Measure BE-3 Urban:	***Reduce existing residential building natural gas consumption by 4% by 2030 and 74% by 2045.***		
BE-3a Urban	Leverage the Regional Climate Committee to lead the development of a decarbonization plan for urban areas that assesses the feasibility and cost for electrification retrofitting for residential buildings as well as identifies potential equity concerns/impacts. The plan should identify strategies and/or specific projects to decarbonize 4 percent of existing residential and multi-family buildings by 2030 and strategies for increasing infrastructure readiness to electrify through 2045. The plan should give consideration for increased electricity capacity needs and RCEA's RePower Humboldt goals to meet increased capacity need. The plan should also identify a variety of equitable decarbonization solutions and potential projects such as partial electrification and increased energy efficiency options for mixed-fuel residences that face barriers to full electrification. The study should also identify the funding and financing requirements necessary to support the community in this transition.	Climate Committee Municipal Public Works (cities)	Phase 1
BE-3b Urban	As part of Regional Climate Committee responsibilities identified in Measure C-1, petition PG&E to help identify priority areas for electric grid expansion projects to increase regional electric grid capacity and islanding capabilities to allow for increased building electrification capacity.	Climate Committee	Phase 1 - 3
BE-3c Urban	Develop a home energy advisory service administered by the Regional Climate Committee that assists existing homeowners to better understand the cost of building decarbonization options including partial and full home electrification, identifies service providers, and provides support for homeowners to access electrification incentives from the Energy Smart Homes program.	Climate Committee	Phase 2 - ongoing

Action ID	Action	Responsible Parties	Timeframe
BE-3d Urban	Work with the Regional Climate Committee to identify and pursue funds through CARB, the Inflation Reduction Act, and the Infrastructure Investment and Jobs Act including: 1. DOE block grants 2. On Bill financing through PG&E 3. Green bonds 4. Grant Anticipation Notes or Short-Term Loans 5. Tax exempt lease purchases 6. Energy as a service 7. Energy Performance Contracting from Energy Service Companies (ESCOs)	Climate Committee Municipal Public Works (cities)	Phase 1 - ongoing
BE-3e Urban	Work with the Regional Climate Committee to develop and manage educational/promotional materials that each jurisdiction can use to educate the community on ways to finance home decarbonization. Materials should include information and links to existing available rebates for Heat Pumps, Weatherization, Smart Thermostats, Appliances, and Pool Pumps as well as other rebates offered through RCEA of the local jurisdiction if applicable.	Climate Committee	Phase 1
BE-3f Urban	Work with the local contractors, realtors, homeowner associations, landlords, and labor unions to develop a comprehensive training program, including hosting workforce development trainings discussing the benefits and technical requirements of electrification as well as addressing interested party concerns regarding electrification.	Municipal Public Works (cities) Municipal Community Development (cities)	Phase 2 - ongoing
BE-3g Urban	Develop a fund for low income and affordable housing electrification pilot projects in collaboration with affordable housing owners, utilities, and the community. Work with RCEA to develop a program to offset cost for occupants using financing and through the sourcing of grant funds to subsidize cost.	Municipal Public Works (cities) RCEA	Phase 2 - ongoing
Measure BE-3 Rural:	***Reduce existing residential fossil-fuel consumption in households not connected to natural gas infrastructure by 2% by 2030***		

Action ID	Action	Responsible Parties	Timeframe
BE-3a Rural	Regional Climate Committee to conduct a feasibility study to establish local low-carbon fuel alternative, such as renewable propane, sourced from local resources such as forest biomass which can be used as direct substitutes for propane or diesel building fuel. The feasibility study should consider procurement and cost considerations with a focus on equity for low-income households, and map communities with significant propane and wood fuel use to identify accessibility strategy for acquiring alternative fuels (e.g. renewable propane, sustainably harvested wood products, renewable diesel) and/or undergoing home electrification.	Climate Committee Municipal Public Works (county)	Phase 1
BE-3b Rural	As part of Regional Climate Committee responsibilities identified in Measure C-1, petition PG&E to help identify priority areas for rural electric grid expansion projects to increase regional electric grid capacity and islanding capabilities to allow for increased building electrification capacity.	Climate Committee	Phase 1- 3
BE-3c Rural	Promote existing available rebates to rural communities for Heat Pumps, Weatherization, Smart Thermostats, Appliances, and Pool Pumps to educate the community on ways to finance electrification or otherwise decarbonize their residences. Provide assistance to rural homeowners in assessing the viability and permitting of installing off-grid solar and battery alternative energy sources on their homes and finance options.	Municipal Public Works (county) RCEA	Phase 1 - ongoing
BE-3d Rural	For viable alternative fuel sources identified in a feasibility study, establish procurement and distribution supply centers within easy access of rural communities.	Municipal Public Works (county) Municipal Planning/Building (county)	Phase 2
BE-3e Rural	The Regional Climate Committee will lead the effort to identify, access, and provide funding assistance for the procurement of alternative fuels, such as biomethane, in alignment with SB 1383 procurement requirements. Advocate to the California Public Utilities Commission (CPUC) for inclusion of alternative low-carbon fuels substitution, such as renewable propane, to be allowed in ratepayer funded programs including energy efficiency programs.	Climate Committee	Phase 2 - 3
Measure BE-4: Reduce existing nonresidential building natural gas consumption by 5% by 2030 and 79% by 2045.			

Action ID	Action	Responsible Parties	Timeframe
BE-4a	As part of the development of the decarbonization plan led by the Regional Climate Committee referenced in Measure BE-3 Urban, identify nonresidential building electrification barriers and develop a nonresidential building decarbonization strategy with analysis supporting future adoption of a nonresidential building decarbonization ordinance. The plan should give consideration for increased electricity capacity needs and for other decarbonization strategies that would be needed to reduce nonresidential natural gas consumption by at least 5 percent. As part of strategy development, conduct outreach to small businesses to understand potential equity impacts of a decarbonization policy. The plan should also assess ordinance parameters for including large scale renovation as part of the new commercial building ordinance requirements established for each organization (Measure BE-6).	Climate Committee RCEA Municipal Planning/Building	Phase 1
BE-4b	Work with the Regional Climate Committee to develop a template Commercial Energy Performance Assessment and Disclosure Ordinance for commercial and multi-family buildings to be adopted within each jurisdiction by 2027. The ordinance should require energy use disclosure consistent with State law (AB 1103) and the use of the ENERGY STAR Portfolio Manager benchmarking tool. Include regulatory mechanism (e.g., permitting and approval requirements, building codes and standards modification) that limits expansion of natural gas infrastructure and incentivizes appliance replacement.	Municipal Planning/Building Board of Supervisors Climate Committee	Phase 2
BE-4c	Establish streamlined permitting in each jurisdiction for energy efficiency technologies, onsite renewable energy, and battery storage in buildings and critical facilities that require power during emergencies or power outages. Incorporate equity considerations into permitting process for all other building battery storage including prioritization, rebates, and outreach.	Municipal Planning/Building	Phase 2

Action ID	Action	Responsible Parties	Timeframe
BE-4d	As part of Regional Climate Committee responsibilities identified in Measure C-1, develop an outreach campaign to promote building decarbonization and include items in the program such as: 1. Conduct engagement efforts for the commercial and industrial sector to identify ways jurisdictions and the Regional Climate Committee can support commercial energy storage installations and neighborhood scale microgrid opportunities 2. Facilitate funding opportunities for commercial business electrification by identifying and supporting grant opportunities available to the community, prioritizing small and frontline community owned businesses 3. Use feedback provided during the community outreach process for small businesses to mitigate potential equity impacts of a future building performance program 4. Distribute utility bill inserts to advertise the incentive programs or grants available and the cost benefits of electric appliances 5. Target outreach to businesses, builders, developers, local contractors, and property managers with information describing the financial benefits of replacing natural gas appliances with all electric appliance when they apply for permits 6. Provide informational webinars and an updated website to advertise and promote All-Electric Building Initiative rebates and incentives 7. Promote the use of the Energy Star Portfolio Manager program and energy benchmarking training programs for nonresidential building owners	Climate Committee	Phase 2 - ongoing
Measure BE-5: Decarbonize 95% of new residential building construction by 2027			

Action ID	Action	Responsible Parties	Timeframe
BE-5a	Regional Climate Committee to develop an energy performance ordinance, EDR, reach code, or zero NOx threshold for new residential construction that can be modified by each jurisdiction as necessary to conserve staff resources. Adopt the ordinances within each jurisdiction to decarbonize 95 percent of new residential buildings by 2027 and update every 3 years thereafter if not included within State building codes. As part of building decarbonization ordinance development and subsequent updates, consider the following: 1. Minimize the exemptions associated with the ordinance, while allowing for health and safety exemptions as necessary and exploring potential exemptions for specific use cases determined to have substantial economic development or business impacts 2. Require the submittal of an infeasibility waiver to review specific end uses where electrification is technologically infeasible 3. Require that any end-use deemed infeasible for electrification exceeds existing Title 24 energy efficiency standards and be electric ready for future electrification 4. Specify that affordable housing developments will be all-electric to ensure no stranded assets 5. Establish substantial remodel and improvement definitions to be included in the ordinance 6. Track and enforce requirement compliance through a permitting compliance program managed by each jurisdiction 7. Revise ordinance during update cycle as necessary to meet 95 percent goal.	Municipal Planning/Building Board of Supervisors Climate Committee	Phase 2
BE-5b	Conduct feasibility study(s) to identify local decarbonization barriers for new residential developments and develop a residential building decarbonization strategy with analysis. The feasibility study should include developing a new residential building decarbonization plan that assesses the grid feasibility and cost for electrification at certain legislative threshold requirements in consideration of leveraging RCEA residential nano-grid and battery storage options. The feasibility study should assess the potential cost impacts to multifamily and affordable housing new developments and identify potential strategies for mitigating negative impacts for equitable electrification.	Climate Committee Municipal Public Works RCEA	Phase 1

Action ID	Action	Responsible Parties	Timeframe
BE-5c	Leverage the Regional Climate Committee to lead engagement efforts with affordable housing developers to leverage incentives for new all-electric and efficient low-income residential buildings through the California Energy Commission Building Initiative for Low-Emissions Development (BUILD) Program, the Affordable Housing and Sustainable Communities (AHSC) Program, and the California Electric Homes Program (CalEHP). Regularly investigate and leverage other incentive programs available for electrification of new buildings.	Climate Committee Municipal Planning/Building	Phase 2 - ongoing
BE-5d	Through the Regional Climate Committee, work with local contractors, realtors, homeowner associations, landlords, and labor unions to develop a comprehensive training program, including hosting workforce development trainings discussing the benefits and technical requirements of local municipality building decarbonization legislation and the most effective pathways to achieving requirements. Include information on load calculations to avoid service upgrade requirements	Climate Committee Municipal Planning/Building Municipal Community Development	Phase 2 - ongoing
BE-5e	Partner with RCEA and PG&E to circumvent or mitigates electric utility infrastructure capacity constraints. Collaborate with RCEA to develop and fund locally implemented programs to help customers in accessing financing options for energy projects and rebates for cleaner, energy efficient technology	Municipal Planning/Building RCEA	Phase 2 - ongoing
Measure BE-6: Decarbonize 95% of new nonresidential building construction by 2027			

Action ID	Action	Responsible Parties	Timeframe
BE-6a	Adopt within each jurisdiction an energy performance ordinance, energy design rating (EDR), reach code, or zero NOx threshold to decarbonize 95 percent of new nonresidential buildings by 2027 and update every 3 years thereafter if not included within State building codes. As part of building decarbonization legislation development and subsequent updates, consider the following: 1. Direct the Regional Climate Committee to develop a template ordinance that can be modified by each jurisdiction as necessary to conserve staff resources. 2. Minimize the exemptions associated with the ordinance, while allowing for health and safety exemptions as necessary and exploring potential exemptions for specific use cases determined to have substantial economic development or business impacts. 3. Require the submittal of an infeasibility waiver to review specific end uses where electrification is technologically infeasible. 4. Require that any end-use deemed infeasible for electrification exceed existing Title 24 energy efficiency standards and be electric ready for future electrification. 5. Establish substantial remodel and improvement definitions to be included in the ordinance. 6. Enforce requirement compliance through the same permitting compliance program as for residential building decarbonization. 7. Establish EDR requirements for new non-residential buildings that incentivize electrification and ina case where electrification is infeasible, requires higher energy efficient and low emissions equipment to meet the EDR. 8. Track effectiveness of ordinance through permitting compliance program and revise ordinance during update cycle as necessary to meet 95 percent goal.	Municipal Planning/Building Board of Supervisors Climate Committee	Phase 2

Action ID	Action	Responsible Parties	Timeframe
BE-6b	Conduct feasibility study(s) to identify decarbonization barriers for commercial buildings and develop a commercial building decarbonization strategy with analysis supporting future adoption of commercial decarbonization legislation. The feasibility study should include a comprehensive nonresidential building electrification plan that assesses the grid feasibility and cost for electrification and opportunities to mitigate grid and cost barriers by leveraging RCEA microgrid and battery storage options. The feasibility study should assess potential decarbonization legislation exemptions for commercial and industrial operations that are significantly restricted by available technology for electrification.	Climate Committee Municipal Planning/Building RCEA	Phase 1
BE-6c	Connect developers with RCEA to identify applicable incentive programs in line with RCEA RePower goals that could benefit new building developments such as microgrids which can aid businesses in overcoming restrictions to electrification or decarbonization of processes.	Municipal Planning/Building	Phase 1 - ongoing
BE-6d	Through the Regional Climate Committee, work with local contractors, realtors, homeowner associations, landlords, and labor unions to develop a comprehensive training program, including hosting workforce development trainings to discuss the benefits and technical requirements of decarbonization. .	Climate Committee Municipal Planning/Building	Phase 2
BE-6e	Partner with RCEA and PG&E to establish a clear path for electrification of new nonresidential buildings which meet EDR requirements and circumvent or mitigate electric utility infrastructure capacity.	Municipal Planning/Building RCEA	Phase 2
Measure BE-7: Decarbonize 30% municipal buildings and facilities by 2030			
BE-7a	Regional Climate Committee to develop a template resolution for each jurisdiction to decarbonize 30 percent of municipal buildings and facilities by 2030 and 100 percent by 2045 by retrofitting natural gas appliances with electric alternatives and install on-site electricity generation and storage capacity. Include in the resolution an 'electric first' purchasing policy for any equipment or appliances in need of replacement.	Municipal Facility Management Board of Supervisors	Phase 1

Action ID	Action	Responsible Parties	Timeframe
BE-7b	Coordinate with the Regional Climate Committee and RCEA to conduct energy audits of municipal buildings to establish a baselines of current energy consumption and identify the largest energy users or municipal buildings with the greatest natural gas consumption. Utilize audit results to prioritize municipal buildings to decarbonize. Conduct follow-up energy audits every 3 years to track progress. Leverage data from buildings reporting to the Building Energy Benchmarking Program established under AB 802 where possible to reduce labor.	Municipal Facility Management RCEA	Phase 1 - ongoing
BE-7c	Develop a study through the Regional Climate Committee which estimates renewable energy generation on County and local jurisdiction facilities, identifies a priority list of sites which may serve as regional resilience hubs, and a proposed schedule for implementing the prioritized energy projects. The study should also seek to understand barriers to installing additional distributed energy resources such as solar and battery storage, or other renewable energy generation infrastructure, at municipal facilities.	Municipal Facility Management RCEA	Phase 2
BE-7d	Identify and pursue funding sources and partnerships needed for successful implementation as well as plan for directing resources through each jurisdiction for funding.	Municipal Facility Management Climate Committee	Phase 1
Measure BE-8: Advocate for Off-shore Wind developers and PG&E to build electrical infrastructure to supply Humboldt with energy produced by the future off-shore wind project which will increase regional supply and resilience			
BE-8a	Dedicate Regional Climate Committee staff time to work with local organizations (e.g. 350Humboldt, Redwood Region Climate & Community Resilience Hub, COREHub) to petition the CEC and Humboldt Bay Off-shore Wind developers to include electricity transmission and distribution to the Humboldt region as a legally enforceable community benefit as stipulated in the Community Benefit Program to be completed as part of the Nationally Significant Multimodal Freight & Highway Projects (INFRA) grant program.	Climate Committee Municipal Community Development	Phase 2
BE-8b	Have the Regional Climate Committee advocate to the CEC and State to allow for an equitable rate tiering law to provide affordable rates for LIDAC communities in Humboldt County.	Climate Committee RCEA	Phase 2 - 3

Action ID	Action	Responsible Parties	Timeframe
BE-8c	Leverage the Regional Climate Committee to work with California Independent System Operator (ISO), California Public Utilities Commission (CPUC),the off Humboldt Bay Offshore Wind project and PG&E to identify pathways to establish equitable regional access to electricity produced by the off-shore wind project. This may include supporting permitting and development processes necessary for the proposed new Humboldt 500 kV substation as well as advocating to include distribution capacities at the substation for Humboldt County.	Climate Committee	Phase 2 - 3
BE-8d	Direct the Regional Climate Committee to evaluate and pursue opportunities for the Environmental and Climate Justice Community Change Grant through the Inflation Reduction Act to advance clean energy from the wind-farm projects.	Climate Committee Municipal Public Works	Phase 2
Measure TR-1 Urban: Implement programs, such as those identified in HCAOG's RTP, to increase the mode share of active transportation in urbanized areas from 9% to 12% by 2030 thereby achieving a regional active transportation mode share of 8%			
T-1a Urban	Regional Climate Committee to aid the urbanized areas of Humboldt by partnering with HCAOG and HTA to identify and pursue grant opportunities such as the Active Transportation Program, AARP Community Challenge, CalEPA's Environmental Justice Action Grants, and Caltrans Sustainable Transportation Planning Grants, etc., to fund active transportation projects identified in the Regional Transportation Plan. Aim to apply for at least 3 grants annually.	Climate Committee HCAOG HTA	Phase 1 - ongoing
T-1b Urban	In urbanized areas with high alternative transit expansion potential work with the Regional Climate Committee to facilitate community outreach on transportation alternatives and promote infrastructure improvements and expansion identified in HCAOG's Regional Transportation Plan. Continually improve methods for engaging the community, gathering input, and utilizing it to prioritize projects.	Climate Committee Municipal Community Development (urban)	Phase 1 - ongoing
T-1c Urban	Leverage the Regional Climate Committee to pursue and access funding to develop and maintain regional webpage and app showing pedestrian and bike trails, bike lanes and bus times and routes. Distribute active transportation maps and promotional materials to hotels and tourism centers to increase visitor use of active transportation. Advertise and promote Humboldt Bikeshare program managed by the City of Arcata, Cal Poly Humboldt, and Tandem Mobility.	Climate Committee Municipal Community Development (urban) HCAOG	Phase 2 - ongoing

Action ID	Action	Responsible Parties	Timeframe
T-1d Urban	Identify equity barriers to safe bike and pedestrian infrastructure through community outreach and use of big data driven analysis w as well as targeted community outreach to better understand nuanced barriers. Include prompts in outreach around ways to improve social and modal equity the active transportation systems and programs. Develop a priority list of active transportation projects from HCAOG's Regional Transportation Plan based on level of impact, expansion of inter-jurisdictional connectivity, and historically under-invested communities.	Climate Committee Municipal Public Works (urban) HCOAG	Phase 1
T-1e Urban	Increase inter-connectivity across the region working with HCAOG and the Regional Climate Committee representatives to: 1. Evaluate and prioritize land use projects and active transportation projects for their impact on increased regional connectivity 2. Identify hurdles limiting connectivity and use, such as last-mile commute limitations 3. Facilitate coordination across jurisdictions and rural and urban areas to plan development in a coordinated and most strategic manner 4. Apply for regional funding opportunities focused on increased inter-connection and VMT reduction 5. Implement the VMT mitigation measures associated with VMT thresholds	Climate Committee HCAOG	Phase 2 – Phase 3
Measure TR-1 Rural: Implement programs, such as those identified in HCAOG's RTP, that increase access to safe active transportation, to increase the mode share of active transportation in rural areas from 5% to 6% by 2030 thereby achieving a regional active transportation mode share of 9%			
T-1a Rural	Regional Climate Committee to conduct a feasibility study evaluating existing bike parking facilities in rural areas and what improvements can be made to increase supply, reduce theft, and increase rider attraction. Include in the study an analysis of current and future land use trends and identify active transportation facility development which would result in high inter- connectivity impact. The study should focus on needs to better connect rural communities to city centers, job centers, and amenities.	Climate Committee	Phase 1
T-1b Rural	Develop a priority list of active transportation projects from HCAOG's Regional Transportation Plan based on level of impact, expansion of inter-connectivity, and historically under-invested communities where there is currently no or limited pedestrian and bicycle infrastructure as informed by feasibility study.	Municipal Public Works (rural) HCAOG	Phase 1

Action ID	Action	Responsible Parties	Timeframe
T-1c Rural	The Regional Climate Committee will work with the regions jurisdictions, HCAOG, and CalTrans to obtain funding for the construction of bikeway and pedestrian systems to improve interconnection within Humboldt County. Focus areas will be projects that connect rural communities to high employment areas such as City of Eureka, Arcata, and Fortuna as well as nearby counties, State, and federal infrastructure through integration of bicycle facilities as part of other roadway construction projects (e.g. CalTrans mobility hub and highway projects).	Regional Climate Committee HCAOG	Phase 2 - ongoing
T-1d Rural	Partner with California Department of Transportation (CalTrans) District 1 Pedestrian and Bicycle Advisory Committee (PBAC) to track progress on implementation of bicycle and pedestrian projects in the region, ensure that projects being planned are consistent with the District Active Transportation Plan, and to represent the regions rural jurisdictions needs to the PBAC.	Climate Committee Municipal Public Works (rural)	Phase 2 - ongoing
T-1e Rural	Regional Climate Committee to work with jurisdictions in rural regions that have planned land use development to establish standards for when and how new residential subdivisions, multi-family, and mixed-use developments shall provide inter- connected bicycle and pedestrian facilities and amend local codes accordingly.	Climate Committee Municipal Public Works (rural)	Phase 2 - 3
T-1f Rural	Increase community awareness of active transportation infrastructure projects occurring and those completed. Work with HCAOG to continue to fund, develop, and maintain regional webpages and apps showing pedestrian and bike trails, bike lanes, and bus times and routes. Distribute active transportation maps and promotional materials to hotels and tourism centers to increase visitor use of active transportation.	Municipal Public Works (rural) Climate Committee HCOAG	Phase 1 - ongoing
T-1g Rural	Partner with the tourism and business sectors of larger tourism and employment regions of the county to identify pathways to increase active transportation from tourists and employees.	Climate Committee Municipal Community Development (rural)	Phase 2
T-1h Rural	Regional Climate Committee to identify and apply for grant opportunities such as the Active Transportation Program, AARP Community Challenge, CalEPA's Environmental Justice Action Grants, and Caltrans Sustainable Transportation Planning Grants, etc., to fund rural active transportation projects identified in the Regional Transportation Plan.	Municipal Public Works (rural) Climate Committee	Phase 1 - ongoing

Action ID	Action	Responsible Parties	Timeframe
T-1i Rural	Leverage the Regional Climate Committee to fund the development of local subsidy for low-income residents across the region for bicycles, helmets, pumps, and other bicycle equipment. Continue to offer e-bike rebates with increased rebate opportunities for low-income customers. Implement an income-qualified coupon for the e-bike share program, in addition to the available 50 percent discounted e-bike share rate.	Climate Committee Municipal Community Development (rural)	Phase 2
Measure TR-2 Urban: Expand the public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 2% to 20% public transit mode share in urbanized areas to achieve a regional 13% public transit mode share by 2030			
T-2a Urban	Regional Climate Committee to work with Humboldt Transit Authority (HTA) and HCAOG to support implementation of measures to increase use of public transportation services in the region as specified in HCAOG's Regional Transportation Plan, and work toward a 10-minute headway in urban areas. This should include, but is not limited to: 1. Improving passenger transfer among local routes and between local and intercity routes (e.g., Greyhound and Amtrak) 2. Improving shelters at bus stops 3. Electronic signage and/or real-time updates of wait time until next bus	Climate Committee HTA Municipal Public Works (urban)	Phase 2
T-2b Urban	For areas with significant tourism industry, conduct a feasibility study to inform the development of a tourism-based mobility plan aimed at decreasing tourism-based single passenger vehicle use. In this study: 1. Identify community boundary locations for tourism designated parking and optimal route connectivity 2. Identify opportunities for town shuttle services and park-and-ride locations for residents and tourists 3. Gauge potential of partnerships with big tourism destinations and local businesses to implement direct public transit routes between park and ride and the relevant tourist destinations 4. Identify opportunities for dogs to be included in a shuttle service to locations that allow dogs	Municipal Public Works (urban) HCAOG	Phase 1

Action ID	Action	Responsible Parties	Timeframe
T-2c Urban	Leverage the Regional Climate Committee to conduct local transportation surveys to better understand the community's needs and motivation for traveling by car versus other alternatives such as the bus. Use survey results to inform policy development and outreach campaigns that are transit focused. Develop marketing materials and provide them to the local jurisdictions to publicize public transportation improvements as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use and success of improvement	Climate Committee	Phase 1
T-2d Urban	Work with HTA to plan facility upgrades that include design improvements of seating and weather protection at bus stops and along transportation routes. Implementation should also include consideration of climate change impacts and increasing micro-transit access to the improved public transit network facility. Incorporate design changes throughout infrastructure modifications, including real-time updates of bus arrival.	Municipal Public Works (urban) HTA	Phase 1 – Phase 2
T-2e Urban	Work with HTA to prioritize public transportation access and improvements in low-income areas of the region and at major destinations. This could include surveying existing transportation routes, schedules, and facilities throughout each jurisdiction as part of HCAOG's Sustainable Transportation Planning Grant Program and improving public transportation facilities and expand access to transit (i.e., first and last-mile access).	Municipal Public Works (urban) HTA	Phase 2
T-2f Urban	Regional Climate Committee to collaborate HTA and HCAOG in obtaining grant funding for service expansion and improvements particularly in underserved and marginalized areas. Also include assistance for working with the appropriate State agencies to petition for updates to the farebox ratio to allow HTA greater access to using funds for self--advertisement.	Municipal Public Works (urban) HTA Climate Committee	Phase 1 - ongoing
Measure TR-2 Rural: Develop a robust public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 1% to 10% in rural areas and achieve a regional 13% public transit mode share by 2030			

Action ID	Action	Responsible Parties	Timeframe
T-2a Rural	Regional Climate Committee to work with HTA and HCAOG to support implementation of measures to increase use of public transportation services in the region as specified in HCAOG's Regional Transportation Plan and work toward a 30-minute headway in rural areas. This should include, but is not limited to: 1. Improving passenger transfer among local routes and between local and intercity routes (e.g., Greyhound and Amtrak) 2. Improving shelters at bus stops 3. Prioritizing infrastructure improvements in existing communities that enable people better access and use of public transit 4. Electronic signage and/or real-time updates of wait time until next bus	Climate Committee HTA	Phase 1 - ongoing
T-2b Rural	For areas with significant tourism industry, conduct a feasibility study to inform the development of a tourism-based mobility plan aimed at decreasing tourism-based single passenger vehicle use. In this study: 1. Identify community boundary locations for tourism designated parking and optimal route connectivity. 2. Identify opportunities for town shuttle services and park-and-ride locations for residents and tourists. 3. Gauge potential of partnerships with big tourism destinations and local businesses to implement direct public transit routes between park and ride and the relevant tourist destinations.	Municipal Public Works (rural) Climate Committee HCAOG	Phase 1
T-2c Rural	Work with HCAOG and HTA to conduct a feasibility study to explore alternative forms of public transit, such as micro transit including on-demand shuttles, car share programs, bike share programs, and scooter share programs. Micro transit is a type of on-demand, shared transportation service that typically operates with smaller vehicles, such as vans or mini-buses, and offers flexible routes and schedules. The analysis should include identification of potential funding sources (e.g., grants, local taxes, local business sponsorship, discretionary funds, etc.) and identification of barriers and opportunities for how such a micro-mobility program may enhance active transportation or public transit use. Evaluate the effectiveness of the micro transit pilot program in McKinleyville to determine opportunities for implementing a similar program in other rural locations of the county.	Climate Committee HCAOG Municipal Public Works (rural)	Phase 1

Action ID	Action	Responsible Parties	Timeframe
T-2d Rural	Based on the findings of the feasibility study, work with the Regional Climate Committee to develop a template micro-mobility policy that establishes a deployment protocol and permitting process, identifies any restrictions for use for safety reasons, and promotes equitable access through requirements for consistent placement of micro-mobility devices (e-scooters, e-bikes, etc.) in underserved areas or reductions in usage fees for lower-income users.	Climate Committee Municipal Public Works (rural) Board of Supervisors (rural)	Phase 2
T-2e Rural	Require large nonresidential and mixed-use developments to participate in Transportation Demand Management strategies, including providing shuttle services between employment centers and key transit centers, offering telecommuting, and encouraging use of pre-tax commute benefits.	Municipal Planning/Building (rural)	Phase 2
T-2f Rural	Market and publicize public transportation improvements as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use.	Climate Committee Municipal Community Development (rural) HTA	Phase 2 - ongoing
T-2g Rural	Work with HTA in the implementation of facility improvements to rural transportation stops to include design improvements of seating and weather protection. Implementation should also include consideration of increasing access to the improved public transit network facility.	Municipal Public Works (rural) Climate Committee HTA	Phase 1 - ongoing
Measure TR-3: Reduce regional VMT by increasing mixed-use development in infill priority areas in alignment with HCAOG's baseline connectivity score included in the RTP.			
T-3a	Work with the Regional Climate Committee to develop template land use and development policy to enable and encourage infill development and streamline zoning changes that allow for higher density housing development. Work with urban areas to rezone for higher residential density and mixed use, reduced parking requirements, and expedited planning and permitting processes in the downtown core, along transit corridors, and within future planned development areas that is compact, pedestrian friendly, and transit oriented where applicable.	Municipal Planning/Building Board of Supervisors	Phase 1 – Phase 2

Action ID	Action	Responsible Parties	Timeframe
T-3b	Leverage feasibility studies conducted by HCAOG to identify opportunities for mixed-use and infill development, map current and future planned transit networks, and establish a priority list of development that encourages regional growth to be in alignment with HCAOG and HTA transit goals. If not already included in previously conducted HCAOG studies, assess equity considerations with regards to location and distribution of developments, and potential transit access equity impacts.	Climate Committee HCAOG HTA	Phase 1
T-3c	Work with HCAOG, HTA, RCEA and CBO's to plan prospective mixed-use and infill projects so that they include design considerations with regards to alternative energy access/generation, EV charging infrastructure, and local public transit facilities. Promote development that increases walkability and is bikeable in neighborhoods.	Municipal Planning/Building	Phase 2 - 3
T-3d	Direct the Regional Climate Committees to develop promotional materials and manage a central webpage on local jurisdiction's websites for planned projects detailing the benefits of mixed-use and/or infill developments.	Climate Committee Municipal Planning/Building	Phase 1-ongoing
T-3e	Dedicate staff time or create multi-jurisdictional staff position to be administered by the Regional Climate Committee to identify and pursue funding opportunities to support mixed-use and infill developments.	Municipal Planning/Building Climate Committee	Phase 1 - ongoing
Measure TR-4: Develop and implement regional mobility hubs and ZEV car-share programs to support mode shift from single occupancy vehicles			
T-4a	Regional Climate Committee to work with HCAOG on the Sustainable Transportation Planning Grant Program efforts to assess regional transportation characteristics and work with regional agencies to identify multimodal land use opportunities throughout the county. As part of this program, conduct a background review of options for purchasing, operating, and maintaining shared mobility assets such as ZEVs, electric bikes, and electric scooters. The program should include identification of potential funding sources (e.g., grants, local taxes, local business sponsorship, discretionary funds, etc.) and identification of barriers and opportunities for how expanding mobility hub facilities beyond state highways access may enhance active transportation or public transit use. Also include in the feasibility study an assessment of alternative powering options in partnership with RCEA (e.g. microgrids) to support ZEV car-share infrastructure with the mobility hubs.	Climate Committee HCAOG	Phase 1

Action ID	Action	Responsible Parties	Timeframe
T-4b	In areas where Caltrans plans to implement mobility hubs along the state highway, local jurisdictions with support from the Regional Climate Committee will work with Caltrans to facilitate successful implementation and use the project to inform decisions on expanding mobility hub options throughout the region that will expand jurisdictional interconnectivity and provide public EV charging to the communities.	Municipal Planning/Building Municipal Public Works	Phase 1 – Phase 2
T-4c	Regional Climate Committee will develop guidance for jurisdictions to implement mobility hub policies that establishes a deployment protocol and permitting process, identifies any restrictions for use for safety reasons, and promotes equitable access through requirements for consistent placement of mobility hub facilities in underserved areas or reductions in usage fees for lower income users. The guidance is to be developed based on the regional feasibility study above.	Climate Committee HCAOG	Phase 1
T-4d	the Regional Climate Committee will coordinate with the City of Arcata in their efforts to bring in commercial autonomous EVs for car-share programs in association with regional mobility hubs.	Climate Committee Municipal Public Works	Phase 1 – Phase 2
T-4e	Dedicate staff time or leverage the Regional Climate Committee to work with work with HCAOG on the Sustainable Transportation Planning Grant Program and Caltrans in identifying and pursuing funding opportunities identified in the feasibility study with focus on linking mobility hub programs with the current Caltrans project to facilitate greater community interconnectivity and adoption of mobility services provided.	Climate Committee Municipal Public Works	Phase 2 - ongoing
Measure TR-5:	***Require commercial and industrial employers with 25 employees or more to develop a Transportation Demand Management Plan***		
T-5a	Across all jurisdictions, and particularly in high employment cities, require employers to develop a Transportation Demand Management (TDM) Plan through a new ordinance and/or as a requirement to obtain a business license. TDM plans should include money-based incentives for employees to bike, walk, carpool, take the bus to work, or remote work where suitable. Require large employers (more than 25 employees) to subsidize biking, walking, or bus travel. The TDM should also include a ride-sharing program and membership within a transportation management association. The ride-sharing program will consist of designated parking spaces for ridesharing vehicles, passenger loading, unloading, and waiting zones; and a website, message board, or app for coordinating ridesharing. The program will include a provision to allow employees to work remotely 2 days per week when feasible and should include consideration for increasing broadband internet access to provide adequate service for those working remote.	Municipal Planning/Building Board of Supervisors Climate Committee	Phase 2

Action ID	Action	Responsible Parties	Timeframe
T-5b	Leverage the Regional Climate Committee and partnership with HCAOG to conduct local transportation surveys within each jurisdiction to better understand the community's needs and motivation for traveling by car versus other alternatives such as the bus. Use survey results to inform policy development and outreach campaigns that are transit focused.	Climate Committee HCAOG Municipal Community Development	Phase 1
T-5c	Have the Regional Climate Committee prepare marketing materials that each jurisdiction may modify and use to market and publicize public and active transportation improvements to local businesses as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use and success of improvement.	Climate Committee Municipal Community Development	Phase 1 - ongoing
T-5e	Work with local businesses to understand employee engagement with alternative transportation methods and barriers to entry and provide workshops to local businesses to address questions or concerns in developing TDM plans.	Municipal Public Works Climate Committee HCAOG	Phase 2
T-5f	Through the Regional Climate Committee, employ a multi-jurisdictional representative to support HTA and local jurisdictions in pursuing grants such as the Sustainable Communities Competitive, Caltrans Sustainable Transportation Planning Grant Program, State Transportation Improvement Program, etc., to expand public and active transit services and infrastructure.	Climate Committee Municipal Planning/Building	Phase 2
Measure TR-6: Decarbonize 15% of passenger vehicle miles traveled by 2030 and 100% by 2045 through increased adoption of low and zero-emission vehicles and development of a regional electric vehicle charging and hydrogen fueling network.			
T-6a	Through the Regional Climate Committee partner with local organizations and community groups throughout the county to distribute outreach and promotional materials to residents and local businesses on the financial, environmental, and health and safety benefits of ZEVs and alternative fueling options. Provide information on available funding opportunities.	Climate Committee Municipal Community Development	Phase 1 - ongoing
T-6b	Regional Climate Committee will identify jurisdictions or land-use zones, such as the Coastal Zone, that may benefit from a streamlined public and private EV infrastructure permitting process or Categorical Exemption and draft an ordinance in accordance with AB 1236. The Regional Climate Committee will develop the program as a template to be distributed to applicable jurisdictions for a coordinated approach and relieve individual jurisdiction workload on program development.	Climate Committee Municipal Planning/Building Board of Supervisors	Phase 2

Action ID	Action	Responsible Parties	Timeframe
T-6c	The Regional Climate Committee with work with local jurisdictions to amend the Municipal Code to promote EV chargers in new development, redevelopment, and existing parking spaces. This may include requiring: ▪ Multifamily – CalGreen Tier 2 provisions ▪ Non-Residential – CalGreen Tier 2 provisions ▪ Designate 10 percent of parking spaces in urbanized areas as EV charging spaces ▪ Require that employers with over 25 employees designate preferred parking spaces for zero emission vehicles or hybrids only ▪ Require that new private parking lots grant ZEVs access to preferred parking spaces. ▪ Require larger residential rental building owners (more than 15 tenants) and large commercial building owners (more than 10,000 square feet) to install working electric vehicle chargers in 10 percent of parking spaces for new and existing buildings at time of renovation if projects are valued at $1,000,000 or greater	Climate Committee Municipal Planning/Building Board of Supervisors	Phase 2
T-6d	Support ZEV car share companies in coming to the region. In jurisdictions with prevalent or planned development of multifamily housing, identify private sector partnerships and develop affordable, zero-emission vehicle car share programs with a priority to target vulnerable communities across all jurisdictions, promoting an accessible ZEV network.	Municipal Planning/Building Municipal Public Works	Phase 1 - ongoing
T-6e	For high employment areas, work with RCEA to develop new public access charging stations. Work with RCEA to develop partnerships with other charging companies (e.g. Go Station) as needed to accommodate charging station needs. Apply for Federal Charging and Fueling Infrastructure (CFI) grant to install electric vehicle chargers at community centers and in high employment areas.	Municipal Planning/Building RCEA	Phase 2
T-6f	Partner with RCEA to provide an EV Monthly Bill Discount Program with increased discount opportunities for low-income customers in each jurisdiction. Promote affordable EV charging rates at jurisdiction-owned EV charging stations and adjust rates as necessary to cover program costs. Explore methods for charging different rates for different user groups or other programs to offset charging costs at public stations for low-income residents.	Municipal Public Works RCEA	Phase 2

Action ID	Action	Responsible Parties	Timeframe
T-6g	Regional Climate Committee will work with interested parties and RCEA to expand home and public fueling/charging station ZEV infrastructure in alignment with RCEA RePower Plan goals and address barriers to ZEV adoption which are not related to electric grid capacity limitations as outlined in the "North Coast and Upstate FCEV Readiness Plan." Evaluate opportunities for curbside street level II chargers in urbanized residential areas where off-street parking is limited to provide equitable access to at home chargers.	Climate Committee RCEA	Phase 2 - 3
T-6h	Regional Climate Committee, in partnership HCAOG, to lead the development of a Hydrogen Vehicle Infrastructure Implementation Plan for public access hydrogen facilities by 2030 which includes the following: 1. Evaluate a list of prioritized locations for hydrogen fueling stations across the county 2. Consideration of procurement needs and potential sourcing from the Redding Rancheria perspective green hydrogen facility 3. Identifies grant funding opportunities (e.g. LCFS)	Climate Committee HCAOG	Phase 1 - 2
T-6i	Based on the results of the Hydrogen Vehicle Implementation Plan, applicable jurisdictions with opportunities identified as high priority hydrogen fueling station locations will evaluate and promote public access hydrogen fuel station development. Leverage the Regional Climate Committee and other regional partnerships to explore funding opportunities for hydrogen fueling infrastructure through the LCFS or PG&E EV Fast Charge Program as well as develop public-private partnerships to attract private developers to the region to build out ZEV infrastructure.	Municipal Public Works Climate Committee	Phase 2 - 3
T-6j	Identify and promote incentives and financing options for residential EV charger installations such as applying for Inflation Reduction Act (IRA) funding.	Climate Committee RCEA Municipal Planning/Building	Phase 1 - ongoing
Measure TR-7: Increase commercial zero-emission vehicle use and adoption to 10% by 2030 and 100% by 2045 through a regional charging network and development of hydrogen hubs			

Action ID	Action	Responsible Parties	Timeframe
T-7a	Through the Regional Climate Committee work with RCEA and the Schatz Energy Research Center (SERC) to refine and implement the North Coast Medium-Duty/Heavy-Duty Zero Emission Vehicle Readiness Blueprint for Humboldt County. As part of the refinement: 1. Conduct in depth study of physical siting opportunities and prioritize locations and a schedule to follow 2. Identify opportunities for local jurisdiction-supported accelerated fleet ZEV adoption and establish a strategy to promote ZEV/EV adoption within business fleets 3. For high priority fleets, establish a strategy and protocol to collaborate with PG&E 4. For high priority fleets, conduct a grid planning study to identify necessary infrastructure upgrades to support a fully built-out fleet and coordinate with PG&E regarding needs	Climate Committee RCEA	Phase 1 – Phase 3
T-7b	Work with the Regional Climate Committee and RCEA to secure funding from state and utility programs (such as the California Air Resources Board's Clean Vehicle Rebate Project, the Truck and Bus Voucher Incentive Program, LCFS, and the PG&E EV Fast Charge Program) and federal sources to increase procurement of EV or ZEV cars, trucks, and other vehicles and installation of EV/ZEV charging/fueling infrastructure. Additionally, provide information to businesses on state and federal programs to help businesses pursue conversion of fleets to ZEVs.	Municipal Public Works RCEA	Phase 1 - ongoing
T-7c	Conduct an inventory of business vehicle fleets in each jurisdiction and identify and engage with employers and businesses subject to the Advanced Clean Fleets rule as well as those to target for accelerating ZEV/EV adoption. As part of the study, identify private trucking company or manufacturer partnership opportunities for piloting new ZEV technology in the region.	Climate Committee Municipal Facility Management	Phase 1 - 2

Action ID	Action	Responsible Parties	Timeframe
T-7d	Direct the Regional Climate Committee to partner with RCEA and SERC to work with local fleet operators, vehicle operators, and fleet maintenance staff to develop a comprehensive training program, including hosting workforce development trainings to discussing the benefits and technical requirements of ZEV fleets and supporting infrastructure. In addition to retraining the existing workforce, advertise and promote opportunities in the area to attract additional workforce support such as ZEV technicians and mechanics, and charging and fueling technicians.	Climate Committee RCEA SERC	Phase 2
Measure TR-8: Electrify or otherwise decarbonize 12% of applicable small off-road engines (SOREs) off-road equipment by 2030 and 100% by 2045 and replace fossil diesel consumption with renewable diesel in 55% of applicable large diesel in alignment with EO N-79-20 by 2030.			
T-8a	Align with AB 1346 and develop and circulate educational materials regarding CARB's Small-Off Road Engines regulations requiring most newly manufactured small off-road engines such as those found in leaf blowers, lawn mowers, and other equipment to be zero emission starting in Model Year 2024. Phase 2 of the regulations will be implemented in Model Year 2028, when the emission standards for generators and large pressure washers will be zero. In addition, work with Humboldt Chamber of Commerce to disseminate information regarding the regulation to impacted businesses (e.g., lawn equipment dealers, commercial landscapers, construction companies) and promote transition of equipment sales and equipment use to electric alternatives.	Municipal Public Works Municipal Facility Management	Phase 1 - ongoing
T-8b	Regional Climate Committee to identify pathways to enforce CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation and the Commercial Harbor Craft Regulation requiring that diesel vehicles over 25 horsepower to procure and only use R99 or R100 renewable diesel. This should include establishing a means to track compliance and developing partnerships with fuel suppliers in the region to promote and support the increased procurement of renewable diesel in the region.	Climate Committee	Phase 1
T-8c	Work with the Regional Climate Committee to develop and implement a plan to replace all jurisdiction owned end-of-life off-road equipment with zero-emission equipment as feasible. Procure renewable diesel for applicable jurisdiction owned diesel equipment that doesn't have available replacement equipment. Plan should include evaluation of current jurisdiction-owned equipment, alternative low or zero-emission options, prioritize equipment to replace first (e.g., largest GHG emission reduction potential), and a timeline for replacements that align with goals and feasibility of replacement.	Municipal Public Works	Phase 2

Action ID	Action	Responsible Parties	Timeframe
T-8d	The Regional Climate Committee will develop and manage an Off-road Equipment Replacement Program and Outreach Campaign that provides information to contractors, residents, and fleet operators in the region regarding alternatives to fossil-fueled off-road equipment, local fuel suppliers with renewable diesel for sale, public health and safety benefits of alternative equipment technology, and funding opportunities available (i.e., Clean Off-Road Equipment Voucher Incentive Program), Zero-Emission Landscaping Equipment Incentive Programs).	Climate Committee	Phase 1 – 2
T-8e	Through the Regional Climate Committee, Partner with North Coast Unified Air Quality Management District to identify funding opportunities to encourage residents to replace gas-powered landscaping equipment and off-road engines with zero emission equipment. This could include a rebate and incentive program for upgrading off-road equipment and switching to renewable diesel, or the development of an off-road zero emission landscaping equipment rental share program for county residents and businesses.	Climate Committee	Phase 1
T-8f	Leverage the Regional Climate Committee to source State funding to decarbonize off-road equipment as a result of Executive Order N-79-20 and State Climate Funding Package.	Climate Committee	Phase 2
Measure TR-9: Establish Humboldt as a pilot program for the decarbonization of the transportation sector to help drive State and philanthropic investment throughout Humboldt.			
T-9a	The Regional Climate Committee will develop and promote a vision and strategy for the regional community foundation to serve as a first-mover/pilot in the State in the decarbonization of America's rural transportation systems.	Climate Committee HCOAG HTA	Phase 2
T-9b	As a first-mover in rural America, the Regional Climate Committee will pursue investment on behalf of the jurisdictions from philanthropy, the State, private businesses, etc. to fund the development of a Humboldt decarbonized rural transportation system.	Climate Committee HCOAG	Phase 2 - 3
T-9c	With the support of the Regional Climate Committee, jurisdictions will directly engage members of disadvantaged and vulnerable communities in the development of the vision and strategy that aims to benefit all members of rural communities.	Municipal Community Development Climate Committee	Phase 2
Measure TR-10: Work with the State and renewable fuel industry to establish a renewable fuel network within Humboldt thereby funding new green industry and job growth to support the decarbonization of the transportation sector			

Action ID	Action	Responsible Parties	Timeframe
T-10a	The Regional Climate Committee will lead establishing a memorandum of understanding with RCEA, PG&E, CARB, CAL FIRE, the California Department of Agriculture, forest owners, and waste management companies to establish a plan to manage biomass and organic waste through the development of biofuel infrastructure in the region to position Humboldt as a first mover in active forest management to support a carbon-free future for California.	Municipal Public Works (county) RCEA	Phase 1
T-10b	The Regional Climate Committee will work jurisdiction to identify and help zone and entitle opportunity locations and specific areas throughout the region for streamlined development of renewable generation facilities where applicable. As part of effort, develop guidelines for evaluating renewable opportunities that meet sustainability criteria such as those set in the Natural Resources Defense Council's "Biofuel Sustainability Performance Guidelines" to limit environmental impacts related to renewable production.	Municipal Public Works	Phase 1
T-10c	The Regional Climate Committee will work with RCEA, PG&E, and State agencies to explore funding opportunities including grants and green bonds to help fund the development of renewable fuel infrastructure in the region and explore revenue options through the Low Carbon Fuel Standard.	Municipal Public Works (county) RCEA	Phase 1
T-10d	Establish Humboldt as a hydrogen hub by: 1. Promoting the pending The U.S. Department of Energy funded HTA hydrogen fueling station to attract additional hydrogen fueling station developers to the region 2. Partner with RCEA, SERC, and CalTrans, where applicable, to identify sites for hydrogen fueling stations that build off the North Coast and Upstate Regional Hydrogen Infrastructure Plan 3. Pursue partnerships with private developers to develop additional hydrogen fueling stations in the region 4. Pursue funding opportunities for hydrogen fueling infrastructure, such as through LCSF, AB 8 program, and the CEC Clean Transportation Program	Municipal Public Works (county) RCEA	Phase 2 - 3
T-10e	The Regional Climate Committee, in partnership with applicable incorporated cities will work with local utilities and State agencies to pursue grants earmarked for biofuel infrastructure from the Inflation Reduction Act.	Municipal Public Works	Phase 2

Action ID	Action	Responsible Parties	Timeframe
T-10f	The Regional Climate Committee will establish partnerships with organic waste haulers to establish a consistent feedstock of biomass from forests and biowaste from residential and agricultural sources and forest service businesses/property owners.	Climate Committee Fire Department	Phase 2 - 3
T-10g	Partner with the forestry services and waste haulers to host an Outreach Campaign informing the community on the economic and wildfire risk benefits of active forest management for bioenergy. Establish a working group/committee to involve local community members and businesses in the planning processes related to biomass and biowaste management locally.	Climate Committee Fire Department (county) Forestry Service (county)	Phase 1
T-10h	Leverage the Regional Climate Committee to create a region-wide workforce development programs to train the local workforce for biofuel jobs. Specifically target training towards members of disadvantaged communities and establish criteria in the planning process that prioritizes/requires the employment of local residents and businesses in the industry.	Climate Committee	Phase 2 - 3
Measure TR-11: Lead by example and electrify or otherwise decarbonize 50% municipal fleets by 2030 in alignment with the State's Advanced Clean Fleet Rule.			
T-11a	Regional Climate Committee will develop a Zero-emission Fleet Conversion and Purchase Policy to be adopted by each jurisdiction that requires new, and replacement of, municipal fleet vehicle purchases to be EVs or ZEVs. The policy will also include a schedule for replacement of fleet vehicles to comply with the State's Advanced Clean Fleet rule requiring 50 percent of medium and heavy-duty vehicle purchases be zero-emissions beginning in 2024 and 100 percent beginning in 2027. Report annually to CARB on fleet status as required per the Advanced Clean Fleets Regulation.	Municipal Facility Management Climate Committee	Phase 1
T-11b	Leverage the Regional Climate Committee conduct a feasibility and cost assessment to determine the number of EV/ZEV chargers and funds needed to support the fleet transition to 50 percent EV/ZEV by 2030.	Municipal Facility Management Climate Committee	Phase 1

Action ID	Action	Responsible Parties	Timeframe
T-11c	The Regional Climate Committee will secure funding from programs such as the California Air Resources Board's Clean Vehicle Rebate Project and the Clean Truck and Bus Voucher Incentive Program to increase procurement of EV or ZEV cars, trucks, and other vehicles and installation of EV/ZEV charging/fueling infrastructure at municipal facilities. Evaluate credit generation opportunities within the LCFS program for ZEV/EV fueling and charging stations for the municipal fleet to offset cost of infrastructure development needed to support transition.	Municipal Facility Management Climate Committee	Phase 1 - ongoing
T-11d	Install additional ZEV chargers/fueling stations in municipal parking lots for fleet, employees, and public use to meet projected demand in alignment with feasibility study.	Municipal Facility Management Municipal Public Works	Phase 1 - 2
T-11e	Leverage the Regional Climate Committee to develop a resolution in alignment with Measure T-8a, to replace jurisdiction-owned end-of-life small off-road equipment with electric equipment (e.g., lawn equipment and leaf blowers) at time of replacement and to procure renewable diesel for all applicable jurisdiction owned equipment. Each jurisdiction will need to adopt the resolution while the Regional Climate Committee will support implementation.	Municipal Facility Management	Phase 1
Measure SW-1: Establish a local waste separation facility and organics management to be able to reduce waste sent to landfills by 75% by 2030. Reduce GHG emissions by limiting truck trips required to ship waste out of the county and import compost from out of the county			
SW-1a	Regional Climate Committee to work with Humboldt Waste Management Authority (HWMA) and Recology to develop a SB 1383 waste management plan which assesses county-wide waste diversion needs, current capacity, and land-use opportunities for developing organic waste processing facilities within Humboldt County that will meet regional requirements. The assessment should also include an analysis of green bond funding opportunities, applicable green bond programs, and a strategic plan for pursuing funding through green bond programs.	Climate Committee HWMA Recology	Phase 1
SW-1b	The Regional Climate Committee will work with HWMA and an underwriter at a desired green bond program identified in the feasibility study to develop a green bond focused on providing funding for HWMA to construct a regional organics processing facility that will be used to meet SB 1383 diversion and procurement requirements.	Climate Committee HWMA	Phase 1 - 2

Action ID	Action	Responsible Parties	Timeframe
SW-1c	Through the Regional Climate Committee, partner with Recology and/or HWMA to pursue funding, such as the Organics Grant Program from CalRecycle or for projects through California Climate Investment, to reduce generated organic waste from multi-family homes and expand waste diversions programs within the county.	Climate Committee HWMA Recology	Phase 1
SW-1d	Meet the requirements of SB 1383 to reduce organics in the waste stream by 75 percent below 2014 levels by 2030 and work towards 90 percent solid waste diversion by 2040 in applicable jurisdictions by leveraging the Regional Climate Committee to provide implementation support. Include activities such as: 1. Implement enforcement and fee for incorrectly sorted materials with sensitivity to shared collection. Utilize funding to implement programs and efforts to increase communitywide organic waste diversion 2. Assure adequate bin signage across commercial and residential areas of acceptable landfill, recyclable, and compostable materials 3. Identify public areas for adding organics collection and recycling bins where needed 4. Work with Recology and HWMA to conduct free food scrap collection pail giveaways and promote curbside organics collection service offered in applicable communities 5. Evaluate opportunities to have community compost hubs throughout the county that is easily accessible for community members. Partner with regional community gardens to increase community wide access to local compost bins 6. Identify long-term and alternate solutions for the community's wastewater bio-solids to avoid long hauling distances and develop local, beneficial reuse.	Municipal Public Works HWMA	Phase 1 - ongoing

Action ID	Action	Responsible Parties	Timeframe
SW-1e	Leverage Regional Climate Committee to draft a templated edible food recovery ordinance for individual jurisdictions to modify and adopt as needed. Alternatively utilize the County's adopted ordinance, HCC 521-13 as a template or guide for drafting ordinances in individual jurisdictions that do not currently have such an ordinance. The ordinance will target edible food generators, food recovery services, or organizations that are required to comply with SB 1383. Ordinance requires all residential and commercial customers to subscribe to an organic waste collection program and/or report self-hauling or backhauling of organics. To support implementation of the ordinance, include the following activities: 1. Work with community food pantries, food suppliers, HWMA, and Recology to identify infrastructure needs to ensure edible food reuse infrastructure in Humboldt is sufficient to accept capacity needed to recover 20 percent of edible food disposed of within Humboldt 2. Regional Climate Committee to work with jurisdictions to establish an edible food recovery program where they are not currently present to minimize food waste 3. Leverage CalRecycle funding opportunities to support projects that prevent food waste or rescue edible food 4. Partner with existing food pantries that are locally appropriate for each jurisdiction to identify and advertise locations for surplus food to be taken in the community	Climate Committee Municipal Public Works Board of Supervisors	Phase 2
SW-1f	The Regional Climate Committee will work with HWMA, Recology and individual jurisdictions to implement structural changes listed above and increase service to jurisdictions without organics collection. This is applicable to both jurisdictions subject to SB 1383 and SB 1383 exempt jurisdictions to prepare for future needs to comply with SB 1383.	Municipal Public Works HWMA Recology	Phase 2

Action ID	Action	Responsible Parties	Timeframe
SW-1g	Regional Climate Committee will coordinate between HWMA and regional wastewater treatment facilities to evaluate the opportunities to process/ co-digest food waste at the wastewater treatment plants. Study should include evaluating existing infrastructure and ability to process food waste, an evaluation of necessary infrastructure upgrades needed to process food waste that would comply with SB 1383 standards for recovered organic products, and a return-on-investment evaluation. Study should also include recommendations of viable opportunities and identification of funding opportunities to support implementation and facility upgrades as necessary.	Municipal Public Works HWMA	Phase 2 - 3
SW-1h	The Regional Climate Committee in partnership with Recology and HWMA, will develop and conduct a conduct a Bring Your Own (BYO) education and outreach training for each jurisdiction community on reusables and implementing more sustainable packaging into daily use. The Regional Climate Committee will develop and provide information resources on HWMA and jurisdiction's websites. Partner with libraries and other existing facilities to market campaigns about waste reductions, reuse and repair.	Municipal Public Works HWMA Recology	Phase 1
SW-1i	Leverage the Regional Climate Committee to provide technical and outreach support to jurisdictions with organics and/or recycling services, by establishing relationships with multi-family property owners/managers to develop signage for their properties and to go door-to-door at each multi-family unit yearly to provide supplies and promote proper sorting.	Municipal Public Works HWMA	Phase 1 - 3
SW-1j	HWMA to add extra bulky-item pick up service in all jurisdictions to low- and medium-income residents at a subsided cost to help minimize illegal dumping.	Municipal Public Works HWMA	Phase 2
SW-1k	The Regional Climate Committee will facilitate conducting waste characterization studies every 3 years to inform programs and policies. Leverage study to understand the waste stream and create a plan to increase diversion and reduce contamination. Work with contracted waste haulers and HWMA to develop and implement a comprehensive monitoring and quality control program with a focus on consumer behavior change. This should include tracking of weight or volume of waste produced; consider including information on billing to inform customer of their waste production and including incentives for reduction. Explore reducing frequency of service for residential and commercial waste to least often possible pick up to reduce truck miles/trips.	Municipal Public Works HWMA	Phase 1 - 3

Action ID	Action	Responsible Parties	Timeframe
SW-1l	Through the Regional Climate Committee create a multi-lingual training/outreach program that can be used in all jurisdictions that is free and accessible to all residents and employees to learn about circular economy practices and diversion strategies and effects of overconsumption. Conduct targeted, multi-lingual, culturally appropriate, and geographically diverse circular economy educational and technical assistance campaigns based on outcomes of waste characterization studies and comprehensive monitoring and quality control program. Topics could include reuse, prolonging the life of common materials and items, and sustainable purchasing. Focus outreach campaign on food waste not going to landfill.	Climate Committee	Phase 1
SW-1m	Utilize the Regional Climate Committee to partner with schools, retirement communities, and other large institutions throughout the county to create waste diversion and prevention program/procedure/plan.	Climate Committee HWMA	Phase 2 - 3
Measure WW-1: Expand regional opportunities for implementation of wastewater decarbonization technologies such as anaerobic digesters to reduce GHG and produce renewable fuel sources			
WW-1a	Regional Climate Committee to conduct a feasibility study(s) in jurisdictions with wastewater processing facilities or community primary reliance on septic systems identifying improved wastewater technologies which could be used to mitigate wastewater processing emissions and generate renewable fuel such as RNG or offset on-site process energy use via electricity generated with an anaerobic digester, particularly in relation to septic system improvements. The study should include an in-depth analysis of the current wastewater treatment methods utilized throughout the region, identification of upgrade opportunities and potential co-benefits to the community, and technological restrictions based on regional water quality and discharge requirements. The study should also specifically consider expanding wastewater treatment capabilities to process food waste that would otherwise go to landfill.	Municipal Public Works Climate Committee	Phase 2
WW-1b	The Regional Climate Committee will partner with regional wastewater service providers to understand current methods, areas for improvement, and whether there is interest in upgrading their wastewater treatment processes.	Municipal Public Works Climate Committee	Phase 2

Action ID	Action	Responsible Parties	Timeframe
WW-1c	The Regional Climate Committee, with input from the wastewater treatment providers, will research and pursue grants to wastewater facility upgrades or home septic system improvements (where applicable), such as applying to the California State Water Board for Clean Water State Revolving Fund grants, or the Community Development Block Grant Program.	Municipal Public Works Climate Committee	Phase 3
Measure WW-2 Reduce per capita potable water consumption by 15% by 2030.			
WW-2a	The Regional Climate Committee will work with regional water providers to update their Urban Water Management Plan every 5 years, as required by the State, and implement the identified demand reduction actions to ensure compliance with the State's Making Water Conservation a Way of Life regulations. Include new actions in the UWMPs as needed to achieve State regulations, which may include: 1. Develop or amend Water Shortage Contingency Plans in the region to develop water waste restrictions for households, businesses, industries, and public infrastructure 2. Work with large water users, and other stakeholders to develop an On-Site Water Reuse Plan to maximize utilization of local water supplies decreasing energy intensity of distribution 3. Revisit and update the Model Water Efficient Landscape Ordinance as needed. Engage, through regional partnerships, with builders and developers to provide information on the requirements for development projects 4. Develop an ordinance for installation of dual-plumbing water systems that utilize greywater or recycled water for irrigation at new residential and commercial construction 5. Increase engagement with the community, specifically low-to-moderate income residents, to understand available incentives or rebates, options, and programs to reduce per capita water use. Leverage regional programs and partnerships with local organizations to expand water conservation outreach 6. Revise water and wastewater rates as necessary to ensure cost of service is covered	Municipal Public Works Climate Committee	Phase 1 - 2

Action ID	Action	Responsible Parties	Timeframe
WW-2b	Through the Regional Climate Committee work with the Humboldt County Resource Conservation District (HCRCD) to develop water conservation promotional materials, programs and outreach efforts are in multiple languages and accessible for low-income or disadvantaged and vulnerable communities. Continue to offer and expand water conservation programs to the community including educational programs like water education program for schools and water wise landscape classes as well as incentives like free water conserving deceives, and rebates for rain water collection systems and turf replacement.	Climate Committee	Phase 1
WW-2c	The Regional Climate Committee will work with the local water and wastewater providers in the region to develop a Recycled Water Master Plan to assess the feasibility of expanding the recycled water system in the region and establish a roadmap for a recycled water expansion program. The plan will identify locations available for recycled water use and establish a schedule for potable water replacement with recycled water in appropriate applications residentially, commercially, and municipally, and determine recycled water user fees.	Municipal Public Works Climate Committee	Phase 2 - 3
Measure CS-1: Research and implement feasible carbon sequestration technology opportunities to support growth and expansion of green jobs industry within the region			
CS-1a	Conduct a carbon sequestration feasibility study facilitated by the Regional Climate Committee to identify emergent technology for carbon sequestration and regional viability of implementation, including consideration of identified carbon sequestration technology facilities (e.g. ocean carbon capture, agriculture methane capture, forest biomass to biochar soil amendment, biochar wastewater filtration, forest biomass as green hydrogen fuel, etc).	Climate Committee	Phase 2
CS-1b	As part of Regional Climate Committee responsibilities established in Measure C-1, work with RCEA, HWMA, wastewater facilities, local tribes, businesses, and other applicable interested parties as appropriate to address potential carbon sequestration technologies available to the region, understand limitations and barriers, and develop solution pathways to implementation.	Climate Committee RCEA HWMA	Phase 2
CS-1c	Based on feasibility study, leverage the Regional Climate Committee to explore partnerships with technology providers and regional research laboratories (e.g. Cal Poly) for viable carbon sequestration technologies to deploy carbon sequestration pilot projects in the region.	Climate Committee	Phase 3

Action ID	Action	Responsible Parties	Timeframe
CS-1d	The Regional Climate Committee shall dedicate staff time or a representative for researching emergent carbon sequestration technologies.	Climate Committee	Phase 2
Measure CS-2: Offset fossil-based emissions and increase carbon sequestration in the community by achieving SB 1383 procurement requirements (0.08 tons recovered organic waste per person) by 2030.			
CS-2a	Leverage the Regional Climate Committee to support jurisdictions in enforcing compliance with SB 1383 and aim to exceed the baseline requirement by establishing a minimum level of compost application per year on applicable/appropriate land throughout the region. Maintain procurement policies to comply with SB 1383 requirements for jurisdictions to purchase recovered organic waste products.	Municipal Public Works	Phase 1 - ongoing
CS-2b	Regional Climate Committee to facilitate the establishment of a compost broker program primarily in rural jurisdictions central to agricultural industries which provides agricultural communities with incentives such as subsidies or community shared compost application equipment to aid in the procurement and distribution of high-quality compost.	Municipal Public Works Climate Committee	Phase 1
CS-2c	The Regional Climate Committee will work with Recology to provide residents, businesses, and developers with promotional material on where compost can be taken and how it can be used (i.e., landscaping).	Climate Committee Recology	Phase 1
CS-2d	The Regional Climate Committee will work with Recology, HWMA, and community-based organizations to provide free compost procurement services to low-income households and small businesses in all jurisdictions.	Municipal Public Works	Phase 2
CS-2e	The Regional Climate Committee will facilitate a soil assessment study to identify applicable locations and quantity of compost that can be applied within each jurisdiction to help meet the procurement requirements of SB 1383 and provide household incentives for small-scale implementation. As part of study, evaluate other carbon sequestration opportunities associated with soil amendments such as biochar.	Climate Committee	Phase 1- 2
CS-2f	Leverage the Regional Climate Committee to identify viable alternative opportunities for achieving SB 1383 compliance based on activities which are already occurring within the region (e.g. diversion of wastewater biosolids from landfill for agricultural application), or activities which provide co-benefits to the community (e.g. sourcing RNG to replace natural gas consumption, diversion of lumber or yard waste from landfill to be used to produce green hydrogen).	Climate Committee	Phase 2

Action ID	Action	Responsible Parties	Timeframe
CS-2g	The Regional Climate Committee with dedicate staff time for researching alternative pathways for achieving SB 1383 compliance and obtaining grant funding for procurement and distribution incentive programs across all jurisdictions.	Climate Committee	Phase 2
CS-2h	Through the Regional Climate Committee collaborate with local schools, Public Works, and Parks and Recreation to identify opportunities to apply compost to landscaping, potentially in addition to open space land conservation efforts.	Municipal Public Works Climate Committee	Phase 2
CS-2i	In jurisdictions currently subject to SB 1383 requirements, utilize the Regional Climate Committee to work with regional organic waste haulers (Recology) and local small-scale commercial composters (e.g. The Local Worm Guy) to identify opportunities for a regional compost procurement program to help meet and exceed the organics procurement provisions of SB 1383 as well as streamline hauler routes through regional collaboration.	Municipal Public Works Recology	Phase 1 - 2
Measure CS-3: Develop a County-wide Natural and Working Lands GHG Inventory baseline by 2027 to better understand the existing and future GHG sequestration and help obtain resources to protect and increase natural carbon sequestration occurring in the region as well as promote biodiverse forests and wetlands resistant to wildfire			
CS-3a	The County will partner with the North Coast Resource Partnership and other interested parties to develop an updated, Humboldt specific natural and working lands GHG Inventory which builds off of the 2017 northern California regional study conducted by the North Coast Resource Partnership. Development of the GHG Inventory should include consideration of requirements specified by prospective grant programs the region would like to pursue.	Municipal Public Works (county)	Phase 1
CS-3b	The Regional Climate Committee will apply for at least one grant (e.g. Sustainable Agricultural Lands Conservation Program) every three years for obtaining grant funding for restoration and preservation activities with a focus on projects that have been unable to be fully completed due to funding constraints.	Climate Committee	Phase 1 - 3
CS-3c	The Regional Climate Committee will work with interested parties, local tribes, and agricultural communities to identify opportunities for expanding wetland conservation areas in a manner that equitably addresses tribal and agricultural interests.	Climate Committee	Phase 2

Action ID	Action	Responsible Parties	Timeframe
CS-3d	The Regional Climate Committee and County will work with CalFire and Humboldt County Resource Conservation District to increase necessary equipment and infrastructure resources to better maintain public and private forested area with focus on understory clearing to prevent wildfire.	Climate Committee Municipal Public Works (county) Fire Department	Phase 2
CS-3e	The Regional Climate Committee and the County will work with Humboldt County Resource Conservation District and interested parties to identify challenges and barriers for private sector landowners to implement forest best management practices as identified by CalFire and the Humboldt County Resource Conservation District.	Climate Committee Municipal Public Works (county)	Phase 1 - 2
CS-3f	The Regional Climate Committee will support rural communities with the development of a community-based volunteer program supporting restoration project activity to create a maintained restoration process. This may involve partnering with local community organizations to communicate sequestration opportunities and facilitate volunteer maintenance projects.	Climate Committee	Phase 2 - 3
CS-3g	Through County efforts, facilitate annual reporting as part of the restoration plan mapping the existing restoration projects and open space lands to gauge progress in restoration activities over time as well as identify any gaps in maintenance activities related to ongoing projects. Incorporate GHG calculations into this monitoring plan to report on the region's contribution as a GHG source or sink.	Municipal Public Works (county)	Phase 2 - 3
CS-3h	Engage with third-party to audit the Natural and Working Lands inventory and monitoring reports. Update County-wide inventory to include GHG emissions and sinks from Natural and Working lands in the region. Leverage this data to pursue State funding to protect the regions resource as a GHG sink for the State.	Municipal Public Works (county)	Phase 2

Appendix A

Climate Regulatory Context

Climate Regulatory Context

As the impacts of climate change are being recognized, many strategies that address climate change have emerged at several different levels of government. This appendix provides an overview of the regulatory context at the international, State, and local levels relative to Humboldt's actions toward reducing its communitywide greenhouse gas (GHG) emissions.

International Climate Action Guidance

1992 United Nations Framework Convention on Climate Change

The primary international regulatory framework for GHG reduction is the United Nations Framework Convention on Climate Change Paris Agreement (UNFCCC). The UNFCCC is an international treaty adopted in 1992 with the objective of stabilizing atmospheric GHG concentrations to prevent disruptive anthropogenic climate change. The framework established non-binding limits on global GHG emissions and specified a process for negotiating future international climate-related agreements.[1]

1997 Kyoto Protocol

The Kyoto Protocol is an international treaty that was adopted in 1997 to extend and operationalize the UNFCCC. The protocol commits industrialized nations to reduce GHG emissions per county-specific targets, recognizing that they hold responsibility for existing atmospheric GHG levels. The Kyoto Protocol involves two commitment periods during which emissions reductions are to occur, the first of which took place between 2008-2012 and the second of which has not entered into force.[2]

2015 The Paris Agreement

The Paris Agreement is the first-ever universal, legally binding global climate agreement that was adopted in 2015 and has been ratified by 189 countries worldwide.[3] The Paris Agreement establishes a roadmap to keep the world under 2° C of warming with a goal of limiting an increase of temperature to 1.5° C. The agreement does not dictate one specific reduction target, instead relying on individual countries to set nationally determined contributions (NDCs) or reductions based on GDP and other factors. According to the International Panel on Climate Change (IPCC) limiting global warming to 1.5° C will require global emissions to reduce through 2030 and hit carbon neutrality by mid-century.[4]

1 United Nations Framework Convention on Climate Change (UNFCCC). United Nations Framework Convention on Climate Change. https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf
2 UNFCCC. What is the Kyoto Protocol? https://unfccc.int/kyoto_protocol
3 UNFCCC. Paris Agreement - Status of Ratification. https://unfccc.int/process/the-paris-agreement/status-of-ratification
4 IPCC. Global Warming of 1.5 C. https://www.ipcc.ch/sr15/

California Regulations and State GHG Targets

California remains a global leader in the effort to reduce GHG emissions and combat climate change through mitigation and adaptation strategies. With the passage of Assembly Bill (AB) 32 in 2006, California became the first state in the United States to mandate GHG emission reductions across its entire economy. To support AB 32, California has enacted legislation, regulations, and executive orders (EOs) that put it on course to achieve robust emission reductions and address climate change impacts. Following is a summary of executive and legislative actions relevant to this CAP Update.

2002 Senate Bill 1078

In 2002, SB 1078, established the California Renewables Portfolio Standards (RPS) Program and was accelerated in 2006 by SB 107, requiring that 20 percent of retail electricity sales be composed of renewable energy sources by 2010. EO S-14-08 was signed in 2008 to further streamline California's renewable energy project approval process and increase the State's RPS to the most aggressive in the nation at 33 percent renewable power by 2020.

2002 Assembly Bill 1493

In 2002, AB 1493, also known as Pavley Regulations, directed the California Air Resources Board (CARB) to establish regulations to reduce GHG emissions from passenger vehicles to the maximum and most cost-effective extent feasible. CARB approved the first set of regulations to reduce GHG emissions from passenger vehicles in 2004, initially taking effect with the 2009 model year.

2005 Executive Order S-3-05

EO S-3-05 was signed in 2005, establishing Statewide GHG emissions reduction targets for the years 2020 and 2050. The EO calls for the reduction of GHG emissions in California to 2000 levels by 2010, 1990 levels by 2020, and 80 percent below 1990 levels by 2050. The 2050 emission reductions target would put the State's emissions in line with the worldwide reductions needed to reach long-term climate stabilization as concluded by the IPCC *2007 Fourth Assessment Report*.

2006 Assembly Bill 32

California's major initiative for reducing GHG emissions is outlined in AB 32, the "California Global Warming Solutions Act of 2006," that was signed into law in 2006. AB 32 codifies the Statewide goal of reducing GHG emissions to 1990 levels by 2020 and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHG emissions to meet the 2020 deadline. AB 32 also requires CARB to adopt regulations requiring reporting and verification of Statewide GHG emissions. Based on this guidance, CARB approved a 1990 Statewide GHG baseline and 2020 emissions limit of 427 million metric tons of CO_2 equivalent (MMT CO_2e). The Scoping Plan was approved by CARB on December 11, 2008, and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan. In May 2014, CARB approved an updated Scoping Plan that defined CARB's climate change priorities for the next five years and set the groundwork to reach post-2020 Statewide goals. The update highlighted State progress toward meeting the 2020 GHG emission reduction goals defined in the original Scoping Plan. It evaluated how to align State longer-term GHG reduction strategies with other State policies for water, waste, natural resources, clean energy, transportation, and land use.

2007 Executive Order S-1-07

Also known as the Low Carbon Fuel Standard, EO S-1-07, issued in 2007, established a Statewide goal that requires transportation fuel providers to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. EO S-1-07 was readopted and amended in 2015 to require a 20 percent reduction in carbon intensity by 2030, the most stringent requirement in the nation. The new requirement aligns with California's overall 2030 target of reducing climate changing emissions 40 percent below 1990 levels by 2030, which was set by Senate Bill 32 and signed by the governor in 2016.

2007 Senate Bill 97

Signed in August 2007, SB 97 acknowledges that climate change is an environmental issue that requires analysis in California Environmental Quality Act (CEQA) documents. In March 2010, the California Natural Resources Agency adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and climate change impacts.

2008 Senate Bill 375

SB 375, signed in August 2008, enhances the State's ability to reach AB 32 goals by directing CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles by 2020 and 2035. In addition, SB 375 directs each of the State's 18 major Metropolitan Planning Organizations (MPOs), including the Metropolitan Transportation Commission (MTC), to prepare a "sustainable communities' strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the MPO's Regional Transportation Plan (RTP). On March 22, 2018, CARB adopted updated regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035.

2009 California Green Building Code

The California Green Building Standards Code (CALGreen) is Part 11 of the California Building Standards Code or Title 24 and is the first Statewide "green" building code in the nation. The purpose of CALGreen is to improve public health, safety, and general welfare by enhancing the design and construction of buildings. Enhancements include reduced negative impact designs, positive environmental impact designs, and encouragement of sustainable construction practices. The first CALGreen Code was adopted in 2009 and has been updated in 2013, 2016, 2019, and 2022. The CALGreen Code will have subsequent, and continually more stringent, updates every three years.

2009 Senate Bill X7-7

In 2009, SB X7-7, also known as the Water Conservation Act, was signed, requiring all water suppliers to increase water use efficiency. This legislation sets an overall goal of reducing per capita urban water use by 20 percent by 2020.

2011 Senate Bill 2X

In 2011, SB 2X was signed, requiring California energy providers to buy (or generate) 33 percent of their electricity from renewable energy sources by 2020.

2012 Assembly Bill 341

AB 341 directed the California Department of Resources Recycling and Recovery (CalRecycle) to develop and adopt regulations for mandatory commercial recycling. As of July 2012, businesses are required to recycle, and jurisdictions must implement a program that includes education, outreach, and monitoring. AB 341 also set a Statewide goal of 75 percent waste diversion by the year 2020.

2014 Assembly Bill 32 Scoping Plan Update

In 2014, CARB approved the first update to the Scoping Plan. This update defines CARB's climate change priorities and sets the groundwork to reach the post-2020 targets set forth in EO S-3-05. The update highlights California's progress toward meeting the near-term 2020 GHG emissions reduction target, defined in the original Scoping Plan. It also evaluates how to align California's longer-term GHG reduction strategies with other Statewide policy priorities, such as water, waste, natural resources, clean energy, transportation, and land use.

2014 Assembly Bill 1826

AB 1826 was signed in 2014 to increase the recycling of organic material. GHG emissions produced by the decomposition of these materials in landfills were identified as a significant source of emissions contributing to climate change. Therefore, reducing organic waste and increasing composting and mulching are goals set out by the AB 32 Scoping Plan. AB 1826 specifically requires jurisdictions to establish organic waste recycling programs by 2016, and phases in mandatory commercial organic waste recycling over time.

2015 Senate Bill 350

SB 350, the Clean Energy and Pollution Reduction Act of 2015, has two objectives: to increase the procurement of electricity from renewable sources from 33 percent to 50 percent by 2030 and to double the energy efficiency of electricity and natural gas end users through energy efficiency and conservation.

2015 Executive Order B-30-15

In 2015, EO B-30-15 was signed, establishing an interim GHG emissions reduction target to reduce emissions to 40 percent below 1990 levels by 2030. The EO also calls for another update to the CARB Scoping Plan.

2016 Senate Bill 32

On September 8, 2016, the governor signed SB 32 into law, extending AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). The bill charges CARB to adopt the regulation so that the maximum technologically feasible emissions reductions are achieved in the most cost-effective way.

2016 Senate Bill 1383

Adopted in September 2016, SB 1383 requires CARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. The bill requires the strategy to achieve the following reduction targets by 2030:

- Methane – 40 percent below 2013 levels

- Hydrofluorocarbons – 40 percent below 2013 levels
- Anthropogenic black carbon – 50 percent below 2013 levels

SB 1383 also requires CalRecycle, in consultation with CARB, to adopt regulations that achieve specified targets for reducing organic waste in landfills. The bill further requires 20% of edible food disposed of at the time to be recovered by 2025.

2017 Scoping Plan Update

On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 goal set by SB 32. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted policies, such as SB 350 and SB 1383. The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2014 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally appropriate quantitative thresholds consistent with Statewide per capita goals of six metric tons (MT) CO_2e by 2030 and two MT CO_2e by 2050. As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level), but not for specific individual projects because they include all emissions sectors in the State.

2018 Senate Bill 100

Adopted on September 10, 2018, SB 100 supports the reduction of GHG emissions from the electricity sector by accelerating the State's Renewables Portfolio Standard Program, which was last updated by SB 350 in 2015. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045.

2018 Executive Order B-55-18

Also, on September 10, 2018, the governor issued Executive Order B-55-18, which established a new Statewide goal of achieving carbon neutrality by 2045 and maintaining net negative emissions thereafter. This goal is in addition to the existing Statewide GHG reduction targets established by SB 375, SB 32, SB 1383, and SB 100.

2020 Advanced Clean Trucks Regulation

The Advanced Clean Trucks Regulation was approved on June 25, 2020. The regulation establishes a zero-emissions vehicle sales requirement for trucks or on-road vehicles over 8,500 lbs gross vehicle weight and set a one-time reporting requirement for large entities and fleets. Under the regulation, manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines are required to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck/chassis sales need to be 55% of Class 2b – 3 truck sales, 75% of Class 4 – 8 straight truck sales, and 40% of truck tractor sales. Additionally, the regulation established a one-time reporting requirement for large entities and fleets where fleet owners, with 50 or more trucks, are required to report about their existing fleet operations by March 15, 2021.

2022 Scoping Plan Update

In November 2022, CARB adopted the 2022 Scoping Plan, which provides a framework for achieving the 2045 carbon neutrality goal set forth by AB 1279. The 2022 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently approved legislation, such as AB 1279. The 2022 Scoping Plan includes discussion of the Natural and Working Lands sector as both an emissions source and carbon sink. The Plan centers equity in terms of State climate investments and climate mitigation strategies.

2022 Senate Bill 1020

Adopted in September 2022, SB 1020 advances the State's trajectory to 100 percent clean energy procurement by 2045 by creating clean energy targets of 90 percent by 2035 and 95 percent by 2040. SB 1020 builds upon SB 100, which accelerated the State's RPS and requires electricity providers to increase procurement from eligible renewable energy resources to 60 percent by 2030 and 100 percent by 2045.

2022 Assembly Bill 1279

Adopted in September 2022, AB 1279, codifies the Statewide carbon neutrality goal into a legally binding requirement for California to achieve carbon neutrality no later than 2045 and ensure 85 percent GHG emissions reduction under that goal. AB 1279 builds upon EO B-55-18 that originally established California's 2045 goal of carbon neutrality.

2022 Advanced Clean Cars II

The Advanced Clean Cars II regulation was adopted in August 2022. The regulation amends the Zero-emission Vehicle Regulation to require an increasing number of zero-emission vehicles, and relies on advanced vehicle technologies, including battery electric, hydrogen fuel cell electric and plug-in hybrid electric-vehicles, to meet air quality, climate change emissions standards, and Executive Order N-79-20, which requires that all new passenger vehicles sold in California be zero emissions by 2035. The regulation also amends standards for gasoline cars and heavier passenger trucks to continue to reduce smog-forming emissions.

2023 Advanced Clean Fleet

Approved by CARB on April 28, 2023, the Advanced Clean Fleets Regulation requires fleets, businesses, and public entities that own or direct the operation of medium- and heavy-duty vehicles in California to transition to 100 percent zero-emission capable utility fleets by 2045. Under the regulation, fleet operators may choose to purchase only ZEVs beginning in 2024 and remove internal combustion engine vehicles at the end of their useful life or fleet operators may elect to meet the State's ZEV milestone targets as a percentage of the total fleet starting with vehicle types that are most suitable for electrification.

Appendix B

GHG Inventory, Forecast, and Targets Report

Humboldt Regional Climate Action Plan

Greenhouse Gas Inventory, Forecast, and Targets Report

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1 Introduction

To guide the development of the Humboldt County Regional Climate Action Plan, the County of Humboldt (Humboldt) developed a 2022 greenhouse gas (GHG) emissions inventory from regional community-wide activities within the incorporated and unincorporated jurisdictions within the County (Humboldt County Regional GHG Inventory). The Humboldt County Regional GHG Inventory estimates GHG emissions from residents and businesses within the region, including GHG emissions from municipal buildings and operations.

This document presents the data, methods, and results for the 2022 GHG emissions inventory, forecast, and targets for the County of Humboldt. The county, situated in the northern part of California, is a diverse and geographically varied region that offers a blend of natural landscapes including coastal areas, mountainous terrain, forests, rangeland, and agricultural crops. Humboldt is predominantly rural, characterized by a dispersed population. The incorporated city areas within Humboldt exhibit a considerable range, hosting populations varying from approximately 450 to 26,000 residents. The 2022 Humboldt County Regional GHG Inventory comprehensively covers the entire county, incorporating emissions data from both the incorporated cities and the unincorporated regions of Humboldt.

California (the State) has established statewide GHG emissions reduction goals to mitigate negative climate change impacts and transition the State to a low-carbon economy. In particular, the State has established goals to reduce statewide GHG emissions 40 percent below 1990 levels by 2030, as established by Senate Bill (SB) 32 and achieve net zero GHG emissions as soon as possible, but no later than 2045, as established by Assembly Bill (AB) 1279.[1] The California Air Resources Board (CARB) is the agency responsible for addressing these goals and developing strategies to achieve them. Many local jurisdictions are completing their own GHG inventories, forecasts, and CAPs to align with SB 32 and AB 1279.

Local governments play a fundamental role in reducing local GHG emissions and preparing for a more resilient future. Local government policies can influence high-emissions behavior and mitigate climate change effects.[2] To this end, Humboldt is developing a regional CAP for its incorporated and unincorporated communities to align with SB 32 and AB 1279 goals, increase resilience and climate change preparedness, maintain healthy air and water resources, and improve community health and the local economy across the county.

To support the development of regionally specific GHG reduction targets, the County has developed a back-cast of Humboldt's GHG emissions to 1990 to set emissions targets in alignment with the State's goals as well as a forecasted emission levels in 2030, 2035, 2040, and 2045. The emissions forecast provides an up-to-date projection of how GHG emissions are expected to change within the region in the future based on changes in population and employment, as well as existing State and federal legislation aimed at reducing GHG emissions through 2045. This document also presents provisional GHG targets and a gap analysis, which identifies the level of GHG emissions reduction

[1] AB 1279 defines net zero GHG emissions as reducing GHG emissions at least 85 percent below 1990 levels. California also set a goal to reach 1990 levels by 2020, as established by AB 32, The 2020 goal set by AB 32 was achieved by the State in 2016. CARB. Frequently Asked Questions – California's 2022 Climate Scoping Plan. Accessed November 14, 2022 at: https://ww2.arb.ca.gov/sites/default/files/2022-06/2022_Scoping_Plan_FAQ_6.21.22.pdf

[2] CARB. California's 2017 Climate Change Scoping Plan. Accessed November 14, 2022 at: https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf

that will need to be achieved through local action to meet the GHG emissions reduction targets. The analysis in this document relies on the best available data and calculation methodologies currently available.

2 Background

2.1 Legislative Context

The State has developed statewide legislative goals and programs to reduce GHG emissions. CARB has issued guidance concerning the establishment of GHG emissions reduction targets for local CAPs so communities can contribute their fair share towards the State's achievement of the GHG emissions reduction goals. In the first Climate Change Scoping Plan (referred to as the 2008 Scoping Plan), CARB encouraged local governments to adopt a reduction target for their own community emissions that parallels the State commitment to reduce GHG emissions.[3] In 2017, CARB published the 2017 Climate Change Scoping Plan (referred to as the 2017 Scoping Plan Update) outlining the strategies the State will employ to reach the additional State targets set by SB 32.[4]

On December 15, 2022, the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan Update) was published and includes recommendations for achieving the goal of carbon neutrality by 2045, which was codified by AB 1279.[5]

The most relevant climate-related legislation is summarized below.

- **Executive Order S-3-05**, signed in 2005, establishes statewide GHG emissions reduction goals to achieve long-term climate stabilization as follows: by 2020, reduce GHG emissions to 1990 levels and by 2050, reduce GHG emissions to 80 percent below 1990 levels. The 2050 goal was accelerated by the 2045 carbon neutral goal established by EO B-55-18 and AB 1279, as discussed below.
- **Assembly Bill 32**, known as the Global Warming Solutions Act of 2006, requires California's GHG emissions be reduced to 1990 levels by the year 2020 (approximately a 15 percent reduction from 2005 to 2008 levels). The 2008 Scoping Plan identifies mandatory and voluntary measures to achieve the statewide 2020 GHG emissions limit.
- **Senate Bill 32**, signed in 2016, establishes a statewide mid-term GHG emissions reduction goal of 40 percent below 1990 levels by 2030. CARB formally adopted the 2017 Scoping Plan Update in December 2017, laying the roadmap to achieve 2030 goals and giving guidance to achieve substantial progress toward the 2050 State goals. The 2022 Scoping Plan Update provides further guidance for reaching the State's SB 32 goal.
- **Executive Order B-55-18**, signed in 2018, expanded upon EO S-3-05 by creating a statewide GHG emissions goal of carbon neutrality by 2045. EO S-55-18 identifies CARB as the lead agency to develop a framework for implementation and progress tracking toward this goal in the 2022 Scoping Plan Update.
- **Assembly Bill 1279**, known as the California Climate Crisis Act, signed by the governor in 2022, codifies the GHG emissions reduction goals of achieving carbon neutrality by 2045 and expands upon this goal to define carbon neutrality as reducing direct emissions 85 percent below 1990

[3] CARB. 2008. Climate Change Scoping Plan: A Framework for Change. Available at: ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/document/adopted_scoping_plan.pdf

[4] CARB. 2017. California's 2017 Climate Change Scoping Plan. Available at: https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf

[5] CARB. 2022. 2022 Scoping Plan Documents. Available at: https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents

levels and removing the remaining 15 percent of emissions via other technologies and practices, like carbon sequestration. The 2022 Scoping Plan Update adopted in December 2022 provides the pathway for reaching the State's AB 1279 goal.

2.2 Climate Science Context

Greenhouse Gases

GHGs are chemical compounds found in the earth's atmosphere which affect climate conditions by trapping infrared radiation from sunlight which can serve to raise global temperatures. Emissions can occur from natural processes as well as human activities which release excess GHGs into the atmosphere. Table 1 presents the six internationally recognized GHGs commonly quantified in GHG inventories. The 2022 Humboldt County Regional GHG Inventory focuses on the three GHGs most relevant to Humboldt's community: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The other gases (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluorides) are emitted primarily in private sector manufacturing and electricity transmission and are therefore omitted from the inventory. This approach is consistent with typical community inventory approaches, as industrial emissions are typically outside of the communities' control and influence. Table 1 also includes the global warming potentials (GWP) for each gas. The 2022 Humboldt County Regional GHG Inventory used 100-year GWPs for each gas that are consistent with the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report,[6] which were also used by the State in the latest State-wide GHG emissions inventory. The GWP refers to the ability of each gas to trap heat in the atmosphere. For example, one pound of methane gas has 25 times more heat capturing potential than one pound of carbon dioxide gas. GHG emissions are reported in metric tons of CO_2 equivalent (MT CO_2e).

Table 1 2022 Inventory GHGs and GWPs

Greenhouse Gas	Primary Source	100-year GWP
Carbon dioxide (CO_2)	Combustion	1
Methane (CH_4)	Combustion, anaerobic decomposition of organic waste (e.g., in landfills, wastewater treatment plants)	25
Nitrous Oxide (N_2O)	Leaking refrigerants and fire suppressants	298
Hydrofluorocarbons	Leaking refrigerants and fire suppressants	4 - 12,400
Perfluorocarbons	Aluminum production, semiconductor manufacturing, HVAC equipment manufacturing	6,630 - 11,100
Sulfur Hexafluoride (SH6)	Transmission and distribution of power	23,500

Source: Intergovernmental Panel on Climate Change (IPCC). 2007. AR4 Synthesis Report: Climate Change 2007. Available at: https://www.ipcc.ch/assessment-report/ar4/

[6] Intergovernmental Panel on Climate Change (IPCC). 2014. AR5 Synthesis Report: Climate Change 2014. Accessed January 5, 2023, at: https://www.ipcc.ch/report/ar5/syr/

2.3 Regional Context

Humboldt's landscape is predominantly rural, contributing to a unique demographic distribution. A significant portion of the population (53 percent) resides in unincorporated areas, emphasizing the county's expansive and varied geography. Incorporated city areas within Humboldt include Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Dell, and Trinidad. At roughly 26,500 residents, Eureka is the largest urban area in Humboldt County followed by Arcata and Fortuna. Due to their smaller population size, the incorporated cities of Ferndale, Blue Lake, Rio Dell, and Trinidad are considered rural and share more characteristics with the unincorporated county.

Incorporated Humboldt cities occupy approximately 1 percent of the total land area of the county. The primary land uses in the Humboldt region include public ownership (e.g. national parks), tribal land, timberland, and agriculture, with timberland and agriculture accounting for the majority of rural land use.[7] The region has witnessed a significant downturn in industries like logging resulting in a shrinking job market, population sizes, and reduced economic capacity. With the decline of the once-dominant industrial sector, the major sources of employment shifted to commercial urban centers such as Eureka, Arcata, and Fortuna. However, the region is anticipated to experience an economic shift on the horizon with the shift in focus to building out green job industries , and other major developments such as the California Polytechnic State University student housing expansion in Arcata,[8] the Nordic Aquafarms project,[9] and the Humboldt Bay Offshore Wind Heavy Lift Multipurpose Marine Terminal project,[10] scheduled to occur in the foreseeable future.

The 2022 Humboldt County Regional GHG inventory serves as a reflection of emissions from land uses and activities which occur across the incorporated and unincorporated regions of the county. The region is characterized by a population that is largely dispersed with a few city centers, which is reflected in the emission trends observed in the transportation, waste, and energy sectors. Due to the dispersed nature of the communities, there are limited options for public and active transportation to accommodate the travel needs of the community, resulting in a high rate of single occupancy vehicle miles traveled regionally. With no open landfills in Humboldt County, all solid waste generated by the community must be transported far outside the region, further contributing to transportation related emissions. Additionally, Humboldt County is at the end of the utilities energy distribution line resulting in limited electricity capacity and resulting in many areas having no access to natural gas lines. Communities without access to natural gas rely on other non-utility fuels such as propane or wood to supply energy to their homes and businesses. Such characteristics of the region are reflected in the trends observed in the GHG inventory.

Sectors such as natural and working land uses pose significant opportunities for Humboldt County communities. The region boasts significant forests with great sequestration potential, contributing to the county's ability to offset carbon emissions. The dairy industry is also prominent, presenting both economic opportunities and environmental considerations. However, because the County and local jurisdictional governments have limited control of agricultural emissions and the state has not yet issued guidance on methodology for quantifying mitigation of emissions from natural working

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[7] https://humboldtgov.org/DocumentCenter/View/1351/Chapter-4-Building-Communities-PDF

[8] https://facilitymgmt.humboldt.edu/sites/default/files/web_cal_poly_humboldt_feir_student_housing_project_0.pdf

[9] https://humboldtgov.org/3218/Nordic-Aquafarms-Project

[10] Humboldt Bay Harbor, Recreation & Conservation District. 2024. Humboldt Bay Offshore Wind Heavy Lift Marine Terminal Project. Available at: https://humboldtbay.org/humboldt-bay-offshore-wind-heavy-lift-marine-terminal-project-3

lands or agricultural lands, agricultural emissions and carbon sequestration of natural working lands are not included in the 2022 Humboldt County Regional GHG inventory.

The 2022 Humboldt County Regional GHG inventory framework aligns with the broader CAP and supporting measures being developed by the County, emphasizing the importance of regional collaboration for collective action to achieve GHG emissions reductions. Addressing the identified challenges in transportation, energy distribution, and waste management as well as leveraging the regions natural lands potential to mitigate carbon emissions will likely play a crucial role in achieving the community's sustainability goals.

3 Regional GHG Emissions Inventory

Conducting a GHG emissions inventory provides a comprehensive understanding of a communities' GHG emissions, and may be developed to serve the following purposes:

- Establishes perspective of GHG emissions conditions in the applicable inventory year.
- Provide an understanding of where the highest sources of GHG emissions in the community originate and where the greatest opportunities for emissions reduction exist.
- Create a GHG emissions baseline from which the community can establish a forecast, reduction targets, and track progress over time.

GHG inventories are developed by identifying the sources and sinks (sectors) for GHGs within the geographic or system boundary of interest (e.g., county), collecting activity data for each sector, and applying an emissions factor to determine the carbon dioxide equivalence (CO_2e). There are often many potential sectors contributing to the communities' GHG emissions. However, only a select few sectors are typically considered the major contributors to a community GHG inventory. The GHG emissions sectors used for the 2022 Humboldt County Regional GHG Inventory are identified in Section 3.1 below.

3.1 Methodology

Protocol

The 2022 Humboldt County Regional GHG Inventory was developed in alignment with accounting protocols provided by the Local Governments for Sustainability International Council for Local Environmental Initiatives (ICLEI) as recommended by the Association of Environmental Professionals (AEP) and the California Office of Planning and Research (OPR).[11] ICLEI protocols are designed for local-scale accounting of GHG emissions that contribute to climate change and provide authoritative guidance to account for GHG emissions accurately and consistently. The ICLEI U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions Version 1.2 (Community Protocol) serves to guide the measurement and reporting of GHG emissions in a standardized way and is used by other jurisdictions to support their own inventory, forecast, and climate action planning efforts. The Community Protocol also includes steps to evaluate the relevance, completeness, consistency, transparency, and accuracy of data used in the GHG inventory.

GHG emissions were calculated by multiplying the activity data in each GHG emissions sector (e.g., transportation, energy, waste, water, and wastewater) by an associated emission factor. Activity data refer to the relevant measured or estimated level of GHG-generating activity (e.g., energy consumption, miles traveled). Emission factors are observation-based conversion factors used to equate activity data to generated GHG emissions. The 2022 Humboldt County Regional GHG Inventory leverages the latest available models and best available data in accordance with the Community Protocol. The inventory serves to provide a comprehensive understanding of the

[11] Association of Environmental Professionals (AEP). 2013. AEP Climate Change Committee's "The California Supplement to the United States Community-Wide Greenhouse Gas (GHG) Emissions Protocol". Available at: https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf

community's current GHG emissions. The following sections contain further information on the inventory approach, calculation methodologies, data used, and results.

Emissions Boundary

The 2022 Humboldt County Regional GHG Inventory covers the relevant emissions sources within the boundary of Humboldt County, including all incorporated and unincorporated areas. The inventory thereby reflects emissions sectors resulting from Humboldt community activities over which the local governments (i.e., County and partnering jurisdictions) have jurisdictional control and influence. Sectors where the local government has limited influence are generally excluded from the 2022 GHG Community Inventory as the local government does not have the power to develop measures to impact associated emissions. The emissions boundary set forth in the analysis herein aligns with general GHG inventory accounting principles as well as methods set forth by the Community Protocol.

Scope

The Community Protocol recommends reporting GHG emissions from five basic reporting activities in a community inventory, which include:

- Use of electricity by the community
- Use of fuel in residential and commercial buildings
- On-road passenger and freight motor vehicle travel
- Use of energy in potable water and wastewater treatment and distribution
- Generation of solid waste by the community

The Community Protocol also provides recommendations for additional GHG emissions source reporting for activities that can be influenced by the accounting agency.[12] Based on reporting practices in California, it is recommended that GHG emissions from off-road equipment fuel combustion and wastewater treatment processes are also included in community GHG emissions inventories. GHG emissions sources can be categorized more generally into the following five activity sectors:

- Electricity
- Natural Gas
- Transportation
- Water and Wastewater
- Solid Waste

The 2022 Humboldt County Regional GHG Inventory assesses regional community generated GHG emissions in these five sectors, forming the foundation for emissions forecasts and targets. This includes electricity and natural gas consumption from industrial operations as most industrial facilities in the area are not subject to regulations under the State's Cap and Trade program which typically governs industrial emissions. While there are some industrial facilities which are subject to Cap and Trade, disaggregated data was not available to remove State regulated industrial facilities energy use from activity data. Furthermore, local jurisdictions are considered to have some influence over the energy use at industrial land uses through zoning and building codes and

[12] i.e. local governments

therefore are included in the inventory. Emissions from industrial point source discharge have been excluded due to lack of local jurisdictional control over this emissions source.

Notably, water sector emissions, arising from electricity use in water delivery and treatment, are accounted for under electricity sector emissions as the entirety of water supplied to Humboldt community members occurs within Humboldt geographic and jurisdictional boundaries.[13] Given that all community water is supplied from within the Humboldt community, these emissions are accounted under electricity sector emissions to prevent double counting (see Section 3.2.1).

There are opportunities to analyze the GHG emissions impacts of other sectors such as natural and working lands. However, the state has not yet issued guidance on methodology for quantifying GHG emission impacts associated with natural working lands or agricultural lands and the available methodology for accounting of emissions activities in this sector can be difficult and resource intensive to quantify. Due to the lack of specific state guidance and methodology for inclusion of natural working lands GHG emission impact in a communitywide inventory, this sector has been excluded from the 2022 Humboldt County Regional GHG Inventory. More information regarding inclusions or exclusions particular to the five mandatory sectors is provided in Section 3.2 below.

3.2 2022 Community GHG Emissions Inventory

3.2.1 Energy

Energy: Residential and Nonresidential Electricity

Emissions from residential and nonresidential electricity were calculated using Community Protocol Equation BE.2.1. Nonresidential electricity includes consumption from commercial, industrial, and agricultural sources. Commercial electricity use is expected to comprise the majority of nonresidential consumption due to the decline in regional industrial operations.

To account for only electricity consumed in the built environment, equation 3.1 subtracts electricity consumed by electric vehicles (EVs) from total purchased electricity by removing passenger car EV electricity use from residential electricity consumption and commercial and bus EV electricity consumption from nonresidential consumption. Electricity use from passenger, commercial, and bus EVs are instead accounted for under the transportation sector of the inventory to provide a more thorough differentiation between building and transportation sector emissions. More information regarding EV energy use can be found in Section 3.2.2. Equation 3.1 and Table 2 provide the equation, associated parameters, and data sources used to quantify GHG emissions associated with community electricity consumption.

EQUATION 3.1

BE.2.1 RESIDENTIAL/NONRESIDENTIAL ELECTRICITY SECTOR EMISSIONS

$$CO_2e_{electricity,j} = \sum_i \left(Elec_{i,j} - EV_{i,j}\right) \times EF_{elec,i,j} \quad 3.1$$

[13] Water sector operation information is based on feedback provided by the County and water districts which supply water to the Humboldt community.

Table 2 Emissions Parameters and Data Sources – Community Electricity Use

Definition	Parameter	Value	Unit	Data Source
Annual GHG emissions from electricity consumption per building type	$CO_2e_{electricity,j}$	See Table 5	MT CO_2e/year	Calculated
Electricity consumption per building type per energy provider	$Elec_{i,j}$	See Table 4	kWh/year	i. PG&E Community Inventory Reports[1] ii. RCEA[2] iii. CEC[3]
Attributed electric vehicle electricity consumption	$EV_{i,j}$	See Table 4	kWh/year	EMFAC2021[4]
Electricity emission factor based on energy provider	$EF_{elec,i,j}$	See Table 5	MT CO_2e/kWh	i. PG&E Community Inventory Reports ii. EPA eGRID[5] iii. RCEA Power Content Label[6]
Energy Providers	i	PG&E RCEA	Categorical	–
Building type	j	Residential Nonresidential[7]	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; kWh = kilowatt hour

1. Pacific Gas and Electricity (PG&E) Community Inventory Reports provided by each jurisdiction in Humboldt County via SharePoint on December 21, 2023. Information regarding PG&E Community Inventory Reports is available at: https://pge-energydatarequest.com/
2. Redwood Coast Energy Authority (RCEA) county-wide electricity consumption data provided by RCEA via email on March 21, 2024.
3. California Energy Commission (CEC). 2023. California Energy Consumption Database. Available at: https://ecdms.energy.ca.gov/Default.aspx
4. California Air and Resources Board (CARB). 2023. Emission FACtor (EMFAC2021 v1.0.1) Model. Available at: https://arb.ca.gov/emfac/emissions-inventory/5e0cb7d6006cc10661f4b3ffb9c120a486d46ea6
5. Environmental Protection Agency (EPA). 2024. Frequently Asked Questions about eGRID. Available at: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid-questions-and-answers
6. Redwood Coast Energy Authority (RCEA). 2024. Power Resources, 2022 Power Content Label. Available at: https://redwoodenergy.org/power-resources/
7. Nonresidential includes kWh consumption includes commercial, industrial, and agricultural sources.

Electricity consumed by residents and businesses in Humboldt County is supplied by Pacific Gas and Electric (PG&E), Redwood Coast Energy Authority (RCEA), and direct access (e.g., primarily rooftop solar panels). According to RCEA, in 2022 there was 19.4 MW of customer rooftop solar in the region, supplying an estimated 31,150 MWh of electricity generation onsite. RCEA provided county-wide electricity sales data broken out by residential and nonresidential uses. RCEA provided data excluded direct access on-site solar generation. PG&E electricity consumption data was received from each jurisdiction within Humboldt County boundaries via the PG&E Community Inventory Reports which differentiates between residential, commercial, industrial, agricultural, and direct access use categories. To determine the quantity of county-wide electricity received from PG&E, the consumption data by use category was summed across all jurisdictions within Humboldt County boundaries. The direct access category reported by PG&E includes electricity provided by commuinty choice aggregations, such as RCEA, and does not differentiate by customer type (i.e., residential or nonresidential).

Utility data reported by PG&E is subject to 15/15 Rule[14] reporting restrictions which can result in utility data being either fail-dropped from the report (i.e. excluded) or aggregated into another sector (e.g. combining commercial and industrial consumption). Agricultural and industrial electricity use did not pass the California Public Utilities Commission (CPUC) 15/15 Rule reporting restrictions and were excluded from the PG&E Community Inventory Report. PG&E provided commercial electricity 2022 data for Rio Dell, as well as 2022 residential and commercial electricity consumption data for for Blue Lake, Ferndale, and Trinidad, all failed 15/15 Rule reporting restrictions and were also exluded. Due to 15/15 rule failures for PG&E data, the RCEA supplied electricity data appears to exceed the kWh of direct access reported by PG&E that encompasses RCEA supplied electricity. The significant number of fail-dropped sectors within the PG&E Community Inventory Report results in an under reporting of regional utility consumption data from PG&E

To establish a more accurate estimate of county-wide electricity use, PG&E provided electricity to these communites was estimated using California Energy Commission (CEC) county-wide data as the basis for total Humboldt electricity usage. CEC county-wide data is reported based on residential and nonresidential consumption, and includes all electricity end-uses which includes PG&E supplied electricity, RCEA supplied electricity, and direct access. To estimate PG&E total provided electricity, known RCEA residential and nonresidential electricity was deducted from CEC electricity data. This approach assumes that all remaining residential and nonresidential kWh consumption is sourced from PG&E. Though RCEA is expanding direct access solar options in the area, direct access was not disaggregated from the remaining residential and nonresidential data due to data limitations. This method provides a replicable, conservative estimation of GHG emissions assocaited with electiricyt use county-wide as well as a more complete accounting of regional electricity consumption, though is limited in reporting sector-based emissions as it cannot establish differentiation between commercial, industrial, and agricultural utility consumption in the nonresidential sector. Table 3 provides a summary of calculation methods and results of this estimation.

Table 3 15/15 Rule Failure Electricity Use Adjustment

Sector	CEC [kWh]	RCEA [kWh]	PG&E 15/15 Adjustment[1] [kWh]
Residential	355,284,200	300,405,000	54,879,200
Nonresidential	419,005,700	297,940,000	121,065,700

Notes: kWh = kilowatt hour;

1. PG&E residential kWh is estimated by deducting RCEA residential kWh from CEC residential electricity data. PG&E nonresidential electricity use is determined by deducting RCEA nonresidential kWh from CEC nonresidential data.

Table 4 below provides resulting electricity activity data by utility provider, allocated EV electricity use data, and subsequent building activity data used to determine GHG emissions for the community's electricity consumption in the built environment.

[14] The 15/15 Rule is a policy put in place by the California Public Utilities Commission which protects the privacy of energy users. Aggregated energy information must have more than 15 customers, with no one customer representing 15 percent of the aggregated energy consumption.

Table 4 Community Residential and Nonresidential Electricity Activity Data Adjustment

Sector	Provider	Provided Activity Data [kWh]	Attributed EV[1] [kWh]	Building Activity Data [kWh]
Residential	PG&E	54,879,200	2,579,824	52,299,376
	RCEA	300,405,000	14,121,779	286,283,221
Nonresidential[2]	PG&E	121,065,700	2,649	121,063,051
	RCEA	297,940,000	6,519	297,933,481

Notes: kWh = kilowatt hour; MT CO_2e = Metric tons of carbon dioxide equivalent; EV = electric vehicles

1. Attributed EV allocates electric vehicle kWh consumption to each provider based on the vehicle type, electricity sector, and proportion of electricity provided by each provider per sector. EV kWh usage from passenger vehicles is removed from residential electricity, while commercial and bus EV kWh usage is removed from nonresidential electricity.
2. Nonresidential includes kWh consumption from commercial, industrial, and agricultural sources.

Resulting activity data, emissions factors, and GHG emissions per building type and provider is summarized in Table 5.

Table 5 Community Residential and Nonresidential Electricity GHG Emissions Calculations

Sector	Provider	Building Activity Data [kWh]	Emission Factor [MT CO2e/kWh]	GHG Emissions [MT CO2e]
Residential	PG&E[1]	52,299,376	0.0000263	1,376
	RCEA	286,283,221	0.0000220	6,293
Nonresidential	PG&E[1]	121,063,051	0.0000263	3,186
	RCEA	297,933,481	0.0000220	6,549

Notes: kWh = kilowatt hour; MT CO_2e = Metric tons of carbon dioxide equivalent

1. PG&E emissions factor only reports carbon dioxide emissions associated with production. To estimate CO_2e emissions, average CAMX grid CH_4 and N_2O emissions reported by eGRID were incorporated into the PG&E CO_2 emissions factor (See Table 2).

Energy: Electricity Transmission and Distribution Losses

Electricity Transmission and Distribution (T&D) losses arise from electricity lost during delivery to the buildings and associated end-uses in the community. Electricity T&D losses occur in the electricity transmission and distribution system and are therefore upstream of the delivery endpoints located within the communities' geographical boundary. This means this electricity is lost before it is counted. However, T&D losses are estimated and included in the 2022 Humboldt County Regional GHG Inventory as they are associated with energy usage by communities in Humboldt County and thereby directly impacted by the community's electricity consumption. Additionally, emissions from T&D losses are recommended for inclusions in community GHG inventories by the Community Protocol. Equation 3.2 and Table 6 provide the calculation method, associated parameters, and data sources used to quantify GHG emissions associated with community T&D losses from electricity consumption. T&D losses associated with EV electricity use are considered negligible and therefore are included in the quantification of residential and nonresidential building electricity T&D.

EQUATION 3.2

BE.4 ELECTRICITY T&D LOSS SECTOR EMISSIONS

$$CO_2e_{T\&D,j} = \sum_i Elec_{i,j} \times L_{T\&D} \times EF_{elec,i,j} \quad 3.2$$

Table 6 Emissions Parameters and Data Sources – Community Electricity T&D Loss

Definition	Parameter	Value	Unit	Data Source
Annual GHG emissions from transmission and distribution losses per building type	$CO_2e_{T\&D,i}$	See Table 7	MT CO_2e/year	Calculated
Electricity consumption per energy provider and building type	$Elec_{i,j}$	See Table 7	kWh/year	i. PG&E Community Inventory Reports[1] ii. RCEA[2] iii. CEC[3]
Electricity emissions factor per energy provider and building type	$EF_{elec,i,j}$	See Table 7	MT CO_2e/kWh	i. PG&E Community Inventory Reports ii. EPA eGRID[4] iii. RCEA Power Content Label[5]
Electricity loss factor	$L_{T\&D}$	5.10%	Percent	EPA eGRID
Energy Providers	i	PG&E RCEA	Categorical	–
Building type	j	Residential Nonresidential[6]	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; kWh = kilowatt hour

1. Pacific Gas and Electricity (PG&E) Community Inventory Reports provided by the County via SharePoint on December 21, 2023. Information regarding PG&E Community Inventory Reports is available at: https://PG&E-energydatarequest.com/
2. Redwood Coast Energy Authority (RCEA) county-wide electricity consumption data provided by the County via SharePoint on January 3, 2024.
3. California Energy Commission (CEC). 2023. California Energy Consumption Database. Available at: https://ecdms.energy.ca.gov/Default.aspx
4. Environmental Protection Agency (EPA). 2022. Emissions & Generation Resource Integrated Database (eGRID) Data Explorer. Available at: https://www.epa.gov/egrid/data-explorer
5. Redwood Coast Energy Authority (RCEA). 2024. Power Resources, 2022 Power Content Label. Available at: https://redwoodenergy.org/power-resources/
6. Nonresidential includes kWh consumption from commercial, industrial, and agricultural sources.

The activity data, emissions factors, and GHG emissions associated with electricity T&D losses is summarized in Table 5 per building type and provider.

Table 7 Community Electricity T&D Loss GHG Emissions Calculations

Sector	Provider	Activity Data [kWh]	T&D Losses [kWh][1]	Emission Factor [MT CO_2e/kWh]	GHG Emissions [MT CO_2e]
Residential	PG&E	54,879,200	2,798,839	0.0000263	74
	RCEA	300,405,000	15,320,655	0.0000220	337
Nonresidential	PG&E	121,065,700	6,174,351	0.0000263	162

Sector	Provider	Activity Data [kWh]	T&D Losses [kWh][1]	Emission Factor [MT CO_2e/kWh]	GHG Emissions [MT CO_2e]
	RCEA	297,940,000	15,194,940	0.0000220	334

Notes: kWh = kilowatt hour; MT CO_2e = Metric tons of carbon dioxide equivalent

1. T&D losses include the kWh consumption associated with EV charging.

Energy: Residential and Nonresidential Natural Gas

GHG emissions from natural gas result from the stationary combustion of natural gas in both the residential and nonresidential building sectors. In alignment with building electricity emissions, nonresidential natural gas includes commercial, industrial, and agricultural sources of consumption, though the majority of consumption is attributable to commercial operations due to limited industrial presence in the Humboldt community. PG&E reported natural gas consumption for the community's industrial and agricultural sources were excluded due to 15/15 rule reporting restrictions. Therefore, CEC reported county-wide natural gas data was utilized to adequately account for regional natural gas emissions from the Humboldt community. This methodology does not allow for differentiation between commercial, agricultural, and industrial utility consumption as CEC regional utility data only reports aggregated residential and nonresidential sources.

Emissions from residential and nonresidential natural gas use were calculated using Community Protocol Equation BE.1.1. Though the majority of GHG emissions result from the combustion of natural gas, not all the natural gas purchased is combusted. Natural gas that leaks from pipes and processing plants has a larger GHG impact compared to combusted natural gas due to the higher global warming potential of methane. Some natural gas also leaks from fittings and appliances within a building, after the natural gas meter which is used to quantify total gas usage. Therefore, Community Protocol has been adjusted to remove this small percentage of metered natural gas from the combustion calculation, and instead count it as leakage. More information regarding emissions associated with natural gas leaks can be found under "Energy: Natural Gas Methane Leaks" subsection below. Equation 3.3 and Table 8 provide the equation used, associated parameters, and data sources used to quantify GHG emissions associated with community natural gas consumption in residential and nonresidential buildings.

EQUATION 3.3

BE.1.1 RESIDENTIAL/NONRESIDENTIAL NATURAL GAS SECTOR EMISSIONS

$$CO_2e_{NatGas,i} = \left(Fuel_{NG,i} - [1 - L_{enduse}]\right) \times \left[\left(EF_{NG,CO_2} \times GWP_{CO_2}\right) + \left(EF_{NG,CH_4} \times GWP_{CH_4}\right) + \left(EF_{NG,N_2O} \times GWP_{N_2O}\right)\right] \times 10^{-1} \times 10^{-3} \quad (3.3)$$

Table 8 Emissions Parameters and Data Sources – Community Natural Gas Use

Definition	Parameter	Value	Unit	Data Source
Annual GHG emissions from stationary combustion of natural gas per building type	$CO_2e_{NatGas,i}$	See Table 9	MT CO_2e/year	Calculated
Natural gas consumed per building type	$Fuel_{NG,i}$	See Table 9	therms/year	CEC[1]

Definition	Parameter	Value	Unit	Data Source
Percent natural gas lost during consumer end-use	L_{enduse}	0.50%	Percent	Environmental Defense Fund[2]
Carbon dioxide emission factor for natural gas combustion	EF_{NG,CO_2}	53.06	kg CO_2/mmBTU natural gas	EPA Emission Factors Hub[3]
Methane emission factor for natural gas combustion	EF_{NG,CH_4}	0.001	kg CH_4/mmBTU natural gas	EPA Emission Factors Hub
Nitrous oxide emission factor for natural gas combustion	EF_{NG,N_2O}	0.0001	kg N_2O/mmBTU natural gas	EPA Emission Factors Hub
Global warming potential of carbon dioxide	GWP_{CO_2}	See Table 1	–	IPCC Fourth Assessment Report[4]
Global warming potential of methane	GWP_{CH_4}	See Table 1	–	IPCC Fourth Assessment Report
Global warming potential of nitrous oxide	GWP_{N_2O}	See Table 1	–	IPCC Fourth Assessment Report
Conversion factor	10^{-1}	0.1	mmBTU/therm	–
Conversion factor	10^{-3}	0.001	MT/kg	–
Building type (i.e. residential or nonresidential)	i	Residential Nonresidential[5]	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; therms = thermal unit; mmBTU = metric million British thermal unit; kg = kilograms

1. California Energy Commission (CEC). 2023. California Energy Consumption Database. Available at: https://ecdms.energy.ca.gov/Default.aspx
2. Environmental Defense Fund USER GUIDE FOR NATURAL GAS LEAKAGE RATE MODELING TOOL. Available at: https://www.edf.org/sites/default/files/US-Natural-Gas-Leakage-Model-User-Guide.pdf
3. Environmental Protection Agency (EPA). 2022. GHG Emission Factors Hub (April, 2022). Available at: https://www.epa.gov/climateleadership/ghg-emission-factors-hub
4. Intergovernmental Panel on Climate Change (IPCC). 2007. AR4 Synthesis Report: Climate Change 2007. Available at: https://www.ipcc.ch/assessment-report/ar4/
5. Nonresidential includes natural gas use from commercial, industrial, and agricultural sources.

The total natural gas consumption, combusted natural gas activity data, emissions factors, and GHG emissions associated with community natural gas use is summarized in Table 9 per building type and provider.

Table 9 Community Residential and Nonresidential Natural Gas GHG Emissions Calculations

Sector	Provided Activity Data [therms]	End-use Leakage [therms]	Combustion Activity Data [therms]	Emissions Factor [MT CO_2e/therm]	GHG Emissions [MT CO_2e]
Residential	19,402,770	97,014	19,305,756	0.005311	102,542
Nonresidential	11,017,950	55,090	10,962,860	0.005311	58,229

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent

Energy: Natural Gas Methane Leaks

Natural gas methane leaks occur during delivery to the buildings and during associated end-uses in the community. Gas methane leaks from delivery occur in the pipeline distribution system and are therefore upstream of the delivery endpoints located in Humboldt and not reflected in the reported total natural gas purchased. While natural gas pipeline distribution leakage is technically outside of a local government's jurisdictional boundaries, the leakage is directly impacted by natural gas consumption in the community. As such, it is more holistic to include leakage as an emissions sector and is therefore included in the 2022 Humboldt County Regional GHG Inventory.

The Community Protocol does not provide a specific calculation methodology for determining GHG emissions from natural gas leakage. Therefore, emissions from natural gas leaks were calculated using Equation 3.4 which estimates emissions in alignment with energy calculation principles set forth by the Community Protocol and the guidance provided under Community Protocol Section BE.5 Upstream Emissions from Energy Use. Table 10 shows the parameters and data sources associated with Equation 3.4 which were used to quantify GHG emissions from natural gas distribution and end-use leakage.

EQUATION 3.4

NATURAL GAS LEAKAGE SECTOR EMISSIONS

$$CO_2e_{leak,i} = Fuel_{NG,i} \times EF_{NG\ leak} \times (L_{enduse} + L_{dist}) \quad 3.4$$

Table 10 Emissions Parameters and Data Sources – Community Natural Gas Leaks

Definition	Parameter	Value	Unit	Data Source
Annual GHG emissions from natural gas distribution leakage per building type	$CO_2e_{leak,i}$	See Table 11	MT CO_2e/year	Calculated
Natural gas consumed per building type	$Fuel_{NG,i}$	See Table 11	therms/year	CEC[1]
Emission factor for natural gas leakage	$EF_{NG\ leak}$	0.047381	MT CO_2e/therm	Calculated[2]
Percent natural gas lost during distribution	L_{dist}	2.3%	Percent	Alvarez, Ramón et al. (2018)[3]
Percent natural gas lost during consumer end-use	L_{enduse}	0.5%	Percent	Environmental Defense Fund[4]
Building type (i.e. residential or nonresidential)	i	Residential Nonresidential[5]	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; therms = thermal unit

1. California Energy Commission (CEC). 2023. California Energy Consumption Database. Available at: https://ecdms.energy.ca.gov/Default.aspx
2. Emission factor is calculated using the following equation:
$$2.85\ \frac{cubic\ meters}{therm} * 95\%\ methane\ content\ * 0.7\ \frac{kg}{cubic\ meter} * 25\ \frac{CO_2e}{CH_4} * 0.001\ \frac{MT}{kg}$$
3. Alvarez, Ramón et al. (2018). Assessment of methane emissions from the U.S. oil and gas supply chain. Science. 361. Accessed January 12, 2023 at: https://www.science.org/doi/abs/10.1126/science.aar7204
4. Environmental Defense Fund USER GUIDE FOR NATURAL GAS LEAKAGE RATE MODELING TOOL. Accessed January 12,2023 at: https://www.edf.org/sites/default/files/US-Natural-Gas-Leakage-Model-User-Guide.pdf
5. Nonresidential includes natural gas use from commercial, industrial, and agricultural sources.

The total natural gas use and resulting leakage activity data, emissions factors, and GHG emissions per building type is summarized in Table 11.

Table 11 Community Natural Gas Methane Leaks GHG Emissions Calculations

Natural Gas Sector	Provided Activity Data [therms]	Leakage Source	Methane Leakage [therms]	Emissions Factor [MT CO_2e/therm]	GHG Emissions [MT CO_2e]
Residential	19,402,770	Distribution	446,264	0.047381	25,741
		End-use	97,014	0.047381	
Nonresidential	11,017,950	Distribution	253,413	0.047381	14,617
		End-use	55,090	0.047381	

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent

Energy: Building Fuel Use

Though PG&E provides natural gas utility to the majority of Humboldt, capacity and infrastructure limitations prevent PG&E from supplying natural gas to the entirety of the community. Due to this limitation, many communities in Humboldt County, particularly the rural regions at the edge of PG&E service territory, rely on stationary fuel sources (e.g. propane, diesel, kerosene, wood, heating oil) instead of a central utility distribution system to supply or supplement building energy consumption. GHG emissions from these fuels result primarily from the stationary combustion in the residential building sector in Humboldt. Based on census data, a majority of homes relying on an alternative fuel source rather than natural gas, relied on propane and wood. Therefore, GHG emission calculations are based on propane and wood used in residential buildings. Emissions from residential fuel use were calculated using Community Protocol Equation BE.1.2. which uses estimated annual state-level fuel consumption and counts of household fuel use obtained from the U.S. Census to determine an average rate of fuel consumption per household in the given inventory year. The established rate is then applied to the number of households in the community which utilize a given fuel type (i.e. propane or wood) to determine regional consumption activity data. Equation 3.3 and Table 8 provide the equation used, associated parameters, and data sources used to quantify GHG emissions associated with residential building fuel consumption.

EQUATION 3.5

BE.1.1 RESIDENTIAL BUILDING FUEL USE EMISSIONS

$$CO_2e_{fuel,i} = \frac{Fuel_{state,i}}{Res_{state,i}} \times EF_i \times Res_{jurisdiction,i} \quad 3.5$$

Table 12 Emissions Parameters and Data Sources – Community Fuel Use

Definition	Parameter	Value	Unit	Data Source
Annual GHG emissions from stationary combustion of building fuel	$CO_2e_{fuel,i}$	See Table 13	MT CO_2e/year	Calculated
Fuel consumed per fuel type in the State	$Fuel_{state,i}$	See Table 13	mmBtu/year	EIA SEDS[1]

Definition	Parameter	Value	Unit	Data Source
Number of residences in the State which use a given fuel type	$Res_{state,i}$	See Table 13	households	EIA RECS Survey[2]
Emissions factor per fuel type	EF_i	See Table 13	MT CO_2e/mmBtu	EPA Emission Factors Hub[3]
Number of residences in the jurisdiction which use a given fuel type	$Res_{jurisdiction,i}$	See Table 13	households	U.S. Census Bureau[4]
Fuel type	i	Propane Wood	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; mmBTU = metric million British thermal unit;

1. U.S. Energy Information Administration (EIA). 2023. State Energy Data System (SEDS), State Energy Consumption Estimates Table C5 Residential Sector Energy Consumption Estimates, 2021. Available at: https://www.eia.gov/state/seds/archive/seds2021.pdf
2. U.S. Energy Information Administration (EIA). 2023. 2020 RECS Survey Data, Highlights for fuels used in U.S. homes by state, 2020. Available at: https://www.eia.gov/consumption/residential/data/2020/index.php?view=state
3. Environmental Protection Agency (EPA). 2022. GHG Emission Factors Hub (April, 2022). Available at: https://www.epa.gov/climateleadership/ghg-emission-factors-hub
4. U.S. Census Bureau. 2022. American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP04 Selected Housing Characteristics. Available at: https://data.census.gov/table/ACSDP5Y2022.DP04?q=DP04: SELECTED HOUSING CHARACTERISTICS&g=050XX00US06023_160XX00US0602476,0607162,0623042,0623910,0625296,0660900,0680448

The data used to quantify residential building stationary fuel emissions from non-utility sources primarily utilized in Humboldt are summarized in Table 13 below.

Table 13 Community Building Fuel Use GHG Emissions Calculations

Fuel Type	State Consumption [mmBtu]	State Households [households]	Fuel Rate [mmBtu/household]	Emissions Factor [MT CO_2e/mmBtu]	Jurisdiction Households [households]	GHG Emissions [MT CO_2e]
Propane	24,200,000	630,000	38	0.0951	4,370	15,956
Wood	22,800,000	1,030,000	22	0.0631	9,104	12,721
Total						**28,677**

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; mmBTU = metric million British thermal unit

3.2.2 Transportation

Transportation: On-road

On-road vehicles in the community produce GHG emissions from the mobile combustion of fossil fuels (i.e., internal combustion engines) and up-stream from the production of electricity (i.e., electric vehicles). The Community Protocol recommends estimating GHG emissions from the on-road transportation sector using a regional travel demand model to acquire vehicle miles travelled (VMT) activity data for the community based on an origin-destination methodology, differentiated between passenger, commercial, and bus vehicle classes. However, the growth of big data[15] sources related to VMT activities presents an opportunity for more precise and reliable data collection on

[15] Big data refers to large and/or complex data sets which grow at increasing rates, and which cannot be handled by traditional data-processing software. These data sets typically provide greater statistical power in data processing.

VMT behaviors in the region. This inventory relies on county-wide 2022 VMT data provided by the traffic consultants Fehr & Peers. During Fehr & Peers review of the existing Humboldt County Travel Demand Model, it was deemed that the regional travel demand model was outdated and was not appropriate for establishing baseline VMT data for the region. Instead, Fehr & Peers developed 2022 baseline VMT data county-wide by leveraging data from StreetLight Data[16]. The VMT estimates were validated by Fehr & Peers using California Statewide Travel Demand Model data, and California Household Travel Survey data. StreetLight Data is a notable big data provider specializing in transportation information. StreetLight Data's Insight cloud-based software utilizes navigation-GPS and other location-based data derived from vehicles and location apps to provide a variety of traffic metrics such as annual average daily traffic (AADT) counts, average travel distances, and top origin-destination locations.[17] Therefore, the 2022 Humboldt County Regional GHG Inventory uses 2022 VMT baseline data sourced from Streetlight Data processed by Fehr & Peers to estimate transportation emissions. Equation 3.6 and Table 14 define the equations, parameters, and data sources used to estimate GHG emissions based on StreetLight Data passenger VMT activity data analyzed and validated by traffic consultant Fehr & Peers.[18]

EQUATION 3.6

PASSENGER ON-ROAD TRANSPORTATION COMBUSTION EMISSIONS

$$CO_2e_{onroad,pass} = \sum_i \left(R_{H,i} + V_{OH,i} + V_{HO,i} + V_{OW,i} + V_{WO,i}\right) \times N_{pass,i} \times 301 \times EF_{auto} \quad 3.6$$

Table 14 Emissions Parameters and Data Sources – Passenger On-road Transportation

Definition	Parameter	Value	Unit	Data Source
Total annual community passenger on-road GHG emissions per jurisdiction	$CO_2e_{Onroad,pass}$	See Table 20	MT CO_2e/year	Calculated
Resident-based average daily trip VMT	$T_{H,i}$	See Table 15	miles/person/weekday	StreetLight Data[1]
Visitor average daily trip VMT from other location within regional boundaries to home	$V_{OH,i}$	See Table 15	miles/person/weekday	StreetLight Data
Visitor average daily trip VMT from home to other location within regional boundaries	$V_{HO,i}$	See Table 15	miles/person/weekday	StreetLight Data
Visitor average daily trip VMT from other location to work, either of which	$V_{OW,i}$	See Table 15	miles/person/weekday	StreetLight Data

16 https://www.streetlightdata.com/how-it-works/

17 https://www.streetlightdata.com/streetlight-data-privacy-principles/

18 https://www.fehrandpeers.com/

Definition	Parameter	Value	Unit	Data Source
may occur within regional boundaries				
Visitor average daily trip VMT from work to other location, either of which may occur within regional boundaries	$V_{WO,i}$	See Table 15	miles/person/weekday	StreetLight Data
Number of passenger vehicles registered to each jurisdiction	N_{pass}	See Table 15	vehicles	CEC[2,3]
Annualization factor	301	301	Annual VMT/weekday VMT	Caltrans PeMS[4]
Emissions factor for on-road vehicles per vehicle class	$EF_{auto,i}$	See Table 20	MT CO_2e/mile	EMFAC2021 v1.0.1[5]
Jurisdiction	i	Arcata Blue Lake Eureka Ferndale Fortuna Rio Dell Trinidad Uninc. Humboldt	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; VMT = vehicle miles travelled

1. StreetLight Data VMT activity data provided by Fehr & Peers via email on December 11, 2023.
2. California Energy Commission (CEC). 2024. Light-Duty Vehicle Population in California, 2022, Humboldt County. Available at: https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle
3. Number of vehicles rather than the number of residents in each jurisdiction was used to scale average daily VMT per person as a more realistic and conservative estimate of GHG emissions.
4. Caltrans PeMS provides online traffic volume measurements by which average weekday daily volume and total annual volume can be measured to determine annualization factors for scaling average weekday VMT. Fehr & Peers provided a range of Caltrans PeMS annualization factors ranging from 242-344 from which StreetLight Data could be scaled. The designated value (301) was chosen as a moderately conservative estimation of annual VMT in each jurisdiction.
5. California Air Resources Board (CARB). 2023. EMission FACtor (EMFAC2021 v1.0.1) Model. Available at: https://arb.ca.gov/emfac/emissions-inventory/5e0cb7d6006cc10661f4b3ffb9c120a486d46ea6

A summary of total average daily VMT per person per day and the methodology to scale StreetLight Data passenger VMT provided by Fehr & Peers is provided in Table 15.

Table 15 Passenger VMT Annualization Calculations

Jurisdiction	AADT [miles/person/weekday]	Population PCT[1]	Vehicles[2]	Annual Passenger VMT[3] [miles]
Arcata	52	13.62%	14,843	232,279,893
Blue Lake	75	0.62%	673	15,255,444
Eureka	41	19.48%	21,235	261,431,302
Ferndale	80	1.15%	1,256	30,317,925
Fortuna	51	9.20%	10,031	154,212,684
Rio Dell	70	2.49%	2,711	57,491,252

Jurisdiction	AADT [miles/person/weekday]	Population PCT[1]	Vehicles[2]	Annual Passenger VMT[3] [miles]
Trinidad	98	0.33%	360	10,556,945
Uninc Humboldt Co	82	53.11%	57,898	1,427,445,820
County Total			**109,008**	**2,188,991,265**

Notes: AADT = annual average daily traffic; VMT = vehicle miles travelled

1. United States Census Bureau. 2022. ACS Demographic and Housing Estimates, American Community Survey, ACS 5-year Estimates Data Profiles, Table DP05. Available at: https://data.census.gov/table/ACSDP5Y2022.DP05?q=population&g=050XX00US06023_160XX00US0602476,0607162,0623042,0623910,0625296,0660900,0680448
2. CEC reports light-duty vehicles registered on a county-wide basis and does not distinguish between jurisdictions. Total county-wide registered vehicles (109,008) are apportioned to each jurisdiction based on jurisdictional percent of total County population as determined based on U.S. Census Bureau data. For example, 109,008 county vehicles multiplied by 53.11 population percent results in 57,898 vehicles attributable to unincorporated Humboldt County.
3. Annual passenger VMT is quantified based on AADT, population proportion, number of registered vehicles in each jurisdiction, and an annualization factor of 301 as provided by Fehr & Peers. The annualization factor was derived from California's Caltrans PeMS online traffic volume database.

The Humboldt VMT assessment provided by Fehr & Peers did not include commercial or bus related activity data, therefore commerical and bus related data was estimated from Caltrans and National Transit Database data, respectively. Equation 3.7 and Table 16 define the equation, parameters, and data sources used to estimate GHG emissions in alignment with the Community Protocol and best available data which will allow the County to track regional progress over time.

EQUATION 3.7

OTHER ON-ROAD TRANSPORTATION COMBUSTION EMISSIONS

$$CO_2e_{onroad,i} = T_{annual,i} \times EF_{auto,i} \quad 3.7$$

Table 16 Emissions Parameters and Data Sources – Other On-road Transportation

Definition	Parameter	Value	Unit	Data Source
Total annual community on-road GHG emissions per jurisdiction and vehicle class	$CO_2e_{Onroad,i}$	See Table 20	MT CO_2e/year	Calculated
Annual VMT per jurisdiction and vehicle class	$T_{annual,i}$	See Table 15	miles	i. Caltrans[1] ii. NTD[2]
Emissions factor for on-road vehicles per vehicle class	$EF_{auto,i}$	See Table 20	MT CO_2e/mile	EMFAC2021 v1.0.1[5]
Vehicle Class	i	Commercial Bus	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; VMT = vehicle miles travelled

1. California Department of Transportation (Caltrans). 2024. Traffic Census Program, Truck Traffic: Annual Average Daily Truck Traffic, 2021 AADT Truck. Available at: https://dot.ca.gov/programs/traffic-operations/census
2. National Transit Database (NTD). 2022. 2022 Annual Agency Profile – Humboldt Transit Authority (NTD ID 91036). Available at: https://www.transit.dot.gov/ntd/transit-agency-profiles
3. California Air Resources Board (CARB). 2023. EMission FACtor (EMFAC2021 v1.0.1) Model. Available at: https://arb.ca.gov/emfac/emissions-inventory/5e0cb7d6006cc10661f4b3ffb9c120a486d46ea6

Bus VMT was determined based on data provided by the National Transit Database which reports activity data on a county-wide basis, while commercial VMT was estimated based on StreetLight Data passenger annual VMT results and the percent of commercial VMT activity as reported by the Caltrans Traffic Census Program. The quantification methodology and resulting annual VMT for commercial and bus activity data is summarized in Table 17 below.

Table 17 Commercial and Bus Activity Data Calculations

Jurisdiction	Annual Passenger VMT [miles]	Commercial PCT[1]	Annual Commercial VMT[2] [miles]	Annual Bus VMT[3,4] [miles]
Arcata	232,279,893	11.42%	29,946,222	–
Blue Lake	15,255,444	11.42%	1,966,778	–
Eureka	261,431,302	11.42%	33,704,510	–
Ferndale	30,317,925	11.42%	3,908,678	–
Fortuna	154,212,684	11.42%	19,881,563	–
Rio Dell	57,491,252	11.42%	7,411,945	–
Trinidad	10,556,945	11.42%	1,361,033	–
Uninc. Humboldt Co	1,427,445,820	11.42%	184,030,608	–
County Total	**2,188,991,265**	**11.42%**	**282,211,337**	**1,028,481**

Notes: AADT = annual average daily traffic; VMT = vehicle miles travelled; PCT = percentage

1. California Department of Transportation (Caltrans). 2024. Traffic Census Program, Truck Traffic: Annual Average Daily Truck Traffic, 2021 AADT Truck. Available at: https://dot.ca.gov/programs/traffic-operations/census
2. Annual commercial VMT is derived through a backward calculation process, utilizing the annual passenger VMT and the percentage of commercial VMT represented on Humboldt County roads as reported by Caltrans.
3. National Transit Database (NTD). 2022. 2022 Annual Agency Profile – Humboldt Transit Authority (NTD ID 91036). Available at: https://www.transit.dot.gov/ntd/transit-agency-profiles
4. Includes vehicle revenue miles data from public transit entities over which local governments within Humboldt County have control, including Humboldt Transit Authority, City of Eureka, and City of Arcata

In addition to mobile combustion emissions accounted under Community Protocol Equations TR.1.A and TR.2.B, GHG emissions from electric vehicles were included in the 2022 Humboldt County Regional GHG Inventory for more accurate accounting of on-road transportation trends. This was achieved through modifying Equation 3.6 to account for EV modeshare estimates obtained from EMFAC2021 based on total VMT. The equation, parameters, and data sources used to estimate GHG emissions attributable to on-road EV activity is provided in Equation 3.8 and Table 18 below.

EQUATION 3.8

ON-ROAD TRANSPORTATION ELECTRIC VEHICLE EMISSIONS

$$CO_2e_{onroad,EV,i} = T_{annual,i} \times EV_{share,i} \times EPM_i \times EF_{elec,j} \quad 3.8$$

Table 18 Emissions Parameters and Data Sources – Community On-road Transportation EV

Definition	Parameter	Value	Unit	Data Source
Total annual community on-road EV GHG emissions per vehicle class	$CO_2e_{Onroad,EV,i}$	See Table 20	MT CO_2e/year	Calculated

Definition	Parameter	Value	Unit	Data Source
Annual VMT per jurisdiction and vehicle class	$T_{annual,i}$	See Table 15 See Table 17	miles	i. StreetLight Data[1] ii. Caltrans[2] iii. NTD[3]
Percent share of VMT attributable to EVs	$EV_{share,i}$	See Table 19	%	EMFAC2021 v1.0.1[4]
Average rate of electricity consumption per EV-mile per vehicle class	EPM_i	See Table 19	kWh/mile	EMFAC2021 v1.0.1
Weighted average electricity emissions factor per building type	$EF_{elec,j}$	See Table 19	MT CO_2e/kWh	i. PG&E Community Inventory Reports[5] ii. EPA eGRID[6] iii. RCEA Power Content Label[7]
Vehicle class	i	Passenger Commercial Bus	Categorical	
Building type	j	Residential Nonresidential	Categorical	

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; EV = electric vehicles; VMT = vehicle miles travelled; kWh = kilowatt hour

1. StreetLight Data VMT activity data provided by Fehr & Peers via email on December 11, 2023.
2. California Department of Transportation (Caltrans). 2024. Traffic Census Program, Truck Traffic: Annual Average Daily Truck Traffic, 2021 AADT Truck. Available at: https://dot.ca.gov/programs/traffic-operations/census
3. National Transit Database (NTD). 2022. 2022 Annual Agency Profile. Available at: https://www.transit.dot.gov/ntd/transit-agency-profiles
4. California Air Resources Board (CARB). 2023. EMission FACtor (EMFAC2021 v1.0.1) Model. Available at: https://arb.ca.gov/emfac/emissions-inventory/5e0cb7d6006cc10661f4b3ffb9c120a486d46ea6. Percent of EV share validated with CEC data for County.
5. Pacific Gas and Electricity (PG&E) Community Inventory Reports provided by the County via SharePoint on December 21, 2023. Information regarding PG&E Community Inventory Reports is available at: https://pge-energydatarequest.com/
6. Environmental Protection Agency (EPA). 2024. Frequently Asked Questions about eGRID. Available at: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid-questions-and-answers
7. Redwood Coast Energy Authority (RCEA). 2024. Power Resources, 2022 Power Content Label. Available at: https://redwoodenergy.org/power-resources/

Table 19 shows the VMT activity data for community vehicles per vehicle class as well as the EV share of VMT and EVMT used to determine EV activity data expressed as electricity consumption.

Table 19 Community On-road EV Activity Data Calculations

Vehicle Class	VMT Activity Data [miles]	EV Share [%]	EVMT [miles]	EPM [kWh/mile]	EV Activity Data [kWh]
Passenger	2,188,991,265	2.09%	45,749,917	0.37	16,701,602
Commercial	282,211,337	0.00%	0	0.00	0
Bus	1,028,481	0.51%	5,245	1.75	9,168

Notes: VMT = vehicle miles travelled; EV = electric vehicle; EPM = electricity per mile; EVMT = electric vehicle miles traveled; kWh = kilowatt hour

The activity data, emissions factors, and resulting GHG emissions from on-road transportation quantified in accordance with Equation 3.6 and Equation 3.8 is summarized in Table 20 below. It is important to highlight that the VMT emissions factors provided by EMFAC2021 encompass all

vehicle types, including EV VMT. However, the GHG emissions for EV activity are considered zero in this emissions factor and does not take into account regional electricity grid emissions. Consequently, applying the emission factor to total VMT data does not result in duplication of emissions associated with EVs.

Table 20 Community On-road Transportation GHG Emissions Calculations

Sector	Activity Data[1]		Emission Factor		GHG Emissions [MT CO_2e]
Passenger VMT	2,188,991,265	VMT	0.0003610	MT CO2e/mile	790,226
Commercial VMT	282,211,337	VMT	0.0011290	MT CO2e/mile	318,617
Bus VMT	1,028,481	VMT	0.0014930	MT CO2e/mile	1,536
Passenger EVMT[2]	16,701,602	kWh	0.0000226	MT CO2e/kWh	378
Commercial EVMT[3]	0	kWh	0.0000226	MT CO2e/kWh	0
Bus EVMT[3]	9,168	kWh	0.0000237	MT CO2e/kWh	<1
Total					**1,110,756**

Notes: VMT = vehicle miles traveled; EVMT = electric vehicle miles traveled; kWh = kilowatt hour; MT CO_2e = Metric tons of carbon dioxide equivalent

1. EV activity data does not include kWh associated with T&D losses as these emissions are considered negligible and are included under energy sector emissions.
2. Emissions factor for on-road passenger EV electricity use is weighted according to the portion of electricity supplied per provider in the residential electricity sector (see Table 5)
3. Emissions factor for on-road commercial and bus EV electricity use is weighted according to the portion of electricity supplied per provider in the commercial electricity sector (see Table 5)

Transportation: Off-road

Off-road equipment and vehicles in the community generate GHG emissions from the mobile combustion of fossil fuels. Off-road fuel usage results from equipment operation for sectors such as agricultural, construction, lawn and garden, or recreational equipment. Community Protocol Equation TR.8 was used to quantify GHG emissions from off-road equipment fuel consumption and is shown under Equation 3.9 below. Table 21 lists the parameters, values, and data sources used to quantify emissions in accordance with the Community Protocol.

EQUATION 3.9

TR.8 OFF-ROAD EQUIPMENT SECTOR EMISSIONS

$$CO_2e_{offroad,j} = EF_j \times \sum_i Fuel_{offroad,i,j} \times AF_i \quad (3.9)$$

Table 21 Emissions Parameters and Data Sources – Community Off-Road Equipment

Definition	Parameter	Value	Unit	Data Source
Annual GHG emissions from offroad equipment	$CO_2e_{offroad,j}$	See Table 23	MT CO_2e/year	Calculated
Annual fuel consumption in the jurisdiction per sector per fuel type	$Fuel_{offroad,i,j}$	See Table 23	Gallons/year	OFFROAD2021[1]
Fuel attribution factor per equipment type	AF_i	See Table 22	Percent	–
Emission factor per fuel type	EF_j	See Table 23	MT CO_2e/gallon	EPA Emission Factors Hub[2]
Equipment Type	i	See Table 22	Categorical	OFFROAD2021
Fuel type	j	Gasoline Diesel Natural Gas	Categorical	OFFROAD2021

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent

1. California Air Resource Board (CARB). 2023. Mobile Source Emissions Inventory Off-road (OFFROAD2021). Available at: https://arb.ca.gov/emfac/emissions-inventory/5e0cb7d6006cc10661f4b3ffb9c120a486d46ea6
2. Environmental Protection Agency (EPA). 2022. GHG Emission Factors Hub. Available at: https://www.epa.gov/climateleadership/ghg-emission-factors-hub

The OFFROAD2021 model used to determine off-road sector activity data reports gallons of fuel consumption per off-road vehicle sector on a county-wide basis. However, fuel consumption from certain off-road vehicle sectors may be considered outside of the local governments jurisdictional control and therefore should not be included in the 2022 Humboldt County Regional GHG Inventory. Identification of off-road vehicle sectors over which Humboldt's incorporated and unincorporated jurisdictions have influence is identified in Table 22 below.

Table 22 Community Off-road Equipment Sector Attributions

Equipment Type	Attribution
Agricultural	Complete Regional Control
Airport Ground Support	Complete Regional Control
Cargo Handling Equipment	Excluded – Not Under Jurisdictional Control
Commercial Harbor Craft	Complete Regional Control
Construction and Mining	Complete Regional Control
Industrial	Complete Regional Control
Lawn and Garden	Complete Regional Control
Light Commercial	Complete Regional Control
Locomotive	Excluded – Other[1]
Ocean Going Vessel	Excluded – Not Under Regional Control
Oil Drilling	Excluded – Other[1]
Outboard Marine Tanks	Excluded – Other[1]
Pleasure Craft	Complete Regional Control
Portable Equipment	Complete Regional Control
Transport Refrigeration Unit	Complete Regional Control
Recreational	Complete Regional Control

Equipment Type	Attribution
Military Tactical Support	Excluded – Not Under Regional Control
Forestry	Complete Regional Control

Notes:

1. Outboard marine, oil drilling, and locomotive activities do not occur in Humboldt County according to OFFROAD2021 model

The attributed and aggregated activity data by fuel type, emission factors, and emissions results for the inventory's off-road equipment sector are provided in Table 23.

Table 23 Community Off-road GHG Emissions Calculations

Fuel Type	Activity Data (gallons)	Emission Factor (MT CO_2e/gallon)[1]	GHG Emissions (MT CO_2e)
Diesel	9,101,978	0.0105021	95,590
Gasoline	2,975,135	0.0091151	27,119
Natural Gas	410,588	0.0058821	2,415
TOTAL			**125,124**

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; Values may not add due to rounding

1. Emission factors per fuel type represent a weighted average based on the emissions factor and fuel consumption per offroad equipment type as determined according to EPA's Emissions Factor Hub available at: https://www.epa.gov/climateleadership/ghg-emission-factors-hub

3.2.3 Solid Waste

GHG emissions associated with the waste sector result from the decomposition of waste at a landfill as well as landfill operation processes. Emissions arising from the decomposition of solid waste can occur at both operational and closed landfills within the community as the waste material naturally degrades over time. However, the Community Protocol indicates to exclude closed landfill emissions as the methodology accounts for current and future decomposition emissions resulting from community generated solid waste. Therefore, the closed Cummings Road Landfill[19] within the community's boundaries is excluded from the 2022 Humboldt County Regional GHG Inventory to avoid double counting of emissions in alignment with the Community Protocol.

GHG emissions from community generated waste decomposition were calculated using Community Protocol Method SW.4. Equation 3.10 and Table 24 provide the calculation method, associated parameters, and data sources used to quantify GHG emissions in accordance with Community Protocol SW.4.

EQUATION 3.10

SW.4.1 SOLID WASTE FUGITIVE EMISSIONS

$$CO_2e_{Waste,fugitive} = GWP_{CH_4} \times (1 - CE) \times (1 - OX) \times M \times \sum_i P_i \times EF_i \quad 3.10$$

[19] https://www.hwma.net/cummings-road-landfill

Table 24 Emissions Parameters and Data Sources – Community Solid Waste Fugitive Emissions

Definition	Parameter	Value	Unit	Data Source
Annual community generated waste GHG emissions	$CO_2e_{Waste,fugitive}$	36,353	MT CO_2e/year	Calculated
Methane global warming potential	GWP_{CH_4}	See Table 1		IPCC Fourth Assessment Report[1]
Default LFG collection efficiency	CE	0.75	Fraction	ICLEI Community Protocol
Oxidation rate	OX	0.10	Fraction	ICLEI Community Protocol
Total mass of waste entering landfill	M	107,713	Wet short tons	CalRecycle[2,3]
Proportion of total waste material per material type	P_i	1	Fraction	–
Emission factor per material type[4]	EF_i	0.060	MT CH_4/wet short ton	ICLEI Community Protocol
Material type	i	Multiple	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent

1. Intergovernmental Panel on Climate Change (IPCC). 2007. AR4 Synthesis Report: Climate Change 2007. Available at: https://www.ipcc.ch/assessment-report/ar4/
2. California Department of Resources Recycling and Recovery (CalRecycle). 2022. RDRS Report 1: Overall Jurisdiction Tons for Disposal and Disposal Related Uses. Available at: https://www2.calrecycle.ca.gov/RecyclingDisposalReporting/Reports/OverallJurisdictionTonsForDisposal
3. Data pulled from CalRecycle includes waste ton information for the incorporated cities and unincorporated areas of Humboldt County.
4. For mixed municipal waste streams where the proportion of material type is unknown, ICLEI specifies a default value of 0.060 MT CH_4 per wet short ton may be used.

Landfill process emissions were quantified according to Equation SW.5 of the Community Protocol. Equation 3.11 and Table 25 provide the calculation method, associated parameters, and data sources used to quantify GHG emissions from landfill operations.

EQUATION 3.11

SW.5 SOLID WASTE PROCESS EMISSIONS

$$CO_2e_{Waste,process} = M \times EF_p \quad 3.11$$

Table 25 Emissions Parameters and Data Sources – Community Solid Waste Process Emissions

Definition	Parameter	Value	Unit	Data Source
Annual landfill process GHG emissions	$CO_2e_{Waste,process}$	1,185	MT CO_2e/year	Calculated
Total mass of solid waste that enters the landfill in the inventory year	M	107,713	Wet short tons/year	CalRecycle[1,2]
Emissions factor for landfill process emissions	EF_p	0.011	MT CO_2e/wet short ton	ICLEI Community Protocol

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent

Definition	Parameter	Value	Unit	Data Source

1. California Department of Resources Recycling and Recovery (CalRecycle). 2022. RDRS Report 1: Overall Jurisdiction Tons for Disposal and Disposal Related Uses. Available at: https://www2.calrecycle.ca.gov/RecyclingDisposalReporting/Reports/OverallJurisdictionTonsForDisposal
2. Data pulled from CalRecycle includes waste ton information for the incorporated cities and unincorporated areas of Humboldt County.

3.2.4 Wastewater

Management of wastewater produces emissions through every stage of the process from collection to final use or discharge. Humboldt is serviced by several wastewater facilities which utilize a variety of processing methods to manage the community's wastewater. Additionally, a large portion of the unincorporated County's wastewater is processed using residential on-site septic tanks. Information regarding the population served by each wastewater facility was used to estimate GHG emissions in alignment with Community Protocol methodologies. Table 26 provides a summary of the wastewater facilities within Humboldt, the populations served by each wastewater facility, and the Community Protocol equations applied to estimate GHG emissions.

Table 26 Wastewater Facility Processes and Population Served

Jurisdiction	Wastewater Treatment Plant (WWTP)	Population Served[1]	Community Protocol EQ's[2]
Arcata	Arcata WWTP	18,555	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Blue Lake	City of Blue Lake Public Works Department	1,100	WW.6.(alt) - Lagoon WW.12.(alt) - Effluent (anaerobic, river)
Eureka	Elk River WWTP	44,000	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, ocean)
Ferndale	City of Ferndale Public Works Department	638	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Fortuna	City of Fortuna WWTP	12,500	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Rio Dell	City of Rio Dell WWTP	3,300	WW.7 - Process N2O (w/ nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Trinidad	Residential	449	WW.11.(alt) - septic system
Uninc. Humboldt County	Fieldbrook Glendale CSD	1,204	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)

Jurisdiction	Wastewater Treatment Plant (WWTP)	Population Served[1]	Community Protocol EQ's[2]
Uninc. Humboldt County	Humboldt CSD	19,500	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	Loleta CSD	828	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	Manila CSD	750	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	Miranda CSD	360	WW.11.(alt) - septic system
Uninc. Humboldt County	Redway CSD	1,400	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	RID	800	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, ocean)
Uninc. Humboldt County	Palmer Creek CSD	320	WW.1.(alt) - stationary combust WW.2.(alt) - stationary combust WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	Scotia CSD	875	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	McKinleyville CSD	14,000	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	Garberville CSD	1,400	WW.8 - Process N2O (w/o nit/denit) WW.12.(alt) - Effluent (aerobic, river)
Uninc. Humboldt County	Weott CSD	364	WW.11.(alt) - septic system
Uninc. Humboldt County	Residential[3]	14,238	WW.11.(alt) - septic system

Notes: EQ = equations; Uninc. = unincorporated

1. Population Served = the combined total number of employees and residents in Humboldt County
2. Population served and community protocol equations determined based on WWTP system descriptions provided to the County by each WWTP. The County provided the information via SharePoint between December 21, 2023 and January 29, 2024.
3. The population served by residential on-site septic tanks in the unincorporated county is estimated based on the differential of total population in Humboldt County and the total population served by an identified wastewater treatment process, including septic (e.g. Trinidad). This estimate assumes that the remaining population not included under a verified wastewater treatment process lies within the unincorporated County and is serviced by a septic system.

The set of methods used to quantify stationary combustion emissions is outlined in Equation 3.12 and Table 27 as well as Equation 3.13 and Table 28 below.

EQUATION 3.12

WW.1.(ALT) WASTEWATER DIGESTER GAS STATIONARY COMBUSTION EMISSIONS (CH_4)

$$CO_2e_{WW,Stat,CH4,i} = (P_i \times Digester\ Gas \times f_{CH4} \times BTU_{CH4} \times 10^{-6} \times EF_{CH4} \times 365.25 \times 10^{-3}) \times GWP_{CH4} \quad 3.12$$

Table 27 Emissions Parameters and Data Sources – Community Wastewater Stationary Combustion (CH_4)

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by devices designed to combust digester gas	$CO_2e_{WW,Stat,CH4}$	See Table 35	MT CO_2e/year	Calculated
Population served by WWTP with stationary combustion	P_i	78,598	People	See Table 26
Rate of digester gas volume production	$Digester\ Gas$	1.00	std ft³/person/day	ICLEI Community Protocol
Fraction of methane in digester gas	f_{CH4}	0.65	Fraction	ICLEI Community Protocol
Default higher heating value of methane	BTU_{CH4}	1,028	BTU/ft³	ICLEI Community Protocol
Conversion factor	10^{-6}	0.000001	mmBTU/BTU	ICLEI Community Protocol
Methane emissions factor	EF_{CH4}	0.0032	kg CH_4/mmBTU	ICLEI Community Protocol
Conversion factor	365.25	365.25	Days/year	ICLEI Community Protocol
Conversion factor	10^{-3}	0.001	MT/kg	ICLEI Community Protocol
Global warming potential of methane	GWP_{CH4}	See Table 1	–	IPCC Fourth Assessment Report
Wastewater treatment plant (WWTP)	i	See Table 26	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; std ft³ = standard cubic feet; BTU = British thermal unit; mmBTU = one million British thermal units; kg = kilograms

EQUATION 3.13

WW.2.(ALT) WASTEWATER DIGESTER GAS STATIONARY COMBUSTION EMISSIONS (N_2O)

$$CO_2e_{WW,Stat,N2O,i} = (P_i \times Digester\ Gas \times f_{CH4} \times BTU_{CH4} \times 10^{-6} \times EF_{N2O} \times 365.25 \times 10^{-3}) \times GWP_{N2O} \quad 3.13$$

Table 28 Emissions Parameters and Data Sources – Community Wastewater Stationary Combustion (N_2O)

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by devices designed to combust digester gas	$CO_2e_{WW,Stat,N2O}$	See Table 35	MT CO_2e/year	Calculated
Population served by WWTP with stationary combustion	P_i	78,598	People	See Table 26
Rate of digester gas volume production	$Digester\ Gas$	1.00	std ft³/person/day	ICLEI Community Protocol
Fraction of methane in digester gas	f_{CH4}	0.65	Fraction	ICLEI Community Protocol
Default higher heating value of methane	BTU_{CH4}	1,028	BTU/ft³	ICLEI Community Protocol

Definition	Parameter	Value	Unit	Data Source
Conversion factor	10^{-6}	0.000001	mmBTU/BTU	
Nitrous Oxide emissions factor	EF_{N2O}	0.0006	kg N_2O/mmBTU	ICLEI Community Protocol
Conversion factor	365.25	365.25	Days/year	ICLEI Community Protocol
Conversion factor	10^{-3}	0.001	MT/kg	ICLEI Community Protocol
Global warming potential of nitrous oxide	GWP_{N2O}	See Table 1	–	IPCC Fourth Assessment Report
Wastewater treatment plant (WWTP)	i	See Table 26	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; std ft^3 = standard cubic feet; BTU = British thermal unit; MMBtu = one million British thermal units; kg = kilograms;

Equation 3.14 shows the calculation method use to quantify emissions from wastewater treatment plants which utilize lagoon processing systems in accordance with Community Protocol WW.6.(alt). Table 29 show the parameter definitions, default factors, and data sources used.

EQUATION 3.14

WW.6.(ALT) METHANE EMISSIONS FROM LAGOONS

$$CO_2e_{WW,lagoon,i} = P_i \times F_{ind-com} \times BOD_5\ load \times \left(1 - F_p\right) \times B_0 \times MCF_a \times 365.25 \times 10^{-3} \times GWP_{CH4} \quad (3.14)$$

Table 29 Emissions Parameters and Data Sources – Community Wastewater Lagoons

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by lagoon system	$CO_2e_{WW,lagoon,i}$	See Table 35	MT CO_2e/year	Calculated
Population served by lagoon system	P_i	1,100	People	See Table 26
Factor for insignificant industrial or commercial discharge	$F_{ind-com}$	1.00	–	ICLEI Community Protocol
Amount of BOD_5 treated per day	$BOD_5\ load$	0.09	kg BOD_5/person/day	ICLEI Community Protocol
Fraction of BOD_5 removed in primary treatment	F_p	0.325	–	ICLEI Community Protocol
Maximum CH_4 producing capacity for domestic wastewater	B_0	0.60	kg CH_4/kg BOD_5	ICLEI Community Protocol
CH_4 correction factor for anaerobic systems	MCF_a	0.80	–	ICLEI Community Protocol
Conversion factor	365.25	365.25	Days/year	ICLEI Community Protocol
Conversion factor	10^{-3}	0.001	MT/kg	ICLEI Community Protocol
Global warming potential of CH_4	GWP_{CH4}	See Table 1	–	IPCC Fourth Assessment Report

Definition	Parameter	Value	Unit	Data Source
Wastewater treatment plant (WWTP)	i	See Table 26	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; BOD_5 = five-day biochemical oxygen demand; kg = kilograms;

Equation 3.15 shows the calculation method use to quantify process emissions with nitrification/denitrification in accordance with Community Protocol WW.7. Table 30 show the parameter definitions, default factors, and data sources used.

EQUATION 3.15

WW.7 CENTRALIZED WWTP W/ NITRIFICATION/DENITRIFICATION

$$CO_2e_{WW,nit/denit,i} = P_i \times F_{ind-com} \times EF_{nit/denit} \times 10^{-6} \times GWP_{N2O} \quad 3.15$$

Table 30 Emissions Parameters and Data Sources – Community Wastewater With Nit/Denit

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by WWTP processes	$CO_2e_{WW,nit/denit,i}$	See Table 35	MT CO_2e/year	Calculated
Population served by the wastewater treatment process	P_i	3,300	People	See Table 26
Factor for insignificant industrial or commercial discharge	$F_{ind-com}$	1.00	–	ICLEI Community Protocol
Emissions factor for a WWTP without nitrification or denitrification	$EF_{nit/denit}$	7.00	g N_2O/person/year	ICLEI Community Protocol
Conversion factor	10^{-6}	0.000001	mmBTU/BTU	ICLEI Community Protocol
Global warming potential of nitrous oxide	GWP_{N2O}	See Table 1	–	IPCC Fourth Assessment Report
Wastewater treatment plant (WWTP)	i	See Table 26	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; std ft^3 = standard cubic feet; BTU = British thermal unit; mmBTU = one million British thermal units; kg = kilograms

Equation 3.16 shows the calculation method use to quantify process emissions without nitrification/denitrification in accordance with Community Protocol WW.8. Table 31 show the parameter definitions, default factors, and data sources used.

EQUATION 3.16

WW.8 CENTRALIZED WWTP W/O NITRIFICATION/DENITRIFICATION

$$CO_2e_{WW,w/o\,nit/denit,i} = P_i \times F_{ind-com} \times EF_{w/o\,nit/denit} \times 10^{-6} \times GWP_{N2O} \quad 3.16$$

Table 31 Emissions Parameters and Data Sources – Community Wastewater Without Nit/Denit

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by WWTP processes	$CO_2e_{WW,w/o\ nit/denit,i}$	See Table 35	MT CO_2e/year	Calculated
Population served by the wastewater treatment process	P_i	100,163	People	See Table 26
Factor for insignificant industrial or commercial discharge	$F_{ind-com}$	1.00	–	ICLEI Community Protocol
Emissions factor for a WWTP without nitrification or denitrification	$EF_{w/o\ nit/denit}$	3.20	g N_2O/person/year	ICLEI Community Protocol
Conversion factor	10^{-6}	0.000001	MMBtu/BTU	ICLEI Community Protocol
Global warming potential of nitrous oxide	GWP_{N2O}	See Table 1	–	IPCC Fourth Assessment Report
Wastewater treatment plant (WWTP)	i	See Table 26	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; std ft^3 = standard cubic feet; BTU = British thermal unit; MMBtu = one million British thermal units; kg = kilograms;

Equation 3.17 shows the calculation method use to quantify emissions from septic tanks wastewater processing in accordance with Community Protocol WW.7. Table 32 show the parameter definitions, default factors, and data sources used.

EQUATION 3.17

WW.11.(ALT) FUGITIVE METHANE EMISSIONS FROM SEPTIC SYSTEMS

$$CO_2e_{WW,septic,i} = P_i \times BOD_5\ load \times B_0 \times MCF_s \times 365.25 \times 10^{-3} \times GWP_{CH4} \quad 3.17$$

Table 32 Emissions Parameters and Data Sources – Community Wastewater Septic

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by septic systems	$CO_2e_{WW,septic,i}$	See Table 35	MT CO_2e/year	Calculated
Population served by the septic system	P_i	15,411	People	See Table 26
Amount of BOD_5 treated per day	$BOD_5\ load$	0.09	kg BOD_5/person/day	ICLEI Community Protocol
Maximum CH_4 producing capacity for domestic wastewater	B_0	0.60	kg CH_4/kg BOD_5	ICLEI Community Protocol
CH_4 correction factor for septic tanks	MCF_s	0.22	–	ICLEI Community Protocol
Conversion factor	365.25	365.25	Days/year	ICLEI Community Protocol
Conversion factor	10^{-3}	0.001	MT/kg	ICLEI Community Protocol

Definition	Parameter	Value	Unit	Data Source
Global warming potential of nitrous oxide	GWP_{CH4}	See Table 1	–	IPCC Fourth Assessment Report
Septic type	i	WWTP Residential	Categorical	See Table 26

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; BOD_5 = five-day biochemical oxygen demand ; kg = kilograms; MT = metric ton

Community Protocol Equation WW.12.(alt) was used to quantify GHG emissions associated with treated wastewater effluent discharge into natural water bodies. Equation 3.18 shows the calculation method used to quantify effluent emissions in accordance with the Community Protocol while Table 33 shows the parameter definitions, default factors, and data sources used.

EQUATION 3.18

WW.12.(ALT) NITROUS OXIDE EMISSIONS FROM EFFLUENT DISCHARGE

$$CO_2e_{WW,effluent,i} = P_i \times F_{ind-com} \times (Total\ N\ Load - N\ Uptake_i \times BOD_5\ load) \times EF_{effluent,i} \times \frac{44}{28} \times \left(1 - F_{plant,i}\right) \times 365.25 \times 10^{-3} \times GWP_{N2O} \quad 3.18$$

Table 33 Emissions Parameters and Data Sources – Community Wastewater Effluent

Definition	Parameter	Value	Unit	Data Source
Total annual GHG emitted by WWTP processes	$CO_2e_{WW,effluent,i}$	See Table 34	MT CO_2e/year	Calculated
Population	P_i	See Table 34	People	See Table 26
Factor for industrial or commercial discharge	$F_{ind-com}$	1.00	–	ICLEI Community Protocol
Average total nitrogen per day	$Total\ N\ Load$	0.026	kg N/person/day	ICLEI Community Protocol
Nitrogen uptake for cell growth per system type (aerobic vs anaerobic)	$N\ Uptake_i$	See Table 34	kg N/kg BOD_5	ICLEI Community Protocol
Rate of BOD_5 produced	$BOD5\ load$	0.09	kg BOD_5/person/day	ICLEI Community Protocol
Emissions factor of discharge to water body type (river or ocean)	$EF_{effluent,i}$	See Table 34	kg N_2O-N/kg sewage-N discharged	ICLEI Community Protocol
Molecular weight ratio of N_2O to N_2	$\frac{44}{28}$	1.57	Fraction	ICLEI Community Protocol
Fraction of nitrogen removed from the WWTP per system type (w/ or w/o nit/denit)	$F_{plant,i}$	See Table 34	Fraction	ICLEI Community Protocol
Conversion factor	365.25	365.25	Days/year	ICLEI Community Protocol

Definition	Parameter	Value	Unit	Data Source
Conversion factor	10^{-3}	0.001	MT/kg	ICLEI Community Protocol
Global warming potential of nitrous oxide	GWP_{N2O}	See Table 1	–	IPCC Fourth Assessment Report
Wastewater treatment plant (WWTP)	i	See Table 26	Categorical	–

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; std ft^3 = standard cubic feet; kg = kilograms; BOD_5 = five-day biochemical oxygen demand

The different effluent discharge conditions exhibited within Humboldt and associated Community default factors are listed in Table 34 along with resulting GHG emissions.

Table 34 Wastewater Effluent GHG Emissions

Effluent Conditions	WWTP N_2O Processing	Population Served	Nitrogen Uptake	Discharge	Nitrogen Removal	MT N_2O	MT CO_2e
Aerobic/river	WW.8	72,844	0.0500	0.0050	0.0000	4.4946	1,339
Aerobic/ocean	WW.8	27,319	0.0500	0.0025	0.0000	0.8428	251
Aerobic/river	WW.7	3,300	0.0500	0.0050	0.7000	0.0611	18
Anaerobic/river	WW.6	1,100	0.0050	0.0050	0.0000	0.0807	24
Total							**1,631**

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; values may not sum due to rounding
1. Population served (or service population) is the sum of population and employment

The resulting GHG emissions from the various wastewater treatment processes present within Humboldt is summarized in Table 35 below.

Table 35 Humboldt Wastewater Management GHG Emissions by Process

Process	Equation	Population Served	MT CO_2e
Stationary Combustion	WW.1.(alt)	78,598	1.53
Stationary Combustion	WW.2.(alt)	78,598	3.60
Process N2O Emissions	WW.7	3,300	6.88
Process N2O Emissions	WW.8	100,163	95.52
Effluent Discharge Fugitive N2O	WW.12.(alt)	104,563	1,631.29
Lagoon System	WW.11.(alt)	1,100	292.89
Septic System	WW.6.(alt)	15,411	7,598.97
Total			**9,630.69**

Notes: MT CO_2e = Metric tons of carbon dioxide equivalent; values may not sum due to rounding
1. Population served (or service population) is the sum of population and employment

3.3 2022 Community GHG Emissions Inventory Results

The inventory provides Humboldt with current GHG emissions estimates that follow the Community Protocol and current best practices for GHG accounting. The results of the 2022 Humboldt County

Regional GHG inventory encompassed incorporated and unincorporated regional emissions resulting from community activities in the energy, transportation, solid waste, and wastewater sectors, including residential, commercial, agricultural, and industrial subsectors. Of the total **1,531,167 MT CO_2e** emitted county-wide, on-road transportation contributed the vast majority of emissions (73 percent) followed by building natural gas consumption (13 percent). Off-road equipment contributed 8 percent of total regional emissions, while solid waste, building electricity, and building fuel use contributed a relatively equal 2 percent. At less than 1 percent, wastewater process emissions resulted in the least contribution to the 2022 Humboldt County Regional GHG inventory total emissions. A summary of the 2022 Humboldt County Regional GHG inventory results are shown in Figure 2 and Figure 2 summarized in detail in Table 36.

Figure 1 Updated 2022 Humboldt County Regional GHG Inventory by Sector

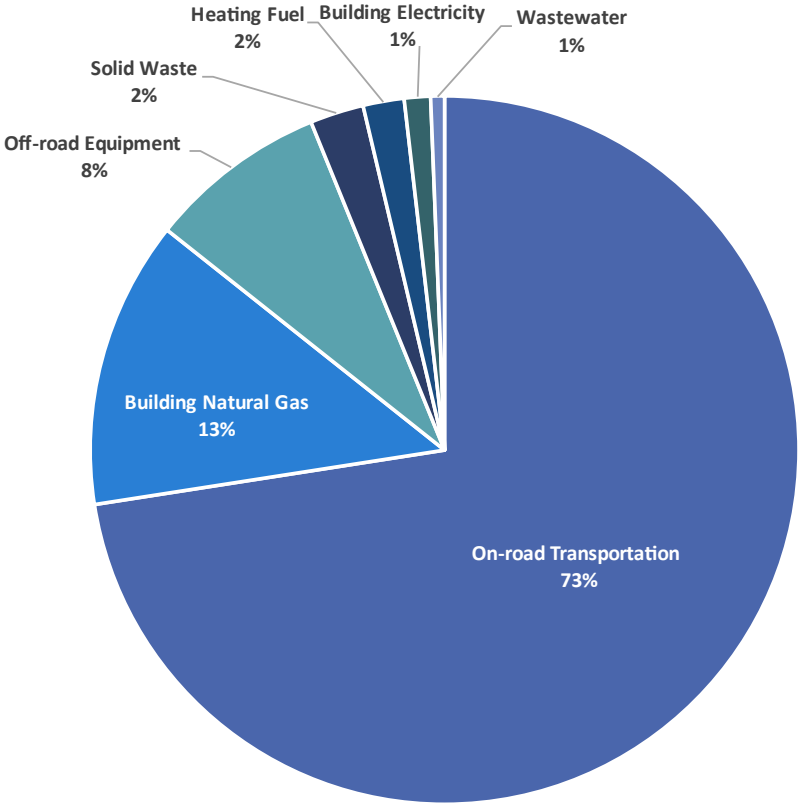

Figure 2 Updated 2022 Humboldt County Regional GHG Inventory by Sub-Sector

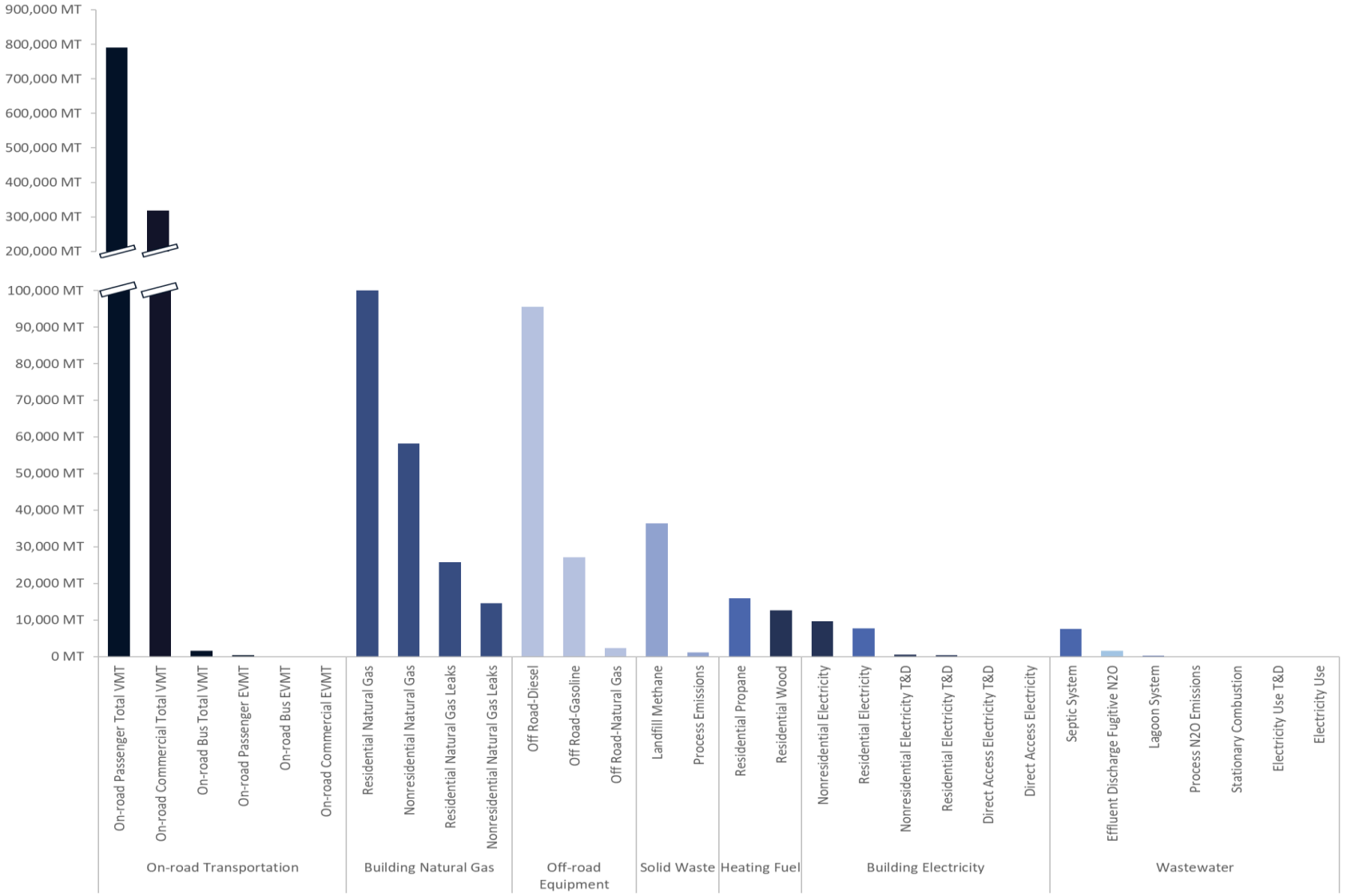

Table 36 2022 Humboldt Community GHG Emissions Inventory

GHG Emissions Sector	GHG Emissions Subsector	Activity Data		Emission Factor		GHG Emissions [MT CO_2e]
Energy	Residential Electricity	338,582,598	kWh	0.0000227	MT CO_2e/kWh	7,669
	Residential Electricity T&D	18,119,494	kWh	0.0000227	MT CO_2e/kWh	410
	Nonresidential Electricity	418,996,532	kWh	0.0000232	MT CO_2e/kWh	9,735
	Nonresidential Electricity T&D	21,369,291	kWh	0.0000232	MT CO_2e/kWh	496
	Residential Natural Gas	19,305,756	therms	0.0053115	MT CO_2e/therm	102,542
	Residential Natural Gas Leaks	543,278	therms	0.0473813	MT CO_2e/therm	25,741
	Nonresidential Natural Gas	10,962,860	therms	0.0053115	MT CO_2e/therm	58,229
	Nonresidential Natural Gas Leaks	308,503	therms	0.0473813	MT CO_2e/therm	14,617
Fuel Use	Residential Propane	4,370	households	3.6512345	MT CO_2e/ household	15,956
	Residential Wood	9,104	households	1.3973035	MT CO_2e/ household	12,721
Transportation	Passenger VMT	2,188,991,265	VMT	0.0003610	MT CO_2e/mile	790,226
	Commercial VMT	282,211,337	VMT	0.0011290	MT CO_2e/mile	318,617
	Bus VMT	1,028,481	VMT	0.0014930	MT CO_2e/mile	1,536
	Passenger EVMT	16,701,602	kWh	0.0000224	MT CO_2e/kWh	378
	Commercial EVMT	0	kWh	0.0000224	MT CO_2e/kWh	0
	Bus EVMT	9,168	kWh	0.0000222	MT CO_2e/kWh	<1
	Off-road Diesel	9,101,978	Gallons	0.0105021	MT CO_2e/gal	95,590
	Off-road Gasoline	2,975,135	Gallons	0.0091151	MT CO_2e/gal	27,119
	Off-road Natural Gas	410,588	Gallons	0.0058821	MT CO_2e/gal	2,415
Solid Waste	Landfill Methane	107,713	Wet short tons	0.3375000	MT CO_2e/ton	36,353
	Process Emissions	107,713	Wet short tons	0.0110000	MT CO_2e/ton	1,185
Water[1]	Local	-	kWh	-	MT CO_2e/kWh	-

GHG Emissions Sector	GHG Emissions Subsector	Activity Data		Emission Factor		GHG Emissions [MT CO_2e]
	Imported	-	kWh	-	MT CO_2e/kWh	-
Wastewater	Stationary Combustion	78,598	people	0.0000653	MT CO_2e/person	5
	Process N_2O Emissions	103,463	people	0.0009897	MT CO_2e/person	102
	Effluent Discharge Fugitive N_2O	104,563	people	0.0156010	MT CO_2e/person	1,631
	Lagoon System	1,100	people	0.2662673	MT CO_2e/kWh	293
	Septic System	15,411	people	0.4930875	MT CO_2e/kWh	7,599
Total						**1,531,167**

Notes: VMT = vehicle miles traveled; EVMT = electric vehicle miles traveled; kWh = kilowatt hour; MT CO_2e = Metric tons of carbon dioxide equivalent; gal = gallons

1. Because all water provided to the community in Humboldt County comes from water providers within county-limits, water sector emission from electricity consumption to extract, treat, convey, and distribute water is included under building electricity sector emissions and therefore not accounted separately to avoid double counting.

4 GHG Emissions Forecast

A GHG emissions inventory sets a reference point for a single year; however, annual GHG emissions change over time due to factors such as population and job growth as well as new technologies and policies. A GHG emissions forecast estimates future GHG emission changes by accounting for projected community growth and changes. Calculating the difference between the GHG emissions forecast and GHG emissions reduction targets determines the gap in GHG emissions that needs to be closed through the implementation of local GHG reduction policies. This section includes an estimate of the future emissions for Humboldt County in the years 2030, 2035, 2040 and 2045 in a *business-as-usual scenario* (BAU) forecast and a *legislative adjusted scenario* (adjusted) forecast, which are defined as follows:

- B*usiness-as-usual scenario*- Provides a forecast of how future GHG emissions would change if consumption trends continued as they did in 2022 and projected changes in population, housing, employment, and transportation activity over time consistent with planned projects within the Humboldt County boundaries. The BAU does not include any GHG reductions associated with local and state regulations.
- *Legislative adjusted scenario*- Provides a forecast of how currently adopted state legislation would reduce GHG emissions from the *business-as-usual scenario*. The *legislative adjusted scenario* represents the State's contribution to reducing local GHG emissions to meet state goals.

Because the adjusted forecast incorporates the impact of State regulations that provide GHG emission reduction potential, the legislative adjusted scenario offers a more accurate picture of future GHG emission growth and the responsibility of Humboldt for GHG reductions through regional actions.

4.1 Business-as-usual Scenario GHG Emissions Forecast

For the BAU forecast, future GHG emissions were calculated by multiplying projected activity data with the baseline emission factors utilized in the 2022 community GHG emissions inventory. Several indicator growth rates were developed from 2022 activity data and applied to demographic projections to project future activity data.

Over the past two decades, U.S. Census data and the Department of Finance has indicated a consistent decline in population, likely attributed to the departure of industrial operations. However, evidence garnered from interviews with local jurisdictions and agencies present a contrasting narrative. Through the implementation of significant development projects such as the Cal Poly student housing expansion[20], Nordic Aquafarms,[21] and the Humboldt Bay Offshore Wind Heavy Lift Multipurpose Marine Terminal project[22] it is anticipated that there will be new job opportunities and increased housing that will serve as catalysts for population movement and

[20] California State Polytechnic University (Cal Poly). 2023. Final Environmental Impact Report, Student Housing Project. Available at: https://facilitymgmt.humboldt.edu/sites/default/files/web_cal_poly_humboldt_feir_student_housing_project_0.pdf

[21] County of Humboldt, Planning and Building Department. 2022. Final Environmental Impact Report, Samoa Peninsula Land-Based Aquaculture Project. Available at: https://humboldtgov.org/DocumentCenter/View/108020/Nordic-Aquafarms-Final-EIR

[22] Humboldt Bay Harbor, Recreation & Conservation District. 2024. Humboldt Bay Offshore Wind Heavy Lift Marine Terminal Project. Available at: https://humboldtbay.org/humboldt-bay-offshore-wind-heavy-lift-marine-terminal-project-3

regional growth. This anticipation of growth is reflected in the Humboldt County Association of Governments (HCAOG) Regional Transportation Plan (RPT) which projects a 1 percent population growth rate in the region in consideration of local project developments, climate trends, and State-wide population movement trends.[23] Additionally, the State has consistently provided mandates for increases in local housing availability, as specified by the State Regional Housing Needs Allocation (RHNA).[24]

Based on the housing increases required by the 5th and 6th RHNA cycles, the most recent available cycles for the region, it becomes apparent that Humboldt needs to elevate housing development efforts to meet the specified State housing needs. To provide a comprehensive, forward-looking projection of demographic trends in the Humboldt community, this report utilized 6th cycle RHNA data to establish a household baseline growth rate in the percent increase of additional households per year. The household growth rate was then applied to U.S. Census 2022 household data to estimate anticipated growth. Projected household estimates were then used to project population and employment growth according to the methodology described in Table 37. This demographic forecast approach aligns with HCAOG estimates of regional growth, serves as a reasonable reflection of current and future conditions within Humboldt's community based on best available data, and recognizes the transformative forces shaping the region in the foreseeable future. A summary of the resulting demographics and projection metrics for each forecast year in the BAU forecast are provided in Table 37.

Table 37 BAU Forecast Demographic and Projection Metrics by Forecast Year

Metric	Data Source	2022	2030	2035	2040	2045
Population	Multiple[1]	136,132	143,556	148,196	152,836	157,476
Employment	Multiple[2]	66,837	70,482	72,760	75,038	77,316
Service Population	Calculated[3]	202,969	214,038	220,956	227,874	234,792
Households	Multiple[4]	54,495	57,467	59,324	61,182	63,039
Off-road gasoline usage (gallons)	CARB OFFROAD2021	2,975,135	3,202,801	3,338,686	3,475,420	3,625,989
Off-road diesel usage (gallons)	CARB OFFROAD2021	9,101,978	9,348,454	9,517,249	9,702,621	9,908,708
Off-road natural gas usage (gallons)	CARB OFFROAD2021	410,588	418,808	425,309	430,298	430,298

Notes:

1. Population forecast estimated based on the 2022 proportion of people per household and the forecasted number of households from 2030-2045.
2. Employment forecast estimated based on the 2022 proportion of jobs per person and the forecasted population from 2030-2045.
3. Service population reflects the sum of population and employment in the region.
4. Household forecast estimated based on a 0.68% household growth rate compared to baseline year as determined by Humboldt's 6th cycle RHNA and using U.S. Census 2022 household data as the baseline year. More information regarding Humboldt's 6th cycle RHNA is available at: https://www.hcd.ca.gov/community-development/housing-element/docs/Humboldt_County_Regional_Housing_Need_Determination_and_Plan_for_the_Sixth_Housing_Element_Update_1.pdf

[23] Humboldt County Association of Governments (HCAOG). 2022. Regional Transportation Plan, VROOM 2022-2042. Available at: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report.pdf

[24] California Department of Housing Needs Allocation (RHNA). 2024. Regional Housing Needs Allocation (RHNA). Available at: https://www.hcd.ca.gov/planning-and-community-development/regional-housing-needs-allocation

A description of the demographic metrics used to project activity data and associated growth factors for each forecasted GHG emission source in the 2022 community GHG emissions inventory are provided in Table 38.

Table 38 GHG Emission Sources and Growth Factors for BAU Scenario Forecast

GHG Emissions Source	Demographic Projection Metric	Growth Factor	Value	Units
Energy[1]				
Residential Electricity Consumption	Households	Electricity consumption per household	6,213.09	kWh
Non-residential Electricity Consumption	Employment	Electricity consumption per job	6,268.93	kWh
Residential Natural Gas Consumption	Households	Natural gas consumption per household	354.27	therms
Residential Natural Gas Leaks	Households	Natural gas leakage per household	9.97	therms
Non-residential Natural Gas Consumption	Employment	Natural gas consumption per job	164.02	therms
Non-residential Natural Gas Leaks	Employment	Natural gas leakage per job	4.62	therms
Building Fuel Use[2]	–	–	–	–
Transportation				
On-Road Passenger Vehicles	Households	Annual VMT per household	40,168.66	VMT
On-Road Commercial Vehicles	Employment	Annual VMT per job	4,222.38	VMT
On-Road Buses	Service Population	Annual bus service per service population	5.07	VMT
Off-Road Equipment[3]	–	–	–	–
Water & Wastewater[4]				
Wastewater Process and Fugitive Emissions	Service Population	Wastewater process and fugitive emissions per service population	0.05	MT CO2e
Solid Waste				
Solid Waste Disposal	Service Population	Solid waste disposed per service population	0.18	tons

Notes: MT CO2e = Metric tons of carbon dioxide equivalent; kWh = kilowatt-hour; VMT = vehicle miles traveled; N/A = Not Applicable; SP = Service Population – the combined total number of employees and residents in Humboldt County

1. Electricity T&D growth factor is not included as GHG emissions from electricity T&D is calculated based on each forecasted year's total electricity amount.
2. Building fuel use is held constant at 2022 rates of household consumption as a conservative estimation of projected emissions.
3. Fuel consumption for each forecasted year are obtained from the CARB OFFROAD2021 Model, available at: https://arb.ca.gov/emfac/emissions-inventory/5e0cb7d6006cc10661f4b3ffb9c120a486d46ea6%206
4. Electricity emissions associated with water consumption and wastewater processing are captured within the energy sector, as previously described in the Community Inventory section of this technical report and therefore are projected under energy sector forecasted activity data.

Using the above demographic and projection metrics in Table 37, multiplied by the growth factors in Table 38 and the 2022 Humboldt County Regional GHG inventory emission factors, the BAU forecast

can be calculated. In the BAU forecast, GHG emissions are expected to increase through 2045 due to anticipated regional growth from regional projects and industry expansion. A summary of the BAU forecast results by GHG emission sector is provided in Table 39.

Table 39 BAU Forecast Results Summary by Emission Sector

GHG Emissions Source	2022	2030	2035	2040	2045
Energy	**248,118**	**260,085**	**267,564**	**275,044**	**282,524**
Residential Electricity + T&D	8,080	8,520	8,796	9,071	9,347
Nonresidential Electricity + T&D	10,231	10,789	11,138	11,487	11,836
Residential Natural Gas	102,542	108,134	111,629	115,125	118,620
Residential Natural Gas Leaks	25,741	27,145	28,022	28,900	29,777
Nonresidential Natural Gas	58,229	61,405	63,389	65,374	67,359
Nonresidential Natural Gas Leaks	14,617	15,414	15,913	16,411	16,909
Building Fuel	28,677	28,677	28,677	28,677	28,677
Transportation	**1,235,880**	**1,301,168**	**1,342,077**	**1,383,159**	**1,424,556**
On-road Passenger Vehicles	790,604	833,720	860,667	887,615	914,562
On-road Commercial Vehicles	318,617	335,992	346,852	357,712	368,572
On-road Buses	1,536	1,619	1,672	1,724	1,777
Off-road Equipment	125,124	129,836	132,885	136,108	139,645
Water and Wastewater	**9,631**	**10,156**	**10,484**	**10,812**	**11,141**
Wastewater Process and Fugitive Emissions	9,631	10,156	10,484	10,812	11,141
Solid Waste	**37,538**	**39,585**	**40,865**	**42,144**	**43,424**
Solid Waste Disposal	37,538	39,585	40,865	42,144	43,424
Total GHG Emissions	**1,531,167**	**1,610,994**	**1,660,990**	**1,711,160**	**1,761,644**

Notes: All values are presented in metric tons of carbon dioxide equivalent (MT CO2e)

4.2 Legislative Adjusted Scenario GHG Emissions Forecast

Several federal and state regulations have been enacted that would reduce Humboldt's GHG emissions below the BAU forecasted levels in 2030, 2035, 2040 and 2045. The impact of these regulations was quantified and incorporated into the adjusted forecast to provide a more realistic depiction of future emissions growth and the GHG emission reduction responsibility of the local governments. The state legislation included in the adjusted forecast reduce GHG emissions associated with transportation, building energy efficiency, and renewable electricity. A brief description of each regulation and the methodology used to calculate associated reductions is

provided in the following, as well as a description of why specific legislation was excluded from the analysis.

4.2.1 Legislative Reduction Programs

Additional legislative programs are expected to reduce GHG emissions in specific sectors throughout California, as identified in the 2017 and 2022 Scoping Plan Updates. Many of these programs were incorporated into the forecast analysis and are summarized in the subsections below.

Transportation Legislation

Advanced Clean Cars Programs

Prior to 2012, mobile emissions regulations were implemented on a case-by-case basis for GHG and criteria pollutant emissions separately. In January 2012, CARB approved a new emissions-control program (the Advanced Clean Cars program) combining the control of smog, soot causing pollutants, and GHG emissions into a single coordinated package of requirements for passenger cars and light trucks model years 2017 through 2025. The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles, Zero Emissions Vehicles, and Clean Fuels Outlet programs, and is more stringent than the federal Corporate Average Fuel Economy (CAFE) standards. The new standards will reduce California's GHG emissions by 34 percent in 2025 which is modeled under the CARB EMission FACtor (EMFAC) Model and included in the GHG forecast.[25]

Advanced Clean Cars II was approved by CARB in August 2022 and expands the program's roadmap so that by 2035 all new cars and passenger trucks will be ZEV. This regulation effectively binds the State to EO N-79-20. The executive order was passed by the governor in 2020 and requires all new cars and passenger trucks sold in California be ZEV by 2035. While these legislations will lead to an expedited timeline for ZEV adoption in California, modeling data is not yet available in CARB's EMFAC Model, and emissions reductions attributable to the Advanced Clean Cars II program were therefore, excluded from the GHG forecast.

Advanced Clean Trucks was approved by CARB in June 2020 and sets a zero-emission vehicle (ZEV) percent-of-sales requirement on medium- and heavy- duty vehicle manufacturers to promote increased truck ZEV sales from 2024 to 2035. The standard is intended to reduce NO_x pollution and GHG emissions, which are disproportionately high in medium- and heavy-duty vehicle classes compared to passenger vehicles, as well as promote first-wave ZEV truck technology penetration in the market.[26] EMFAC models the effect of the Advanced Clean Trucks regulation on ZEV truck penetration and associated GHG emissions and is included in the forecast.

Assembly Bill 1493

Signed into law in 2002, AB 1493 (Pavley Standards) required vehicle manufacturers to reduce GHG emissions from new passenger vehicles and light trucks from 2009 through 2016. Regulations were adopted by CARB in 2004 and took effect in 2009 when the United States Environmental Protection Agency (USEPA) issued a waiver confirming California's right to implement the bill. CARB anticipates that the Pavley I standard will reduce GHG emissions from new California passenger vehicles by

[25] California Air and Resource Board (CARB). 2019. Advanced Clean Cars Summary. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-12/acc%20summary-final_ac.pdf

[26] California Air and Resource Board (CARB). 2023. Advanced Clean Trucks. Available at: https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks/about

about 30 percent in 2016, while simultaneously improving fuel efficiency and reducing motorists' costs.[27]The impacts of the Pavley Standards on ZEV market penetration was incorporated into the EMFAC model starting in 2014 and is included in the forecast assessment.

Innovative Clean Transit

Public transit GHG emissions will be reduced in the future through the Innovative Clean Transit (ICT) regulation, which was adopted in December 2018. It requires all public transit agencies to gradually transition to a 100-percent zero-emission bus fleet by 2040. Under ICT, large transit agencies are expected to adopt Zero-Emission Bus Rollout Plans to establish a roadmap towards zero emission public transit buses.[28] The effects of the ICT regulation on GHG emissions are modeled in EMFAC2021 and is therefore included in the forecast.

Energy Legislation

Title 24

Although it was not originally intended to reduce GHG emissions, California Code of Regulations Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was adopted in 1978 in response to a legislative mandate to reduce California's energy consumption, which in turn reduces fossil fuel consumption and associated GHG emissions. The standards are updated triennially to allow consideration and possible incorporation of new energy-efficient technologies and methods. Starting in 2020, new residential developments had to include on-site solar generation and near-zero net energy use. For projects implemented after January 1, 2020, the California Energy Commission (CEC) estimates that the 2019 standards will reduce electricity consumption by 53 percent for residential buildings and 30 percent for non-residential buildings, relative to the 2016 standards. The CEC further estimates residential natural gas efficiency increases of 7 percent for residential end uses.[29] No efficiency increases were estimated for commercial natural gas end uses, based on lack of requirements in this sector in the 2019 standards. These percentage savings relate to heating, cooling, lighting, and water heating only and do not include other appliances, outdoor lighting not attached to buildings, plug loads, or other energy uses. In December 2022 the CEC published the new Title 24 2022 Building Efficiency Standards.[30]

Due to the complexity of the new code, there is currently no available model establishing projected efficiency increase as a result of the standard. Therefore, the updated 2022 code was not included in the forecast. This provides a conservative estimate of forecasted GHG emission reductions resulting from efficiency increases.

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[27] CARB. Clean Car Standards – Pavley, Assembly Bill 1493. May 2013. Accessed November 14, 2022, at: http://www.arb.ca.gov/cc/ccms/ccms.htm

[28] Innovative Clean Transit. Approved August 13, 2019. Accessed November 14, 2022 at: https://ww2.arb.ca.gov/sites/default/files/2019-10/ictfro-Clean-Final_0.pdf?utm_medium=email&utm_source=govdelivery

[29] California Energy Commission. 2019 Building Energy Efficiency Standards Frequently Asked Questions. January 1, 2020. Accessed November 8, 2022 at: https://www.energy.ca.gov/sites/default/files/2020-03/Title_24_2019_Building_Standards_FAQ_ada.pdf

[30] California Energy Commission (CEC). 2023. 2022 Building Energy Efficiency Standards. Available at: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency

Renewables Portfolio Standard, Senate Bill 100, & Senate Bill 1020

Established in 2002 under SB 1078, enhanced in 2015 by SB 350, and accelerated for the first time in 2018 under SB 100, California's Renewable Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, publicly owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 50 percent of total procurement by 2026 and 60 percent of total procurement by 2030. The RPS program further requires that by 2045 that 100 percent of total energy procured be a combination of eligible renewable energy resources and zero-carbon resources.

California's RPS was further accelerated in 2022 by SB 1020 which established additional requirements that procurement from eligible renewable energy resources and zero-carbon resources increase to 90 percent of total procurement by 2035 and 95 percent of total procurement by 2040. The requirements of SB 1020 do not affect those previously set forth and are to be considered additional to the existing RPS requirements. The RPS program and SB 1020 were incorporated into the GHG forecast by adjusting the electricity emissions factors for future years, as discussed in Section 4.4.

PG&E as well as RCEA currently provide electricity to Humboldt and are subject to the RPS requirements. Weighted emission factors adjusted for RPS requirements were used to project emissions through 2045. Table 40 provides the estimated electricity emission factors that would result from SB 100.

Table 40 Forecasted RPS and Weighted Electricity Emission Factor

Metric	2022	2030	2035	2040	2045
Renewables Portfolio Standard Percentage (PG&E)	50%	60%	90%	95%	100%
Renewables Portfolio Standard Percentage (RCEA)	51%	60%	90%	95%	100%
Residential Weighted EF (MT CO_2e/kWh)	0.0000227	0.0000183	0.0000046	0.0000023	0.0000000
Nonresidential Weighted EF (MT CO_2e/kWh)	0.0000232	0.0000187	0.0000047	0.0000023	0.0000000

Notes: MT CO2e = Metric tons of carbon dioxide equivalent; kWh = kilowatt-hour; EF = emissions factor

Waste Legislation

Assembly Bill 939 & Assembly Bill 341

In 2011, AB 341 set the target of 75 percent recycling, composting, or source reduction of solid waste by 2020 calling for the California Department of Resources Recycling and Recovery (also known as CalRecycle) to take a statewide approach to decreasing California's reliance on landfills. This target was an update to the former target of 50 percent waste diversion set by AB 939.

As actions under AB 341 are not assigned to specific local jurisdictions, potential future reductions from the bill were conservatively not included in the GHG forecast analysis.

Assembly Bill 1826

In 2014, AB 1826 set regulations in place requiring California businesses to recycle all of their organic waste starting in April 2016. The bill also required jurisdictions across the State to provide organic waste recycling programs to accommodate diverted waste from local businesses. As Humboldt has already implemented an organics collection program, implementation of AB 1826 compliance is reflected in the community's inventory solid waste activity data and is thereby included in the BAU and adjusted forecast.

Senate Bill 1383

SB 1383 established a methane emission reduction target for short-lived climate pollutants in various sectors of the economy, including waste. Specifically, SB 1383 establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020 and a 75 percent reduction by 2025.[31] Additionally, SB 1383 requires a 20 percent reduction in "current"[32] edible food disposal by 2025. Although SB 1383 has been signed into law, compliance with this Senate Bill must occur at the jurisdiction-level rather than the state-level. Due to current limitations in local jurisdiction's ability to comply with organic waste targets set by SB 1383, as well as regional exemptions for some local governments within Humboldt County, anticipated emissions reductions attributable to the bill are conservatively excluded from the forecast. However, estimated impacts associated with SB 1383 will be included in the GHG reduction measures in the CAP.

4.2.2 Legislative Adjusted Scenario Forecast Results

In the adjusted emissions forecast, energy and transportation show a steady decline in GHG emissions, while wastewater, solid waste, are projected to slightly increase. Electricity shows a downward trend approaching zero in 2045 due to stringent RPS requirements from SB 100/1020. This effect is counteracted by natural gas consumption growth which experiences minimal benefits from Title 24 code efficiency cycles. Transportation emissions are expected to decrease in the next 10 to 15 years due to existing fuel efficiency requirements, fleet turnover rates, and increased electric vehicle penetration. As most current regulations expire in 2025 or 2030, emissions standards will experience diminishing returns while VMT continues to increase, leading to lower rates of emissions reduction in the transportation sector as 2045 is approached. A detailed summary of Humboldt's projected GHG emissions under the adjusted forecast by sector and year through 2045 can be found in Table 41.

Table 41 Legislative Adjusted Scenario Forecast Results

GHG Emissions Source	2022	2030	2035	2040	2045
Energy	**248,118**	**255,592**	**250,748**	**255,384**	**259,934**
Residential Electricity + T&D	8,080	6,726	1,712	870	0

[31] CalRecycle. California's Short-Lived Climate Pollutant Reduction Strategy. https://calrecycle.ca.gov/organics/slcp/

[32] SB 1383 does not specify a baseline year for the 20 percent food recovery target; however, CalRecycle's 2018 statewide waste characterization studies will be used to help measure the baseline for the State to meet its SB 1383 goals. See CalRecycle FAQ accessed November 14, 2022 for more information:https://calrecycle.ca.gov/organics/slcp/faq/foodrecovery/#:~:text=SB%201383%20requires%20the%20state,for%20individual%20jurisdictions%20to%20achieve.

GHG Emissions Source	2022	2030	2035	2040	2045
Nonresidential Electricity + T&D	10,231	8,580	2,202	1,129	0
Residential Natural Gas	102,542	107,743	110,993	114,244	117,494
Residential Natural Gas Leaks	25,741	27,047	27,863	28,679	29,495
Nonresidential Natural Gas	58,229	61,405	63,389	65,374	67,359
Nonresidential Natural Gas Leaks	14,617	15,414	15,913	16,411	16,909
Building Fuel	28,677	28,677	28,677	28,677	28,677
Transportation	**1,235,880**	**1,154,265**	**1,106,063**	**1,078,584**	**1,073,445**
On-road Passenger Vehicles	790,604	698,109	665,176	651,449	653,308
On-road Commercial Vehicles	318,617	324,984	306,827	290,094	279,775
On-road Buses	1,536	1,336	1,175	932	717
Off-road Equipment	125,124	129,836	132,885	136,108	139,645
Water and Wastewater	**9,631**	**10,156**	**10,484**	**10,812**	**11,141**
Wastewater Process and Fugitive Emissions	9,631	10,156	10,484	10,812	11,141
Solid Waste	**37,538**	**39,585**	**40,865**	**42,144**	**43,424**
Solid Waste Disposal	37,538	39,585	40,865	42,144	43,424
Total GHG Emissions	**1,531,167**	**1,459,598**	**1,408,160**	**1,386,924**	**1,387,943**

Notes: All values are presented in metric tons of carbon dioxide equivalent (MT CO2e)

4.2.3 Legislative GHG Emission Reduction Contribution

A summary of the reductions from the BAU forecast that can be expected under the adjusted forecast are provided in Table 42.

Table 42 Summary of Legislative GHG Emission Reductions

Metric	2030	2035	2040	2045
California Renewable Portfolio Standards	3,955	17,540	20,999	24,483
Title 24	845	1,440	2,005	2,581
Transportation (Pavley, Innovative Clean Transit, etc.)	146,596	233,850	301,232	346,636
Total	**151,396**	**252,830**	**324,236**	**373,700**

Notes: All values are presented in metric tons of carbon dioxide equivalent (MT CO2e); negative values indicate

5 GHG Emissions Targets

GHG reduction targets are used in climate action planning to establish metrics that guide the community's commitment to achieve GHG emissions reductions and help gauge progress reducing emissions over time. California has established statewide GHG reduction goals for 2030 and 2045, relative to a baseline emissions level. CARB's 2022 Scoping Plan encourages local agencies to take ambitious, coordinated climate action that is consistent with and supportive of the state's climate goals[33]. Thus, local agencies are recommended to establish equivalent reduction targets at the local level by establishing community wide GHG reduction goals for climate action that will help California achieve its 2030 and 2045 goals. CARB has issued several guidance documents concerning the establishment of GHG emission reduction targets for CAPs to comply with California Environmental Quality Act (CEQA) Guidelines § 15183.5(b). Even if a plan is not CEQA-qualified, CARB has long recommended that local targets be a part of the process of developing, monitoring, and updating a CAP.

5.1 1990 Level GHG Emissions Back-cast

Humboldt County does not have a 1990 GHG emissions inventory from which to develop GHG reduction targets consistent with SB 32, however, 1990 GHG emissions can be estimated for the community relative to Humboldt's updated 2022 inventory using a state-level emissions change metric.

As the State 2022 GHG emissions inventory has not yet been published, Humboldt's 1990 GHG emissions have been calculated using the State's 2021 GHG emissions inventory[34] as compared to the State's GHG emissions inventory in 1990 to calculate approximate percent reduction in the Humboldt community between 2022 and 1990. The calculation is developed using the published Statewide emissions results from CARB[35], after removing emissions from sectors not included in Humboldt's inventory (e.g., non-specified, industrial point sources, agricultural land management practices). This approach assumes that Humboldt's community activities and associated GHG emissions have generally tracked with the State's activity trends and associated GHG emissions. However, since 1990, electricity and natural gas consumption and associated GHG emissions in Humboldt have declined at a much more rapid rate than the Statewide trend reflected in the Statewide inventory. This is because Humboldt has experienced a significant decline in industrial operations leading to a significant decrease in electricity and natural gas consumption. Further, RCEA has emerged as the main alternative electricity provider in the region opposed to PG&E, the sole utility provider to the Humboldt region in 1990. Because RCEA has a more renewable and carbon-free energy profile than PG&E, GHG emissions associated with building electricity use in the region have declined to a greater extent than Statewide trends reflect.

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[33] California Air Resources Board. 2022. California's Climate Change Scoping Plan, p.268. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf

[34] The State's 2020 GHG emissions inventory was used as this is the most recently available statewide inventory from CARB. It is assumed that the 1990-2020 Statewide GHG emissions change is similar to the 1990-2021 Statewide GHG emissions change, therefore it can be used to estimate 1990 level GHG emissions for Humboldt based on the 2022 Humboldt County Regional GHG Inventory.

[35] California Air Resources Board. 2023. California GHG Emission Inventory Program. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf

Since these trends are specific to the Humboldt region and do not track with Statewide trends reflected in the Statewide inventory, electricity and natural gas emissions were also removed from the Statewide emissions to back-cast Humboldt's 1990 emissions associated with the following included inventory sectors: transportation (on and off-road), solid waste, wastewater, and heating fuel. GHG emissions from electricity and natural gas consumption in Humboldt in 1990 was quantified using 1990 county-wide activity data obtained from CEC and PG&E 1990 electricity emissions factor provided in the PG&E Community Report. This approach for developing a 1990 back-cast for Humboldt assumes that Humboldt's community GHG emissions associated with transportation, solid waste, wastewater, and heating fuel consumption have generally tracked with Statewide trends, while taking into consideration the more regionally applicable changes in electricity and natural gas consumption in the county. The 1990 back-cast for Humboldt is shown in Table 43.

Table 43 1990 Back-cast Calculations

GHG Emissions Inventory/Emissions Category	Emissions
2021 Statewide GHG Emissions w/o Building Energy (MMT CO2e)[1]	170.32
1990 Statewide GHG Emissions w/o Building Energy (MMT CO2e)[1]	188.98
2021 to 1990 Statewide GHG Emissions Change (%)	10.96%
2022 Humboldt GHG Emissions w/o Building Energy (MT CO2e)[2]	1,311,726
1990 Humboldt GHG Emissions w/o Building Energy (MT CO2e)[3]	1,455,496
1990 Humboldt Electricity Emissions (MT CO2e)[4]	259,675
1990 Humboldt Natural Gas Emissions (MT CO2e)[4]	354,144
1990 Total Humboldt GHG Emissions (MT CO2e)[5]	2,069,316

Notes:

1. Includes transportation, solid waste, wastewater, and heating fuel emissions.

2. Excludes 2022 building energy emissions associated with electricity and natural gas consumption. As shown in Table 36, in 2022 electricity consumption accounted for X MT CO2e and natural gas consumption accounted for X MT CO2e.

3. Humboldt 1990 GHG emission associated with transportation, solid waste, wastewater, and heating fuel was back-cast from the Statewide GHG emissions inventory by multiplying the percent change that occurred at the Statewide level to the 2022 Humboldt GHG inventory less electricity and natural gas associated emissions. based on the percent change.

4. In 1990, Humboldt consumed a total of 1,007,867,146 kWh of electricity and 53,349,803 therms of natural gas. According to PG& E, the emissions factor in 1990 was 0.000258 MT CO2e/kWh. Emissions were calculated in accordance with methods outlined in Section 3.2.1. More information regarding CEC activity data is available at: https://ecdms.energy.ca.gov/Default.aspx

5. Calculated 1990 electricity and natural gas emissions were added to the "1990 Humboldt GHG Emissions w/o Building Energy" back-cast to determine the total Humboldt 1990 GHG Emissions.

5.2 GHG Emissions Reduction Target Setting

The purpose of target setting is to develop the trajectory toward achieving the State's 2030 goal (SB 32) and prepare for the deep decarbonization needed by 2045 in a cost-effective manner by setting an incremental path toward achieving AB 1279 targets. CARB guidance is for jurisdictions to first strive to exceed the SB 32 targets of reducing GHG emissions 40% below 1990 levels, while establishing a policy framework to achieve the long-term target of carbon neutrality by 2045.

Target setting is an iterative process which must be informed by the reductions that can realistically be achieved through the development of feasible GHG reduction measures. As such, the targets identified herein should remain provisional until the quantification and analysis of potential GHG reduction measures has been completed.

Achieving the established target will require major shifts in how communities within California obtain and use energy, transport themselves and goods, and how the population lives and builds. The CEQA Guidelines section 15183.5(b) requires qualified GHG reduction plans (which allow for CEQA streamlining) to "Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable".[36] A defensible way (shown through litigation) to identify such levels is to demonstrate consistency with State targets.

To maintain consistency with State targets, Humboldt's provisional GHG emissions reduction targets are:

- Reduce GHG emissions to 40% below 1990 levels by 2030 (SB 32 target year)
- Make substantial progress towards carbon neutrality by 2045 (AB 1279 target year)

With GHG emission reduction targets in place, the reduction gap that Humboldt will be responsible for through local action can be calculated. Humboldt's GHG emissions reduction gap is based on the difference between the adjusted forecast, discussed previously, and the established GHG emission reduction targets. Table 44 provides a summary of the GHG emission reduction targets in mass emissions.

Table 44 GHG Emissions Reduction Targets and Gap Analysis

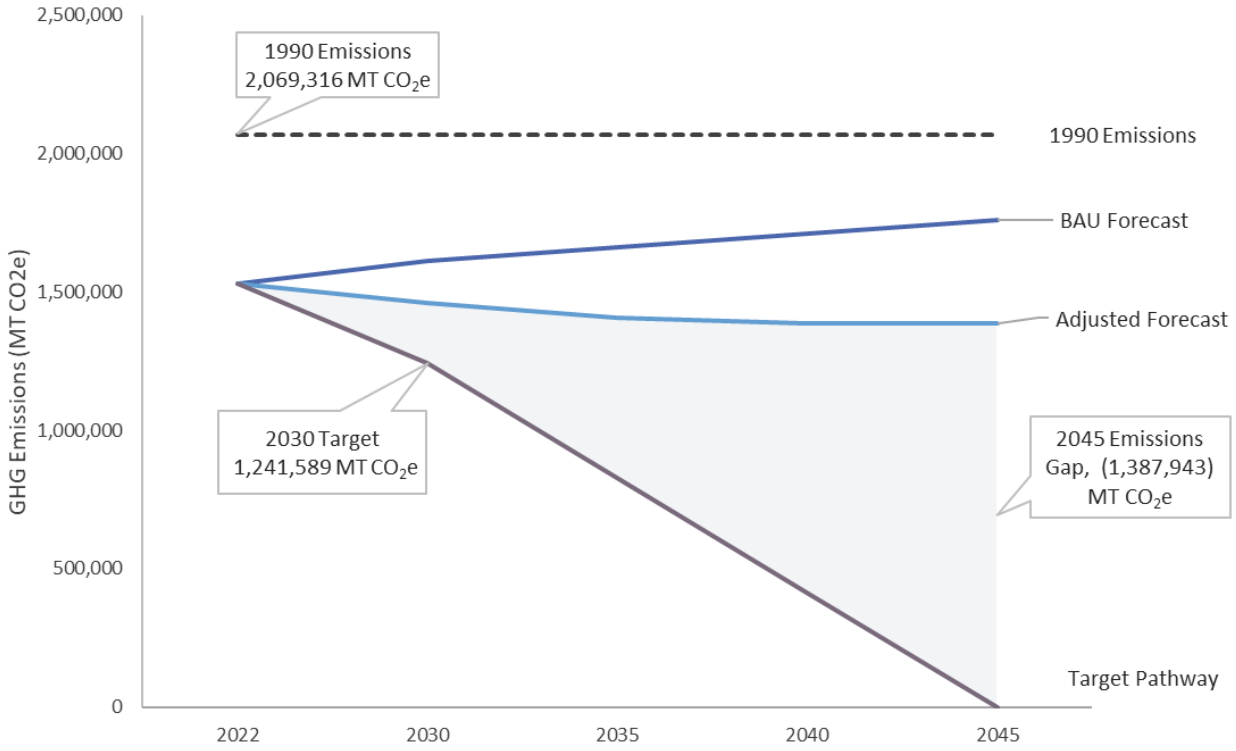
Emissions Forecast or Pathway	2022	2030	2035	2040	2045
Mass Emissions Target Pathway Scenario (MT CO2e)					
Adjusted Forecast	1,531,167	1,459,598	1,408,160	1,386,924	1,387,943
SB 32 Mass Emissions Target Pathway[1]	1,531,167	1,241,589	827,726	413,863	-
Remaining Emissions Gap	-	218,008	580,434	973,061	1,387,943

Notes: MT CO2e = Metric tons of carbon dioxide equivalent
Emissions have been rounded to the nearest whole number and therefore sums may not match.
1. The target pathway is calculated by reducing 1990 mass emissions by 40% in 2030 and to 0 in 2045. This provisional target pathway is consistent with both SB 32 and a trajectory set forth to achieve AB 1279.

Figure 3 provides a visual representation of future GHG emissions, with the impacts of State legislation and the remaining gap the community will be responsible for to meet the GHG emission reduction targets set by the State.

[36] https://casetext.com/regulation/california-code-of-regulations/title-14-natural-resources/division-6-resources-agency/chapter-3-guidelines-for-implementation-of-the-california-environmental-quality-act/article-12-special-situations/section-151835-tiering-and-streamlining-the-analysis-of-greenhouse-gas-emissions

Figure 3 GHG Emissions Forecast and Provisional Target Pathways (Mass Emissions)



Appendix C

GHG Reduction measures Quantification and Evidence

Humboldt Regional Climate Action Plan

Greenhouse Gas Emissions Measure Reduction Quantification and Substantial Evidence

prepared for

County of Humboldt

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1 Introduction

This technical report presents the quantification and substantial evidence that supports the greenhouse gas (GHG) emissions reduction potential of Humboldt's **Regional Climate Action Plan** (RCAP). This report also supports the RCAP's classification as a qualified GHG reduction plan. The RCAP is the region's plan to reduce GHG emissions and address climate change. It includes **Measures** with numeric targets to reduce GHG emissions and **Actions** under each Measure that the region will implement through 2045 to reduce GHG emissions.

Section 15183.5(b)(1) of the California Environmental Quality Act (CEQA) guidelines establishes several criteria which a plan must meet to be considered a qualified GHG reduction plan and allow for programmatic CEQA streamlining of project GHG emissions. This report details the evidence substantiating the GHG emissions reductions associated with the RCAP measures pursuant to Subsection (D) which requires measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified GHG emissions level. This report demonstrates the Measures in the RCAP provide the GHG emission reductions necessary to meet the region's 2030 GHG emission reduction target, which aligns with the State's GHG emission reduction goal established by Senate Bill (SB) 32 and make substantial progress towards the region's 2045 target which aligns with the State's goal established Assembly Bill (AB) 1279.

Mechanisms to monitor the implementation of the RCAP and progress toward achieving the region's GHG emission reduction targets are included in the RCAP, as required in CEQA Guidelines Section 15183.5(b)(e). If, based on the tracking of community GHG emissions, the region is not on track to reach the 2030 GHG emission reductions specified in this report, the RCAP as a whole or specific Measures and Actions will be amended. Based on these amendments, a RCAP Update will be prepared that includes altered or additional Measures and Actions, with evidence that with implementation can achieve the region's 2030 GHG emission reduction target and make substantial progress towards the region's 2045 target.

1.1 GHG Emission Reduction Targets

The Humboldt Regional GHG emission reduction targets align with California's goal to reduce GHG emissions 40 percent below 1990 levels by 2030 (SB 32) and California's goal to achieve carbon neutrality by 2045 (AB 1279), defined as reducing GHG emissions at least 85 percent below 1990 levels and removing or sequestering the remaining GHG emissions.

Humboldt's regional short- and long-term GHG emission reduction targets are:

- Reduce GHG emissions 40 percent below 1990 levels by 2030; and
- Achieve carbon neutrality by 2045.

1.2 Measures and Actions Organization

As part of the RCAP process, the Humbolt region (i.e., the County and all incorporated jurisdictions) has developed a comprehensive set of Measures and Actions to reduce communitywide GHG emissions to achieve the region's 2030 GHG emission reduction target and make substantial progress towards the region's 2045 target. The Measures are organized around a set of six

mitigation Strategies to reduce GHG emissions. Each Measure is then supported by a set of Actions. The structure of the mitigation Strategies, Measures, and Actions are as follows:

- **Strategies**: Strategies describe an overall approach for reducing GHG emissions within a given sector.
- **Measures**: Measures are long-range policies that the Humboldt region has established to ultimately reduce GHG emissions in line with the State.
    - Some Measures will be further defined as "***urban"*** or "***rural"*** where different goals and approaches were necessary given the characteristics of the communities targeted with the Measure. Generally, ***"urban"*** is used to define the more densely developed areas in the region with greater access to energy and transportation infrastructure while ***"rural"*** generally represents the dispersed communities in the region with limited access to energy and transportation infrastructure. See each sector Strategy summary for the definition applied in that Strategy.
- **Actions:** Actions are the discrete steps that the region will take to achieve the established Measures.

The Measures and Actions can be either quantitative or supportive, defined as follows:

- **Quantitative:** Quantitative Measures result in direct and measurable GHG emissions reductions when their Actions, backed by substantial evidence, are implemented. GHG emissions reductions from these Measures and Actions are justified by case studies, scientific articles, calculations, and other third-party substantial evidence that establish the effectiveness of the reduction Actions. Quantitative Measures can be summed to quantify how the region will meet its 2030 GHG emission reduction target and demonstrate progress towards the 2045 target.
- **Supportive:** Supportive Measures may also be quantifiable and have substantial evidence to support their overall contribution to GHG emission reductions. However, due to one of several factors – including a low GHG emission reduction benefit, indirect GHG emission reduction benefit, or potential for double-counting– they have not been quantified and do not contribute directly to achieving and making progress towards the region's GHG emission reduction targets. Despite not being quantified, supportive Measures are nevertheless critical to the overall success of the RCAP and provide support so that the quantitative Measures will be successfully implemented.

This report identifies both the quantitative and supportive Measures and provides a complete description of their contribution to achieving the Humboldt region's 2030 GHG emission reduction target and making substantial progress towards region's 2045 target. This report, however, only details the quantitative Actions that enable each Measure. The supportive Actions are excluded from this report because they do not quantitatively contribute to achieving and making progress towards the region's GHG emission reduction targets. These supportive Actions are nevertheless critical to the overall success of each Measure. Detail on these supportive Actions can be found in the RCAP.

1.3 GHG Emissions Reductions

The primary focus of RCAP measures is to determine the actions needed to achieve the region's 2030 GHG reductions target, while the RCAP is anticipated to be revised in future iterations to address 2045 targets for longer term planning. Table 1 summarizes the mitigation Measures and the

GHG emission reductions they would achieve in 2030, and estimated for 2045, upon the implementation of their Actions.

Table 1 Regional RCAP GHG Emission Reduction Summary by Measure

Measure ID	Measure Text	2030 GHG Emission Reduction Potential (MT CO2e)	2045 GHG Emission Reduction Potential (MT CO2e)
Strategy C: Cornerstone			
Measure C-1	Establish a Regional Climate Committee comprised of elected officials from each jurisdiction, HTA, HCAOG, HWMA, and RCEA.	Supportive/Critical	Supportive/Critical
Strategy BE: Building Energy			
Measure BE-1	By 2030, source 90% of grid-supplied electricity from renewable and carbon-free sources.	15,403	0
Measure BE-2	Increase the development of micro-grids and storage across the region to support RCEA's RePower Humboldt goals of enhancing grid capacity and facilitating the electrification of buildings and transportation.	Supportive	Supportive
Measure BE-3 Urban	Reduce existing residential building natural gas consumption by 4% by 2030 and 74% by 2045.	2,603	55,866
Measure BE-3 Rural	Reduce existing residential fossil-fuel consumption in households not connected to natural gas infrastructure by 2% by 2030.	Supportive	Supportive
Measure BE-4	Reduce existing nonresidential building natural gas consumption by 5% by 2030 and 79% by 2045.	3,821	42,887
Measure BE-5	Decarbonize 95% of new residential building construction by 2027.	2,252	13,907
Measure BE-6	Decarbonize 95% of new nonresidential building construction by 2027.	1,374	8,492
Measure BE-7	Decarbonize 30% municipal buildings and facilities by 2030.	Supportive	Supportive
Measure BE-8	Lobby Off-shore Wind developers and PG&E to build electrical infrastructure to supply Humboldt with energy produced by the off-shore wind project which will increase supply and resilience.	Supportive	Supportive
Strategy TR: Transportation			
Measure TR-1 Urban	Implement programs, such as those identified in HCAOG's RTP, to increase the mode share of active transportation in urbanized areas from 9% to 12% by 2030, thereby achieving a regional active transportation mode share of 8%.	1,147	2,594
Measure TR-1	Implement programs, such as those identified in	1,080	4,405

Measure ID	Measure Text	2030 GHG Emission Reduction Potential (MT CO2e)	2045 GHG Emission Reduction Potential (MT CO2e)
Rural	HCAOG's RTP, that increase access to safe active transportation, to increase the mode share of active transportation in rural areas from 5% to 6% by 2030 thereby achieving a regional active transportation mode share of 9%.		
Measure TR-2 Urban	Expand the public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 2% to 20% public transit mode share in urbanized areas to achieve a regional 13% public transit mode share by 2030.	18,055	26,482
Measure TR-2 Rural	Develop a robust public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 1% to 10% in rural areas and achieve a regional 13% public transit mode share by 2030.	20,180	29,703
Measure TR-3	Reduce regional VMT by increasing promotion of mixed-use development in infill priority areas in alignment with HCAOG's baseline connectivity score included in the RTP.	Supportive	Supportive
Measure TR-4	Develop and implement regional mobility hubs and ZEV car-share programs to support mode shift from single occupancy vehicles.	Supportive	Supportive
Measure TR-5	Require commercial and industrial employers with 25 employees or more to develop a Transportation Demand Management plan.	Supportive	Supportive
Measure TR-6	Decarbonize 15% of passenger vehicle miles traveled by 2030 and 100% by 2045 through increased adoption of low and zero-emission vehicles and development of a regional electric vehicle charging and hydrogen fueling network.	55,726	590,124
Measure TR-7	Increase commercial zero-emission vehicle use and adoption to 10% by 2030 and 100% by 2045 through a regional charging network and development of hydrogen hubs.	17,441	279,775
Measure TR-8	Electrify or otherwise decarbonize 12% of applicable SORE off-road equipment by 2030 and 100% by 2045 and replace fossil diesel consumption with renewable diesel in 55% of applicable large diesel in alignment with EO N-79-20 by 2030.	49,143	139,645
Measure TR-9	Establish Humboldt as a pilot program for the decarbonization of the transportation sector to help drive state and philanthropic investment throughout Humboldt.	Supportive	Supportive

Measure ID	Measure Text	2030 GHG Emission Reduction Potential (MT CO2e)	2045 GHG Emission Reduction Potential (MT CO2e)
Measure TR-10	Work with the state and biofuel industry to establish a biofuel network within Humboldt thereby funding new green industry and job growth to support the decarbonization of the transportation sector.	Supportive	Supportive
Measure TR-11	Lead by example and electrify or otherwise decarbonize 50% of the municipal fleet by 2030 in alignment with the state's Advanced Clean Fleet Rule.	Supportive	Supportive
Strategy SW: Solid Waste			
Measure SW-1	Establish a local waste separation facility and organics management to be able to reduce waste sent to landfills by 75% by 2030. Reduce GHG emissions by limiting truck trips required to ship waste out of the county and import compost from out of the county.	29,689	32,568
Strategy WW: Water and Wastewater			
Measure WW-1	Expand regional opportunities for implementation of wastewater decarbonization technologies such as anaerobic digesters to reduce GHG and produce renewable fuel sources.	Supportive	Supportive
Measure WW-2	Reduce per capita potable water consumption by 15% by 2030.	Supportive	Supportive
Strategy CS: Carbon Sequestration			
Measure CS-1	Research and implement feasible carbon sequestration technology opportunities to support growth and expansion of green jobs industry within the region.	Supportive	Supportive
Measure CS-2	Offset fossil-based emissions and increase carbon sequestration in the community by achieving SB 1383 procurement requirements (0.08 tons recovered organic waste per person) by 2030.	1,532	1,681
Measure CS-3	Develop a County-wide Natural and Working Lands GHG Inventory baseline by 2027 to better understand the existing and future GHG sequestration and help obtain resources to protect and increase natural carbon sequestration occurring in the region as well as promote biodiverse forests and wetlands resistant to wildfire.	Supportive	Supportive
Total		**219,446**	**1,228,128**

Together, the Measures and Actions in in the RCAP provide the Humboldt region with the GHG emission reductions necessary to achieve the region's 2030 GHG emission reduction target (see Section 1.1). Additionally, with full implementation of the RCAP Measures and Actions and assuming

complete alignment with State on-road and off-road decarbonization goals, the 2045 GHG emissions reductions quantified in this report demonstrate a potential 85 percent reduction from 1990 levels. However, to meet Humboldts 2045 target of carbon neutrality the rate at which Measures and Actions are implemented would need to be increased, and additional Measure and Actions to increase carbon removal will need to be added. Future RCAP updates will monitor effectiveness of RCAP implementation, address addition of emerging technologies, increase the specificity of measures, review new state regulations, and include new Measures and Actions that Humboldt will implement to continue on the track toward carbon neutrality by 2045.

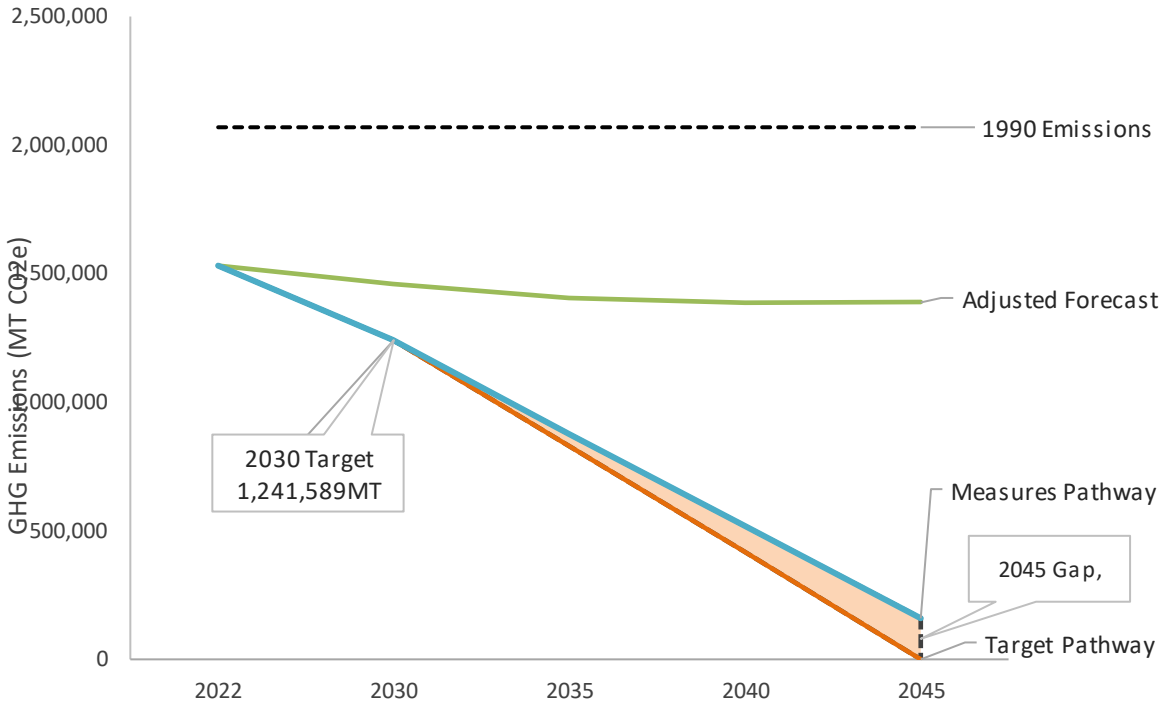
Table 2 Humboldt Region GHG Emissions Reductions Pathway

GHG Emission Forecast or Reduction Target	2030 GHG Emissions (MT CO_2e)	2045 GHG Emissions (MT CO_2e)
Business-as-usual Forecast	1,610,994	1,761,644
Adjusted Forecast	1,459,598	1,387,943
GHG Emissions Reductions (from full implementation of Measures)	219,446	1,228,128
GHG Emissions Remaining (after Measure reductions)	1,240,151	159,815
GHG Emission Reduction Target	1,241,589	0
GHG Emissions Gap (between remaining GHG emissions and target)	-1,438	159,815
Target anticipated to be met?	**Yes**	**No**

Notes: Numeric numbers donated in parathesis represent negative numbers.

Figure 1 shows the the region's GHG emission reduction targets in relation to the Humboldt Regional GHG emissions after implementation of the Mitigation Measures and Actions included in the RCAP. A complete description of each Measure and the quantitative Actions is included in the remainder of the report.

Figure 1 Humboldt Regional GHG Emissions Reductions Pathway



2 Strategy C: Cornerstone

The Humboldt Regional Cornerstone Strategy focuses on fostering collaboration between jurisdictions and key organizations to establish a regional approach to climate-related challenges through coordinated efforts. Given the rural nature of the region and its dispersed population, individual municipalities, even the larger incorporated cities, face significant constraints in their efforts to reduce GHG emissions due to limited resources (e.g. staffing and funding). These constraints can be overcome through a coordinated and collaborative approach to RCAP implementation. Through a collaborative approach the region can more effectively identify and build efficiencies, attract and share resources (e.g., funding, staff time), and undertake regional infrastructure initiatives needed to enhance capacity and interconnectivity in sectors such as solid waste and transportation, thereby reducing GHG emissions as outlined in the RCAP Measures. While this Strategy will not produce quantifiable GHG emission reductions, it is critical to successful implementation of the RCAP Measures where deep GHG reductions can only be achieved through regionally applied efforts. Based on this approach, the RCAP's Cornerstone Strategy consists of the Measure presented in Table 3. The table also indicates the Measure is supportive.

Table 3 Strategy C: Cornerstone GHG Emissions Reduction Summary

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
C-1	Establish a Regional Climate Committee comprised of elected officials from each jurisdiction, HTA, HCAOG, HWMA, and RCEA.	Supportive/Critical	Supportive/Critical
Total		**0**	**0**

Notes:

Measure C-1: Establish a Regional Climate Committee comprised of elected officials from each jurisdiction, HTA, HCAOG, HWMA, and RCEA.

Measure C-1 commits the region to establishing a Regional Climate Committee, facilitated by the County, to serve as a regional coalition. This committee is crucial to facilitate implementation of the Measures outlined in the RCAP. The measure emphasizes the six pillars used in each measure of the RCAP to provide proven structure for successful implementation and clearly illustrates the purposes.

- **Structural Change:** Develop and provide models, pilot programs, and template policies or ordinances that enable each jurisdiction in the region to implement uniform changes and facilitating local communities in making the necessary structural adjustments to reduce GHG emissions.
- **Engagement**: Develop and distribute promotional materials and programs across the region to inform the community, gain buy-in, and promote awareness of new and existing programs and opportunities.
- **Equity**: Leverage regional programs to engage and support frontline communities that may experience secondary impacts or not benefit directly from the measures' objectives. Ensure these communities can access regional resources or funding opportunities to mitigate identified impacts and benefit the entire community.
- **Feasibility Studies**: Utilize regional resources to conduct efficient studies that provide a clear understanding of the details, obstacles, and feasibility of proposed programs. This includes necessary analyses to identify the best path forward or the feasibility of implementing specific measures.
- **Funding**: Collaborate regionally to identify and pursue grants and financial backing. Ensure resources and efforts are directed towards securing funds that can be distributed across the region, such as grants or rebates to support measure implementation and adequate program staffing.
- **Partnerships:** Use the collaborative network of local jurisdictions, agencies, and community-based organizations (CBOs) to attract additional internal and external support and expertise. This includes engaging community organizations that are well-positioned to consistently and sustainably advance specific measures.

This committee would include representatives from municipalities across Humboldt County as well as representatives from regonal agencies such as the HTA, HCAOG, HWMA, and RCEA, and other partner organizations. The purpose of this coalition is to foster collaboration and coordination among the region to address climate-related challenges and implement effective climate action strategies. By bringing together key parties from various sectors and jurisdictions, Measure C-1 leverages collective expertise, resources, and efficiencies to tackle climate change at a regional level. The committee would support RCAP implementation through information sharing, coordination of RCAP efforts, development of joint initiatives to reduce GHG emissions, support and pursue funding, and promote sustainable development practices.

It is critical to have such collaboration and coalition-building to implement the RCAP in a rural and dispersed region that is highly constrained by limited resources. As this is the first RCAP for the region, establishing a collaborative approach is necessary to expand and improve upon shared infrastructure development, such as an interconnected energy and transportation system and regional waste management solutions, that is needed to successfully achieve GHG reductions in the RCAP on both a regional and individual municipality level. Measure implementation will be phased

and iterative, which will allow for the strategies to evolve based on ongoing monitoring of the region's GHG emission levels and progress on measure implementation. Regular monitoring allows progress with implementation to be tracked and effectively inform changes in approach. If the region skews from the GHG reduction targets established in the RCAP, the approach will be updated to include additional and more specific measures to focus on sectors that require renewed emphasis. However, long term change first requires foundational regional efforts to address the region's disconnected infrastructure and resource disadvantages.

Coalition building has been referenced by multiple local, state, national, and international organizations as being critical features in the fight against climate change. Evidence supporting the effectiveness of coalitions in climate action can be found in various successful initiatives globally. For instance, the World Resources Institute notes a significant rise in number of coalitions since the 2015 Paris Agreement and highlights over 90 intergovernmental climate initiatives, emphasizing the importance of cooperation across sectors to tackle emissions effectively.[1] The necessity of coalition-building is further endorsed by senior diplomats, who assert that environmental diplomacy and effective climate action require robust coalitions and convening interested parties (UNC Global, 2022).[2] The United Nations Net Zero Coalition exemplifies this approach by bringing together non-state entities such as cities, regional entities, businesses, and investors to accelerate implementation and achieve net-zero emissions by 2050.[3] Additionally, the World Economic Forum showcases numerous alliances and initiatives aimed at addressing the United Nations Sustainable Development Goals, reinforcing the critical role of partnerships in global climate action.[4] EcoAmerica also underscores the need for coalition-building to enhance community engagement and implementation efficiency in climate action.[5]

At the state level, California has emphasized a coalition-based approach, recognizing it as a crucial strategy for achieving climate-related goals. The State's 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan) identifies a number of partnership strategies and opportunities for partnership development to aid in reducing GHG emissions including but not limited to developing partnerships across state and local governments, fostering regional collaboration, and establishing public-private partnerships.[6] As detailed in the 2022 Scoping Plan, the State is investing one billion dollars into regional partnerships and economic diversification to support the creation of new jobs and/or economic transition to a carbon neutral economy. The Community Economic Resilience Fund (CERF) was specifically created to support regional groups in developing comprehensive roadmaps for economic recovery and transition, with a focus on creating accessible, high-quality jobs in sustainable industries. Given the Humboldt region's economic downturn in recent decades due to

[1] World Resources Institute. 2023. Launching a Climate Coalition? Learn from Existing Ones First. Available at: https://www.wri.org/insights/climate-coalition-cooperation-strategies

[2] The University of North Carolina at Chapel Hill. 2024. Climate change, environmental diplomacy require coalition-building, say senior diplomats. Available at: https://global.unc.edu/news-story/climate-change-environmental-diplomacy-require-coalition-building-say-senior-diplomats/

[3] United Nations. 2023. Net Zero #ItsPossible. Available at: https://www.un.org/en/climatechange/net-zero-coalition

[4] World Economic Forum. 2022. Meet the 100 Coalitions accelerating climate action and sustainable development. Available at: https://widgets.weforum.org/sdg-alliances-initiatives-coalitions/index.html

[5] EcoAmerica. 2023. We need coalitions to stop climate change. Available at: https://ecoamerica.org/we-need-coalitions-to-stop-climate-change/

[6] California Air and Resources Board (CARB). 2022. 2022 Scoping Plan for Achieving Carbon Neutrality. Available at: https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf

the decline of industries like logging, and the emerging opportunities for green industry growth such as offshore wind, the region is well-positioned to apply for this type of funding. Through the 2022 Scoping Plan, the State also recognizes the importance of establishing partnerships with tribal leaders to incorporate their priorities, expertise, and knowledge to achieve climate goals. There are several tribes in the Humboldt region that have already engaged in climate action efforts on their own. It will be important for the region to continue to engage with these tribes to gain insight on implementation of measures and actions that may impact tribal cultural resources and/or may benefit from tribal input.

The California Climate Adaptation Strategy, a program mandated by AB 1482, also recognizes the importance of regional collaboration and has recently updated priority strategies to enhance the implementation methods and metrics for establishing effective collaboratives and the successful leveraging of resources.[7] There are several grant funding opportunities available for regional climate adaptation resilience planning and scaling of regional climate solutions through the Integrated Climate Adaptation and Resiliency Program (ICARP).[8] ICARP was formed by the Governor's Office of Planning and Research (OPR) as directed by SB 246 signed in 2015. The most recent round of funding through the Adaptation Planning Grant Program (APGP) prioritized funding communities with capacity and resource constraints such as those in rural communities. Although this round of grant funding for the APGP has closed, the focus on supporting regional-scale climate planning and implementation efforts underscores the emphasis state programs place on addressing climate change through regional coalitions and the added value of such coalitions for rural communities like Humboldt.

An example of a successful coalition within the State includes the San Mateo County Regionally Integrated Climate Action Planning Suite (RICAPS) program that was developed to provide the tools and technical support for climate action planning and implementation to the 21 local jurisdictions in San Mateo County. The program was developed with the recognition that smaller incorporated cities in the region were limited in staff resources and funding to implement climate actions on their own and that a regional approach was necessary to reduce GHG emissions countywide and meet statewide GHG reduction goals. The RICAPS program is funded by grants from the regional air quality district (Bay Area Air Quality Management District) and PG&E.

Similar to San Mateo County, Humboldt's RCAP seeks to address climate change on a regional level and recognizes that the individual jurisdictions face significant constraints to implementation of the RCAP due to staffing and funding availability. Establishing a Regional Climate Committee in Humboldt aligns with state-recommended methods for implementing climate-related initiatives and addresses the constraints faced by individual jurisdictions. By leveraging the region's collective resources, this coalition can increase efficiency, pool resources, and enhance access to funding opportunities for implementing the RCAP measures. Furthermore, a regional approach focuses on increasing the interconnectedness of infrastructure in the region, which is essential for achieving substantial reductions in GHG emissions.

[7] CA.gov. 2024. California Climate Adaptation Strategy. Available at: https://www.climateresilience.ca.gov/

[8] https://opr.ca.gov/climate/icarp/grants/

3 Strategy BE: Building Energy

The Humboldt region's Building Energy Strategy focuses on two approaches developed specifically for the incorporated cities with natural gas infrastructure, termed as "urban" areas and for the unincorporated Humboldt County and smaller jurisdictions without natural gas infrastructure, that are best characterized as "rural". In the larger incorporated cities, the RCAP strategy primarily consists of electrifying and weatherizing residential and nonresidential buildings to leverage the carbon-free and renewable electricity provided by Redwood Coast Energy Authority (RCEA) and increase building energy efficiencies to reduce the load on the local grid. The strategy also focuses on supporting RCEA's buildout of local residential solar installations and community-scale generation and storage of renewable energy.[9] This strategy also aims to collaborate with the Rural Regional Energy Network (RuralREN) administered by RCEA to access funding and develop locally-appropriate programs to enhance energy efficiency in the community and reduce the energy burden in the region. RuralREN formation was approved by the California Public Utilities commission (CPUC) in June of 2023 to expand access of rural communities to energy efficiency services by investing $177 million to underserved rural regions across the state including the North Coast where Humboldt is located. The funding is intended to go towards helping customers with financing options for energy projects, workforce education and training, energy codes and standards training, as well as energy assessments, rebates, and incentives for cleaner energy efficient equipment.[10]

Electrifying the urban areas of the region's building stock consists of transitioning natural gas appliances—the equipment that heats the water we use and heats and cools the spaces we live and work in—to electric alternatives. When coupled with renewable and zero-carbon electricity, all-electric buildings eliminate GHG emissions from natural gas consumption and transition to a zero-emission operational energy footprint. The incorporated jurisdictions will also work to increase the generation and storage of community-scale renewable energy via on-site solar and battery storage to further support the additional electricity demand resulting from building electrification.

Due to the limitations of the energy infrastructure in rural regions, many rural households in Humboldt rely on alternative energy sources such as propane. In recognition of difference in regional characteristics, the RCAP Building Energy Strategy includes efforts to provide direct, decarbonized substitutions for currently used fuels in addition to electrification, weatherization, and on-site generation efforts. Based on these regionally specific approaches, the RCAP's Building Energy Strategy consists of the following Measures presented in Table 4. The table also indicates which Measures are quantitative and which Measures are supportive. The following subsections detail the substantial evidence and calculation methodologies of the quantitative Measures and the role of the supportive Measures.

[9] Community-scale renewable energy provides electricity for community or commercial consumption rather than for a single home as residential rooftop solar does.

[10] https://kymkemp.com/2023/07/11/rcea-to-administer-new-energy-network-serving-rural-california/

Table 4 Strategy BE: Building Energy GHG Emission Reduction Summary

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
Measure BE-1	By 2030, source 90% of grid-supplied electricity from renewable and carbon-free sources.	15,403	0
Measure BE-2	Increase the development of micro-grids and storage across the region to support RCEA's RePower Humboldt goals of enhancing grid capacity and facilitating the electrification of buildings and transportation.	Supportive	Supportive
Measure BE-3 Urban	Reduce existing residential building natural gas consumption by 4% by 2030 and 74% by 2045.	2,603	55,866
Measure BE-3 Rural	Reduce existing residential fossil-fuel consumption in households not connected to natural gas infrastructure by 2% by 2030.	Supportive	Supportive
Measure BE-4	Reduce existing nonresidential building natural gas consumption by 5% by 2030 and 79% by 2045.	3,821	42,887
Measure BE-5	Decarbonize 95% of new residential building construction by 2027.	2,252	13,907
Measure BE-6	Decarbonize 95% of new nonresidential building construction by 2027.	1,374	8,492
Measure BE-7	Decarbonize 30% municipal buildings and facilities by 2030	Supportive	Supportive
Measure BE-8	Lobby Off-shore Wind developers and PG&E to build electrical infrastructure to supply Humboldt with energy produced by the off-shore wind project which will increase supply and resilience	Supportive	Supportive
Total		**25,453**	**121,152**

1. Assumes emissions for electricity will be 0 due to SB 100 requirements that all retail electricity must be generated from renewable, carbon-free sources by 2045.

Measure BE-1: By 2030, source 90% of grid-supplied electricity from renewable and carbon-free sources.

Measure BE-1 aims to increase the share of electricity-supplied to the region that is sourced from renewable and carbon-free sources such that 90 percent of all electricity consumed in the Humboldt region is carbon-free. As RCEA is on track to provide 100 percent renewable electricity to all customers by 2030, this Measure would significantly aid in decarbonizing the region's building energy sector. The primary Actions that enable this Measure are:

- **Action BE-1a,** which supports RCEA in implementation of the RePower Humboldt plan which focuses on the continued procurement of renewable and carbon-free power and administration of decarbonization programs such as continued customer solar installations, electrification support, EV charging infrastructure buildout, and advanced biofuel infrastructure development;
- **Action BE-1b**, which directs the Regional Climate Committee to develop a policy or ordinance that will be adapted and adopted by each jurisdiction that requires new commercial and industrial developments to acquire electricity from renewable and carbon-free sources by either enrolling with RCEA or a comparable program;
- **Action BE-1d**, which involves the development of promotional materials and engagement with the community to inform the community of available incentives and benefits of enrolling in RCEA programs and discourage opting-out,
- **Action BE-1e**, which commits the region to increasing communication and technical assistance to low/moderate income households on the rebate and funding assistance programs available through the California Alternate Rates for Energy (CARE) and Low Income Home Energy Assistance Program (LIHEAP).

Currently, electricity customers in the Humboldt region are automatically enrolled in RCEA's REPower electricity option but may choose to 1) opt-up to the REPower+ option, 2) opt-out to receive electricity directly from PG&E, or 3) opt-out to procure electricity at wholesale directly from electricity generators (i.e., direct access). Automatic enrollment has shown to be an effective method of increasing the use of carbon-free and renewable electricity, with RCEA currently maintaining a 9 percent opt-out rate[11]. Based on electricity data provided by RCEA and region wide electricity use from CEC, RCEA currently supplies 77 percent of all electricity consumed in the region. A majority of the remaining 23 percent is provided by PG&E.

RCEA currently offers electricity options with a GHG emission rate lower than the standard electricity options offered in the region. In 2022, RCEA's REPower electricity option sourced 50 percent of its supply from eligible renewable sources, while the REPower+ option supplied 100 percent from solar, wind, and eligible hydroelectric at a GHG emissions rate of zero.[12] Though RCEA currently provides two renewable rate options, RCEA has established a strategy (RePower Humboldt Plan) and is currently on track to provide all customers with electricity that is sourced from 100 percent net-zero-carbon emission renewable sources by 2030.[13] As such, by maintaining the current enrollment level and opt-out rates, approximately 77 percent of building electricity emissions in the region will be reduced to zero by 2030 as RCEA achieves its goal to procure electricity that is 100

[11] Opt-out rates reported by RCEA via email on March 21, 2024.

[12] California Energy Commission (CEC). 2022 Power Content Label: Redwood Coast Energy Authority. Accessed at: https://www.energy.ca.gov/filebrowser/download/6060.

[13] Redwood Coast Energy Authority (RCEA). 2019. REPower Humboldt (2019 Update). Available at: https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

percent net-zero-carbon for both REPower and REPower+ customers. This means that to achieve Measure BE-1 goal, an additional 13 percent of electricity supplied to the region will need to be sourced from renewable and carbon-free sources. Through **Action BE-1a** the region will support RCEA in implementing the renewable energy and decarbonization programs, by providing the necessary assessments to plan and implement an effective energy strategy that addresses obstacles to implementation.

To further increase the percent of regional electricity that is supplied by RCEA or a comparable 100% renewable program, jurisdictions in Humboldt will leverage the Regional Climate Committee to develop education initiatives to advertise benefits and financial incentives to increase enrollment in RCEA and minimize opt-out rates through **Action BE-1d.** RCEA and jurisdictions in Humboldt understand cost is often the deciding factor for residents and businesses when making choices about an energy provider.[14] Currently, RCEA has capacity to enroll all Humboldt electricity consumers in their REPower and REPower+ energy packages, though higher procurement costs pose the largest constraint for higher enrollment rates. For this reason, the region will focus educational efforts on, and support RCEA in implementing energy finance programs through **Action BE-1f** and pursuing funding to expand available financial assistance such as the CARE and LIHEAP programs to keep customers enrolled in RCEA's power supply programs. As directed by **Action BE-1e**, expanding the CARE and LIHEAP programs will reduce financial limitations of low income residents in maintaining RCEA enrollment as well as increase access to the REPower+ option at no extra cost. This plan will prevent customers enrolled in these programs from experiencing cost increases that may drive decisions to opt-out of RCEA. Moreover, studies have also shown informational programs can result in up to a 70 percent implementation rate of recommended practices by participants.[15] The jurisdictions will, therefore, include education on the benefits of clean energy for residents and businesses to encourage customers to remain in RCEA programs.

In 2022, RCEA provided 85 percent of residential electricity and 71 percent of non-residential electricity indicating that there is a lower enrollment rate of RCEA by non-residential customers. To increase the percent of non-residential customers receiving renewable and carbon-free electricity, **Action BE-1b** commits jurisdictions to require new commercial and industrial facilities to enroll with a 100 percent renewable energy and carbon free source such as RCEA[16] or PG&E's 100% Solar Choice or Green Saver program.[17] The unincorporated County of Humboldt implemented such a building code[18] for cannabis industries developing in the region which was effective in increasing enrollment in 100 percent renewable energy electricity. This building code serves as an example of implementation that has been proven successful in the region. The template for such a policy or ordinance would be developed by the Regional Climate Committee through **Action BE-1b** to increase efficiencies during policy development, best utilize limited staff resources and time, and to create consistency across the jurisdictions. With actions focused on education and financial

[14] Villasenor, Karen. The City of Rancho Mirage Launches Community Choice Aggregation Program with Low Opt-Out Rate (2018). Accessed at: https://www.civicbusinessjournal.com/city-rancho-mirage-launches-community-choice-aggregation-program-low-opt-rate/.

[15] Laquatra, Joseph et al. The Consumer Education Program for Residential Energy Efficiency (2009). Accessed at: https://archives.joe.org/joe/2009december/a6.php.

[16] Note that RCEA REPower and REPower+ enrollment options are both expected to provide 100 percent carbon free renewable energy by 2030.

[17] PG&E offers a varied of rate plans that include 100% renewable and carbon-free rates that can be enrolled in. Available at: https://www.pge.com/en/clean-energy.html

[18] Humboldt County. Section B: Regulations That Apply In All or Several Zones, Part 1: Uses and Activities. Available at: https://humboldt.county.codes/Code/313-55

incentives in conjunction with building code requirements on non-residential land uses it is anticipated that the percent of regional supplied electricity that is sourced from renewable and carbon-free sources will increase to 90 percent by 2030.

Table 5 shows the parameters and data sources that support these clean energy GHG emission reductions and Table 6 shows the calculations as outlined in Equations 1 through 1.1.

RCEA Clean Energy Equations

Equation 1 $CO_2e\ Reduction_{Elec,y,i} = Total\ Elec_{y,i} * Supply\ Rate_i * (EF_{elec,y,i} - EF_{CF,y})$

Equation 1.1 $Total\ Elec_{y,i} = (Elec_{y,i} + Total\ Elec\ Converted_{y,i}) * (1 + L_{T\&D})$

Table 5 RCEA Clean Energy Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 1				
$CO_2e\ Reduction_{Elec,y,i}$	Electricity GHG emission reductions	See calculation table	MT CO_2e	Calculated
$Total\ Elec_{y,i}$	Total electricity consumption	See calculation table	kWh	Calculated
$Supply\ Rate_i$	Target supply rate community-wide	90%	percentage	Estimated to account for current RCEA enrollment and increased enrollment in RCEA or an alternative Green Rate expected with education and incentive programs via Action BE-1e and required enrollment by nonresidential sector via Action BE-1b.
$EF_{elec,y,i}$	Forecasted electricity emission factor	See calculation table	MT CO_2e/kWh	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$EF_{CF,y}$	Electricity emission factor of carbon-free electricity	0.00	MT CO_2e/kWh	RCEA REPower Plan[1] PG&E 100% Solar or Green Saver Program[2]
y	Year	2030	year	–
i	Subsector	Residential or Nonresidential	N/A	–
Equation 1.1				
$Elec_{y,i}$	Forecasted electricity consumption	See calculation table	kWh	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Elec\ Converted_{y,i}$	Total electricity usage from conversions	See calculation table	kWh	Measures BE-3, BE-4, BE-5, and BE-6
$L_{T\&D}$	Electricity transmission and distribution loss percentage	5.10%	Percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. Redwood Coast Energy Authority (RCEA). REPower Humboldt (2019 Update). Available at: https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

2. Action BE-1b would require industries to enroll in carbon free electricity program. Beyond RCEA, PG&E a few options for 100% renewable and carbon-free rates that can be enrolled in. Available at: https://www.pge.com/en/clean-energy.html The aPG&E's green saver

Table 6 RCEA Clean Energy GHG Emission Reduction Calculations

Definition	Definition	Units	Sector	2030	2045
Equation 1.1					
$Elec_{y,i}$	Forecasted electricity consumption	kWh	Residential	400,921,013	452,724,827
			Nonresidential	451,198,361	570,590,085
$Elec\ Converted_{y,i}$	Total electricity usage from conversions	kWh	Residential	14,037,798	234,911,282
			Nonresidential	12,889,430	160,324,644
$Total\ Elec_{y,i}$	Total electricity consumption	kWh	Residential	436,121,710	722,705,550
			Nonresidential	487,756,269	768,191,380
Equation 1					
$EF_{elec,y,i}$	Forecasted electricity emission factor	MT CO_2e/kWh	Residential	0.0000183	0.00
			Nonresidential	0.0000187	0.00
$CO_2e\ Reduction_{Elec,y,i}$	**Electricity GHG emission reductions**	**MT CO_2e**	**Residential**	**7,180**	**0**
			Nonresidential	**8,224**	**0**

Measure BE-2: Increase the development of micro-grids and storage across the region to support RCEA's RePower Humboldt goals of enhancing grid capacity and facilitating the electrification of buildings and transportation.

Measure BE-2 calls for the regional enhancement of energy grid capacity by developing micro-grids and energy storage systems, supporting RCEA's goals established in the REPower Humboldt Plan. Micro-grids, which can operate independently from the traditional grid, combined with energy storage, improve grid reliability and resilience by storing excess energy during low demand and supplying it during peak periods. While the GHG emission reductions from this measure are not quantified in this RCAP due to potential overlaps with other measures, these efforts play a crucial role in reducing the strain on the current grid and increase the available renewable energy to source locally. This supports the region's transition to renewable electricity and the electrification of buildings and transportation, as outlined in Measures BE-3 through BE-7, as well as TR-6 through TR-8.

With their flexibility and resilience, micro-grids serve as a viable method for addressing the capacity constraints that exist throughout the region.[19] Micro-grids and energy storage enhance grid efficiency, reduce reliance on fossil fuel-based plants, and facilitate the integration of renewable energy sources. Micro grids provide for increased resilience against power outages, crucial for climate adaptation. Furthermore, by decentralizing energy production, micro-grids can expand access to renewable energy in rural and isolated areas, thereby promoting greater availability of low-carbon energy solutions.

[19] Redwood Coast Energy Authority (RCEA). 2024. Resilience, Energy Resilience and Emergency Response. Available at: https://redwoodenergy.org/resilience/

Measure BE-3 Urban: Reduce existing residential building natural gas consumption by 4% by 2030 and 74% by 2045.

Measure BE-3 puts the region's urban areas (i.e. all incorporated cities with natural gas infrastructure) on a path to reduce residential natural gas consumption by approximately 4 percent by 2030 and 74 percent by 2045 to reduce GHG emissions. The primary Actions that enable this level of adoption include:

- **Action BE-3a** which calls for the development of an equitable decarbonization plan for urban residences connected to natural gas infrastructure that determine feasibility, cost, and equity concerns of retrofits as well as identifies projects and specific strategies to meet decarbonization targets;
- **Action BE-2b** which commits the Regional Climate Committee to petition PG&E on the region's behalf to help identify priority areas for electric grid expansion to help increase regional grid capacity and islanding capabilities;
- **Action BE-2d** which coordinates a regional effort to pursue and obtain increased funding from sources such as CARB, the Investment Reduction Act, and the Infrastructure Investment and Jobs Act; and
- **Action BE-2e** which commits incorporated jurisdictions to promote and provide information regarding currently available rebates for heat pumps, weatherization, smart appliances, etc. developed by the Regional Climate Committee with support provided by RCEA.

These actions will prepare urban areas with the engagement, resources, and funding assistance needed to reduce natural gas consumption through voluntary replacement. Currently available incentives will help continue the growth in electric space and water heaters seen in California over the past decade. According to Opinion Dynamics' *California Heat Pump Residential Market Characterization and Baseline Study* (2022), electric space heaters have grown from a five percent market share in 2009 to a 20 percent market share in 2019. Likewise, electric water heaters have grown from a six percent market share in 2009 to a 12 percent market share in 2019.[20] This trend is not only expected to continue through 2030 as electric appliances become more efficient and more cost-effective, but also be accelerated when coupled with sufficient funding for community members to replace their space and water heating appliances with electric or heat pump alternatives. While the total amount of funding available will change with sunset dates and budget cycles, the currently available federal (i.e., High Efficiency Electric Home Rebate [HEEHRA], Homeowner Managing Energy Savings [HOMES] Rebate, Inflation Reduction Act), state (i.e., TEHC Clean California), and local (i.e., RCEA's Residential Equipment Rebate Catalog and Heat Pump Rebate Catalog) funding options make it so that low- and middle-income residents in the Humboldt region can install electric space and water heaters at no additional cost compared to gas space and water heaters. In some cases, such customers will even be able to install the heat pump water heaters for free.[21] Though the region is currently limited in its electrification potential largely due to capacity restrictions from PG&E infrastructure, it is anticipated that the significant amount of funding available to Humboldt region residents and businesses combined with RCEA efforts to expand regional capacity (See Measure BE-2) will remove this hinderance to electrification and thereby help drive the voluntary market trend for electric space and water heating appliances

[20] Opinion Dynamics. California Heat Pump Residential Market Characterization and Baseline Study (2022). Accessed at: https://pda.energydataweb.com/#!/documents/2625/view.

[21] Rincon Consultants, Inc. Installation Costs for Zero-NOx Space and Water Heating Appliances (2024).

through 2030. Further, by developing a regional residential decarbonization plan that accounts for infrastructure and cost limitations and identifies strategies for partial electrification, more widespread adoption of residential decarbonization strategies can be anticipated.[22]

Table 7 shows the parameters and data sources that support these electrification programs and incentives for voluntary replacement, and Table 8 shows the GHG emissions reductions as outlined in Equation 2 through 2.4. Though the primary rebate programs specified prioritize heat pump replacements due to their superior efficiency, electric resistance equipment currently make up the majority of the electric technology market, likely due to their overall lower up-front cost. As the Actions employed by the Regional Climate Committee and urban areas would rely largely on voluntary replacement, the quantification of GHG reductions for this Measure assumes alignment with current market penetration of available electric technologies. Studies, such as those conducted by the American Council for an Energy-Efficient Economy (ACEEE) and the California Energy Commission (CEC), indicate that electrification and decarbonization practices are more common in urban areas due to better access to electrical infrastructure and greater policy and regulatory support.[22,23] As such, the GHG reductions associated with this Measure were conservatively applied only to the natural gas consumption in the incorporated cities of Humboldt, which account for approximately 60% of the region's total residential natural gas consumption. Given the substantial funding opportunities and increased awareness regarding the benefits of partial or full electrification available to all residences connected to the natural gas infrastructure in the region, it is anticipated that larger GHG reductions than those presented below are achievable.

Additionally, the emissions associated with natural gas consumption from PG&E are expected to decrease due to Senate Bill 1440, which mandates gas utilities, including PG&E, to replace pipeline-supplied natural gas with renewable natural gas (RNG). In 2022, the California Public Utilities Commission (CPUC) set RNG supply requirements for California utilities, requiring them to increase the amount of RNG in the pipeline supplied to residential and commercial customers by 12% by 2030.[24] RNG is derived from organic waste materials, such as landfill waste, sewer, and agricultural waste through processes like anaerobic digestion. Because organic waste naturally releases biogenic carbon dioxide during decomposition, conversion of organic waste into RNG means that any carbon dioxide released during combustion of RNG is considered part of the natural carbon cycle and does not contribute a net increase in carbon dioxide emissions to the atmosphere like combustion of fossil derived natural gas does. Production and consumption of RNG still releases non-biogenic GHG emissions, but to a lesser extent than extraction and consumption of fossil derived natural gas.[25] The information on SB 1440 provided here is for informational purposes only. The potential GHG emissions reductions associated with SB 1440's RNG procurement requirements are not quantified in this RCAP as it is unclear how extensively SB 1440 might affect emissions linked to natural gas sourced from pipelines.

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[22] American Council for an Energy-Efficient Economy (ACEEE). (2022). Building Electrification: Programs and Best Practices. Available at: https://www.aceee.org/sites/default/files/pdfs/b2201.pdf

[23] California Energy Commission (CEC). 2021. California Building Decarbonization Assessment – Final Commission Report. Available at: file:///C:/Users/elinard/Downloads/TN239311_20210813T140633_California%20Building%20Decarbonization%20Assessment%20-%20Final%20Commission%20Report.pd.pdf

[24] Pacific Gas and Electric Company's (PG&E). (2022) Draft Renewable Gas Procurement Plan in Compliance with Commission Decision 22-02-02. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M500/K435/500435651.PDF

[25] U.S. Environmental Protection Agency. (2021). An Overview of Renewable Natural Gas from Biogas. Available at: https://www.epa.gov/sites/default/files/2021-02/documents/lmop_rng_document.pdf

Existing Building Technical Assistance and Incentive Program Equations

Equation 2 $CO_2e\ Reduction_{NG,y,i}=\Sigma((Fuel\ Avoided_{j,y,i}*EF_{NG})+(Fuel\ Avoided_{j,y,i}*(L_{Pipeline}+L_{End\text{-}use})*EF_{NGL}))-(Elec\ Converted_{y,i}*EF_{elec,y,i}*(1+L_{T\&D}))$

Equation 2.1 $Elec\ Convert_{y,i} = \Sigma\ (Fuel\ Avoided_{j,y,i}*CF_{elec}/Eff_{elec,j})$

Equation 2.2 $Fuel\ Avoided_{j,y,i}=Fuel_{y,i}*Prop_{urban}*(EOL_{NG,j,y,i}*Fuel\ Share_{j,i}*MS_{elec,j,y})$

Equation 2.3 $EOL_{NG,j,y,i}=1/LSP_{j,i}*(y\text{-}imp.y_i)$

Equation 2.4 $Eff_{elec,j} = \Sigma\ Eff_{elec,j,k} * Prop_{elec,j,k}$

Table 7 Existing Building Voluntary Replacement Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 2				
$CO2e\ Reduction_{NG,y,i}$	Natural gas GHG emission reductions	See calculation table	MT CO2e	Calculated
$Fuel\ Avoided_{j,y,i}$	Natural gas consumption avoided	See calculation table	therms	Calculated
EF_{NG}	Natural gas emission factor	0.005311	MT CO2e/therm	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
EF_{NGL}	Natural gas leakage emission factor	0.047381	MT CO2e/therm	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Elec\ Converted_{y,i}$	Electricity usage from conversion	See calculation table	kWh	Calculated
$EF_{elec,y,i}$	Forecasted electricity emission factor	See calculation table	MT CO2e/kWh	Forecast
$L_{pipeline}$	Natural gas pipeline leakage percentage	2.3%	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$L_{End\text{-}use}$	Natural gas end-use leakage percentage	0.5%	percentage	See Appendix GHG Inventory, Forecast, and Targets Technical Report
$L_{T\&D}$	Electricity transmission and distribution loss percentage	5.10%	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
y	Year	2030 or 2045	year	—
i	Subsector	Residential or Nonresidential	—	—
j	Electric equipment type	HVAC or water heater	—	—
Equation 2.1				
CF_{elec}	Electricity to therms conversion factor	29.3	kWh/therm	Metric Conversions[1]
$Eff_{elec,j}$	Efficiency factor of electric equipment relative to natural gas equipment	See calculation table	unitless	Calculated
Equation 2.2				
$Prop_{urban}$	Estimated proportion of natural gas attributable to incorporated cities	See calculation table	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Fuel_{y,i}$	Forecasted natural gas consumption after new building electrification	See calculation table	therms	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$EOL_{NG,j,y,i}$	Percent of equipment reaching end of life	See calculation table	percentage	Calculated

Variable	Definition	Value	Unit	Data Source
$Fuel\ Share_{j,i}$	Percent of sector natural gas consumption	—	—	—
$Fuel\ Share_{wh,Res}$	Percent of residential natural gas consumption from water heaters	38%	percentage	Synapse[2]
$Fuel\ Share_{wh,Nonres}$	Percent of nonresidential natural gas consumption from water heaters	28%	percentage	Synapse[2]
$Fuel\ Share_{HVAC,Res}$	Percent of residential natural gas consumption from HVAC units	39%	percentage	Synapse[2]
$Fuel\ Share_{HVAC,Nonres}$	Percent of nonresidential natural gas consumption from HVAC units	42%	percentage	Synapse[2]
$MS_{elec,j,y}$	Market share of electric equipment	—	—	—
$MS_{elec,wh,\ 2030}$	Market share of electric water heaters	12%	percentage	Opinion Dynamics[3]
$MS_{elec,HVAC,2030}$	Market share of electric space heating units	22%	percentage	Opinion Dynamics[4]
$MS_{elec,wh,\ 2045}$	Market share of electric water heaters	100%	percentage	Assuming 100% electric market share by 2045
$MS_{elec,HVAC,2045}$	Market share of electric space heating units	100%	percentage	Assuming 100% electric market share by 2045
Equation 2.3				
$LSP_{i,wh}$	Average water heater lifespan in sector	—	—	—
$LSP_{residential,wh}$	Average residential water heater lifespan	13	years	EIA[5]
$LSP_{nonresidential,wh}$	Average nonresidential water heater lifespan	10	years	EIA[5]
$LSP_{i,HVAC}$	Average HVAC unit lifespan in sector	—	—	—
$LSP_{residential,HVAC}$	Average residential HVAC unit lifespan	21.5	years	EIA[5]
$LSP_{nonresidential,HVAC}$	Average nonresidential HVAC unit lifespan	23	years	EIA[5]
$imp.y_i$	Ordinance implementation year	—	—	—
$imp.y_{residential}$	Ordinance implementation year for residential buildings	2025	year	RCAP adoption
$imp.y_{nonresidential}$	Ordinance implementation year for nonresidential buildings	2025	year	RCAP adoption
Equation 2.4				
$Eff_{elec,HVAC}$	Efficiency factor of HVAC systems relative to natural gas equipment	See calculation table	unitless	—

Variable	Definition	Value	Unit	Data Source
$Eff_{elec,HVAC,HP}$	Efficiency factor of heat pumps	3	unitless	Leonardo Energy[6] and European Copper Institute[8]
$Eff_{elec,HVAC,ER}$	Efficiency factor of electric resistance	1	unitless	Energy.gov[7] and Schnackle Engineering[9]
$Eff_{elec,wh,ER}$	Efficiency factor of water heaters relative to natural gas	1	unitless	Conservative estimate of 1:1 efficiency of gas and electric water heaters[10,11]
$Prop_{elec,HVAC,k}$	Proportion of electric equipment types making up the electric HVAC market	—	—	—
$Prop_{elec,HVAC,HP}$	proportion of heat pump technology for HVAC systems	18%	percentage	Calculated based on the combined market share of heat pumps and electric resistance heaters for space heating[4]
$Prop_{elec,HVAC,ER}$	proportion of electric resistance technology for HVAC systems	82%	percentage	Calculated based on the combined market share of heat pumps and electric resistance heaters for space heating[4]
$Prop_{elec,wh,ER}$	Electric HVAC technology proportion of electric resistance space heaters	100%	percentage	As high efficiency technology (i.e. solar and heat pumps) is 1% of the market, assume all water heaters are electric resistance as a conservative estimation[3]
k	types of options for a given electric equipment system	e.g. heat pumps, electric resistance	—	—

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. Metric Conversions. Therms (US) to Kilowatt-hours. Available at: https://www.metric-conversions.org/energy-and-power/therms-us-to-kilowatt-hours.htm
2. Synapse Energy Economics, Inc. 2018. Decarbonization of Heating Energy Use in California Buildings, Figure 2. Available at: https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf
3. Opinion Dynamics. 2022. California Heat Pump Residential Market Characterization and Baseline Study, Figure 34. Available at: https://pda.energydataweb.com/api/view/2625/OD-CPUC-Heat-Pump-Market-Study-Report_Final.pdf
4. Opinion Dynamics. 2022. California Heat Pump Residential Market Characterization and Baseline Study, Figure 21. Available at: https://pda.energydataweb.com/api/view/2625/OD-CPUC-Heat-Pump-Market-Study-Report_Final.pdf
5. U.A. Energy Information Administration (eia). 2023. Updated Buildings Sector Appliance and Equipment Costs and Efficiencies. Available at: https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf
6. Leonardo Energy - Knowledge Base. 2023. How efficient is a heat pump?. Available at: https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump
7. Energy.gov. Electric Resistance Heating. Available at: https://www.energy.gov/energysaver/electric-resistance-heating#:~:text=Electric%20resistance%20heating%20is%20100,the%20fuel's%20energy%20into%20electricity.
8. European Copper Institute. 2018. Heat Pumps: Integrating technologies to decarbonize heating and cooling. Accessed at: https://www.ehpa.org/wp-content/uploads/2022/10/White_Paper_Heat_pumps-1.pdf
9. Schnackel Engineers. 2023. Electric Heating vs Gas Heating. Available at: https://schnackel.com/blogs/electric-heating-vs-gas-heating#:~:text=One%20of%20the%20significant%20advantages,losses%20during%20the%20combustion%20process.

Variable	Definition	Value	Unit	Data Source

10. Southface Energy Institute. Water Heater Efficiency, Efficiency of Fuel Types and Alternatives for Heating Water. Available at: https://www.ncelec.org/sites/ncelec/files/documents/waterheater_efficiency_041614.pdf
11. Pennsylvania State University. 2023. Energy Efficiency of Water Heaters. Available at: https://www.e-education.psu.edu/egee102/node/2009

Table 8 Existing Residential Voluntary Replacement GHG Emission Reduction Calculations

Definition	Definition	Units	Sector	2030	2045
Equation 2.4					
$Eff_{elec,wh}$	Efficiency factor of water heaters relative to natural gas	unitless	Residential	1.00	1.00
$Eff_{elec,HVAC}$	Efficiency factor of HVAC systems relative to natural gas equipment	unitless	Residential	1.36	1.36
Equation 2.3					
$EOL_{NG,y,i,wh}$	Percent of water heaters reaching end-of-life since ordinance implementation	percentage	Residential	38.46%	100.00%
$EOL_{NG,y,i,HVAC}$	Percent of HVAC units reaching end-of-life since ordinance implementation	percentage	Residential	23.26%	93.02%
$imp.y_i$	Ordinance implementation year	year	Residential	2025	2025
Equation 2.2					
$Prop_{urban}$	Estimated proportion of natural gas attributable to incorporated cities	percentage	Residential	56.57%	56.57%
$Fuel_{y,i}$	Forecasted natural gas consumption after new building electrification	therms	Residential	11,278,225	11,330,156
$Fuel\ Avoided_{wh,y,i}$	Natural gas consumption avoided (water heaters)	therms	Residential	197,803	4,305,459
$Fuel\ Avoided_{HVAC,y,i}$	Natural gas consumption avoided (HVAC)	therms	Residential	225,040	4,110,475
Equation 2.1					
$Elec\ Converted_{wh,i}$	Electricity usage from conversion of water heater systems	kWh	Residential	5,795,620	126,149,953
$Elec\ Converted_{HVAC,i}$	Electricity usage from conversion of HVAC systems	kWh	Residential	4,835,358	88,320,408
Equation 2					
$EF_{elec,y,i}$	Forecasted electricity emission factor	MT CO2e/kWh	Residential	0.0000183	0.0000000
$CO2e\ Reduction_{NG,y,i}$	**Natural gas GHG emission reductions**	**MT CO2e**	**Residential**	**2,603**	**55,866**

Measure BE-3 Rural: Reduce existing residential fossil-fuel consumption in households not connected to natural gas infrastructure by 2% by 2030.

Much of rural Humboldt lies at the edge of PG&E's natural gas infrastructure, and experience reduced electric grid capacity compared to other areas in the county. These households typically rely on other fossil fuels such as, propane or diesel, in place of natural gas. Measure BE-3 Rural aims to reduce fossil fuel usage in residential households not connected to PG&E natural gas infrastructure by 2% by 2030. While this measure's GHG emission reductions are not quantified in the RCAP due to the complexity of accurate measurement and data limitations with regards to rural building decarbonization initiatives, it contributes to the community's broader goals of reducing carbon emissions and transitioning to cleaner energy sources.

Reducing fossil-fuel use in rural areas not only helps decrease GHG emissions but also encourages the adoption of alternative energy sources such as electricity or renewable fuels. This transition supports the overall electrification efforts and aligns with other measures aimed at decarbonizing the regional energy supply. Additionally, like Measure BE-3 Urban, this measure aims to provide rural areas with weatherization assistance that will help reduce consumption rates and provide community benefits such as decreased utility cost. By focusing on these rural households, Measure BE-3 Rural seeks to make the benefits of a low-carbon transition accessible to all segments of the community.

Measure BE-4: Reduce existing nonresidential building natural gas consumption by 5% by 2030 and 79% by 2045.

Measure BE-4 puts the Humboldt region on a path to reduce commercial and mixed-use natural gas consumption by 5 percent by 2030 and 79 percent by 2045 to reduce GHG emissions. The primary Actions that enable this level of adoption include:

- **Action BE-4a** which calls for the inclusion of feasibility assessment, cost analysis and strategy development for decarbonization of nonresidential buildings as part of the decarbonization plan led by the Regional Climate Committee as part of Measure BE-3;
- **Action BE-4c** which establishes streamlined permitting for energy efficiency technology, onsite renewable energy, and battery storage projects in support of RCEA RePower Humboldt goals to offset increased electrical needs associated with electrifying buildings;
- **Action BE-4d** which commits jurisdictions to adopt a decarbonization policy for existing commercial buildings by 2027 that establishes a regulatory mechanism, such as permitting processes, that limits expansion of natural gas infrastructure and incentivizes the decarbonization of appliances upon replacement;
- **Action BE-4e** which directs the Regional Climate Committee to develop and administer an outreach program that promotes building decarbonization, involves targeted outreach to businesses and local contractors, and provides information on funding availability specifically to commercial, industrial, and multifamily building owners for decarbonization efforts.

Similar to Measure BE-3 Urban, these actions will prepare jurisdictions county-wide to facilitate voluntary replacement of equipment in the commercial, mixed use, and multifamily buildings, as well as mandatory replacements for large scale renovations. **Action BE-4d** involves adoption of a decarbonization policy to guide decision-making and administrative actions such as permitting processes. Similarly, **Action BE-4c** facilitates permitting processes to make decarbonization easier. This Measure is designed to leverage the Regional Climate Committee to lead the development of a decarbonization strategy, prepare and administer an educational program, and support the jurisdictions with policy and ordinance drafting to conserve staff resources. GHG reduction associated with this measure were calculated based on market trends and the assumption that conditions in more urbanized areas are more favorable for decarbonization of nonresidential buildings. As such, the GHG reductions associated with this Measure were conservatively applied only to the natural gas consumption by nonresidential buildings in the incorporated cities of Humboldt, which account for approximately 75% of the region's total nonresidential natural gas consumption. Based on market trends of electric water and space heater technology, voluntary replacement is anticipated to account for 3-4 percent of the region's 5 percent target.[26] GHG Emissions from voluntary replacement of building equipment was quantified using the same methodology as Equations 2 through 2.4. The full set of parameters and data sources that support these electrification programs and incentives for voluntary replacement are identified in Table 7. Table 9 shows the GHG emissions reductions as outlined in Equation 2 through 2.4.

[26] For more information and substantial evidence regarding electric equipment market trends, see *Measure BE-3 Urban: Reduce existing residential building natural gas consumption connected to PG&E natural gas infrastructure by 3.8% by 2030 and 74% by 2045.*

Table 9 Existing Commercial Voluntary Replacement GHG Emission Reduction Calculations

Definition	Definition	Units	Sector	2030	2045
Equation 2.4					
$Eff_{elec,wh}$	Efficiency factor of water heaters relative to natural gas	unitless	Nonresidential	1.00	1.00
$Eff_{elec,HVAC}$	Efficiency factor of HVAC systems relative to natural gas equipment	unitless	Nonresidential	1.36	1.36
Equation 2.3					
$EOL_{NG,y,i,wh}$	Percent of water heaters reaching end-of-life since ordinance implementation	percentage	Nonresidential	50.00%	100.00%
$EOL_{NG,y,i,HVAC}$	Percent of HVAC units reaching end-of-life since ordinance implementation	percentage	Nonresidential	21.74%	86.96%
$imp.y_i$	Ordinance implementation year	year	Nonresidential	2025	2025
Equation 2.2					
$Prop_{urban}$	Estimated proportion of natural gas attributable to incorporated cities	percentage	Nonresidential	76.22%	76.22%
$Fuel_{y,i}$	Forecasted natural gas consumption after new building electrification	therms	Nonresidential	8,649,265	8,691,986
$Fuel\ Avoided_{wh,y,i}$	Natural gas consumption avoided (water heaters)	therms	Nonresidential	145,308	2,433,756
$Fuel\ Avoided_{HVAC,y,i}$	Natural gas consumption avoided (HVAC)	therms	Nonresidential	173,737	3,174,465
Equation 2.1					
$Elec\ Converted_{wh,i}$	Electricity usage from conversion of water heater systems	kWh	Nonresidential	4,257,514	71,309,056
$Elec\ Converted_{HVAC,i}$	Electricity usage from conversion of HVAC systems	kWh	Nonresidential	3,733,038	68,208,662
Equation 2					
$EF_{elec,y,i}$	Forecasted electricity emission factor	MT CO2e/kWh	Nonresidential	0.0000187	0.0000000
$CO2e\ Reduction_{NG,y,i}$	**Natural gas GHG emission reductions**	**MT CO2e**	**Nonresidential**	**1,961**	**37,228**

Under **Action BE-4d**, the remaining 2-3 percent of natural gas is anticipated to be achieved by including major renovations in the new commercial building ordinance (see Measure BE-6). Major renovations will be defined by this ordinance as renovation projects that affect over 50 percent of the building, add an additional 50 percent of gross floor space to the building, or value more than 50 percent of the assessed value of the property at time of application submittal. These three definitions will be utilized to capture more projects under the ordinance established as part of Measure BE-6.

In the United States, the commercial building renovation market made up about 22 percent of the total commercial building market in 2022. It is anticipated that the commercial renovation market

will continue to grow and make up a larger portion of the commercial building market due to the aging building stock and need for upgrades.[27] A study by the Lawrence Berkely National Laboratory found that of the renovation and retrofit projects occurring in commercial buildings, approximately 18 percent and 20 percent of the projects included water heater and HVAC system replacements, respectively.[28] This equates to an estimated replacement of water heaters and HVAC units at a 4.0 percent and 4.5 percent annual rate, respectively, due to renovation or retrofit.

Since Humboldt is largely a bedroom community where even urban centers are considered to be small rural communities, this Measure assumes the region's nonresidential building stock has a similar history to the residential housing stock. As much of the region can be considered as bedroom communities serving surrounding commercial centers, most of the existing nonresidential buildings in the region were developed to support the residents of Humboldt. Thus, it is anticipated that the development and age of nonresidential buildings would have followed the same path as residential development, so residential housing stock data can be utilized for this Measure. As shown in Table 10, over 60 percent of Humboldt's regional housing stock was built prior to the 1980s. This means the majority of commercial buildings in the community are older than 45 years old, having reached or soon reaching the point of needing major renovations since the average lifespan of a commercial building is 50 to 60 years.[29] This quantification thus conservatively assumes 1 percent of commercial buildings will need major renovations each year through 2045 so that a conservative 3 percent receive major renovations cumulatively by 2030 and 18 percent by 2045.

Table 10 Humboldt's Regional Housing Stock Age

Year Built	Age (years)	Total Houses	Share of Houses
Built 2020 or later	4 or younger	148	0.20%
Built 2010 to 2019	5 to 14	2,757	4.40%
Built 2000 to 2009	15 to 24	5,045	8.10%
Built 1990 to 1999	25 to 34	8,041	12.90%
Built 1980 to 1989	35 to 44	8,391	13.50%
Built 1970 to 1979	45 to 54	9,098	14.60%
Built 1960 to 1969	55 to 64	6,746	10.80%
Built 1950 to 1959	65 to 74	8,764	14.10%
Built 1940 to 1949	75 to 84	4,349	7.00%
Built 1939 or earlier	85 or older	8,967	14.40%
Total		**62,306**	**100%**

1. US Census: https://data.census.gov/table/ACSDP5Y2022.DP04?g=050XX00US06023_040XX00US06&tid=ACSDP5Y2022.DP04

[27] IBISWorld. 2023. Commercial Property Remodeling Industry in the US – market Research Report. Available at: https://www.ibisworld.com/united-states/market-research-reports/commercial-property-remodeling-industry/#IndustryStatisticsAndTrends

[28] Cindy Regnier P.E., Paulk Mathew Ph.D., Alastair Robinson, Jordan Shackelford, Travis, Walter Ph.D. 2020. System Retrofit Trends in Commercial Buildings: Opening Up Opportunities for Deeper Savings. Lawrence Berkeley National Laboratory. Available at: https://buildings.lbl.gov/sites/default/files/Regnier%20-%20Systems%20Retrofit%20Trends.docx__1.pdf

[29] BCI Construction. Which Factors Determine the Lifespan of a Building? (2021). Accessed at: https://bciconstruction.us/which-factors-determine-the-lifespan-of-a-building/.

The annual major renovation percentage (i.e., 1 percent) is applied to a decreasing existing building stock (i.e., buildings receiving major renovations the previous year are removed from the existing building stock) to employ diminishing returns in the quantification. Due to the available incentives, ordinance requirements, and the age of existing appliances, the quantification assumes all major renovations will replace existing natural gas appliances with electric alternatives, eliminating the natural gas usage of the renovated building.

As a component of the new commercial building ordinance, **Action BE-6a** helps local jurisdictions enforce the ordinance through a permit compliance program. Although permits are required for many energy efficiency improvements (e.g., water heaters, insulation, HVAC systems, duct replacement) many jurisdictions face permit evasion issues, with permitted HVAC systems only accounting for eight to about 30 percent of total HVAC system installations.[30, 31] According to a report by the NRDC, only 25 percent of commercial HVAC replacements are properly installed and inspected, highlighting the widespread issue of non-compliance and poor installation practices that undermine energy efficiency and increase operational costs.[32] This trend in permit evasion means jurisdictions face issues determining compliance with building ordinances and codes. Strategies that have proven effective at improving permit compliance in various states and local jurisdictions include streamlining the compliance process and providing advanced training for enforcement staff—actions each jurisdiction's permit compliance program will implement to enforce the major renovation electrification ordinance.[33] Considering challenges in maintaining 100 percent compliance, the quantification conservatively assumes a portion of major renovations (i.e., 12 percent) will not conform with the ordinance each year to electrify. Jurisdictions will monitor permit numbers to estimate compliance rates and adjust the permit compliance program strategies as needed to achieve a high compliance rate with the ordinance.

This Action will result in a 2.6 percent reduction in existing nonresidential natural gas usage by 2030 and 14.7 percent by 2045. Table 11 shows the parameters and data sources that support this Action's GHG emission reductions and Table 12 shows the calculations as outlined in Equations 4 through 4.2.

Electric-Preferred Nonresidential Major Renovation Equations

Equation 4 $$CO_2e\ Reduction_{NG,y,i}=(Fuel\ Avoided_{NG,y,i}*EF_{NG})+(\ Fuel\ Avoided_{NG,y,i}*L_{NGL}*EF_{NGL})-(Elec\ Converted_{y,i}*EF_{elec,y,i}*(1+L_{T\&D}))$$

Equation 4.1 $$Fuel\ Avoided_{NG,y,i}=Fuel_{NG,y,i}*(1-MR_i*(1-NCR_i))^{(y-imp.y)}$$

Equation 4.2 $$Elec_{convert,y,i}\ =\ Fuel_{\ AvoidedNG,y,i}*CF_{elec}/Eff_{elec}$$

[30] Alvarez, Emily and Mast, Bruce. BayREN Codes & Standards Program. Local Government Policy Calculator for Existing Single-Family Buildings – User Guide (2021). Accessed at: https://www.bayrencodes.org/wp-content/uploads/2021/11/BayREN-Policy-Calculator-User-Guide_10.29.2021.pdf.

[31] California Public Utilities Commission (CPUC). Final Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I – Report (2017). Accessed at: http://www.calmac.org/publications/HVAC_WO6_FINAL_REPORT_VolumeI_22Sept2017.pdf.

[32] Kiki Velez, Merrian Morgeson. 2023. Poor-Quality HVAC Installs are Costing Us – A solution is within reach. NRDC. Available at: https://www.nrdc.org/bio/kiki-velez/poor-quality-hvac-installs-are-costing-us-solution-within-reach

[33] Meres, Ryan et al. American Council for an Energy-Efficient Economy (ACEEE). Successful Strategies for Improving Compliance with Building Energy Codes (2012). Accessed at: https://www.aceee.org/files/proceedings/2012/data/papers/0193-000112.pdf.

Table 11 Electric-Preferred Nonresidential Major Renovation Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 4				
$CO_2e\ Reduction_{NG}$	Natural gas GHG emission reductions	See calculation table	MT CO_2e	Calculated
$Fuel\ Avoided_{NG}$	Natural gas consumption avoided	See calculation table	therms	Calculated
EF_{NG}	Natural gas emission factor	0.005311	MT CO_2e/therm	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
L_{NGL}	Natural gas leakage factor	2.3%	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
EF_{NGL}	Natural gas leakage emission factor	0.04738	MT CO_2e/therm	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Elec Converted	Electricity usage from conversion	See calculation table	kWh	Calculated
EF_{elec}	Forecasted electricity emission factor	See calculation table	MT CO_2e/kWh	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
y	Year	2030 or 2045	year	–
i	Subsector	Nonresidential	N/A	–
Equation 4.1				
$Fuel_{NG}$	Forecasted natural gas consumption after new building electrification ordinance (Measure BE-1)	See calculation table	therms	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
MR_i	Annual percentage of nonresidential buildings receiving major renovations	1%	percentage	Estimated based on age of Humboldt's regional building stock (Table 10) and average lifespan of commercial buildings. [1]
NCR	Ordinance noncompliance rate	12%	percentage	Estimate based on permit evasion rates and strategies to increase building code compliance.[2, 3, 4]
imp.y	Ordinance implementation year	See calculation table	year	Measure BE-6
Equation 4.2				
CF_{elec}	Electricity to therms conversion factor	29.3	kWh/therm	Metric Conversions[5]
Eff_{elec}	Efficiency factor of electric equipment	3	unitless	Assume ordinance and/or efficiency standards will

Variable	Definition	Value	Unit	Data Source
	relative to natural gas equipment			promote the majority of renovations to implement highly efficient electric equipment such as heat pumps[3]

1. BCI Construction. 2021. Which Factors Determine the Lifespan of a Building?. Available at: MIT Architecture. Architectural Longevity: What Determines a Building's Lifespan? (2023). Accessed at: https://architecture.mit.edu/news/architectural-longevity-what-determines-buildings-lifespan#:~:text=Courtesy%20of%20the%20artists.&text=The%20average%20lifespan%20of%20a,years%2C%20from%20construction%20to%20demolition.
2. Alvarez, Emily and Mast, Bruce. BayREN Codes & Standards Program. Local Government Policy Calculator for Existing Single -Family Buildings – User Guide (2021). Accessed at: https://www.bayrencodes.org/wp-content/uploads/2021/11/BayREN-Policy-Calculator-User-Guide_10.29.2021.pdf.
3. California Public Utilities Commission (CPUC). Final Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I – Report (2017). Accessed at: http://www.calmac.org/publications/HVAC_WO6_FINAL_REPORT_VolumeI_22Sept2017.pdf.
4. Meres, Ryan et al. American Council for an Energy-Efficient Economy (ACEEE). Successful Strategies for Improving Compliance with Building Energy Codes (2012). Accessed at: https://www.aceee.org/files/proceedings/2012/data/papers/0193-000112.pdf.
5. Metric Conversions. Therms (US) to Kilowatt-hours. Available at: https://www.metric-conversions.org/energy-and-power/therms-us-to-kilowatt-hours.htm
6. Leonardo Energy - Knowledge Base. 2023. How efficient is a heat pump?. Available at: https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump

Table 12 Electric-Preferred Nonresidential Major Renovation GHG Emission Reduction Calculations

Variable	Definition	Units	Sector	2030	2045
Equation 6.1					
$Fuel_{NG}$	Forecasted natural gas consumption after new building electrification ordinance (Measure BE-1)	therms	Nonresidential	11,028,690	5,795,564
imp.y	Ordinance implementation year	year	Nonresidential	2027	2027
$Fuel\ Avoided_{NG}$	Natural gas consumption avoided	therms	Nonresidential	288,603	852,469
Equation 6.2					
Elec Converted	Electricity usage from conversion	kWh	Nonresidential	2,818,687	8,325,777
Equation 6					
EF_{elec}	Forecasted electricity emission factor	MT CO_2e/kWh	Nonresidential	0.0000187	0.0000000
CO_2e $Reduction_{NG}$	**Natural gas GHG emission reductions**	**MT CO_2e**	**Nonresidential**	**1,860**	**5,659**

Measure BE-5: Decarbonize 95% of new residential building construction by 2027.

Measure BE-5 commits the Humboldt region to decarbonize new residential building construction in the community. The primary Action that enables this Measure is:

- **Action BE-5a** which directs each jurisdiction to adopt an energy design rating, reach code, energy performance ordinance, or some other type of ordinance in 2027 to limit new natural gas construction for residential buildings. The action also establishes a permit compliance program to monitor and reach the 95% goal.

Humboldt jurisdictions are committed to limiting new natural gas developments in the community. However, the U.S. Court of Appeals for the Ninth Circuit's decision to overturn Berkeley's natural gas regulation—the ordinance that prohibited the installation of natural gas piping within newly constructed buildings—limits the region's ability to establish regulations to ban new natural gas construction.[34] As part of the previous CAP initiative, some jurisdictions in the region had already drafted electrification ordinances as part of their efforts to pursue building decarbonization. However, these efforts were halted prior to adoption due to the results of the Berkeley case. Despite this setback, the drafting of these electrification building codes demonstrates the regional interest in pursuing building decarbonization and highlights the community's commitment to reducing reliance on natural gas. Through **Action BE-5a**, each jurisdiction will employ the most stringent regulation currently available and suitable to their needs to electrify or otherwise decarbonize the majority of new construction in the community. To conserve staff resources and increase efficiencies, the Regional Climate Committee will develop an ordinance template based on jurisdictional input and feedback that can be modified as needed by each jurisdiction. **Action BE-5a**'s ordinance will be designed to either strongly encourage electrification of new construction as a single margin energy score or specifically restrict the use of natural gas in new construction.

As a single margin source energy score, the ordinance would establish a low Energy Design Rating (EDR)—a scoring metric that determines a building's compliance with California's Building Energy Efficiency Standards—that new residential buildings in the applicable jurisdiction would need to meet. The EDR would be set in a way to make electrification the easiest pathway to meet the standard. However, since the ordinance does not ban natural gas infrastructure outright, this ordinance may permit some new construction to be built with natural gas. These exceptions are expected to be minimal because of the cost effectiveness of new building electrification and the available incentives in the region that will help continue the natural growth in electric space and water heater installations seen in California over the past decade. As previously discussed, electric space heaters have grown to a 20 percent market share in 2019, while electric water heaters have grown to an 11 percent market share in 2019.[35] This trend is not only expected to continue through 2030 because all-electric new construction has proven to be cost-effective in the region for most all buildings types,[36,37] but also be accelerated when coupled with the large amount of funding available for community members to install electric or heat pump space and water heating

[34] CRA V. City of Berkeley, No. 21-16278. Accessed at: https://law.justia.com/cases/federal/appellate-courts/ca9/21-16278/21-16278-2023-04-17.html.

[35] Opinion Dynamics. California Heat Pump Residential Market Characterization and Baseline Study (2022). Accessed at: https://pda.energydataweb.com/#!/documents/2625/view.

[36] California Energy Codes and Standards. Cost Effectiveness Explorer (2024). Accessed at: https://explorer.localenergycodes.com/jurisdiction/eureka-city/study-results/1-PGE?only_study_type=new-buildings

[37] According to the California Energy Codes and Standards' Cost Effectiveness Explorer, all-electric construction is cost effective for all residential building types.

appliances. While the total amount of funding available will change with sunset dates and budget cycles, the currently available federal (i.e., High Efficiency Electric Home Rebate [HEEHRA], Homeowner Managing Energy Savings [HOMES] Rebate, Inflation Reduction Act), State (i.e., TEHC Clean California), and local (i.e., RCEA's Residential Equipment Rebate Catalog and Heat Pump Rebate Catalog) funding makes it so that low- and middle-income residents in the region can install electric or heat pump space and water heaters at no additional cost compared to gas space and water heaters. In some cases, such customers will even be able to install the heat pump water heaters for free.[38]

For those minimal cases where construction with natural gas may still occur under a single margin source energy score despite cost effectiveness and incentives, this Measure relies on CEQA mechanisms to require such buildings to mitigate the GHG emissions from natural gas construction. This mitigation can be assumed because the RCAP assumes 95 percent of new construction will be all-electric or otherwise decarbonized. This assumption is then incorporated into the regional CEQA GHG Emissions Thresholds and CEQA GHG Emissions Analysis Compliance Checklist. This incorporation means new construction that utilizes natural gas will need to identify other ways to mitigate GHG emissions to meet the GHG emission threshold of an all-electric building. Moreover, **Action BE-5a** also allows jurisdictions to adopt a more stringent ordinance that effectively bans new natural gas construction. This option may be feasible as more jurisdictions across the State explore pathways for all-electric new construction after the Berkeley case. With limited exemptions, this option would also allow for 95 percent electric-preferred or decarbonized new construction.

Thus, the GHG emission reductions from this Measure are based on the forecasted residential building growth and the assumption that 95 percent of new buildings will be all-electric or otherwise decarbonized. Table 13 shows the parameters and data sources that support these electrification ordinance GHG emission reductions and Table 14 shows the calculations as outlined in Equations 4 through 4.2.

All-electric New Residential Construction Equations

Equation 4 $CO_2e\ Reduction_{NG,y,i}=(Fuel\ Avoided_{NG,y,i}*EF_{NG})+(\ Fuel\ Avoided_{NG,y,i}*EF_{NGL})-(Elec\ Convert_{y,i}*EF_{elec,y,i}*(1+L_{T\&D}))$

Equation 4.1 $Fuel\ Avoided_{NG,y,i}=(Fuel_{NG,y,i}-Fuel_{NG,imp.y,i})*Ord_{target,i}$

Equation 4.2 $Fuel\ Avoided_{NGL,y,i}=(Fuel\ Avoided_{NG,y,i}*(1+L_{End\text{-}use}))*(L_{Pipeline}+L_{End\text{-}use})$

Equation 4.3 $Elec\ Convert_{,y,i}=Fuel_{\ AvoidedNG,y,i}*CF_{elec}/Eff_{elec}$

Table 13 All-electric New Construction Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 4				
$CO_2e\ Reduction_{NG,y,i}$	Natural gas GHG emission reductions	See calculation table	MT CO_2e	Calculated
$Fuel\ Avoided_{NG,y,i}$	Natural gas consumption avoided	See calculation table	therms	Calculated
EF_{NG}	Natural gas emission factor	0.005311	MT CO_2e/therm	See references in Appendix GHG Inventory,

[38] Rincon Consultants, Inc. Installation Costs for Zero-NOx Space and Water Heating Appliances (2024).

Variable	Definition	Value	Unit	Data Source
				Forecast, and Targets Technical Report
EF_{NGL}	Natural gas leakage emission factor	0.047381	MT CO_2e/therm	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Elec\ Convert_{y,i}$	Electricity usage from conversion	See calculation table	kWh	Calculated
$EF_{elec,y,i}$	Forecasted electricity emission factor	See calculation table	MT CO_2e/kWh	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$L_{T\&D}$	Electricity transmission and distribution loss percentage	5.10%	Percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
y	Year	2030 or 2045	year	–
i	Subsector	Residential or Nonresidential	–	–
Equation 4.1				
$Fuel_{NG,y,i}$	Forecasted natural gas consumption	See calculation table	therms	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Fuel_{NG,imp,i}$	Forecasted natural gas in implementation year	See calculation table	therms	Calculated
$Ord_{target,i}$	Percent of buildings ordinance applies to	–	percentage	–
$Ord_{target,res}$	–	95%	percentage	Assumed due to electric appliance market trends, cost-effectiveness, incentives, and inclusion of all-electric assumption in CEQA documents.
$Ord_{target,nonres}$	–	95%	percentage	
imp.y	Ordinance implementation year	–	year	–
imp.y,res	–	2027	year	Building code adoption cycle
imp.y,nonres	–	2027	year	Building code adoption cycle
Equation 4.2				
$L_{Pipeline}$	Natural gas pipeline leakage percentage	2.3%	kWh/therm	Metric Conversions[1]
$L_{End\text{-}use}$	Natural gas end-use leakage percentage	0.5%	unitless	Leonardo Energy[2] and European Copper Institute[3]
Equation 4.3				
CF_{elec}	Electricity to therms conversion factor	29.3	kWh/therm	Metric Conversions[1]

Variable	Definition	Value	Unit	Data Source
Eff_{elec}	Efficiency factor of electric equipment relative to natural gas equipment	3	unitless	Leonardo Energy[2] and European Copper Institute[3]

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. Metric Conversions. Therms (US) to Kilowatt-hours. Available at: https://www.metric-conversions.org/energy-and-power/therms-us-to-kilowatt-hours.htm
2. Leonardo Energy - Knowledge Base. 2023. How efficient is a heat pump?. Available at: https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump
3. European Copper Institute. 2018. Heat Pumps: Integrating technologies to decarbonise heating and cooling. Accessed at: https://www.ehpa.org/wp-content/uploads/2022/10/White_Paper_Heat_pumps-1.pdf.

Table 14 All-electric New Residential Construction GHG Emission Reduction Calculations

Variable	Definition	Units	Sector	2030	2045
Equation 4.1					
$Fuel_{NG,y,i}$	Forecasted natural gas consumption	therms	Residential	20,284,903	22,120,804
imp.y	Ordinance implementation year	year	Residential	2027	2027
$Fuel_{NG,imp,i}$	Forecasted natural gas in implementation year	therms	Residential	19,917,723	19,917,723
$Fuel\ Avoided_{NG,y,i}$	Natural gas consumption avoided	therms	Residential	348,821	2,092,927
Equation 4.2					
$Fuel\ Avoided_{NGL,y,i}$	Natural gas leakage avoided	therms	Residential	9,816	58,895
Equation 4.3					
$Elec\ Convert_{y,i}$	Electricity usage from conversion	kWh	Residential	3,406,820	20,440,921
Equation 4					
$EF_{elec,y,i}$	Forecasted electricity emission factor	MT CO_2e/kWh	Residential	0.0000183	0.000000
$CO_2e\ Reduction_{NG}$	**Natural gas GHG emission reductions**	**MT CO_2e**	**Residential**	**2,252**	**13,907**

Measure BE-6: Decarbonize 95% of new nonresidential building construction by 2027.

Measure BE-5 commits the Humboldt region to electrify new nonresidential building construction in the community. The primary Action that enables this Measure is:

- **Action BE-6a** which directs each jurisdiction to adopt an energy design rating, reach code, energy performance ordinance, or some other type of ordinance in 2027 to avoid new natural gas construction for nonresidential (including commercial, industrial, and multi-family) buildings. The action also establishes permit compliance program to monitor and reach the 95% goal.

The Humboldt regional jurisdictions are committed to limiting new natural gas developments in the community from nonresidential buildings. Similar to Action BE-5a, **Action BE-6a** commits each jurisdiction to employ the most stringent regulation currently available and suitable to their needs to electrify or otherwise decarbonize the majority of new nonresidential construction in the community. To conserve staff resources and increase efficiencies, the Regional Climate Committee will develop an ordinance template based on jurisdictional input and feedback that can be modified as needed by each jurisdiction. **Action BE-6a**'s ordinance will be designed to either strongly encourage electrification of new construction as a single margin energy score or specifically restrict the use of natural gas in new construction. For further discussion supporting the effectiveness of this method in achieving natural gas reductions, see *Measure BE-5: Decarbonize 95% of new nonresidential building construction by 2027*.

Similar to Measure BE-5, this Measure relies on CEQA mechanisms such as CEQA GHG Emissions Thresholds and CEQA GHG Emissions Analysis Compliance Checklist to require such buildings to mitigate the GHG emissions from nonresidential natural gas construction. By incorporating all-electric or decarbonized construction requirements through CEQA mechanisms, it is assumed that RCAP mitigation will achieve 95 percent decarbonization of new nonresidential building construction. This incorporation means new nonresidential construction that utilizes natural gas will need to identify other ways to mitigate GHG emissions to meet the GHG emission threshold of an all-electric or fully decarbonized building. Moreover, **Action BE-6a** also allows jurisdictions to adopt a more stringent ordinance that effectively bans new natural gas construction. This option may be feasible as more jurisdictions across the State explore pathways for all-electric new construction after the Berkeley case. Without limited exemptions, this option would also allow for 95 percent all-electric new construction.

Thus, the GHG emission reductions from this Measure are based on the forecasted nonresidential building growth and the assumption that 95 percent of new buildings will be all-electric. GHG reductions were quantified according to the methodology outlined by Table 13 and Equation 4 through 4.3 (See Measure BE-5). Table 15 shows the calculations and estimated GHG reductions from ordinance implementation for new nonresidential construction.

Table 15 All-electric New Nonresidential Construction GHG Emission Reduction Calculations

Variable	Definition	Units	Sector	2030	2045
Equation 4.1					
$Fuel_{NG,y,i}$	Forecasted natural gas consumption	therms	Nonresidential	11,560,724	12,681,718
imp.y	Ordinance implementation year	year	Nonresidential	2027	2027
$Fuel_{NG,imp,i}$	Forecasted natural gas in implementation year	therms	Nonresidential	11,336,525	11,336,525
$Fuel\ Avoided_{NG,y,i}$	Natural gas consumption avoided	therms	Nonresidential	212,989	1,277,933
Equation 4.2					
$Fuel\ Avoided_{NGL,y,i}$	Natural gas leakage avoided	therms	Nonresidential	5,994	35,961
Equation 4.3					
$Elec\ Convert_{y,i}$	Electricity usage from conversion	kWh	Nonresidential	2,080,192	12,481,149
Equation 1					
$EF_{elec,y,i}$	Forecasted electricity emission factor	MT CO_2e/kWh	Nonresidential	0.0000187	0.000000
$CO_2e\ Reduction_{NG}$	**Natural gas GHG emission reductions**	**MT CO_2e**	**Nonresidential**	**1,374**	**8,492**

Measure BE-7: Decarbonize 30% municipal buildings and facilities by 2030.

Measure BE-5 commits the jurisdictions to lead by example through decarbonizing municipal buildings and facilities region-wide. While the strategies to decarbonize municipal buildings and facilities will reduce GHG emissions, emissions from municipal building energy are included as a subset of the nonresidential building energy sector in the Humboldt Regional GHG Inventory. This means the associated GHG emission reductions are included within the community mitigation Measures (i.e., BE-1 through BE-6). Thus, to avoid double counting, this municipal mitigation measure emissions reductions are not counted towards the 2030 and 2045 targets.

Measure BE-8: Lobby Off-shore Wind developers and PG&E to build electrical infrastructure to supply Humboldt with energy produced by the off-shore wind project which will increase supply and resilience.

The Humboldt Bay Offshore Wind project recently received over $400 million in grant funding to construct a wind farm off the coast of Humboldt. The project will produce 1 GW of energy and the project will help toward the State's 2030 target to deploy 5 GW of offshore wind.[39] Though this energy would be produced off the coast of Humboldt county, local jurisdictions and interested parties have expressed concern that, due to current infrastructure limitations, this energy will be sold outside of the county and the local community will not receive an equitable benefit from the project.

Measure BE-8 focuses on advocating for the development of appropriate electrical infrastructure by offshore wind developers and PG&E so that the community can benefit from the Humboldt Bay Offshore Wind project. Receiving an equitable share of the generated electricity would increase the region's energy resilience and increase capacity to meet other electrification goals outlined in the RCAP (see measures BE-1 through BE-7, and TR-6 through TR-8). While the GHG emission reductions from this measure are not quantified in the RCAP, it plays a vital role in supporting the region's transition to renewable energy and strengthening energy security.

[39] Humboldt Bay Harbor Recreation$ Conservation District. 2024. Humboldt Bay Offshore Wind Heavy Lift Marine Terminal Project. Available at: https://humboldtbay.org/humboldt-bay-offshore-wind-heavy-lift-marine-terminal-project-3

4 Strategy TR: Transportation

The Humboldt regional Transportation Strategy aims to reduce vehicle miles travelled (VMT) and leverage renewable and carbon-free electricity (partially provided by Strategy BE) to reduce GHG emissions from the transportation system. Reducing VMT consists of transitioning residents and visitors out of single-occupancy vehicles and into active transportation mode options (i.e., walking and biking) and public and shared transit options (e.g., public buses, rail, carpools) by improving these mode options and adopting policies to discourage single-occupancy vehicle commutes. Additionally, land use changes such as promoting jobs and amenities to be located near residents, particularly in more rural areas, can help reduce the community's average trip length as well as encourage mode shifts to active or public transit. VMT reduction is further supported by the use of VMT thresholds developed by Fehr & Peers for the County where the County has elected to establish a threshold of significance at 15 percent below existing baseline VMT per capita, in line with current Office of Planning and Research (OPR) guidance and consistent with the achievement of the state's climate goals.

The remaining VMT will then be decarbonized by increasing the adoption of zero-emission vehicles (ZEVs). When combined with renewable and carbon-free electricity, electric vehicles (EVs) eliminate GHG emissions from fossil fuel combustion and transition commutes to a zero-emission operational footprint. Other ZEVs such as fuel cell electric vehicles (FCEVs), which are powered by hydrogen and only produce water when operated, also result in zero tailpipe emissions[40] and serve as important options for reducing emissions from hard to electrify sectors such as heavy-duty and off-road transportation equipment. Though upstream production of fuel is not considered in the GHG emissions attributable to a community, hydrogen fuel has the potential to further decarbonize the transportation sector when the fuel is produced from electricity sourced from renewable energy sources, known as "green hydrogen."[41,42] In addition to targeting mode shift and increasing the number of ZEVs, the Strategy targets off-road equipment and vehicles for decarbonization. Based on this approach, the RCAP's Transportation Strategy consists of the following Measures presented in Table 16.

The table also indicates which Measures are quantitative and which Measures are supportive. The following subsections detail the substantial evidence and calculation methodologies of the quantitative Measures and the role of the supportive Measures. Note that Measures which are designated as "Urban" provide strategies and targets designed for the incorporated cities of Arcata, Fortuna, and Eureka,[43] while "Rural" Measures are intended for areas which are not considered central economic hubs such as the unincorporated Humboldt County as well as incorporated cities of Blue Lake, Ferndale, Rio Dell, and Trinidad that have transportation networks more characteristic of rural areas.

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[40] U.S. Department of Energy. Fuel Cell Electric Vehicles. Available at: https://afdc.energy.gov/vehicles/fuel-cell#:~:text=Fuel%20cell%20electric%20vehicles%20(FCEVs,the%20early%20stages%20of%20implementation.

[41] National grid. The Hydrogen Colour Spectrum (2023). Available at: https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum

[42] Energy Education. Types of Fuel. Available at: https://energyeducation.ca/encyclopedia/Types_of_hydrogen_fuel

[43] Caltrans. Caltrans District 1 Active Transportation Plan. Available at: https://storymaps.arcgis.com/stories/75fb376153094696b56c0e6dac3055d7

Table 16 Strategy TR: Transportation GHG Emission Reduction Summary

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
Measure TR-1 Urban	Implement programs, such as those identified in HCAOG's RTP, to increase the mode share of active transportation in urbanized areas from 9% to 12% by 2030 thereby achieving a regional active transportation mode share of 8%.	1,147	2,594
Measure TR-1 Rural	Implement programs, such as those identified in HCAOG's RTP, that increase access to safe active transportation, to increase the mode share of active transportation in rural areas from 5% to 6% by 2030 thereby achieving a regional active transportation mode share of 9%.	1,080	4,405
Measure TR-2 Urban	Expand the public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 2% to 20% public transit mode share in urbanized areas to achieve a regional 13% public transit mode share by 2030.	18,055	26,482
Measure TR-2 Rural	Develop a robust public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 1% to 10% in rural areas and achieve a regional 13% public transit mode share by 2030.	20,180	29,703
Measure TR-3	Reduce regional VMT by increasing promotion of mixed-use development in infill priority areas in alignment with HCAOG's baseline connectivity score included in the RTP.	Supportive	Supportive
Measure TR-4	Develop and implement regional mobility hubs and ZEV car-share programs to support mode shift from single occupancy vehicles.	Supportive	Supportive
Measure TR-5	Require commercial and industrial employers with 25 employees or more to develop a Transportation Demand Management plan.	Supportive	Supportive
Measure TR-6	Decarbonize 15% of passenger vehicle miles traveled by 2030 and 100% by 2045 through increased adoption of low and zero-emission vehicles and development of a regional electric vehicle charging and hydrogen fueling network.	55,726	590,124
Measure TR-7	Increase commercial zero-emission vehicle use and adoption to 10% by 2030 and 100% by 2045 through a regional charging network and development of hydrogen hubs.	17,441	279,775
Measure TR-8	Electrify or otherwise decarbonize 12% of applicable SORE off-road equipment by 2030 and 100% by 2045 and replace fossil diesel consumption with renewable diesel in 55% of applicable large diesel in alignment with EO N-79-20 by 2030.	49,143	139,645
Measure TR-9	Establish Humboldt as a pilot program for the decarbonization of the transportation sector to	Supportive	Supportive

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
	help drive state and philanthropic investment throughout Humboldt.		
Measure TR-10	Work with the state and biofuel industry to establish a biofuel network within Humboldt thereby funding new green industry and job growth to support the decarbonization of the transportation sector.	Supportive	Supportive
Measure TR-11	Lead by example and electrify or otherwise decarbonize 50% of the municipal fleet by 2030 in alignment with the state's Advanced Clean Fleet Rule.	Supportive	Supportive
Total		**162,772**	**1,072,728**

Measure TR-1 Urban: Implement programs, such as those identified in HCAOG's RTP, to increase the mode share of active transportation in urbanized areas from 9% to 12% by 2030 thereby achieving a regional active transportation mode share of 8%.

Measure TR-1 Urban aims to increase the active transportation mode share in urbanized areas in Humboldt to 12 percent by 2030 and to 16 percent by 2045. The primary Actions that enable this Measure are:

- **Action TR-1a** which directs the Regional Climate Committee to facilitate partnerships between urbanized areas of Humboldt and Humboldt County Association of Governments (HCAOG) to identify and pursue funding opportunities to support the goals set forth in HCAOG's Regional Transportation Plan (RTP).
- **Action TR-1f** which directs the Regional Climate Committee established in the RCAP measures to work with HCAOG to identify land use and interconnectivity opportunities and to pursue regional funding to implement active transportation interconnectivity improvement projects.

In 2022 (i.e. Humboldt's regional GHG Inventory year), the urban areas of Humboldt had weighted average commuting bicycle and walking mode shares of 1.4 percent and 7.7 percent, respectively, equating to a 9 percent total commuting active transportation mode share.[44,45] At 12.2 percent walking and 1.9 percent bike, the incorporated city of Arcata has the highest active transit mode share in the region. Census reported active mode shares only include commute-based trips and exclude tourist-based travel on trails focused on eco-tourism that is prevalent in the region, though expansion of these trails can also serve to reduce VMT. Though the more urbanized areas of the region exhibit relatively high combined walking and biking mode share, studies show that investments in active transportation infrastructure can further drive active transportation mode shifts and GHG emissions reductions.[46] For example, urban cities that make a strong commitment to bicycle travel can see up to an 11 percent reduction in vehicle miles traveled and associated GHG emissions.[47] Such reductions can be reasonably expected because in 2022, about 16 percent of vehicle trips made nationally were one mile or less—a distance easily travelled by foot or bicycle.[48]

To estimate the mode shift potential of developing and implementing an Active Transportation Plan in Humboldt urbanized centers, other cities' bicycle and road networks were analyzed. The City of Berkeley leads the State with an 18 percent active transportation mode share in 2022 (i.e., 4.9 percent bicycle mode share and 13.4 percent pedestrian mode share) followed by the City of Davis with a 16 percent active transportation mode share in 2022 (i.e., 13.5 percent bicycle mode share

[44] US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting

[45] Weighted average mode shares were estimated based on mode share data provided in the U.S. Census Bureau's ACS 5-Year Survey and vehicle miles travelled (VMT) data for each region as reported in the Humboldt Regional 2022 GHG Inventory Report for the CAP.

[46] Glazener, Andrew and Khreis, Haneen. Transforming our Cities: Best Practices Towards Clean Air and Active Transportation (2019). Accessed at: https://link.springer.com/article/10.1007/s40572-019-0228-1

[47] Jacob Mason et al., Institute for Transportation & Development Policy and the University of California, Davis. A Global High Shift Cycling Scenario (2015). Accessed at: https://itdpdotorg.wpengine.com/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario_Nov-2015.pdf

[48] National Household Travel Survey. Population Vehicle Trips Statistics (2021). Accessed at: https://nhts.ornl.gov/vehicle-trips

and 2.6 percent pedestrian mode share).[49, 50] The City of Davis has 9.8 miles of bike lane per square mile, which equates to approximately 0.6 miles of bike lane per mile of street. [51,52] City of Berkley has approximately 4.8 miles of bike lane per square mile, but equates to 0.2 miles of bike lane per mile of street given the number of street miles in the Cities 10.5 square miles.[53,54] Currently the urbanized areas of Humboldt (e.g. Arcata, Eureka, and Fortuna) have about 2 miles of bike lane per square mile based on the bike map provided by HCAOG.[55] HCAOG's Regional Bicycle Plan plans for approximately 506 miles of bikeways over the 20 year planning horizon throughout Humboldt county to connect all the cities and unincorporated areas as well as connecting the county to adjacent counties.[56] Humboldt County has approximately 1,200 miles of county roads and city streets roadway, full implementation of this plan would lead to 0.4 miles of bike lane per mile of street. Based on other similar cities it would seem that this increase in bicycle lane miles per street mile would lead to a bicycle mode share of approximately 10-15%. Implementation of the Bicycle Plan largely depends on securing funding. The region has had good success at obtaining funding to implement the projects to increase the bicycle and pedestrian routes. In 2023 HCAOG allocated $2.1 million to jurisdictions for road improvements including funds specifically for bicycle and pedestrian improvements.[57] Additionally, Eureka was recently awarded a combined $11.3 million from Caltrans for a multi-use trail and a bike boulevard in the city.[58]

Given the success of the region at obtaining funding and continually implementing priority bicycle projects, the current active transportation mode share, and trends in active transportation in other locations with similar bike lane to street ratios, it was assumed that this Measure would lead to a 3 percent increase in active transportation mode share to 12 percent in urbanized regions. It was assumed that the increase would come predominantly from bicycle mode share while walking mode share is conservatively assumed to remain constant. 2045 quantification estimates an active transportation mode shift by an additional 4 percent to 16 percent to align with the City of Davis and assumes by 2045 the regional infrastructure will support significant active transit mode shift for the last mile of distance travelled. An increase in active transportation to 12 percent and 16 percent in urbanized areas equates to a 0.2 percent and 0.4 percent passenger VMT reduction, respectively. This is conservative compared with the VMT reduction target of 15 percent from baseline conditions used for the VMT Significance Threshold established by the County in compliance with SB 743. Like 2030, the 2045 quantification assumes the increases would be attributable to bicycle mode share,

49 US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table?t=Commuting&g=160XX00US0618100.

50 US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table?t=Commuting&g=160XX00US0606000.

51 https://www.cityofdavis.org/city-hall/public-works-utilities-and-operations/streets

52 https://www.cityofdavis.org/city-hall/public-works-engineering-and-transportation/bike-pedestrian-program/davis-bike-and-pedestrian-infrastructure#:~:text=4%20miles%20of%20buffered%20bike,and%20twenty%2Done%20underpass%20crossings.

53 https://www.visitberkeley.com/media-press/press-kit/fact-sheet/

54 https://berkeleyca.gov/your-government/about-us/departments/public-works#:~:text=Our%20325%2B%20staff%20are%20responsible,%2C%20and%20waste%2C%20recycling%2C%20and

55 https://www.hcaog.net/map/

56 Humboldt County Association of Governments (HCAOG). (2018). Humboldt Regional Bicycle Plan. Available at: https://www.hcaog.net/sites/default/files/Final%20Bike%20Plan%20Update%202018%20incl%20maps.pdf

57 https://www.hcaog.net/sites/default/files/HCAOG%202023%20Highlights%20(Canva).pdf

58 https://dot.ca.gov/news-releases/news-release-2022-043

while walking mode share remains constant. These 2030 and 2045 targets conservatively support HCAOG's Regional Transportation Plan which sets ambitious goals to increase public and active transit mode share by a combined 30 percent by 2030, and 40 percent by 2050.[59]

Table 17 shows the parameters and data sources that support the GHG emission reductions from active transportation mode shifts and Table 18 shows the calculations as outlined in Equations 5 through 5.2.

Active Transportation Mode Share Equations

Equation 5 $CO_2e\ Reduction_{i,y} = VMT\ Reduced_{i,y} * VMT\ EF_{i,y}$

Equation 5.1 $VMT\ Reduced_{i,y} = VMT_{i,y} * Prop_j * TPM_{i,y} * TL_i * MS\ Increase_{Bike,y}$

Equation 5.2 $MS\ Increase_{Bike,y} = MS\ Target_{Active,y} - MS_{Walk,by} - MS_{Bike,by}$

Table 17 Active Transportation Mode Share Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 5				
CO_2e *Reduction*	VMT GHG emission reductions	See calculation table	MT CO_2e	Calculated
VMT Reduced	VMT reduced	See calculation table	miles	Calculated
VMT EF	VMT emission factor	See calculation table	MT CO_2e/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 5.1				
$VMT_{i,y}$	Forecasted VMT	See calculation able	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Prop_j$	Proportion of total regional VMT	See calculation able	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report /Calculated
$TPM_{i,y}$	Forecasted trips per mile	See calculation table	trips/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
TL_i	Average bicycle trip length	1.5	miles	CARB Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks: Technical Documentation[1]
$MS\ Increase_{Bike,y}$	Bicycle mode share increase	See calculation table	percentage	Calculated
i	VMT type	Passenger	–	–
y	Year	2030 or 2045	–	–
j	County subregion	Urban or rural	–	–
Equation 5.2				

[59] Humboldt County Association of Governments (HCAOG). Regional Transportation Plan, VROOM 2022-2042. Available at: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

Variable	Definition	Value	Unit	Data Source
$MS\ Target_{Active,y}$	Active transportation mode share target	–	percentage	Conservative estimate based on bicycle mode shares currently seen in Davis and Berkeley.[2,3]
$MS\ Target_{Active,2030}$	–	12.00%	percentage	City of Davis and Berkeley.[2,3]
$MS\ Target_{Active,2045}$	–	16.00%	percentage	HCAOG RTP goals
$MS_{Walk,by}$	Walking mode share in baseline year	7.73%	percentage	US Census Bureau. ACS 5-Year Estimates Subject Tables (2022) [4]
$MS_{Bike,by}$	Bicycle mode share in baseline year	1.35%	percentage	US Census Bureau. ACS 5-Year Estimates Subject Tables (2022)[4]
by	Baseline year	2022	year	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. CARB. Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks: Technical Documentation (2019). Accessed at: https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/bicycle_facilities_technical_041519.pdf.
2. US Census Bureau. ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex, Davis (2022). Available at: https://data.census.gov/table/ACSST5Y2022.S0801?t=Commuting&g=160XX00US0618100
3. US Census Bureau. ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex, Berkley (2022). Available at: https://data.census.gov/table/ACSST5Y2022.S0801?t=Commuting&g=160XX00US0606000
4. US Census Bureau. ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex (2022). Available at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting

Table 18 Active Transportation Mode Share GHG Emission Reduction Calculations

Variable	Definition	Units	VMT Type	2030	2045
Equation 5.2					
$MS\ Target_{Active,y}$	Active transportation mode share target	percentage	Passenger	12.00%	16.00%
$MS\ Increase_{Bike,y}$	Bicycle mode share increase	percentage	Passenger	2.92%	6.92%
Equation 5.1					
VMT	Forecasted VMT	miles	Passenger	2,308,368,699	2,532,201,389
$Prop_{urban}$	Proportion of total regional VMT	percentage	Passenger	30.77%	30.77%
TPM	Forecasted trips per mile	trips/mile	Passenger	0.121980	0.124294
VMT Reduced	VMT reduced	miles	Passenger	3,797,653	10,055,097
Equation 5					
VMT EF	VMT emission factor	MT CO_2e/mile	Passenger	0.000302	0.000258
CO_2e Reduction	**VMT GHG emission reductions**	**MT CO_2e**	**Passenger**	**1,147**	**2,594**

Measure TR-1 Rural: Implement programs, such as those identified in HCAOG's RTP, that increase access to safe active transportation, to increase the mode share of active transportation in rural areas from 5% to 6% by 2030, thereby achieving a regional active transportation mode share of 8%.

Measure TR-1 Rural aims to increase rural area active transportation mode share to 6 percent by 2030 and to 10 percent by 2045. For the purpose of transportation related Measures, "rural" is defined as small, incorporated cities not considered to be major commuter hubs in the region (i.e. Blue Lake, Ferndale, Rio Dell, and Trinidad) as well as unincorporated Humboldt County. The primary Actions that enable this Measure are:

- **Action TR-1c** which directs the Regional Climate Committee to work with the regions rural jurisdictions and HCAOG to obtain funding and prioritize construction and improvement projects connecting bikeway and pedestrian systems to high employment zones such as Eureka, Arcata, and Fortuna;
- **Action TR-1e** which commits jurisdictions with planned land use development to establish building code standards for inclusion of bicycle and pedestrian facilities; and
- **Action TR-1g** which dedicates staff time or the Regional Climate Committee to assist HCAOG in pursuing grant opportunities such as the Active Transportation Program, AARP Community Challenge, CalEPA's Environmental Justice Action Grants, and Caltrans Sustainable Transportation Planning Grants.

Actions under Measure TR-1 Rural are designed to align with HCAOG's RTP program, VROOM 2022-2042. HCAOG's VROOM 2022-2042 plan is the county-wide guiding long range regional planning document when it comes to public and active transportation implementation. Listed projects focus on aggressive mode share shift projects to achieve an aggregate public and active transportation mode share of 30 percent by 2030 and 40 percent by 2050.[60] Though increasing active transportation mode share can be a challenge, the projects listed in the RTP and supported by the Actions in **Measure TR-1 Rural** employ many recommended strategies for increasing active transportation in rural communities, such as focusing on strategic land use development planning, implementing complete streets, pursuit of diverse funding sources, building partnerships, and defining activity centers.[61] In order to achieve VMT reductions from these Actions, the rural areas will need to work collaboratively with the high employment centers of the county to implement mutually beneficial projects found in the RTP. Many of the zoning and land use policies are implemented through the General Plan. The RTP modeling results provide additional evidence for the ability of the region to reduce VMT through improved land use and growth management.

Despite their rural characteristics, the rural cities and unincorporated areas of Humboldt currently have relatively high walking mode shares, though biking mode shares are low. In 2022, the weighted average bicycle and pedestrian mode shares for the designated rural areas were 0.55 percent and 4.78 percent, respectively.[62] However, studies show that investments in active transportation infrastructure have demonstrated significant improvements in active transportation mode shifts and

[60] For a full list of the projects please see the Connected 2050 plan. Accessed here: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

[61] Smart Growth America. 2023. An Active Roadmap: Best Practices in Rural Mobility. Available at: https://smartgrowthamerica.org/wp-content/uploads/2023/07/SGA-Rural-Transportation-Field-Scan_Final_7.27.pdf

[62] US Census Bureau. 2017: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2019.S0801?q=Humboldt%20County,%20California&t=Commuting&g=160XX00US0602476,0623042,0625296

GHG emissions reductions.[63] Rural areas can also reasonably expect to see significant mode share increases, as approximately 7.7 percent of rural trips nation-wide are one mile or less, with 15 percent of trips being three miles or less.[64] As the average bike trip length is approximately 1.5 miles,[65] a similar 11 percent reduction in vehicles miles travelled can be similarly expected with rural investment in bicycle and pedestrian infrastructure. A key to increasing active transportation mode share in rural areas in the county is creating an interconnected system of safe pedestrian and bicycle lanes that connect to city centers, job centers, amenities, and other parts of the region. HCAOG's 2018 Regional Bicycle Plan and VROOM 2022-2042 plan recognize the need for interconnectivity across the region and have identified specific projects to enhance the interconnectivity of the bicycle and pedestrian system. Of the 506 miles of bikeway planned in the 2018 Regional Bicycle Plan, 406 of those miles are planned for the unincorporated county with many of the planned bikeways designated as rural routes that would connect the incorporated cities and unincorporated communities. The Actions in this Measure focus on obtaining the funding and resources to implement priority infrastructure projects that will continue to build out this interconnected system. The region has seen success with obtaining funding for such projects already, including grant funding for the bicycle and pedestrian improvements through the Caltrans Sustainable Transportation Planning Grant.[66]

Based on these factors and the alignment of the Actions for this Measure with HCAOG's RTP and the planned county-wide bicycle and pedestrian projects to increase interconnectivity, it is conservatively estimated that rural areas can increase their combined biking and walking mode share from 4.8 percent to 6.0 percent by 2030. An increase in active transportation to 4.8 percent and 6.0 percent in rural areas equates to a 0.2 percent and 0.7 percent passenger VMT reduction, respectively. This is conservative compared with the VMT reduction target of 15 percent from baseline conditions used for the VMT Significance Threshold established by the County in compliance with SB 743. A 1.2 percent increase in active transportation in rural areas is further supported by the California Air Pollution Control Officers Association (CAPCOA) Handbook that found that enhancing the pedestrian network and expanding the bikeway network can reduce VMT by up to 7%.[67] Bike share programs, such as those to be implemented by **Action T-1i** have also been shown to reduce VMT.[67]

Table 19 shows the parameters and data sources that support these electrification ordinance GHG emission reductions and Table 20 shows the calculations as outlined in Equations 6 through 6.5.

Active Transportation Mode Share Equations

Equation 6 $CO_2e\ Reduction_{i,y} = VMT\ Reduced_{i,y} * VMT\ EF_{i,y}$

Equation 6.1 $VMT\ Reduced_{i,y} = VMT_{i,y} * Prop_j * TPM_{i,y} * TL_i * MS\ Increase_{Bike,y}$

[63] Glazener, Andrew and Khreis, Haneen. Transforming our Cities: Best Practices Towards Clean Air and Active Transportation (2019). Accessed at: https://link.springer.com/article/10.1007/s40572-019-0228-1

[64] U.S. Department of Transportation. 2022. Downloads, 2022 NHTS Dataset. Available at: https://nhts.ornl.gov/downloads

[65] CARB. Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks: Technical Documentation (2019). Accessed at: https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/bicycle_facilities_technical_041519.pdf.

[66] https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/fiscal-year-2023-24-award-list-a11y.pdf

[67] California Air Pollution Control Officers Association (CAPCOA). 2021. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Accessed at: https://www.airquality.org/ClimateChange/Documents/Final%20Handbook_AB434.pdf

Equation 6.2 $MS\ Increase_{Bike,y}=MS\ Target_{Active,y}-MS_{Walk,by}-MS_{Bike,by}$

Table 19 Rural Active Transportation Mode Share Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 6				
CO_2e *Reduction*	VMT GHG emission reductions	See calculation table	MT CO_2e	Calculated
VMT Reduced	VMT reduced	See calculation table	miles	Calculated
VMT EF	VMT emission factor	See calculation table	MT CO_2e/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 6.1				
$VMT_{i,y}$	Forecasted VMT	See calculation able	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Prop_j$	Proportion of total regional VMT	See calculation able	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$TPM_{i,y}$	Forecasted trips per mile	See calculation table	trips/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
TL_i	Average bicycle trip length	1.5	miles	CARB[1]
$MS\ Increase_{Bike,y}$	Bicycle mode share increase	See calculation table	percentage	Calculated
i	VMT type	Passenger	–	–
y	Year	2030 or 2045	–	–
j	County subregion	Urban or rural	–	–
Equation 6.2				
$MS\ Target_{Active,y}$	Active transportation mode share target	–	percentage	–
$MS\ Target_{Active,2030}$	–	6.00%	percentage	U.S. Department of Transportation[1] and Jabon Mason[3]
$MS\ Target_{Active,2045}$	–	10.00%	percentage	Conservative alignment with HCAOG RTP goals and TR-1 Urban active transportation goals
$MS_{Walk,by}$	Walking mode share in baseline year	0.55%	percentage	US Census Bureau. ACS 5-Year Estimates Subject Tables (2022) [4,5]
$MS_{Bike,by}$	Bicycle mode share in baseline year	4.22%	percentage	US Census Bureau. ACS 5-Year Estimates Subject Tables (2022)[4,5]
by	Baseline year	2022	year	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Variable	Definition	Value	Unit	Data Source

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. CARB. Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks: Technical Documentation (2019). Accessed at: https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/bicycle_facilities_technical_041519.pdf.
2. U.S. Department of Transportation. 2022. Downloads, 2022 NHTS Dataset. Available at: https://nhts.ornl.gov/downloads
3. Jacob Mason et al., Institute for Transportation & Development Policy and the University of California, Davis. A Global High Shift Cycling Scenario (2015). Accessed at: https://itdpdotorg.wpengine.com/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario_Nov-2015.pdf
4. US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting
5. Weighted average active transit mode share estimated based on walking and biking mode shares provided by U.S. Census data for Blue Lake (2.9%, 2.6%), Ferndale (4.5%, 0.0%), Rio Dell (0.9%, 0.0%), Trinidad (3.4%, 0.0%), and Unincorporated Humboldt County (4.36%, 0.57%), and their respective VMT contributions as reported in the Humboldt Regional 2022 GHG Inventory.

Table 20 Rural Active Transportation Mode Share GHG Emission Reduction Calculations

Variable	Definition	Units	VMT Type	2030	2045
Equation 6.2					
$MS\ Target_{Active,y}$	Active transportation mode share target	percentage	Passenger	6.00%	10.00%
$MS\ Increase_{Bike,y}$	Bicycle mode share increase	percentage	Passenger	1.22%	5.22%
Equation 6.1					
VMT	Forecasted VMT	miles	Passenger	2,308,368,699	2,532,201,389
$Prop_{rural}$	Proportion of total regional VMT	percentage	Passenger	69.23%	69.23%
TPM	Forecasted trips per mile	trips/mile	Passenger	0.121980	0.124294
VMT Reduced	VMT reduced	miles	Passenger	3,576,953	17,072,304
Equation 6					
VMT EF	VMT emission factor	MT CO_2e/mile	Passenger	0.000302	0.000258
CO_2e Reduction	**VMT GHG emission reductions**	**MT CO_2e**	**Passenger**	**1,080**	**4,405**

Measure TR-2 Urban: Expand the public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 2% to 20% public transit mode share in urbanized areas to achieve a regional 13% public transit mode share by 2030.

Measure TR-2 Urban aims to increase major regional urban centers' (i.e. Arcata, Eureka, Fortuna) public and shared transit mode share to 20 percent by 2030 and 30 percent by 2045. The primary Actions that enable this Measure are:

- **Action TR-2a** which directs the Regional Climate Committee to work with HCAOG and Humboldt Transit Authority (HTA) to implement initiatives in HCAOG's Regional Transportation Plan (RTP) to achieve a 10-minute headway; and
- **Action TR-2f, g** which commits the region to developing a multi-jurisdictional staff position through the Regional Climate Committee to support HTA and HCAOG in obtaining funding through grant opportunities or other identified sources and prioritize access improvements in low-income communities.

Actions under Measure TR-2 Urban are designed to align with HCAOG's RTP program, VROOM 2022-2042. HCAOG's VROOM 2022-2042 plan is the county-wide guiding long range regional planning document when it comes to public and active trasportation implementation. Listed projects focus on aggressive mode share shift projects to achieve an aggregate public and active transportation mode share of 30 percent by 2030 and 40 percent by 2050.[68] Additionally, HTA's acquisition of 11 zero-emissions buses makes the shift to increased public transit mode share an even more attractive option for reducing GHG emissions.[69] Consistent with the RTP, a majority of VMT reductions will come from land use changes and infrastructure improvement projects to aid the expansion of HTA services and prioritizing neighboring city and rural interconnectivity improvement projects. In order to achieve these reductions, the cities will need to work collaboratively with the County and neighboring cities to implement mutually beneficial projects found in the RTP. By leveraging the Regional Climate Committee to administer a multi-jurisdictional staff position to work with HTA and HCAOG on behalf of the jurisdictions to support transit projects that best improve interconnectivity and serve the jurisdictions' needs, it will lessen the load on each individual jurisidiction and create consistency in planning. Many of the zoning and land use policies are implemented through the General Plan. The RTP modeling results provide additional evidence for the ability of the region to reduce VMT through improved land use and growth management.

In general, increases and improvements to public transportation systems reduce a jurisdiction's dependence on fossil fuels and reduce VMT. The best ways to improve a transit system and reduce driving is to expand its geographical reach and increase the frequency and reliability of transit service. Each new mile of transit usage reduces VMT on much more than a 1:1 basis. Approximately 1% increase in transit frequency saves 0.5% in VMT.[70] Further, improving transit access has the

[68] For a full list of the projects please see the Connected 2050 plan. Accessed here: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

[69] Humboldt Transit Authority (HTA). 2024. Expanding Transit Services and Introducing Zero-Emission Fleets on the North Coast. Available at: https://hta.org/projects-tircp/

[70] Todd Litman. Victoria Transport Policy Institute. August 2021. Evaluating Public Transit Benefits and Costs Best Practices Guidebook. Accessed at: https://www.vtpi.org/tranben.pdf

potential to shift trips from cars to transit, which may reduce vehicle trips, VMT, and greenhouse gas emissions, with time spent getting to a transit stop being the key indicator of transit access.[71]

In 2022 (i.e., the Humboldt RCAP inventory year), Arcata, Eureka, and Fortuna had a weighted average regional public transit mode share of 1.74 percent.[72] However, other city areas have shown that increasing investment can significantly raise public mode transit mode share. The City of San Francisco leads the state with 26% transit mode share in 2017 (pre-COVID).[73, 74] The City of Seattle has documented significant increases in public transit mode share to 48% in 2017 (pre-COVID).[75] Key strategies employed by these cities include significant expansions of transit service lines, designated streets or lanes for bus lines to decrease headways, implementation of taxes to support transit, reduced parking availability, and user taxes. Though these city areas experience higher population density compared to the urban centers of Humboldt, these strategies represent core principles for improving public transit and largely align with objectives set forth in the Humboldt RTP. Therefore, it is anticipated that the urban areas (e.g., Arcata, Eureka, and Fortuna) will follow the trends of San Francisco and Seattle by implementing similar strategies under Measure TR-2. Quantification estimates suggest that, with full implementation of public transit improvement actions, achieving a public transit mode share of 29% (the average of Seattle and San Francisco) by 2030 is ambitious for the urban areas in the region. This is due to the current impacts of COVID-19 and existing barriers to public transit in the region. A more realistic goal set forth by this measure is public transit mode share of 20% by 2030. Though this goal is still ambitious, it conservatively aligns with the aggressive 2030 alternative mode share goals set by HCAOG in the RTP and HTA's goals to expand transit services such that there is a less than 10-minute headway. An increase in public transportation mode share to 20 percent in urbanized areas equates to a 3 percent passenger VMT reduction. This is conservative compared with the VMT reduction target of 15 percent from baseline conditions used for the VMT Significance Threshold established by the County in compliance with SB 743. It is further supported by CAPCOA's findings that expanding transit network coverage or hours can reduce VMT by up to 4.6 %, while increasing transit service frequency (e.g., reducing headway) can reduce VMT by up to 11.3%.[76] Obtaining funding to expand transit coverage and frequency will be key to achieving these aggressive goals. HCAOG and HTA have continually worked to procure funds for transit. In 2023 HCAOG allocated over $9 million in funds for funding transit operations, route planning, and operation assistance.[77] Additionally, HTA was awarded a $38.7 million grant from the California State Transportation Agency's Transit and Intercity Rail Capital Program to expand fleet

[71] California Air Resources Board (CARB). August 2017. Methods to Assess Co-Benefits of California Climate Investments: Vehicle Miles Travelled. Accessed at: http://ww2.arb.ca.gov/sites/default/files/auction-proceeds/carb_vehicle_miles_traveled.pdf

[72] US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting&g=160XX00US0602476,0623042,0625296

[73] San Francisco Municipal Transportation Agency (SFMTA). December 2021. Sustainable Transportation Mode Share. Accessed at: https://www.sfmta.com/reports/sustainable-transportation-mode-share

[74] Pre-COVID numbers are referenced here with the understanding that public transit usage during the COVID pandemic were lower than normal and are likely to increase again assuming a return to pre-COVID conditions.

[75] Commute Seattle. December 2021. 2019 Mode Split Study Report. Accessed at: https://www.commuteseattle.com/resource/2019-mode-split-study/

[76] California Air Pollution Control Officers Association (CAPCOA). 2021. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Accessed at: https://www.airquality.org/ClimateChange/Documents/Final%20Handbook_AB434.pdf

[77] HCAOG. 2023. HCAOG 2023 Highlights. Accessed at: https://www.hcaog.net/sites/default/files/HCAOG%202023%20Highlights%20(Canva).pdf

services and procure 11 new zero-emission hydrogen fuel cell electric buses to add to the fleet.[78] Further, HCAOG recently submitted a competitive application for the Caltrans Sustainable Communities Planning Grant Program - Strategic Transit Partnerships that focuses on building strong relationships among HCAOG, HTA, other transit and mobility-service providers, Caltrans, local tribes, cities, and county agencies in order to plan transportation and land use together. The focus on regional collaboration for land use planning and coordination for transit is key to creating an interconnected network. With this Measure providing additional support through the Regional Climate Committee to identify and apply for funding and jurisdictions committing to implementing initiatives locally, it is anticipated to accelerate implementation of the projects necessary to meet the HCAOG and HTA goals.

Table 21 shows the parameters and data sources that support the GHG emission reductions associated with reducing vehicle miles traveled through public transit mode share and Table 22 shows the calculations as outlined in Equations 7 through 7.2.

Public Transit Mode Share Equations

Equation 7 $CO_2e\ Reduction_{i,y} = VMT\ Reduced_{i,y} * VMT\ EF_{i,y}$

Equation 7.1 $VMT\ Reduced_{i,y} = ((VMT_{i,y} * Prop_j) - VMT_{active}) * TPM_{i,y} * TL_i * MS\ Increase_{public,y}$

Equation 7.2 $MS\ Increase_{public,y} = MS\ Target_{public,y} - MS_{public,by}$

Table 21 Public Transit Mode Share Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 7				
$CO_2e\ Reduction_{i,y}$	VMT GHG emission reductions	See calculation table	MT CO_2e	Calculated
$VMT\ Reduced_{i,y}$	VMT reduced	See calculation table	miles	Calculated
$VMT\ EF_{i,y}$	VMT emission factor	See calculation table	MT CO_2e/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 7.1				
$VMT_{i,y}$	Forecasted VMT after active transportation reductions	See calculation able	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Prop_j$	Proportion of total regional VMT	See calculation able	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$VMT_{active,y}$	VMT reduction from active transportation targets	See calculation able	miles	Calculated (See Measures TR-1)
$TPM_{i,y}$	Forecasted trips per mile	See calculation table	trips/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

[78] Humboldt Transit Authority (HTA). 2022. Humboldt Transit Authority Awarded $38.7M Grant for Fuel Cell Electric Buses. Accessed at: https://hta.org/wp-content/uploads/2022/07/2022-07_HTA-TIRCP-Press-Release.pdf

Variable	Definition	Value	Unit	Data Source
TL_i	Average public transit trip length	3.8	miles	American Public Transportation Association's Public Transportation Fact Book[1,2]
$MS\ Increase_{Public,y}$	Public transit mode share increase	See calculation table	percentage	Calculated
i	VMT type	Passenger	–	–
y	Year	2030 or 2045	–	–
j	County subregion	Urban or Rural	–	–
Equation 7.2				
$MS\ Target_{Public,y}$	Public transit mode share target	–	percentage	–
$MS\ Target_{Public,2030}$	Public transit mode share target (2030)	20%	percentage	Conservative estimate based on achievable pre-COVID public transit mode shares in San Francisco[3] and Seattle.[4]
$MS\ Target_{Public,2045}$	Public transit mode share target (2045)	30%	percentage	
$MS_{Public,by}$	Public transit mode share in baseline year	1.74%	percentage	US Census Bureau[5,6]
by	Baseline year	2022	year	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. American Public Transportation Association. Public Transportation Fact Book (2018). Accessed at: https://www.apta.com/wp-content/uploads/Resources/resources/statistics/Documents/FactBook/2018-APTA-Fact-Book.pdf.
2. Note: Regular bus trip length was utilized to remain conservative.
3. San Francisco Municipal Transportation Agency (SFMTA). December 2021. Sustainable Transportation Mode Share. Accessed at: https://www.sfmta.com/reports/sustainable-transportation-mode-share
4. Commute Seattle. December 2021. 2019 Mode Split Study Report. Accessed at: https://www.commuteseattle.com/resource/2019-mode-split-study/
5. US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting&g=160XX00US0602476,0623042,0625296
6. Weighted average public transit mode share estimated based on mode shares provided by U.S. Census data for Arcata (2.5%), Eureka (0.9%) and Fortuna (1.2%), and their respective VMT contributions as reported in the Humboldt Regional 2022 GHG Inventory.

Table 22 Public Transit Mode Share GHG Emission Reduction Calculations

Variable	Definition	Units	VMT Type	2030	2045
Equation 7.2					
$MS\ Target_{Public}$	Public transit mode share target	percentage	Passenger	20.00%	30.00%
$MS\ Increase_{Public}$	Public transit mode share increase	percentage	Passenger	18.26%	28.26%
Equation 7.1					
VMT	Forecasted VMT after active transportation reductions	miles	Passenger	2,308,368,699	2,532,201,389
$Prop_{urban}$	Proportion of total regional VMT	Percentage	Passenger	30.77%	30.77%
VMT_{active}	VMT reduction from active transportation targets	miles	Passenger	3,797,653	10,055,097

Variable	Definition	Units	VMT Type	2030	2045
TPM	Forecasted trips per mile	trips/mile	Passenger	0.121980	0.124294
VMT Reduced	VMT reduced	miles	Passenger	59,785,448	102,641,693
Equation 7					
VMT EF	VMT emission factor	MT CO_2e/mile	Passenger	0.000302	0.000258
CO_2e Reduction	**VMT GHG emission reductions**	**MT CO_2e**	**Passenger**	**18,055**	**26,482**

Measure TR-2 Rural: Develop a robust public transit network in support of HCAOG's Regional Transportation Plan to increase public transit mode share from 1% to 10% in rural areas and achieve a regional 13% public transit mode share by 2030.

Measure TR-2 Rural aims to increase rural incorporated and unincorporated regions of the county (i.e. Blue Lake, Ferndale, Rio Dell, Trinidad, and Unincorporated Humboldt County) public and shared transit mode share to 10 percent by 2030 and 15 percent by 2045. The primary Actions that enable this Measure are:

- **Action TR-2a** which directs the Regional Climate Committee to work with HCAOG and Humboldt Transit Authority (HTA) to implement initiatives in HCAOG's Regional Transportation Plan (RTP) to achieve a 30-minute headway in rural areas;
- **Action TR-2c, d** which directs jurisdictions to work with HCAOG to conduct a feasibility study for micro transit programs to enhance public transit use and develop a micro-mobility policy that establishes the process for implementing a micro-mobility program; and
- **Action TR-2e** which directs jurisdictions to require nonresidential and mixed-use developments to participate in Transportation Demand Management strategies such as shuttle services or pre-tax commute benefits; and
- **Action TR-2i** which commits the Regional Climate Committee to direct a multi-jurisdictional staff position to support HCAOG and HTA in pursuing funding for expanding the transit network and prioritizing public transportation access in low-income communities.

Actions under Measure TR-2 Rural are designed to align with HCAOG's RTP program, VROOM 2022-2042. HCAOG's VROOM 2022-2042 plan is the county-wide guiding long range regional planning document when it comes to public and active transportation implementation. Listed projects focus on aggressive mode share shift projects to achieve an aggregate public and active transportation mode share of 30 percent by 2030 and 40 percent by 2050.[79] As previously mentioned, HTA's acquisition of 11 zero-emissions buses makes the shift to increased public transit mode share an even more attractive option for reducing GHG emissions.[80] Consistent with the RTP, a majority of VMT reductions will come from land use changes and infrastructure improvement projects to aid the expansion of HTA services and prioritize neighboring city and rural interconnectivity improvement projects. To achieve these reductions, the rural areas will need to work collaboratively with the employment centers of the county to implement mutually beneficial projects found in the RTP.

In 2022, rural areas had a weighted average regional public transit mode share of 0.96 percent.[81] Urbanized areas have shown that increasing investment can significantly raise public mode transit mode share (See Measure TR-2 Urban for more information). As previously mentioned, key strategies employed by these cities include significant expansions of transit service lines, designated

[79] For a full list of the projects please see the Connected 2050 plan. Accessed here: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

[80] Humboldt Transit Authority (HTA). 2024. Expanding Transit Services and Introducing Zero-Emission Fleets on the North Coast. Available at: https://hta.org/projects-tircp/

[81] US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting&g=160XX00US0602476,0623042,0625296

streets or lanes for bus lines to decrease headways, implementation of taxes to support transit, reduced parking availability, and user taxes.

While these core strategies typically result in increased public transit mode share, more rural areas may not experience comparably significant benefits. Rural communities make up 68 percent of road miles in the United States, these areas are often underfunded such that only 36 percent have access to airline, rail, and bus transportation services.[82] To increase rural mode shift to public transportation, access needs to be increased, and transit use must be more convenient. Effective communication, especially communication that takes advantage of new and emerging technologies to accurately and easily disseminate trip planning and real-time status information, is a strong factor in helping customers decide to use transit for business or leisure trips.[83] **Action TR-2a** focuses on supporting the implementation of infrastructure and technology improvements that would improve access and convenience to public transit for rural communities.

Strategies such as expansion of fixed-route systems, a core strategy for urban centers, may not pose the best solution on its own as compared to leaning on other solutions for public transit, such as on-demand or micro transit options.[84,85] Many cities in California and throughout the Country have been conducting micro-transit projects for several years and the number of projects is continuing to grow due to their success.[86], [87] Further, CAPCOA's Handbook found several studies that micro transit programs such as bike and scooter share can reduce VMT and improve access to public transit thereby increasing mode shift to public transit.[88]Recently HCAOG in collaboration with HTA and a community based partner received a grant for $2.6 million to expand transit options throughout an unincorporated community of Humboldt, McKinleyville, by piloting an on-demand micro transit program that would offer in-town trips and connections to intercity buses. It is anticipated that this program may serve as a model for other areas in the region that have potential for infill but do not have the population density for a fixed-route transit [89] **Action TR-2c** directs jurisdictions to work with HCAOG and HTA to conduct a feasibility study for implementing micro transit programs in other parts of the county, using information gained from the McKinleyville pilot program to inform effectiveness of such a program. Based on the feasibility study and if determined that micro transit could be a solution, jurisdictions would develop a micro-mobility policy through **Action TR-2d** that would establish the framework for implementing a micro-mobility program the community.

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[82] U.S. Department of Transportation. 2023. The Critical Role of Rural Communities in the U.S. Transportation System. Available at: https://www.transportation.gov/rural/grant-toolkit/critical-role-rural-communities

[83] https://transitleadership.org/docs/TLS-WP-Improving-the-Customer-Experience.pdf

[84] Cities Today. 2021. Public transit in rural communities is extremely inefficient — this data tells us how to change that. Available at: https://cities-today.com/industry/public-transit-rural-communities-extremely-inefficient-data-change/

[85] Smart Growth America. 2023. An Active Roadmap: Best Practices in Rural Mobility. Available at: https://smartgrowthamerica.org/wp-content/uploads/2023/07/SGA-Rural-Transportation-Field-Scan_Final_7.27.pdf

[86] https://www.apta.com/research-technical-resources/mobility-innovation-hub/microtransit/

[87] https://transweb.sjsu.edu/research/2249-Demand-Responsive-Transportation-Shared-Mobility

[88] California Air Pollution Control Officers Association (CAPCOA). 2021. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Accessed at: https://www.airquality.org/ClimateChange/Documents/Final%20Handbook_AB434.pdf

[89] HCAOG. 2023. HCAOG and Partners Awarded $2.6 million Grant for Community Based Housing and Transportation. Accessed at: https://kymkemp.com/2023/10/18/hcaog-and-partners-awarded-2-6-million-grant-for-community-based-housing-and-transportation/

In recognition of the need for varied transportation methods throughout the county, HCAOG's VROOM 2022-2042 sets goals and projects for expanding on-demand and micro transit infrastructure in addition to public transit to meet the 30 percent mode alternative transit goal by 2030. Therefore, by aligning the Actions for Measure TR-2 Rural with the RTP and partnering with HCAOG, it is anticipated that rural regions will be able to meet the goal of 10 percent public transit mode share by 2030. An increase in public transportation mode share to 10 percent in rural areas equates to a 3 percent passenger VMT reduction. This is conservative compared with the VMT reduction target of 15 percent from baseline conditions used for the VMT Significance Threshold established by the County in compliance with SB 743. Table 23 shows the parameters and data sources that support the GHG emission reductions associated with reducing vehicle miles traveled through rural public transit mode share and Table 24 shows the calculations as outlined in Equations 8 through 8.2.

Public Transit Mode Share Equations

Equation 8 $CO_2e\ Reduction_{i,y} = VMT\ Reduced_{i,y} * VMT\ EF_{i,y}$

Equation 8.1 $VMT\ Reduced_{i,y} = ((VMT_{i,y} * Prop_j) - VMT_{active}) * TPM_{i,y} * TL_i * MS\ Increase_{public,y}$

Equation 8.2 $MS\ Increase_{public,y} = MS\ Target_{public,y} - MS_{public,by}$

Table 23 Public Transit Mode Share Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 8				
$CO_2e\ Reduction_{i,y}$	VMT GHG emission reductions	See calculation table	MT CO_2e	Calculated
$VMT\ Reduced_{i,y}$	VMT reduced	See calculation table	miles	Calculated
$VMT\ EF_{i,y}$	VMT emission factor	See calculation table	MT CO_2e/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 8.1				
$VMT_{i,y}$	Forecasted VMT after active transportation reductions	See calculation able	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Prop_j$	Proportion of total regional VMT	See calculation able	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$VMT_{active,y}$	VMT reduction from active transportation targets	See calculation able	miles	Calculated (See Measures TR-1)
$TPM_{i,y}$	Forecasted trips per mile	See calculation table	trips/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
TL_i	Average public transit trip length	3.8	miles	American Public Transportation Association's Public Transportation Fact Book[1,2]
$MS\ Increase_{Public,y}$	Public transit mode share increase	See calculation table	percentage	Calculated

Variable	Definition	Value	Unit	Data Source
i	VMT type	Passenger	–	–
y	Year	2030 or 2045	–	–
j	County subregion	Urban or Rural	–	–
Equation 8.2				
$MS\ Target_{Public,y}$	Public transit mode share target	–	percentage	–
$MS\ Target_{Public,2030}$	Public transit mode share target (2030)	10%	percentage	Based on rural strategies for public transportation[3,4] and alignment with regional RTP.[5]
$MS\ Target_{Public,2045}$	Public transit mode share target (2045)	15%	percentage	
$MS_{Public,by}$	Public transit mode share in baseline year	0.96%	percentage	US Census Bureau[5,6]
by	Baseline year	2022	year	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. American Public Transportation Association. Public Transportation Fact Book (2018). Accessed at: https://www.apta.com/wp-content/uploads/Resources/resources/statistics/Documents/FactBook/2018-APTA-Fact-Book.pdf.
2. Note: Regular bus trip length was utilized to remain conservative.
3. Cities Today. 2021. Public transit in rural communities is extremely inefficient — this data tells us how to change that. Available at: https://cities-today.com/industry/public-transit-rural-communities-extremely-inefficient-data-change/
4. Smart Growth America. 2023. An Active Roadmap: Best Practices in Rural Mobility. Available at: https://smartgrowthamerica.org/wp-content/uploads/2023/07/SGA-Rural-Transportation-Field-Scan_Final_7.27.pdf
5. Humboldt County Association of Governments (HCAOG). Regional Transportation Plan, VROOM 2022-2042. Available at: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf
6. US Census Bureau. 2022: ACS 5-Year Estimates Subject Tables. S0801|Commuting Characteristics by Sex. Accessed at: https://data.census.gov/table/ACSST5Y2022.S0801?q=Humboldt%20County,%20California&t=Commuting&g=160XX00US0602476,0623042,0625296
7. Weighted average public transit mode share estimated based on mode shares provided by U.S. Census data for Blue Lake, (2.6%), Ferndale (0.0%), Rio Dell (0.0%), Trinidad (0.0%), and Unincorporated Humboldt County (0.57%) and their respective VMT contributions as reported in the Humboldt Regional 2022 GHG Inventory.

Table 24 Public Transit Mode Share GHG Emission Reduction Calculations

Variable	Definition	Units	VMT Type	2030	2045
Equation 8.2					
$MS\ Target_{Public}$	Public transit mode share target	percentage	Passenger	10.00%	15.00%
$MS\ Increase_{Public}$	Public transit mode share increase	percentage	Passenger	9.04%	14.04%
Equation 8.1					
VMT	Forecasted VMT after active transportation reductions	miles	Passenger	2,308,368,699	2,532,201,389
$Prop_{urban}$	Proportion of total regional VMT	Percentage	Passenger	69.23%	69.23%
VMT_{active}	VMT reduction from active transportation targets	miles	Passenger	3,576,953	17,072,304
TPM	Forecasted trips per mile	trips/mile	Passenger	0.121980	0.124294
VMT Reduced	VMT reduced	miles	Passenger	66,822,406	115,129,048
Equation 8					
VMT EF	VMT emission factor	MT CO_2e/mile	Passenger	0.000302	0.000258
CO_2e Reduction	**VMT GHG emission reductions**	**MT CO_2e**	**Passenger**	**20,180**	**29,703**

Measure TR-3: Reduce regional VMT by increasing promotion of mixed-use development in infill priority areas in alignment with HCAOG's baseline connectivity score included in the RTP.

Measure TR-3 aims to encourage mixed-use development in designated infill priority areas within incorporated cities, aligning with the baseline connectivity score identified in HCAOG's VROOM 2022-2042.[90] Promoting mixed-use development in infill areas supports efficient land use by combining residential, commercial, and recreational spaces, which can reduce traffic congestion, lower transportation-related emissions, and dissuade regional sprawl. Such efforts are already underway in the City of Arcata which recently approved a final draft of the Gateway Area Plan which establishes long-range planning for high-density housing and mixed-use developments.[91]

This measure enhances community livability by supporting the development of walkable neighborhoods with easy access to essential services and amenities. By aligning with the initiatives outlined in the RTP, the infill projects will be strategically planned to increase connectivity and accessibility. Though this measure will aid in reducing regional VMT and associated GHG emissions, reductions from this Measure are not quantified due to complex indirect impacts and high risk of double counting with other RCAP Measures (see Measures TR-1 and TR-2).

[90] Humboldt County Association of Governments (HCAOG). Regional Transportation Plan, VROOM 2022-2042. Available at: https://www.hcaog.net/sites/default/files/vroom_2022-2042_full_report_0.pdf

[91] Lost Coast Outpost. 2024. 'This is a Major Milestone': Arcata Planning Commission Passes Final Draft of Gateway Area Plan. Available at: https://lostcoastoutpost.com/2024/may/15/major-milestone-arcata-planners-pass-final-draft-g/

Measure TR-4: Develop and implement regional mobility hubs and ZEV car-share programs to support mode shift from single occupancy vehicles.

Measure TR-4 focuses on creating regional mobility hubs and implementing ZEV car-share programs to encourage a shift away from single-occupancy vehicle use. This measure aims to enhance transportation options across urban and rural communities, making it easier for residents to choose sustainable and efficient modes of travel. Regional mobility hubs integrate various transportation services, such as public transit, bike-sharing, and car-sharing, in a single location to provide convenience and increase connections between different modes of travel.[92,93] The introduction of ZEV car-share programs further supports this initiative by offering clean transportation alternatives, reducing the reliance on fossil fuels. While the GHG emission reductions from this measure are not quantified in the RCAP due to the complexity of directly attributing these reductions and risk of double counting with other Measures in the RCAP, it plays a critical role in increasing access to alternative, more sustainable forms of transportation and reducing overall vehicle emissions.

[92] Sacramento Area Council of Governments (SACOG). Mobility Hub Design Guidance. Available at: https://www.sacog.org/planning/transportation/innovative-mobility-program/mobility-hubs

[93] CoMoUK. Mobility Hubs Overview and benefits. Available at: https://www.como.org.uk/mobility-hubs/overview-and-benefits

Measure TR-5: Require commercial and industrial employers with 25 employees or more to develop a Transportation Demand Management plan.

Measure TR-5 commits jurisdictions, particularly high employment areas, to require that commercial and industrial employers with 25 or more employees create a Transportation Demand Management (TDM) plan. This measure aims to lower GHG emissions and better accommodate employees living far from their place of work by further incentivizing alternative commuting options through employer-based subsidies for alternative modes of travel, which can also reduce their commuting costs. TDM plans can include strategies such as promoting carpooling, offering public transit incentives, supporting telecommuting, and providing facilities for cycling and walking. Employer-based TDM plans with these types of strategies which combine incentives with improved commute alternatives can lead to a 25 percent reduction in employee trips.[94] By requiring these plans, Measure TR-5 encourages employers to actively participate in reducing their transportation footprint, improving air quality, and enhancing the overall efficiency of the transportation network. While the GHG emission reductions from this Measure are not quantified in the RCAP due to the challenges in measuring individual employer contributions, it has been included to support the RCAP goals as an effective means to reduce transportation sector emissions.

[94] U.S. Department of Transportation. 2020. 10. Known Effectiveness of TDM Strategies. Available at: https://ops.fhwa.dot.gov/publications/fhwahop12035/chap10.htm

Measure TR-6: Decarbonize 15% of passenger vehicle miles traveled by 2030 and 100% by 2045 through increased adoption of low and zero-emission vehicles and development of a regional electric vehicle charging and hydrogen fueling network.

Measure TR-6 aims to increase passenger zero-emission vehicle (ZEV) adoption across the county through increased ZEV adoption and implementation of hydrogen hubs as an alternative to electric ZEVs. The state has established a goal of putting 5 million ZEVs on the road by 2030 and, according to executive order N-79-20, 100 percent of passenger vehicle sales are to be zero emission by 2035. This new executive order puts the total number of ZEVs on the road by 2035 at approximately 15 million.[95] Based on the current number of vehicles registered in California and a 2% growth rate per year, 15 million ZEVs accounts for 35% of total passenger vehicles in 2035. Currently, the State is only anticipated to reach a 26 percent ZEV adoption rate by 2030,[96,97] Though jurisdictions in Humboldt are expected to aid in aligning regional ZEV adoption with state goals, Humboldt's electricity infrastructure[98,99] and rural nature poses challenges with matching the State's goals or anticipated ZEV market rate. In recognition of these challenges as well as the pressing need to decarbonize the transportation sector, Measure TR-6 sets a conservative goal of 15 percent ZEV adoption by 2030 and 100 percent by 2045. While Measure TR-6 focuses on ZEVs, hybrids also pose a viable option for interim GHG reduction of on-road transportation. However, legislative reductions from hybrid use are largely captured in the forecast of the RCAP, therefore it is more conservative to exclude hybrid-specific targets to avoid double-counting these reductions. Furthermore, California's manufacturing legislation will mean no fossil-fueled cars will be manufactured in the state after 2035, reinforcing the long-term focus on ZEVs. The primary Actions that are designed to drive these investments and enable this Measure include:

- **Action TR-6b** which commits the Regional Climate Committee to develop a streamlined EV infrastructure permitting process and ordinance which can be utilized as a template for jurisdictions to utilize and adopt;
- **Action TR-6c** which commits the Regional Climate Committee to working with local jurisdictions to modify the Municipal code to promote EV charger access in new developments, redevelopment and existing parking spaces;

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95 Susan Carpenter. Spectrum News 1. October 2020. What it will take to get 100% EV sales in California. Accessed at: https://spectrumnews1.com/ca/la-west/transportation/2020/10/05/what-it-will-take-to-sell-100--evs-in-california

96 Crisostomo, Noel et al. Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030. Accessed at: Calmatters.org/environment/2023/03/california-electric-cars-demographics/?utm_id=91724&sfmc_id=4863450.

97 Based on the zero-emission vehicle goals for passenger vehicles established by Executive Order N-79-20, eight million zero-emission vehicles are anticipated statewide by 2030. Humboldt calculated that these eight million zero-emission vehicles represent 26 percent of the total passenger vehicles expected statewide by 2030 (based on statewide passenger car and light-duty truck counts in 2016 and population estimates for 2016 and 2030).

98 According to the CEC's electric vehicle charger 2025 capacity planning tool, the regional capacity varies considerably across the county, with some areas anticipated to have negative capacity (aka the projected electric capacity is not anticipated to support the modeled EV load).

99 California Energy Commission (CEC). 2024. EVSE Deployment and Grid Evaluation (EDGE) Tool (version 1.0). Available at: https://experience.arcgis.com/experience/6aaadc11586447aaaeab2a473947ad07#data_s=id%3AdataSource_2-189e1db67fd-layer-3%3A39

- **Action TR-6f** which establishes an EV Monthly Bill Discount Program with additional discount opportunities for low-income households aimed at reducing cost barriers to EV adoption;
- **Action TR-6g** which directs the Regional Climate Committee to work with RCEA to expand home and public ZEV fueling/charging infrastructure in alignment with goals established in RCEA's REPower Humboldt Plan; and
- **Action TR-6j** which commits the Regional Climate Committee to lead the development of a Hydrogen Vehicle Infrastructure Implementation Plan for public access by 2030 in collaboration with HCAOG and the incorporated cities.

Action TR-4g directs the jurisdictions to work with RCEA to install publicly accessible EV chargers needed to support RCEA's ZEV infrastructure goals. According to the REPower Plan, RCEA aims to install sufficient charging infrastructure to support 22,000 EVs by 2030.[100] This effort will be supported by RCEA's goals to increase regional electricity capacity and infrastructure discussed in Measure BE-1, as well as State strategies to build new, and upgrade aging, transmission and distribution infrastructure to support the transition to renewable energy.[101] This Action focuses on public EV chargers because studies have consistently found that limited charging infrastructure is one of the primary barriers to electric vehicle adoption.[102, 103] Publicly accessible EV chargers make owning an electric vehicle convenient for all drivers—including those who cannot charge at home or drive daily distances longer than their electric vehicle battery range. According to a recent study on public charging infrastructure needs, it is expected that 20 percent of EV charging nationally will occur at publicly accessible chargers in 2030.[104] This Action's quantification is based on the U.S. Department of Energy's Electric Vehicle Infrastructure Projection Tool outputs for the State of California.[105] The tool is used to calculate the number of publicly accessible EV chargers needed in the region to support a 15 percent passenger ZEV adoption in 2030 and a 100 percent passenger ZEV adoption in 2045. Though Measure TR-6 seeks to establish a hydrogen industry in the region to support adoption of hydrogen fuel vehicles, further development needs to occur to develop infrastructure capacity targets before GHG reductions can be substantially quantified from hydrogen passenger vehicles. Currently, key components of this infrastructure in the region include the HTA hydrogen fueling station, contracted to supply fuel to the public but still awaiting construction,[106] and the hydrogen production facility to be constructed located in Red Bluff within the Redding

[100] Redwood Coast Energy Authority (RCEA). 2019. REPower Humboldt (2019 Update). Available at: https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

[101] Governor Gavin Newsom. 2023. Building the Electricity Grid of the Future: California's Clean Energy Transition Plan. Available at: https://www.gov.ca.gov/wp-content/uploads/2023/05/CAEnergyTransitionPlan.pdf

[102] Kumar, Rajeev Ranjan and Kumar Alok. Adoption of Electric Vehicle: A Literature Review and Prospects for Sustainability (2020). Accessed at: https://www.sciencedirect.com/science/article/abs/pii/S095965261934781X.

[103] Winjobi, Olumide and Kelly, Jarod. Used Plug-in Electric Vehicles as a Means of Transportation Equity in Low-Income Households (2021). Accessed at: https://www.osti.gov/biblio/1658592.

[104] Kampshoff, Philipp et al. Building the Electric-Vehicle Charging Infrastructure America Needs (2022). Accessed at: https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs.

[105] U.S. Department of Energy. Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite. Accessed at: https://afdc.energy.gov/evi-pro-lite.

[106] Humboldt Transit Authority. 2024. Expanding Transit Services and Introducing Zero-Emission Fleets on the North Coast. Available at: https://hta.org/projects-tircp/

Rancheria.[107] Given these factors, the quantification assumes all ZEVs will be EVs to remain conservative.

Table 25 shows the parameters and data sources used to calculate the publicly accessible EV chargers needed in 2030 and 2045 with the Department of Energy's Electric Vehicle Infrastructure Projection Tool and Table 26 shows the calculations as outlined in Equations 9 through 9.2.

Publicly Accessible Electric Vehicle Chargers Equation

Equation 9 $PEV\ Chargers_y = Region\ PEV\ Chargers_y * (EVs_y/(Region\ EVs_y) - Existing\ PEV\ Chargers_{by}$

Equation 9.1 $EVs_y = Population_y * (Vehicles_{by}/Population_{by}) * EV\ Target_{Pass,y}$

Equation 9.2 $Region\ EVs_y = Region\ Vehicles_y * EV\ Target_{Pass,y}$

Table 25 Publicly Accessible Electric Vehicle Charger Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 9				
$PEV\ Chargers_y$	New publicly accessible electric vehicle chargers needed in Humboldt	See calculation table	chargers	Calculated
$Region\ EV\ Chargers_y$	Regional electric vehicle chargers needed	See calculation table	electric vehicles	Estimated using the Electric Vehicle Infrastructure Projection Tool public charger outputs for the State with the $Region\ EVs_{2030}$ value as the input.[1]
EVs_y	Electric vehicles targeted in Humboldt	See calculation table	electric vehicles	Calculated
$Region\ EVs_y$	Regional electric vehicles targeted	See calculation table	electric vehicles	Calculated
$Existing\ EV\ Chargers_{by}$	Existing publicly accessible electric vehicle chargers in Humboldt	127	chargers	PlugShare[2]
y	Year	2030 or 2045	year	–
by	Baseline year	2022	year	–
Equation 9.1				
$Population_y$	Forecasted population in region	See calculation table	people	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Vehicles_{by}$	Vehicles in baseline year in region	109,772	vehicles	California Department of Motor Vehicles[3]

[107] KRCR. 2024. Redding Rancheria to build green hydrogen facility off I-5. Available at: https://krcrtv.com/news/local/redding-rancheria-to-build-green-hydrogen-facility-off-i-5

Variable	Definition	Value	Unit	Data Source
$Population_{by}$	Population in baseline year in Humboldt	136,132	people	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$EV\ Target_{Pass,y}$	Electric vehicle adoption target	See calculation table	percentage	Targeted zero-emission vehicle adoption for Measure TR-4.
Equation 9.2				
$Region\ Vehicles_y$	Regional vehicles	33,167,900	vehicles	Electric Vehicle Infrastructure Projection Tool value for the State[1]

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. U.S. Department of Energy. Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite. Accessed at: https://afdc.energy.gov/evi-pro-lite.
2. PlugShare. EV Charging in Pinole, CA. Accessed at: https://www.plugshare.com/directory/us/california/pinole.
3. California Department of Motor Vehicles. 2022. Vehicles Registered By County. Accessed at: https://www.dmv.ca.gov/portal/dmv-research-reports/research-development-data-dashboards/vehicles-registered-by-county/

Table 26 Publicly Accessible Electric Vehicle Charger Parameters and Data Sources

Variable	Definition	Units	2030	2045
Equation 9.2				
$EV\ Target_{Pass,y}$	Zero-emission vehicle adoption target	percentage	15%	100%
$Region\ EVs_y$	Regional electric vehicles targeted	electric vehicles	4,975,185	33,167,900
Equation 9.1				
$Population_y$	Forecasted population in Humboldt	people	143,556	157,476
EVs_y	Electric vehicles targeted in Humboldt	electric vehicles	17,364	126,983
Equation 9				
$PEV\ Chargers_y$	New publicly accessible electric vehicle chargers needed in Humboldt	chargers	388	9,154

Through public-private funding and partnerships, the Humboldt jursidictions will need to install a collective 388 publicly accessible EV chargers by 2030 and 9,154 publicly accessible EV chargers by 2045. This is estimated to support 17,364 EVs, a more conservative target installation compared to the goals defined by RCEA. These ZEVs will also be supported by private electric vehicle chargers in new developments and existing buildings.

While jurisdictions cannot require residents to buy and use ZEVs rather than gasoline or diesel-powered vehicles, the Regional Climate Committee will support each jurisdiction in the region of Humboldt to incentivize this behavior change and support this level of ZEV adoption. Providing 388 additional public electric vehicle chargers is in line with other counties in California, such as Alameda, Santa Clara, and Marin counties and consistent with state legislation assessing the gap to needed ZEV charging infrastructure.[108] Buildout of EV infrastructure will be further supported by Actions to identify and obtain funding for increasing publicly available charging stations and

[108] AB 2127 directs the CEC to assess needed charging infrastructure from which the number of chargers in the County was inferred. Accessed here: https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127

infrastructure, expand incentive programs for at home electric vehicle chargers, and streamline the installation permitting process. These local actions along with new federal and state funding will help cover the upfront costs to purchasing an electric vehicle and installing the equipment or infrastructure upgrades needed to charge an electric vehicle at home as high costs are one of the barriers to electric vehicle adoption for low-income households.[109]

Table 27 shows the parameters and data sources that support GHG emission reductions from the zero-emission vehicle adoption and Table 28 shows the calculations as outlined in Equations 10 through 10.2.

Passenger Zero-emission Vehicle Adoption Equations

Equation 10 $CO_2e\ Reduction_{VMT,i,y}=(VMT\ Reduced_{ICE,i,y}*EF_{VMT,i,y})-(Elec\ Converted_{i,y}*EF_{elec,i,y}*(1+L_{T\&D}))$

Equation 10.1 $Elec\ Converted_{i,y}=VMT\ Reduced_{ICE,i,y}*EPM_{ZEV,i,y}$

Equation 10.2 $VMT\ Reduced_{ICE,i,y}=(VMT_{i,y}-VMT_{alt,i,y})*(ZEV\ Adoption_{i,y}-ZEV\ Adoption\ Baseline_{i,y})$

Table 27 Passenger Zero-emission Vehicle Adoption Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 10				
$CO_2e\ Reduction_{VMT,I,y}$	VMT GHG emission reductions	See calculation table	MT CO_2e	Calculated
$VMT\ Reduced_{ICE,I,y}$	Internal combustion engine VMT reduced	See calculation table	miles	Calculated
$EF_{VMT,I,y}$	Forecasted VMT emission factor	See calculation table	MT CO_2e/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Elec\ Converted_{i,y}$	Electricity from zero-emission vehicle conversion	See calculation table	kWh	Calculated
$EF_{elec,I,y}$	Forecasted residential electricity emission factor	See calculation table	MT CO_2e/kWh	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$L_{T\&D}$	Electricity transmission and distribution loss percentage	5.10%	Percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
i	VMT type	Passenger	–	–
y	Year	2030 or 2045	–	–
Equation 10.1				
$EPM_{ZEV,I,y}$	Forecasted electricity usage per mile of zero-emission vehicles	See calculation table	kWh/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 10.2				

[109] Gaillard, Isa. Ingredients for Equitable Electrification: Analyzing Equity in Statewide Electric Vehicle Rebate Programs (2022). Accessed at: https://greenlining.org/wp-content/uploads/2022/10/Greenlining-Ingredients-Equitable-Transportation-WebFINAL.pdf.

Variable	Definition	Value	Unit	Data Source
$VMT_{i,y}$	Forecasted total VMT	See calculation table	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$VMT_{alt,i,y}$	VMT reduction from alternative transit methods	See calculation table	miles	See Measures TR-1 and TR-2
ZEV Adoption$_{i,y}$	Zero-emission vehicle adoption target	See calculation table	percentage	Conservative based on RCEA goals[1] and enabled by 388 new publicly accessible chargers (Table 26).
ZEV Adoption Baseline$_{i,y}$	Zero-emission vehicle adoption baseline	See calculation table	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. Redwood Coast Energy Authority (RCEA). 2019. REPower Humboldt (2019 Update). Available at: https://redwoodenergy.org/wp-content/uploads/2020/06/RePower-2019-Update-FINAL-.pdf

Table 28 Passenger Zero-emission Vehicle Adoption GHG Emission Reduction Calculations

Variable	Definition	Units	VMT Type	2030	2045
Equation 10.2					
$VMT_{i,y}$	Forecasted total VMT	miles	Passenger	2,308,368,699	2,532,201,389
$VMT_{alt,i,y}$	VMT reduction from alternative transit methods	miles	Passenger	133,982,460	244,898,141
ZEV Adoption$_{i,y}$	Zero-emission vehicle adoption target	percentage	Passenger	15.00%	100.00%
ZEV Adoption Baseline$_{i,y}$	Zero-emission vehicle adoption baseline	percentage	Passenger	6.31%	9.54%
VMT Reduced$_{ICE,l,y}$	Internal combustion engine VMT reduced	miles	Passenger	188,954,164	2,287,303,248
Equation 10.1					
$EPM_{ZEV,l,y}$	Forecasted electricity usage per mile of zero-emission vehicles	kWh/mile	Passenger	0.3684	0.3692
Elec Converted$_{i,y}$	Electricity from zero-emission vehicle conversion	kWh	Passenger	69,610,147	844,504,381
Equation 10					
$EF_{VMT,l,y}$	Forecasted VMT emission factor	MT CO_2e/mile	Passenger	0.0003020	0.0002580
$EF_{elec,l,y}$	Forecasted electricity emission factor	MT CO_2e/kWh	Passenger	0.0000183	0.0000000
CO_2e Reduction$_{VMT}$	**VMT GHG emission reductions**	**MT CO_2e**	**Passenger**	**55,726**	**590,124**

Measure TR-7: Increase commercial zero-emission vehicle use and adoption to 10% by 2030 and 100% by 2045 through a regional charging network and development of hydrogen hubs.

Measure TR-7 aims to increase commercial ZEV adoption across the county through increased EV adoption and implementation of hydrogen hubs as an alternative to electric ZEVs. Commercial VMT includes medium- and heavy-duty (MDHD) vehicles and trucks. The primary Actions that are designed to drive these investments and enable this Measure include:

- **Action TR-7a** which directs the Regional Climate Committee to work with RCEA and Schatz Energy Research Center (SERC) to refine and implement the North Coast Medium-Duty/Heavy-Duty Zero Emission Vehicle Readiness Blueprint for Humboldt County;
- **Actions TR-7b** which involves engaging employers and business fleet owners regarding Advanced Clean Fleet requirements, funding opportunities, and identification of opportunities for accelerated conversion to ZEVs and ZEV infrastructure build-out; and
- **Action TR-7e** which will secure funding from state and federal sources to increase ZEV procurement as well as expand charging/fueling infrastructure.

As the forecast included in the RCAP incorporates impacts from the Innovative Clean Transit regulation which requires 100 percent zero emission bus fleets by 2040, consideration of public transit ZEV targets and HTA's acquisition of 11 ZEV buses is not included in this Measure to avoid double counting of emissions reductions. These commercial VMT targets are in line with the State's goals and regulations for MDHD vehicles. California is working towards achieving Executive Order (EO) N-79-20, which aims to reach a 100 percent zero-emission drayage truck population by 2035 and 100 percent zero-emission MDHD vehicle population by 2045. To reach these goals, CARB has adopted the Advanced Clean Trucks regulation which regulates the sale of MDHD vehicles in California and the Advanced Clean Fleets regulation which regulates the purchase and use of zero-emission MDHD vehicles in public and private fleets in California. These regulations have increasing requirements for zero-emission MDHD vehicle sales and use to mandate the phase-in of commercial ZEVs. For example, by 2030, the Advanced Clean Fleets regulation requires 10 percent of sleeper cab tractors and specialty vehicles, 25 percent of pickup trucks and day cab tractors, and 50 percent of box trucks, vans, and package delivery vehicles in a fleet to be zero-emission.

According to the North Coast Medium-Duty and Heavy-Duty ZEV Blueprint Plan[110] developed by RCEA in collaboration with SERC, the target 10 percent commercial fleet ZEV adoption aligns the region to comply with the State's goals, with primary method of replacement being based on estimated end-of life. As part of the Blueprint, the energy required to achieve the States mandates through either electric charging stations or hydrogen fueling stations was estimated. The Blueprint recognizes that a major barrier in Humboldt County is electricity infrastructure but has identified several strategies to work with the utility to overcome this barrier. Working with PG&E to determine the necessary infrastructure needs to support a fully built-out fleet and planning ahead with interconnection applications will be necessary to accelerate utility interconnection. Further, Highway 101 that runs through Humboldt is a proposed electric fuel corridor for Round 2 eligibility of California's National Electric Vehicle Infrastructure (NEVI) Funding Program, a program funded by the Infrastructure Investment and Jobs Act to advance ZEV infrastructure along interstates and

[110] Redwood Coast Energy Authority (RCEA). 2023. North Coast Medium-Duty and Heavy-Duty ZEV Blueprint Plan. Provided by the County via SharePoint on March 15, 2023.

national highways.[111] If the portion of Highway that runs through Humboldt is eligible for California round 2 of NEVI funding, this would further support the transition of commercial vehicles to ZEVs in the region.

By also investing in hydrogen refueling infrastructure, the region is able to better diversify the fleets and continue to move towards fleet ZEV transition even with electricity infrastructure barriers. HTA is already working on building a new hydrogen fueling station that is expected to be operational in 2025.[110] To support this transition, Measure TR-7 includes Actions that focus on funding for, and education of, commercial ZEVs, workforce development, and engaging with fleet owners and business owners that are subject to the States regulations. Table 29 shows the parameters and data sources that support the GHG emission reductions associated with commercial ZEVs and Table 30 shows the calculations as outlined in Equations 11 through 11.2.

Commercial Zero-emission Vehicle Adoption Equations

Equation 11 $CO_2e\ Reduction_{VMT,i,y}=(VMT\ Reduced_{ICE,i,y}*EF_{VMT,i,y})-(Elec\ Converted_{i,y}*EF_{elec,i,y}*(1+L_{T\&D}))$

Equation 11.1 $Elec\ Converted_{i,y}=VMT\ Reduced_{ICE,i,y}*EPM_{ZEV,i,y}$

Equation 11.2 $VMT\ Reduced_{ICE,i,y}=VMT_{i,y}*(ZEV\ Adoption_{i,y}-ZEV\ Adoption\ Baseline_{i,y})$

Table 29 Commercial Zero-emission Vehicle Adoption Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 11				
$CO_2e\ Reduction_{VMT,I,y}$	VMT GHG emission reductions	See calculation table	MT CO_2e	Calculated
$VMT\ Reduced_{ICE,I,y}$	Internal combustion engine VMT reduced	See calculation table	miles	Calculated
$EF_{VMT,I,y}$	Forecasted VMT emission factor	See calculation table	MT CO_2e/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Elec\ Converted_{i,y}$	Electricity from zero-emission vehicle conversion	See calculation table	kWh	Calculated
$EF_{elec,I,y}$	Forecasted residential electricity emission factor	See calculation table	MT CO_2e/kWh	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$L_{T\&D}$	Electricity transmission and distribution loss percentage	5.10%	Percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
i	VMT type	Nonresidential	–	–
y	Year	2030 or 2045	–	–
Equation 11.1				

[111] CalTrans, CEC. 2023. California's National Electric Vehicle Infrastrucutre (NEVI) Formula Program. Acccessed at: https://www.energy.ca.gov/programs-and-topics/programs/national-electric-vehicle-infrastructure-nevi-formula-program-0

Variable	Definition	Value	Unit	Data Source
$EPM_{ZEV,I,y}$	Forecasted electricity usage per mile of zero-emission vehicles	See calculation table	kWh/mile	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 11.2				
$VMT_{i,y}$	Forecasted total VMT	See calculation table	miles	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
ZEV Adoption$_{i,y}$	Zero-emission vehicle adoption target	See calculation table	percentage	Targets that are consistent with state regulations and goals.
ZEV Adoption Baseline$_{i,y}$	Zero-emission vehicle adoption baseline	See calculation table	percentage	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

Table 30 Commercial Zero-emission Vehicle Adoption GHG Emission Reduction Calculations

Variable	Definition	Units	VMT Type	2030	2045
Equation 11.2					
$VMT_{i,y}$	Forecasted total VMT	miles	Commercial	297,601,835	326,459,019
ZEV Adoption$_{i,y}$	Zero-emission vehicle adoption target	percentage	Commercial	10.00%	100.00%
ZEV Adoption Baseline$_{i,y}$	Zero-emission vehicle adoption baseline	percentage	Commercial	4.51%	28.46%
VMT Reduced$_{ICE,I,y}$	Internal combustion engine VMT reduced	miles	Commercial	16,338,341	326,459,019
Equation 11.1					
$EPM_{ZEV,I,y}$	Forecasted electricity usage per mile of zero-emission vehicles	kWh/mile	Commercial	1.1953	1.1264
Elec Converted$_{i,y}$	Electricity from zero-emission vehicle conversion	kWh	Commercial	19,529,660	367,727,356
Equation 11					
$EF_{VMT,I,y}$	Forecasted VMT emission factor	MT CO_2e/mile	Commercial	0.0010910	0.0008570
$EF_{elec,I,y}$	Forecasted electricity emission factor	MT CO_2e/kWh	Commercial	0.0000187	0.0000000
CO_2e Reduction$_{VMT}$	**VMT GHG emission reductions**	**MT CO_2e**	**Passenger**	**17,441**	**279,775**

Measure TR-8: Electrify or otherwise decarbonize 12% of applicable SORE off-road equipment by 2030 and 100% by 2045 and replace fossil diesel consumption with renewable diesel in 55% of applicable large diesel in alignment with EO N-79-20 by 2030.

Measure TR-8 aims for the Humboldt region to decarbonize 12 percent of small off-road engine (SORE) use in the community by 2030 and 100 percent by 2045. Additionally, the Measure aims to replace 55 percent of fossil fuel consumption in large diesel off-road equipment with renewable diesel in alignment with recent CARB regulations. The primary Actions that enable this Measure are:

- **Action TR-8a** which commits the jurisdictions to align with and support CARB's regulations requiring new sale small off-road equipment to be zero emission by 2024 in compliance with AB 1346, and phase 2 of the regulation affecting the manufacture and sale of larger scale equipment such as generators and pressure washers by 2028.
- **Action TR-8b** which directs the Regional Climate Committee to establish a regulatory pathway to enforce CARB's In-Use Off-Road Diesel Fueled Fleets Regulation and Commercial Harbor Craft Regulation requiring that diesel vehicles over 25 horsepower to procure and only use R99 or R100 renewable diesel;
- **Action TR-8d** which commits the Regional Climate Committee to developing and managing an Off-road Equipment Replacement Program and Outreach Campaign that provides information and technical assistance on complying with the regulations and identifies funding sources to aid residents in replacing existing off-road equipment with zero emission alternatives;
- **Action TR-8f** which directs regional partners to develop private-public partnerships with renewable diesel producers and local fuel suppliers to bring more renewable diesel to the region to ensure there is enough fuel in the region to support compliance with the regulations.

The SORE regulation is phased such that it will impact the sale of most off-road vehicles and equipment with gasoline- and diesel-powered SOREs by no later than 2024. As defined by CARB, SORE are those equipment types with rated power at or below 19 kilowatts (i.e., 25 horsepower). Typical off-road vehicle and equipment types that use these engines include lawn and garden equipment, portable generators, and pressure washers.[112] In 2030, gasoline and diesel used by these SOREs will compromise over 12 percent of the off-road vehicle and equipment fuel used throughout Humboldt.[113] By promoting State regulations for limiting the sale of gasoline- and diesel-powered small off-road engines, and providing resources (i.e. information and incentives) for residents and businesses to replace their existing SORE equipment, the Actions have the potential to reduce approximately 12 percent of the community's off-road fuel usage.

In 2022, CARB also approved amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation that incorporates new requirements to use renewable diesel. Beginning January 1, 2024, all California fleets subject to this regulation are required to procure and only use R99 or R100 renewable diesel fuel in all vehicles subject to the Off-Road Regulation, with some limited exceptions. This regulation applies to all self-propelled off-road diesel vehicles 25 horsepower or greater used in California and applies to vehicles that are rented or leased. Exceptions to the

[112] California Air Resources Board (CARB). (2021) SORE Applicability Fact Sheet. Accessed at: https://ww2.arb.ca.gov/resources/fact-sheets/sore-applicability-fact-sheet.

[113] Humboldt region SORE fuel usage in 2030 was estimated based on attributions established in the Humboldt Regional 2022 GHG Inventory and by filtering CARB OFFROAD2021 model outputs for horsepower ratings less than or equal to 25. The results were divided by the total estimated off-road fuel usage in the Humboldt region in 2030 to estimate the share, or percentage, of fuel usage attributable to SOREs.

regulation include locomotives, commercial marine vessels, marine engines, recreational off-highway vehicles, combat and tactical support equipment, stationary equipment, portable engines, equipment used exclusively for agricultural operations, implements husbandry, and off-road diesel vehicles owned and operated by an individual for personal, non-commercial and non-governmental purposes.[114] Taking into account these exceptions, 72 percent of all diesel consumed in the county in 2030 and accounted for in the forecast as applicable equipment categories would be subject to the regulation. Further, amendments approved by CARB for the Commercial Harbor Craft Regulation in December of 2022 require that beginning in January 2023 all commercial harbor craft operated in the state must use R99 or R100 renewable diesel fuel.[115] Commercial harbor craft diesel consumption subject to this regulation is forecasted to make up approximately 7 percent of all diesel consumed in the county in 2030. In total, with full compliance, these two regulations would effectively replace 79 percent of fossil diesel consumption by off-road equipment with renewable diesel by 2030. Renewable diesel that meets the required standards has an emissions factor that is approximately 70 percent lower than fossil-fuel diesel.[116]

Action TR-8b directs the Regional Climate Committee to establish a pathway for enforcing and tracking regulatory compliance and developing a strategy to ensure resources in the region are adequate to allow fleets to be in compliance. Compliance with the regulations will be further supported by a communication and outreach program (**Action TR-8d**) and the development of public-private partnerships to bring more renewable diesel to the region to ensure local fuel suppliers are able to provide adequate amounts of renewable diesel to fleets subject to the regulation (**Action TR-8f**). The program will raise awareness of the regulations, provide information to community members and businesses regarding the benefits of electrifying equipment or using renewable diesel, identify funding opportunities for offroad decarbonization (e.g., CARB's Clean Off-road Equipment Voucher Incentive Program), and provide information on local fuel suppliers with renewable diesel for sale.

Table 31 shows the parameters and data sources that support off-road ordinance GHG emission reductions and Table 32 shows the calculations as outlined in Equations 12 through 12.2.

Off-road Decarbonization Equations

Equation 12 $$CO_2e\ Reduction_y = (Fuel\ Avoided_{SORE,y} * Weighted\ EF_y) + (Fuel\ Replaced_{Diesel,y} * (Weighted\ EF_{Diesel} - EF_{RDiesel}))$$

Equation 12.1 $$Weighted\ EF_y = CO_2e\ Emissions_y / (Fuel_{Gas,\ y} + Fuel_{Diesel,\ y} + Fuel_{NG,\ y})$$

Equation 12.2 $$Fuel\ Avoided_{SORE,y} = (Fuel_{Gas,\ y} + Fuel_{Diesel,\ y} + Fuel_{NG,\ y}) * Target_{SORE,y}$$

Equation 12.3 $$Fuel\ Replaced_{Diesel,y} = (Fuel_{Diesel,\ y} * (1 - Target_{SORE,y})) * Target_{Diesel,y}$$

[114] California Air Resources Board (CARB). (2022). Final Regulation Order Amendments to Sections 2449, 2449.1, and 2449.2 Title 12, California Code of Regulations. Accessed at: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/off-roaddiesel/froa-1.pdf

[115] California Air Resources Board (CARB). (2022) Commercial Harbor Craft Factsheet: Renewable Diesel (R100 or R99). Accessed at: https://ww2.arb.ca.gov/resources/fact-sheets/chc-factsheet-renewable-diesel-r100-or-r99

[116] CARB staff has reached out to several renewable diesel fuel producers and as of February 2023, is aware that renewable diesel produced by Neste meets the regulatory requirements and standards. Estimates in GHG emission reductions based on emission factors provided by Neste accessed at: https://www.neste.com/en-us/products-and-innovation/neste-my-renewable-diesel/product-information

Table 31 Off-road Decarbonization Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 12				
$CO_2e\ Reduction_{offroad,y}$	Offroad fuel GHG emission reductions	See calculation table	MT CO_2e	Calculated
$Fuel\ Avoided_{SORE,y}$	Off-road fuel avoided from applicable SORE equipment	See calculation table	gallons	Calculated
$Weighted\ EF_y$	Weighted emission factor for all off-road fuels	See calculation table	MT CO_2e/gallon	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Fuel\ Replaced_{Diesel,y}$	Off-road diesel replaced from applicable diesel equipment >25 hp	See calculation table	gallons	Calculated
$EF_{RDiesel}$	Emissions factor of renewable diesel	0.00308	MT CO2e/gallon	Neste (as recommended by CARB)[6]
$Weighted\ EF_{Diesel}$	Emissions factor of fossil fuel diesel	0.01050	MT CO2e/gallon	Inventory
y	Year	2030 or 2045	–	–
Equation 12.1				
$CO_2e\ Emissions_y$	Forecasted off-road GHG emissions	See calculation table	MT CO_2e	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Fuel_{Gas,y}$	Forecasted gasoline use	See calculation table	gallon	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Fuel_{Diesel,y}$	Forecasted diesel use	See calculation table	gallon	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Fuel_{NG,y}$	Forecasted natural gas use	See calculation table	gallon	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
Equation 12.2				
$Target_{SORE,y}$	Fuel use reduction target for all off-road fueles	See calculation table	percentage	–
$Target_{SORE,2030}$	Fuel use reduction target (2030)	12%	percentage	OFFROAD2021[1,2] and direction of state goals (i.e., EO N-79-20).[3]
$Target_{SORE,2045}$	Fuel use reduction target (2045)	100%	percentage	Based on compliance with state goals established by EO N-79-20.
Equation 12.3				
$Target_{Diesel,y}$	Fuel replacement target for diesel off-road fuels	See calculation table	percentage	–
$Target_{Diesel,2030}$	Fuel replacement target (2030)	55%	percentage	OFFROAD2021[1,4] and CARB applicable regulations requiring renewable diesel fuel use (i.e., In-Use Off-Road Diesel-Fueled Fleets Regulation and the

Variable	Definition	Value	Unit	Data Source
				Commercial harbor Craft Regulation)[5,6] and assuming 30% non-compliance
$Target_{Diesel,2045}$	Fuel replacement target (2045)	100%	percentage	Based on compliance with state goals established by EO N-79-20.

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. California Air Resources Board (CARB). 2024. Off-Road Emissions Inventory (OFFROAD2021). Available at: https://arb.ca.gov/emfac/offroad/emissions-inventory/3f377c1f45fef7c154509eac6354b9086be9cdd9
2. Humboldt region SORE fuel usage in 2030 was estimated based on attributions established in the Humboldt Regional 2022 GHG Inventory and by filtering CARB OFFROAD2021 model outputs for horsepower ratings less than or equal to 25. The results were divided by the total estimated off-road fuel usage in the Humboldt region in 2030 to estimate the share, or percentage, of fuel usage attributable to SOREs.
3. California Air Resources Board (CARB). SORE Applicability Fact Sheet (2021). Accessed at: https://ww2.arb.ca.gov/resources/fact-sheets/sore-applicability-fact-sheet.
4. Humboldt region diesel fuel usage in 2030 was estimated based on attributions established in the Humboldt Regional 2022 GHG Inventory and by filtering CARB OFFROAD2021 model outputs for horsepower ratings greater than or equal to 25 and for equipment categories subject to the In-Use Off-Road Diesel-Fueled Fleets Regulation. Commercial Harbor Craft was also included because it is also subject to renewable diesel usage under the Commercial Harbor Craft regulation. The results were divided by the total estimated off-road diesel usage in the Humboldt region in 2030 to estimate the share, or percentage, of fuel usage subject to the In-Use Off-Road Diesel-Fueled Fleets Regulation and Commercial Harbor Craft regulation which accounted for 79% of all diesel fuel use. It was assumed 30% non-compliance resulting in a target of 55%.
5. California Air Resources Board (CARB). (2022). Final Regulation Order Amendments to Sections 2449, 2449.1, and 2449.2 Title 1 2, California Code of Regulations. Accessed at: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/off-roaddiesel/froa-1.pdf
6. California Air Resources Board (CARB). (2022) Commercial Harbor Craft Factsheet: Renewable Diesel (R100 or R99). Accessed at: https://ww2.arb.ca.gov/resources/fact-sheets/chc-factsheet-renewable-diesel-r100-or-r99

Table 32 Off-road Decarbonization GHG Emission Reduction Calculations

Variable	Definition	Units	2030	2045
Equation 12.1				
$CO_2e\ Emissions_y$	Forecasted off-road GHG emissions	MT CO_2e	129,836	139,645
$Fuel_{Gas,y}$	Forecasted gasoline use	gallons	3,202,801	3,625,989
$Fuel_{Diesel,y}$	Forecasted diesel use	gallons	9,348,454	9,908,708
$Fuel_{NG,y}$	Forecasted natural gas use	gallons	418,808	430,298
*Weighted EF*y	Weighted fuel emission factor	MT CO_2e/gallon	0.010010	0.010000
Equation 12.2				
$Target_{SORE,y}$	Fuel use reduction target for all off-road fuels	percentage	12%	100%
$Fuel\ Avoided_{SORE,y}$	Off-road fuel avoided from applicable SORE equipment	gallons	1,556,408	13,964,996
Equation 12.3				
$Target_{Diesel,y}$	Fuel use reduction target for all off-road fuels	percentage	55%	100%
$Fuel\ Replaced_{Diesel,y}$	Off-road fuel replaced from applicable diesel equipment >25 hp	gallons	4,524,652	0
Equation 12				
$CO_2e\ Reduction_{Fuel}$	**Fuel GHG emission reductions**	**MT CO_2e**	**49,143**	**139,645**

Measure TR-9: Establish Humboldt as a pilot program for the decarbonization of the transportation sector to help drive state and philanthropic investment throughout Humboldt.

Measure TR-9 aims to position the region as a pilot program for the decarbonization of rural transportation emissions by establishing a regional vision for rural transportation which incorporates relevant Measure efforts outlined in this report and attracting state[117] and philanthropic investment[118,119] to support this initiative. The decarbonization of rural transportation can pose a variety of challenges (e.g. longer average travel distances, more vehicles per household, lower average income, etc)[120] which are further exacerbated, or driven by, the long-term underinvestment in rural communities.[121] Establishing the region as a rural decarbonized transportation pilot program will drive increased investment in rural communities through a collaborative, county-wide approach to promote integrated solutions to Humboldt's transportation infrastructure. Furthermore, the pilot program would serve to position the Humboldt region as a leader in rural sustainability, attracting investments that can further enhance local and regional environmental efforts. As the parameters of the pilot program vision are not yet defined and would be based on other transportation Measures outlined in this report, GHG reductions are not quantified to avoid double counting of emissions.

[117] U.S Department of Transportation. 2024. Rural and Tribal Assistance Pilot Program. Available at: https://www.transportation.gov/buildamerica/RuralandTribalGrants

[118] Bezos Earth Fund. 2024. Our Programs. Available at: https://www.bezosearthfund.org/

[119] Bill & Melinda Gates Foundation. 2024. North America. Available at: https://www.gatesfoundation.org/our-work/places/north-america

[120] Smart Growth America. 2023. An Active Roadmap: Best Practices in Rural Mobility. Available at: https://smartgrowthamerica.org/wp-content/uploads/2023/07/SGA-Rural-Transportation-Field-Scan_Final_7.27.pdf

[121] U.S Department of Transportation. 2022. Building a Better America Fact Sheet for Rural Communities. Available at: https://transportation.gov/briefing-room/building-better-america-fact-sheet-rural-communities

Measure TR-10: Work with the state and biofuel industry to establish a biofuel network within Humboldt thereby funding new green industry and job growth to support the decarbonization of the transportation sector.

Measure TR-10 focuses on collaborating with the state and the biofuel industry (e.g. green hydrogen, renewable diesel, or renewable natural gas (RNG) production) to create a biofuel network within Humboldt to support transportation fuel decarbonization as well as fuel economic development. Humboldt faces significant challenges with electric infrastructure, limiting the region's ability to decarbonize through electricity as other parts of the state might. Biofuels serve as a transitional bridge, allowing the region to continue working towards its decarbonization goals despite challenges with electricity infrastructure. Bringing renewable diesel to the region is also a necessary step to support implementation of Measure T-8 and comply with a number of CARB's regulations on off-road equipment.

Moreover, the production of biofuels from biomass can help reduce wildfire risks by utilizing biomass that would otherwise fuel fires. Biofuels reduce emissions by substituting conventional fossil fuels with renewable organic materials which absorb CO_2 from the atmosphere during the growth phase of the organic material. Biogenic CO_2 refers to the carbon that was originally removed from the atmosphere by organic material and, under natural conditions, would eventually be released back into the atmosphere during degradation of the organic materials. When biofuels are combusted, the CO_2 released is considered biogenic, meaning it does not contribute to net atmospheric increase in carbon emissions. While biofuels do release other emissions that are not biogenic, these emissions are significantly lower compared to those from traditional fossil fuels. The production of biofuels can even facilitate carbon sequestration when paired with carbon capture technologies.[122] While the GHG emission reductions from this measure are not quantified in the RCAP due to the complexities in measuring industry-wide impacts, it is essential for driving alternative energy solutions and fostering economic growth.

This Measure primarily seeks to aid the development of hydrogen fuel in the region in support of Measures TR-6 and TR-7, particularly as an alternative solution for nonresidential vehicle decarbonization. Green hydrogen fuel provides a seamless, emissions free transition that can support a variety of light, medium, and heavy duty vehicle classes without needing to sacrifice travel range, an issue commonly faced by EVs in the nonresidential vehicle market.[123] For rural areas such as Humboldt County which experience greater travel distances on average compared to cities, hydrogen provides an attractive solution in addition to implementing EVs so that all travel needs are met in the community. Additionally, implementing a hydrogen network in Humboldt would serve to contribute to the State's goal to reach 200 hydrogen fueling stations by 2025.[124]

[122] U.S. Department of Energy. 2022. Bioenergy: A Pathway to Decarbonization. Available at: https://www.energy.gov/sites/default/files/2022-04/beto-decarbonizer-fs-04-2022.pdf

[123] FASTECH. 2023. Hydrogen vs. Electric: An Analysis for Long-Haul Trucking. Available at: https://www.fastechus.com/blog/hydrogen-vs-electric-for-trucking

[124] CA.gov. 2024. Hydrogen. Available at: https://business.ca.gov/industries/hydrogen/

Measure TR-11: Lead by example and electrify or otherwise decarbonize 50% of the municipal fleet by 2030 in alignment with the state's Advanced Clean Fleet Rule

Measure TR-11 commits each jurisdiction to lead by example by electrifying or otherwise decarbonizing its municipal fleet in line with the State's Advanced Clean Fleet Rule. Under the rule 50% of vehicles added to fleets subject to the regulation from 2024-2026 must be ZEVs with 100% of vehicles added to the fleet 2027 and after must be ZEV. Alternatively, fleets may opt-in to the Milestones Option. If the Milestone Option is selected, fleet owners must continuously meet or exceed the ZEV Fleet Milestone percentage as defined by the regulation. Compliance reporting would be required annually and within 30 days of adding vehicles to the fleet. This Measure aims to exceed State requirements by decarbonizing 50% of the municipal fleets by 2030. This measure will reduce GHG emissions from municipal operations and demonstrate the feasibility and benefits of transitioning to clean transportation technologies. While the strategies to decarbonize fleet vehicles will reduce GHG emissions, these emissions are already included as a subset of transportation sector emissions within the Humboldt Regional GHG Inventory. This means the associated GHG emission reductions are included within the community mitigation Measures (i.e., TR-6 through TR-7). Thus, to avoid double counting, this municipal mitigation measure is not counted towards the 2030 and 2045 targets.

5 Strategy SW: Solid Waste

The regional Solid Waste Strategy for Humboldt focuses on increasing diversion to reduce the amount of resources sent to the landfill and effectively using those diverted resources across the community. Currently, waste produced in the region is sorted and trucked long distances to processing facilities which are outside of county boundaries. This not only limits the community's influence over waste management, but also contributes to regional transportation emissions to haul waste outside of the county. The strategy aims to bolster regional infrastructure to allow for expanded organic and inorganic materials collection and separation services and providing local organic processing. In the landfill, organic waste decays without access to light or oxygen and produces methane (CH_4) gas. Diverting organic waste from the landfill reduces the occurrence of this anaerobic decomposition, providing the region with an important opportunity to reduce solid waste GHG emissions. Diverted organic waste can be further processed and repurposed into an array of different types of products, such as compost or renewable natural gas, which can serve to sequester or offset carbon emissions. Thus, managing organic waste provides an important opportunity to employ circular economy methods to reduce GHG emissions and sequester carbon. While diverting inorganic waste from the landfill does not provide direct GHG emission reductions, it does support indirect GHG emission reduction benefits outside the Humboldt region's jurisdiction.

Based on this solid waste strategy and current conditions of the region's solid waste infrastructure, the RCAP's Solid Waste Strategy consists of one primary Measure presented in Table 33. The following subsection details the substantial evidence and calculation methodology of the quantitative Measure.

Table 33 Strategy SW: Solid Waste GHG Emission Reduction Summary

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
SW-1	Establish a local waste separation facility and organics managements to be able to reduce waste sent to landfills by 75% by 2030. Reduce GHG emissions by limiting truck trips required to ship waste out of the county and import compost from out of the county.	29,689	32,568
Total		**29,689**	**32,568**

Measure SW-1: Establish a local waste separation facility and organics managements to be able to reduce waste sent to landfills by 75% by 2030. Reduce GHG emissions by limiting truck trips required to ship waste out of the county and import compost from out of the county.

Measure SW-1 aims for the region to meet SB 1383 requirements to recover 20 percent of disposed edible food for human consumption and reduce landfilled organic waste —and its associated GHG emissions—75 percent by 2025. The primary Actions that enable this Measure include:

- **Action SW-1a** which directs the Regional Climate Committee in partnership with Humboldt Waste Management and Recology to conduct an assessment of waste diversion needs, current capacity, and land-use opportunities for developing local waste processing facilities;
- **Action SW-1b** which directs HWMA to pursue green bond funding opportunities for the purpose of constructing local waste processing facilities in accordance with the assessment completed in SW-1a;
- **Action SW-1d** which commits regional jurisdictions to implement SB 1383 requirements by establishing incorrect sorting fees, improving bin signage, promoting organic collection services, establishing local compost hubs, and providing public access organics and recycling collection as applicable;
- **Action SW-1e** which commits jurisdictions to adopt a food recovery ordinance in compliance with SB 1383 and to support implementation of the ordinance by identifying the necessary infrastructure to recover 20% of edible food disposed and obtain funding to establish an edible food recovery program;
- **Action SW-1f** which commits jurisdictions to continue partnering with HWMA and Recology to implement structural changes or expand services to currently under-serviced regions, as applicable, to comply with SB 1383;
- **Action SW-1l** which directs jurisdictions, with support from the Regional Climate Committee, to provide targeted, multilingual education and technical assistance to communities based on results of regional waste characterization studies and waste monitoring programs which cover topics such as reuse, sustainable purchasing, and reducing food waste;

These Actions encompass the activities the California Department of Resources Recycling and Recovery (CalRecycle) requires jurisdictions to conduct to comply with SB 1383.[125] Humboldt faces challenges in solid waste management due to a lack of local processing infrastructure and solid waste management funding, hindering efficient diversion efforts. However, initiatives supported by green bonds have shown promise in promoting solid waste infrastructure and expansion in other regions, such as the Napa Solid Waste Project[126] and initiatives supported by RethinkWaste,[127] which have utilized green bonds to fund critical waste management infrastructure upgrades and expansions. Pursuing green bond funding and other applicable funding opportunties to allow

[125] CalRecycle. SB 1383 Jurisdiction Responsibilities. Accessed at: https://www2.calrecycle.ca.gov/Docs/Web/119160#:~:text=Beginning%20in%202022%2C%20SB%201383,is%20automatically%20provided%20the%20service.

[126] NHA Advisors. 2016. Napa Solid Waste Project/Green Bond Designation. Available at: https://nhaadvisors.com/portfolio-items/napa-solid-waste-project-green-bond-designation/

[127] ReThink Waste. 2019. RethinkWaste Issues almost $50 million in Green Bonds for environmental upgrades to reduce greenhouse gases, reduce waste and improve recycling revenue at the Shoreway Environmental Center. Available at: https://rethinkwaste.org/wp-content/uploads/legacy_media/070119-rethinkwaste-green-bonds-final.original.pdf

Humboldt to build out the necessary infrastructure for local waste processing is considered a key first step to the region being able to achieve compliance with SB 1383.

With adequate infrastructure for local waste processing in place, then, continuing and completing the activities that meet SB 1383 complaince obligations, like the establishment of an edible food recovery program and ensuring adequate organic waste collection services on a jursidictional level can be expected to achieve the levels of diversion needed to reduce Humboldt's landfilled organic waste 75 percent by 2030. This level of landfilled organic waste reduction is expected to directly reduce solid waste disposal GHG emissions by 75 percent because nearly all GHG emissions from the natural decay of solid waste in landfills come from organic waste.[128] This Measure also includes several Actions focused on education and outreach campaigns to influence consumer behavior to produce less waste to begin with and to promote reuse, repair, and composting when possible to further divert waste from the landfill. For the region to comply with SB 1383, it will take partnerships and obtaining funding to build out the necessary infrastructure, jursidcitional support to develop programs and polcies that support waste diversion, and community engagement to change consumer behavior.

Table 34 shows the parameters and data sources that support the landfilled organic waste reduction GHG emission reductions and Table 35 shows the calculations as outlined in Equation 17.

Landfilled Organic Waste Reduction Equations

Equation 13 $CO_2e\ Reduction_{LOW,y} = CO2e\ Emissions_y * Reduction\ Target_{LOW,\ y}$

Table 34 Landfilled Organics Reduction Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 13				
$CO_2e\ Reduction_{LOW,y}$	Landfilled organic waste GHG emission reductions	See calculation table	MT CO_2e	Calculated
$CO_2e\ Emissions_y$	Landfilled organic waste GHG emissions	See calculation table	MT CO_2e	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Reduction\ Target_{LOW,\ y}$	Landfilled organic waste reduction percent	75	percentage	Estimated based on compliance with CalRecycle's required activities for SB 1383 compliance and GHG emission factors for solid waste.[1, 2]
y	Year	2030 or 2045	–	–

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. CalRecycle. SB 1383 Jurisdiction Responsibilities. Accessed at: https://www2.calrecycle.ca.gov/Docs/Web/119160#:~:text=Beginning%20in%202022%2C%20SB%201383,is%20automatically%20provided%20the%20service
2. According to the ICLEI U.S. Community Protocol, Appendix E, GHG emissions are generated by non-biologic wastes only if they are combusted.

128 According to the Local Governments for Sustainability (ICLEI) U.S. Community Protocol for Accounting and Reporting of Greenho use Gas Emissions, Appendix E – Solid Waste Emission Activities and Sources, GHG emissions are generated by non-biologic wastes only if they are combusted.

Table 35 Landfilled Organics Reduction GHG Emission Reduction Calculations

Variable	Definition	Units	2030	2045
Equation 13				
CO_2e Emissions	Landfilled organic waste GHG emissions	MT CO_2e	39,585	43,424
Reduction Target$_{LOW, y}$	Landfilled organic waste reduction percent	percentage	75%	75%
CO_2e Reduction$_{LOW}$	**Landfilled organic waste GHG emission reductions**	**MT CO_2e**	**29,689**	**32,568**

6 Strategy WW: Water and Wastewater

The Humboldt Regional Water and Wastewater Strategy aims to identify and establish decarbonization technologies suitable to the region's varied wastewater management systems. In addition to decarbonizing the wastewater sector, the strategy aims to prioritize co-benefits of potential wastewater processing technologies, such as the production of renewable fuels. Although wastewater contributed just 1 percent of the community's regional GHG emissions in 2022, the ongoing decarbonization of other sectors will increase the need to address emissions from sectors like wastewater. Therefore, the Water and Wastewater Strategy aims to set the region up for success by identifying viable alternatives in this phase of RCAP implementation.

Based on this strategy, the RCAP's strategy to manage wastewater systems is presented in Table 36. The table also indicates that the Measure is supportive as it does not directly result in GHG reductions at this stage. The following subsections provide further information on the benefits of the wastewater strategy.

Table 36 Strategy WW: Water and Wastewater GHG Emissions Reduction Summary

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
WW-1	Expand regional opportunities for implementation of wastewater decarbonization technologies such as anaerobic digesters to reduce GHG and produce renewable fuel sources.	Supportive	Supportive
WW-2	Reduce per capita potable water consumption by 15% by 2030.	Supportive	Supportive
Total		**0**	**0**

Notes:

Measure WW-1: Expand regional opportunities for implementation of wastewater decarbonization technologies such as anaerobic digesters to reduce GHG and produce renewable fuel sources.

Measure WW-1 focuses on expanding regional opportunities for the implementation of wastewater decarbonization technologies, including anaerobic digesters, throughout the Humboldt region. This measure aims to reduce GHG emissions from wastewater treatment processes and generate renewable fuel sources that can be used to decarbonize wastewater facility building energy or provide a supply of decarbonized energy to the community. It also investigates opportunities for expanding wastewater treatment capabilities to process organic waste that would otherwise go to landfill, supporting solid waste diversion and GHG reduction efforts. As this measure seeks to scope and assess viable options for the variety of wastewater facilities throughout the county, GHG emissions reductions are not quantified in the RCAP. However, this Measure will aid the jurisdictions in identifying and implementing future solutions for reducing GHG emissions from wastewater in future RCAP updates.

Measure WW-2: Reduce per capita potable water consumption by 15% by 2030.

Measure WW-2 focuses on promoting water conservation by reducing per capita potable water consumption and increasing access to and use of recycled water. The State is currently finalizing the Making Water Conservation a Way of Life regulation, which will set water conservation standards and objectives for certain categories with targets set for each urban water retailer. This measure's primary focus is providing support to water retailers in the region to align with the regulation as well as providing educational and outreach materials to promote water conservation in the community and from large water users. Additionally, the Measure encourages local water providers and wastewater services to work together to identify opportunities for expanding the recycled water network in the region. While the region does not currently have issues with accessing water, continued climate conditions strain water resources in the state. Expanding recycled water resources allow for water reuse for certain applications such as agricultural land irrigation or for wildfires rather than potable water. All water providers for the region operate fully in county-boundaries and therefore GHG emissions associated with water conveyance are incorporated into the building energy sector under regional electricity use. As such, to avoid double counting of emission reductions associated with electricity use in the region, GHG emissions reductions associated with this Measure are not quantified in the RCAP.

7 Strategy CS: Carbon Sequestration

The Regional Carbon Sequestration Strategy aims to increase both nature-based and industrial carbon sequestration within the community. While most of the Humboldt region's mitigation strategies focus on reducing GHG emissions, the Carbon Sequestration Strategy capitalizes on Humboldt's strengths and opportunities, particularly its ample forested areas and natural working lands. This strategy supports the statewide objectives, as described in the 2022 Scoping Plan, to leverage natural working lands (NWL) to reduce potential carbon losses and support sequestration of GHG emissions. The State recognizes that while on-the-ground action for local carbon sequestration and NWL management will largely be executed and managed by the local government, state agencies must support these communities to implement such actions which includes providing resources, developing implementation frameworks, and providing the increased capacity and technical assistance to the local and regional partners. The State plans to support local governments and partners through various initiatives, including the development of funding programs such as the Regional Forest and Fire Capacity Program. This program provides funding to local and regional groups to enhance their organizational capacity, enabling them to plan and implement wildfire and forest management projects based on their local expertise.[129]

The Carbon Sequestration Strategy emphasizes the identification and funding of both industrial and nature based physical removal of carbon from the atmosphere to store it in long-term forms, playing a crucial role in achieving carbon neutrality by 2045. It focuses on obtaining resource support from the State to obtain NWL objectives and developing private partnerships to explore alternative solutions for carbon sequestration, such as direct air carbon capture and sequestration.

While the region will reduce GHG emissions across all sectors to achieve as close to zero GHG emissions as possible, some GHG emissions are expected to remain under each jurisdiction's control in 2045. These GHG emissions are expected to be from hard-to-decarbonize sectors, such as long-haul transportation, which have technological limitations or are costly to decarbonize. They can also be expected from sectors that require significant behavior change to decarbonize, such as VMT reduction, because it takes time to normalize new behaviors. Carbon sequestration will offset these remaining GHG emissions to help Humboldt achieve carbon neutrality. While most of these strategies are not quantified in this RCAP, they are important to implement now to begin setting the foundation and building the capacity for the Humboldt region to sequester carbon for long-term carbon neutrality. Based on this approach, the RCAP's Carbon Sequestration Strategy consists of the Measures presented in Table 37. Each Measure is supportive due to data limitations. The following subsections detail the role of these supportive Measures.

[129] California Air and Resources Board (CARB). 2022. 2022 Scoping Plan for Achieving Carbon Neutrality. Available at: https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf

Table 37 Strategy CS: Carbon Sequestration GHG Emissions Reduction Summary

Measure ID	Measure	2030 GHG Emission Reductions (MT CO_2e)	2045 GHG Emission Reductions (MT CO_2e)
CS-1	Research and implement feasible carbon sequestration technology opportunities to support growth and expansion of green jobs industry within the region.	Supportive	Supportive
CS-2	Offset fossil-based emissions and increase carbon sequestration in the community by achieving SB 1383 procurement requirements (0.08 tons recovered organic waste per person) by 2030.	1,532	1,681
CS-3	Develop a County-wide Natural and Working Lands GHG Inventory baseline by 2027 to better understand the existing and future GHG sequestration and help obtain resources to protect and increase natural carbon sequestration occurring in the region as well as promote biodiverse forests and wetlands resistant to wildfire.	Supportive	Supportive
Total		**1,532**	**1,681**

Notes:

Measure CS-1: Research and implement feasible carbon sequestration technology opportunities to support growth and expansion of green jobs industry within the region.

In 2022, the State updated GHG emissions reduction targets such that 15 percent of the State's GHG inventory would be addressed through man-made carbon sequestration solutions in order to reach carbon neutrality.[130] In alignment with the State objective, Measure CS-1 directs the Regional Climate Committee to research the viability of carbon sequestration technologies for future regional development to aid in the reduction of GHG emissions and stimulate the growth of the green jobs industry in the area, such as utilizing the Eel River Basin as a CO_2 sequestration site.[131] Artificial (i.e. non-biological processes) carbon capture and sequestration technologies typically capture CO_2 from the atmosphere, or from point source emissions, and store the captured CO_2 in the natural environment.[132] However, with advancing need for solutions, other methods of carbon capture have begun to emerge, such as CO_2 capture from seawater.[133]

By assessing the feasibility of the carbon capture technologies available, the region will set the groundwork for later implementation of technologies which suit the areas and the community's needs. While this Measure does not lead to direct GHG emissions reductions at this stage, it sets Humboldt on a path to successfully meeting, or exceeding, 2045 GHG reductions targets.

[130] LegiScan. 2022. California Assembly Bill 1279. Available at: https://legiscan.com/CA/text/AB1279/id/2606946

[131] California Geological Survey. 2006. An Overview of Geological Carbon Sequestration Potential in California. Available at: https://www.conservation.ca.gov/cgs/Documents/Publications/Special-Reports/SR_183-Carbon-Report.pdf

[132] Nationalgrid. 2024. Carbon capture technology and how it works. Available at: https://www.nationalgrid.com/stories/energy-explained/carbon-capture-technology-and-how-it-works

[133] Massachusetts Institute of Technology. 2023. How to pull carbon dioxide out of seawater. Available at: https://news.mit.edu/2023/carbon-dioxide-out-seawater-ocean-decorbonization-0216

Measure CS-2: Offset fossil-based emissions and increase carbon sequestration in the community by achieving SB 1383 procurement requirements (0.08 tons recovered organic waste per person) by 2030.

Measure CS-2 puts the region on a path to meeting the SB 1383 procurement targets by 2030 and maintain it thereafter. SB 1383 requires each jurisdiction in California to procure recovered organics waste products to meet annual procurement targets developed by CalRecycle.[134] Recovered organic waste products include compost, mulch, renewable energy generated from anaerobic digestion (e.g., transportation fuel, electricity, and gas for heating), and electricity generated from biomass conversion. While a jurisdiction has the option to procure any combination of recovered organic waste products to fulfill 100 percent of its procurement target, jurisdictions in Humboldt currently aim to meet their procurement targets primarily through sourcing of compost to leverage the carbon sequestration benefits it provides when applied to community lands. However, local jurisdictions have expressed interest in potentially expanding procurement options, though more research must be conducted before committing to alternative options. The primary Actions that enable this Measure include:

- **Action CS-2a** which commits applicable jurisdictions to enforce compliance with SB 1383 by establishing a minimum level of compost application per year;
- **Action CS-2b** which directs jurisdictions, with support from the Regional Climate Committee, central to the regional agriculture industry to establish a compost broker program which provides incentives to aid procurement and distribution of compost.
- **Action CS-2d** which commits all jurisdictions to provide free compost procurement services to low-income households and small businesses.
- **Action CS-2f** which directs a collaborative research effort to identify regionally viable opportunities for sourcing non-compost organics options to meet SB 1383 procurement requirements, such as renewable natural gas or use of organics to produce green hydrogen.

These Actions will allow the jurisdictions to establish the supply and procurement of recovered organic products to meet their annual procurement targets. These actions and the region's organics infastructure limitations will be further supported by the funding and construction of local waste and organic processing infrastructure discussed in Measure SW-1. Table 38 shows the parameters and data sources that support the annual procurement targets and landfilled organic waste reduction GHG emission reductions, assuming 100 percent SB 1383 compliance through compost, associated with this Measure. Table 39 shows the calculations as outlined in Equation 14 through 14.1.

Compost Procurement Equations

Equation 14 $CO_2e\ Sequestration_y = (Compost_y * CSF_{Compost}) * Compliance\ Target_y$

Equation 14.1 $Compost_y = Population_y * (Ratio_{procure} * CF_{compost})$

[134] CalRecycle. Procurement Targets and Recovered Organic Waste Products. Accessed at: https://calrecycle.ca.gov/organics/slcp/procurement/recoveredorganicwasteproducts/.

Table 38 Compost Procurement Parameters and Data Sources

Variable	Definition	Value	Unit	Data Source
Equation 14				
$CO_2e\ Sequestration_y$	Carbon sequestered from compost procurement and application	See calculation table	MT CO_2e	Calculated
$Compost_y$	Compost procurement required to meet organic waste procurement target	See calculation table	compost tons	Calculated
$CSF_{compost}$	Carbon sequestration factor for mixed organic compost application	0.23	MT CO_2e/ feedstock ton	CARB[1]
$Compliance\ Target_y$	Compliance target with procurement requirement	100%	percentage	State required compliance with SB 1383[2]
y	Year	2030 or 2045	–	–
Equation 14.1				
$Population_y$	Forecasted population	See calculation table	persons	See references in Appendix GHG Inventory, Forecast, and Targets Technical Report
$Ratio_{procure}$	Organic waste procurement required per capita	0.08	feedstock tons/person	CalRecycle's Procurement Calculator Tool[3]
$CF_{compost}$	Conversion factor of organics to compost tons	0.58	compost tons/organic waste tons	CalRecycle's Procurement Calculator Tool[3]

Notes: "-" means either reference not applicable or see references for disaggregated parameter in the following table rows

1. CARB. Method for Estimating Greenhouse Gas Emission Reductions from Diversion Of Organic Waste from Landfills to Compost Facilities (2017). Accessed at: https://ww2.arb.ca.gov/sites/default/files/classic/cc/waste/cerffinal.pdf.
2. CalRecycle. Procurement Targets and Recovered Organic Waste Products. Accessed at: https://calrecycle.ca.gov/organics/slcp/procurement/recoveredorganicwasteproducts/.
3. CalRecycle. Procurement Calculator Tool. Accessed at: https://calrecycle.ca.gov/organics/slcp/reporting/.

Table 39 Landfilled Organics Reduction GHG Emission Reduction Calculations

Variable	Definition	Units	2030	2045
Equation 14.1				
$Population_y$	Forecasted population	persons	143,556	157,476
$Ratio_{procure}$	Organic waste procurement required per capita		0.08	0.08
$CF_{compost}$	Conversion factor of organics to compost tons		0.58	0.58
$Compost_y$	Compost procurement required to meet organic waste procurement target	tons	6,661	7,307
Equation 14				
$Compliance\ Target_y$	Compliance target with procurement requirement	percentage	100%	100%
$CSF_{compost}$	Carbon sequestration factor for mixed organic compost application	MT CO_2e/ feedstock ton	0.23	0.23
$CO_2e\ Sequestration_y$	**Carbon sequestered from compost procurement and application**	**MT CO_2e**	**1,532**	**1,681**

Measure CS-3: Develop a County-wide Natural and Working Lands GHG Inventory baseline by 2027 to better understand the existing and future GHG sequestration and help obtain resources to protect and increase natural carbon sequestration occurring in the region as well as promote biodiverse forests and wetlands resistant to wildfire.

Measure CS-3 directs the County to build off of North Coast Resource Partnership's 2017 Northern California regional natural working lands study to establish an updated County-wide Natural and Working Lands GHG Inventory baseline by 2027. This initiative seeks to provide a comprehensive understanding of current and future potential GHG sequestration within the county's natural and working lands. The Natural and Working Lands inventory baseline will be folded into future RCAP updates and used to establish GHG sequestration tracking metrics and monitor resiliency efforts. Further this measure includes strengthening the partnership with the North Coast Resource Partnership (NCRP) that received a $13.5 million grant from the Regional Forest and Fire Capacity Program to refine and implement the North Coast Resilience Plan.[135] Developing and strengthening this partnership may provide opportunities for the region to better implement and track projects maintaining and improving regional carbon stock.

Developing this Natural and Working Lands inventory will identify key areas where natural carbon sequestration is occurring and highlight opportunities to protect and expand these areas. By promoting biodiverse forests and wetlands that are resilient to wildfire, Measure CS-3 supports the dual goals of enhancing carbon sequestration and mitigating climate risks. This measure will help the region obtain funding and resources necessary for conservation and restoration projects, ultimately contributing to long-term climate resilience, biodiversity, and the health of natural ecosystems. With a baseline established, carbon sequestration can be effectively tracked and reflected in updates to the RCAP's GHG reduction measures. The region is anticipated to contribute significantly to the State's carbon sequestration efforts and may even serve as a larger sink than contributor, but this cannot be verified without a comprehensive inventory of carbon stocks in the region. Through this comprehensive approach, Humboldt can better manage its natural resources to maximize GHG sequestration and safeguard against environmental threats.

[135] North Coast Resource Partnership (NCRP). 2023. A Vision for North Coast Resilience. Available at: https://northcoastresourcepartnership.org/resilience-plan/wp-content/uploads/2023/04/NorthCoastVision_2023.03.11.pdf