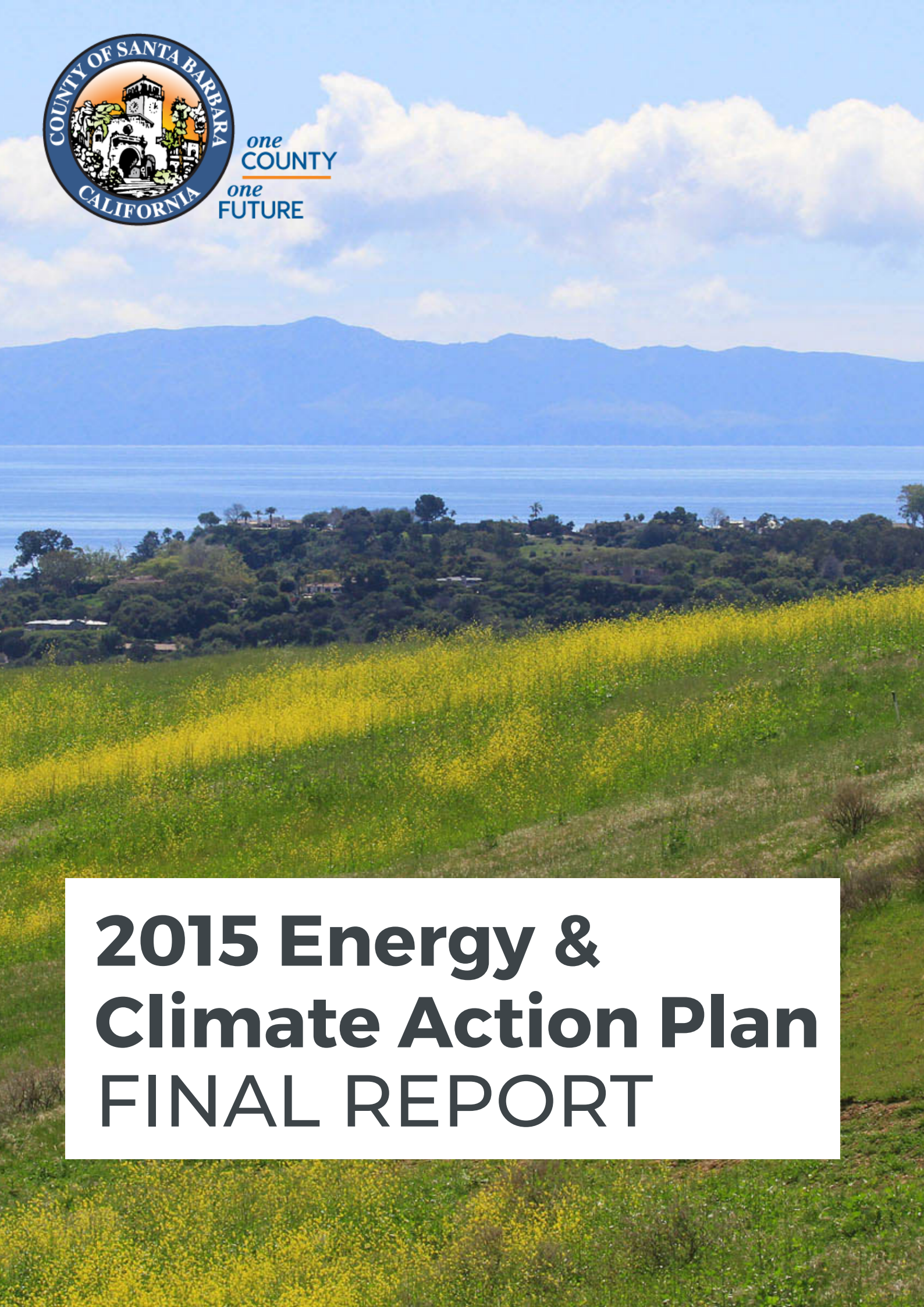

2015 Energy & Climate Action Plan
FINAL REPORT

A planning effort of the

Prepared by the
Sustainability Division
Community Services Department

Acknowledgements

Board of Supervisors
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Das Williams, 1st District
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Bob Nelson, 4th District
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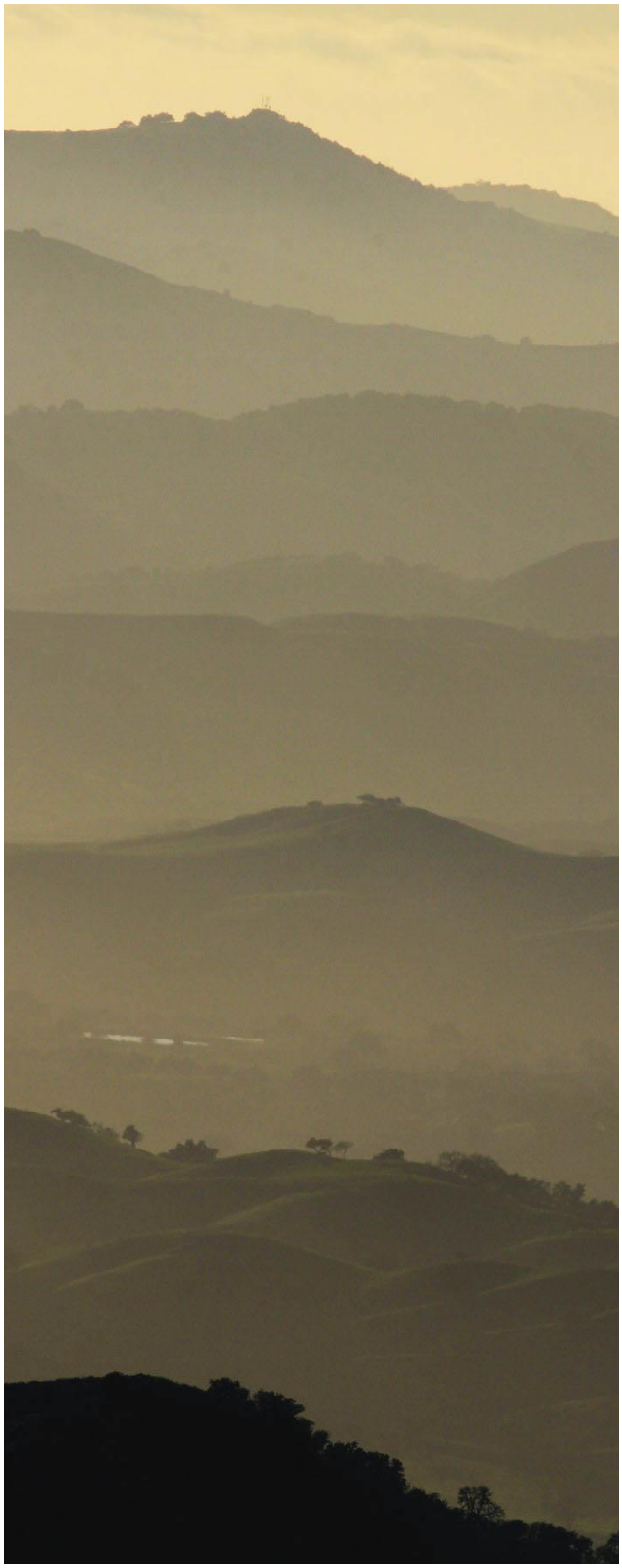
Parks Division

Planning & Development
Building & Safety Division
Long-Range Planning Division

Public Works Department
Transportation Division
Resource Recovery & Waste Management Division
Water Agency

General Services Department
Capital Improvements Division
Facility Management Division
Real Estate Services
Vehicle Operations
Agricultural Commissioner

Cachuma Resource Conservation District
Community Environmental Council
Santa Barbara County Association of Governments
Santa Barbara County Air Pollution Control District
Santa Barbara County Green Business Program



Credit Mark Bright

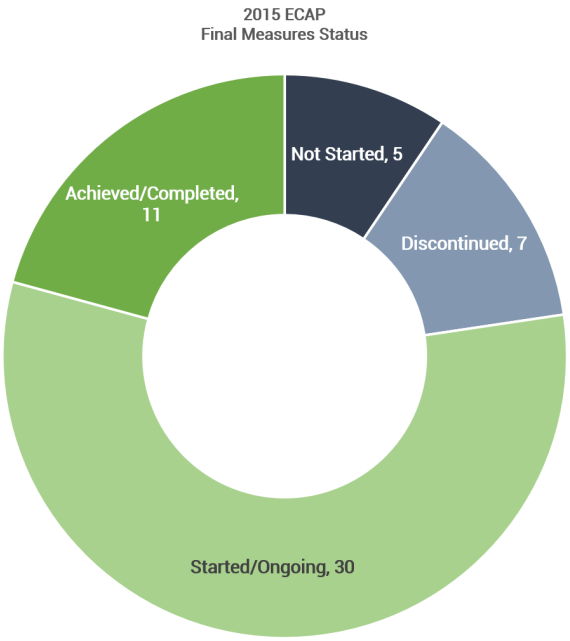
Executive Summary

In 2015, the County set a goal to reduce its emissions 15% (below 2007 levels) by 2020 by adopting the Energy & Climate Action Plan (ECAP). The ECAP identified 53 emission reduction measures (ERMs) to be initiated or achieved by 2020. The ECAP estimated that full attainment of the targets established for each of the ERM would help the County reduce or avoid new growth in its annual rate of emissions.

This report summarizes progress on actions that were identified in the 2015 Energy & Climate Action Plan (ECAP). The actions were broadly aimed at reducing local carbon emissions and better preparing the community for the impacts of climate change.

Measure Progress

- 41 out of 53 (77%) measures were either initiated or completed by 2020.
- 5 (9%) measures have not yet started.
- 7 (13%) measures were discontinued.



Emissions Reduction Progress

- An estimated 100,754 out of 226,760 (44%) metric tons of CO2e (MTCO2e) were reduced or avoided
- An additional 37,520 MTCO2e are to be reduced through implementation of Community Choice Energy by 2030
- An additional 18,494 MTCO2e per year are to be reduced through the full operation of the Tajiguas Landfill ReSource Center
- Combined, these additional reductions would achieve an estimated 156,768 MTCO2e in reductions, which would equate to 69% of the ECAP's reduction target

Staff and consultants have conducted a 2018 greenhouse gas emissions inventory and adjusted some methodologies from previous inventory years (2007, 2016). Greenhouse gas inventories provide a snapshot of the annual rate of emissions from the unincorporated County areas. The 2018 inventory reveals that over 1.4M metric tons of carbon dioxide equivalents (MTCO2e) were generated from the unincorporated County.

Table 1. Greenhouse Gas Inventories Comparison
Unincorporated County

Sector	Emissions (MT CO2e)		% Change from 2007	Primary Reason for change
	2007	2018		
Transportation	**523,159**	**700,706**	**34%**	Increase in commuting and goods movement; change in methodology
Building Energy	**381,074**	**390,105**	**2%**	Increase in commercial natural gas use
Off-Road	**126,416**	**75,463**	**-40%**	Change in methodology
Agriculture	**163,577**	**195,140**	**19%**	Increase in fertilizer use and livestock population
Solid Waste[1]	**91,920**	**52,168**	**-43%**	Decreased waste sent to landfill, change in methodology
Waste & Wastewater	**5,482**	**14,184**	**159%**	Change in methodology
TOTAL	**1,291,628**	**1,427,766**	**11%**	

1. Waste-in-place emissions are no longer included

This represents a 3% decrease from 2016, but still 11% over from 2007 baseline levels. A full inventory memo is included as an appendix to this report which provides detailed methodologies.

Through evaluating the ECAP's progress, we have learned some valuable lessons that will be carried forth into the County's next climate action plan.

- **Measures with an educational/outreach component or are driven by voluntary participation limit achievement potential.** *Voluntary measures must be complemented with regulatory or administrative mechanisms to assure a target is achieved.*
- **Strength of a measure is important to ensure that it is well-conceived and implementable**. *Future measures need to be developed with the departments or agencies responsible in order to ensure robustness and feasibility.*
- **Lack of dedicated funding and staff limits the ability of all implementing parties to achieve the plan's goals.** *Implementation of the next CAP measures and actions needs to be integrated into existing plans, programs, projects and departmental work plans and budgets.*
- **Too many measures and actions to implement and track, with limited emissions reduction potential.** *The next CAP will feature focus areas and be structured to ensure the greatest amount of impact that can be feasibly achieved.*

Introduction

Credit Mark Bright

Climate change is altering local climatic conditions like increased temperatures and prolonged, more severe drought that impacts the productivity of agriculture in our county and imperils life and property through events such as the Thomas Fire that began in December 2017 and subsequent 1/9 Debris Flow. These two events claimed the lives of 23 residents, damaged or destroyed more than 600 properties, cost an estimated $50 million in impacts to public infrastructure, reduced the assessed value of affected properties by $1.2 billion, and resulted in $2.9 million in lost tax revenues in 2018 and an estimated $3.6 million in 2019.

In 2015, the County set a goal to reduce its emissions 15% (below 2007 levels) by 2020 by adopting the Energy & Climate Action Plan (ECAP). The ECAP identified 53 emission reduction measures (ERMs) to be initiated or achieved by 2020. The ECAP estimated that full attainment of the targets established for each of the ERM would help the County reduce or avoid new growth in its annual rate of emissions.

The Sustainability Division was initially created to monitor and report on plan implementation, but did not have resources or capacity for directly implementing measures. Two progress reports were prepared for 2016 and 2017, with a greenhouse gas inventory conducted for the year 2016. While progress was being made across a variety of ECAP, the 2016 inventory revealed that annual emissions had actually increased by 14% since 2007.

The Board of Supervisors adopted a more ambitious reduction target of 50% (below 2007 levels) by 2030. The Board directed staff to develop a new climate action plan in collaboration with regional partners and stakeholders and to include measures to bolster regional resilience.

Over the past five years, major changes and shifts have taken place. The County has increased its capacity to secure funding, develop and implement climate mitigation and adaptation projects and programs, and policies. This includes transformative actions such as creating the Tri-County Regional Energy Network (3C-REN) in partnership with San Luis Obispo and Ventura counties, joining a community choice energy program and nearing the completion of the Tajiguas Landfill ReSource Center.

Significant events have also impacted the County's ability to achieve its goals, including the Thomas Fire and the ongoing COVID-19 pandemic. However, these events have also galvanized people to come together to support those in need.

This third and final report summarizes progress on actions that were identified in the 2015 Energy & Climate Action Plan (ECAP). The actions were broadly aimed at reducing local carbon emissions and better preparing the community for the impacts of climate change.

Some of the actions were specific to the County, and some actions were shared with other agencies and partner organizations. Looking at progress by the sections, the distribution of actions that are started, completed, not started or discontinued can be put into deeper context.

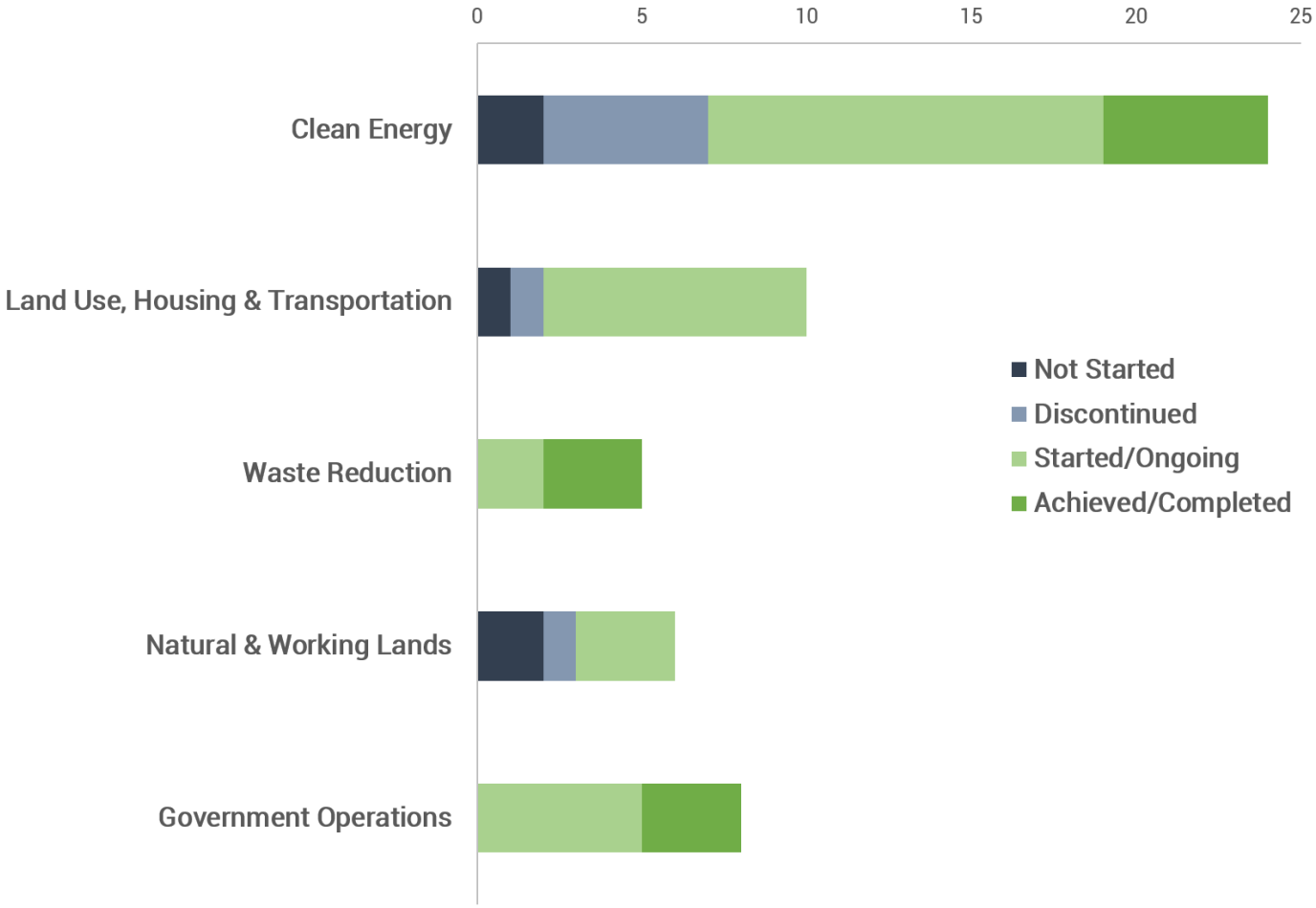
For instance, Clean Energy has the most completed actions and has the most action items overall. Comparatively, Waste Reduction has the fewest actions, but the highest achievement rate. Each section of this report provides short narrative summaries of a few of the completed actions. The status of each individual measure can be found in the appendix to this report.

While there are many implementation stories to point to, it should also be noted that not all the measures in the plan have been successful or impactful. In some cases, shifting priorities or a lack of resources have prevented work; in others, strategies identified in 2015 are no longer relevant in today's context. This report details some of the obstacles and challenges that have played out over the implementation phase of the plan.

Finally, in preparing this report we took the opportunity to reorganize the sections of the plan to better reflect the outline of the future 2030 Climate Action Plan.

Energy & Climate Action Plan Progress by Section

- 41 out of 53 (77%) measures were either initiated or completed by 2020.
- 5 (9%) measures have not yet started.
- 7 (13%) measures were discontinued.



2015 Energy & Climate Action Plan Highlights

Adopted Strategic Energy Plan

Joined Central Coast Community Energy

Launched the Tri-County Regional Energy Network

24 agriculture irrigation evaluations 2019 - 2020

293 landscaping tools replaced through Landscape Equipment Electrification Fund

36 tractors replaced for lower emissions since 2017

Adopted **Santa Ynez Bicycle Master Plan**

71,626 homes retrofitted for energy efficiency

1,144 affordable housing units created

240 new homes **exceeding energy code**

672 infill units built

50 New Fleet Electric Vehicles

70 Charging Stations installed

94 Green Certified Businesses

Greenhouse Gas Inventory

The GHG emissions covered by the ECAP are created from activities like driving, burning natural gas for heating and cooking, sending trash to the landfill, and applying fertilizer. The ECAP does not include emissions from large regulated sources of emissions like oil and gas operations or power plants. These "point sources" are regulated at the State and Federal level, as well as through permits that must be obtained from the County and the Santa Barbara County Air Pollution Control District. The ECAP also does not account for the large emissions contribution from wildfires, as there is not yet a standardized way for estimating these emissions.

Sector	Emissions (MT CO2e)		% Change from 2007	Primary Reason for change
	2007	2018		
Transportation	**523,159**	**700,706**	**34%**	Increase in commuting and goods movement; change in methodology
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1. Waste-in-place emissions are no longer included

Progress & Challenges

Challenges beyond the County's control and jurisdiction significantly influenced its ability or inability to implement certain actions or achieve progress.

In December 2017, the Thomas Fire burned nearly 282,000 acres and over 1,000 buildings across Santa Barbara and Ventura counties. At the time, the Thomas Fire was California's largest fire in modern history. It is now the seventh largest fire. Following the Thomas Fire, heavy rains caused a devastating debris flow event in the community of Montecito causing 23 fatalities, destroying more than 100 homes, damaging more than 300 other homes, and shutting down Highway 101 for nearly two weeks. Disaster response and post-disaster recovery consumed the County and the community, straining resources and capacity for little else.

In March 2020, the State of California and the County issued lockdown orders to prevent the spread of COVID-19. Business and school restrictions severely disrupted daily life. The most vulnerable people were disproportionately affected, many of whom are still working on the front lines and living in high-risk conditions like overcrowded housing. Dealing with the pandemic and its collateral impacts has, once again, been nearly all consuming for the County.

These events have tested the resolve and resilience of the County and the community. Despite the challenges, new partnerships, networks and collaborations have been formed focused on meeting the climate crisis head on. Now as the community emerges from the pandemic, more attention will be focused on economic recovery and equity.

Top and middle photos: Credit Mark Bright
Bottom photo: Credit Jacqueline Pilar / Foodbank of Santa Barbara County photo. Originally published by Noozhawk.

Lessons Learned

Some of the projects, policies and programs identified in the ECAP have not met the ideals for impact, equity, inclusion, or accountability that were originally envisioned. In addition, not all actions identified in a plan will be completed or remain relevant given shifting community and political priorities, new information and science, and additional implementation experience. Some of the ECAP's shortcomings, however, offer important insights that must be learned from so that the next iterations of climate action will be more effective.

Evaluation of the ECAP was conducted through an Existing Conditions Emissions Reduction Evaluation (ECERE) tool, completed by various County departments and partner organizations. Through evaluating the ECAP's progress, we have learned some valuable lessons that will be carried forth into the County's next climate action plan.

- **Strength of a measure is important to ensure that it is well-conceived and implementable**. The ECERE evaluated all ECAP measures to determine if they had a clear objective, strategy to attain, potential funding, metrics and a responsible party. The most commonly identified missing attributes were metrics to measure progress and potential funding. Lack of specificity or measurability of actions contributed to limited achievement. Additionally, there were instances where the performance metric did not line up with what is trackable. *Future measures need to be developed with the departments or agencies responsible in order to ensure robustness and feasibility.*
- **Measures with an educational/outreach component or are driven by voluntary participation have limited achievement potential.** Measures that rely on voluntary action by residents or businesses are difficult to ensure the progress necessary to achieve the ECAP's target. They are also more challenging to measure, which then leads to estimations and extrapolations that reduce confidence in the measure's robustness. *Voluntary measures must be complemented with regulatory or administrative mechanisms to assure a target is achieved.*
- **Lack of dedicated funding and staff limits the ability of all implementing parties to achieve the plan's goals.** The Sustainability Division came into being shortly after the ECAP was adopted and was charged only with monitoring plan implementation with modest funds. Additionally, funding and staffing requests have often competed with other priorities across the County, limiting departments' ability to fully implement various measures. *Implementation of the next CAP measures and actions needs to be integrated into existing plans, programs, projects and departmental work plans and budgets.*
- **Too many measures and actions to implement and track, with limited emissions reduction potential.** The ECAP featured 53 emission reduction measures and 222 actions. In order to be a qualified climate action plan per CEQA[1], the ECAP required measures and actions with quantifiable reduction estimates. However, the ECAP did not reflect the reality of the County's ability to implement or track so many measures to their fullest extent. Additionally, a number of the measures had a very low or no potential emissions reduction associated with them. *The next CAP will feature focus areas and be structured to ensure the greatest amount of impact that can be feasibly achieved.*

[1] California Environmental Quality Act § 15183.5(b)

Looking Ahead

Planning and development of the 2030 Climate Action Plan began in mid 2020. We are incorporating lessons learned and building off of local advancements. Through the 2030 CAP we seek to:

- **Integrate Equity & Resilience.** The County established an Equity Advisory & Outreach Committee (EAOC), bringing together organizations that represent marginalized and under-resourced communities. Recognizing historical and structural inequities, the County has established a budget to provide stipends to eligible participants to compensate them for the expertise and experience they bring. The EAOC provides input, guidance and feedback on the County's One Climate projects.
- **Prioritize & Structure Measures to Improve Success.** With less than 10 years to achieve our goal, we must be strategic and realistic about what we can achieve. Some measures take more time and effort than others, while some are more impactful than others. With this CAP, we have to focus on the County's strengths and actions that can achieve depth, speed and scale when it comes to emissions reductions. Additionally, there are other organizations and entities that are better suited and positioned than the County to implement certain activities.
- **Leverage Partnerships & Collaboration.** There are many stakeholders and partners at the local and regional level that the County leads or supports in climate-related efforts. For example, in Building Energy and Energy Generation, the utilities, Central Coast Community Energy and the Tri-County Regional Energy Network, will be the primary entities that will increase renewable energy sources, reduce use of fossil fuels in buildings, and support vehicle electrification. In transportation and goods movement, there are a variety of agencies involved. The County is but one stakeholder in regional planning, transit services and transportation projects. In these situations, the County must target gaps in policy, programs and projects, rather than try to lead on all fronts.
- **Focus on priority sectors.** We generally know what needs to be done. With limited resources and time to implement, we must be strategic in focusing our efforts on the highest emitting sectors and the most impactful reduction measures. With the transition to Central Coast Community Energy, energy efficiency becomes less effective in reducing emissions compared to reducing natural gas usage through electrification. With commercial energy use and vehicle trips constituting over half of the community's emissions, it will be more efficient and effective to focus on business policies and programs.

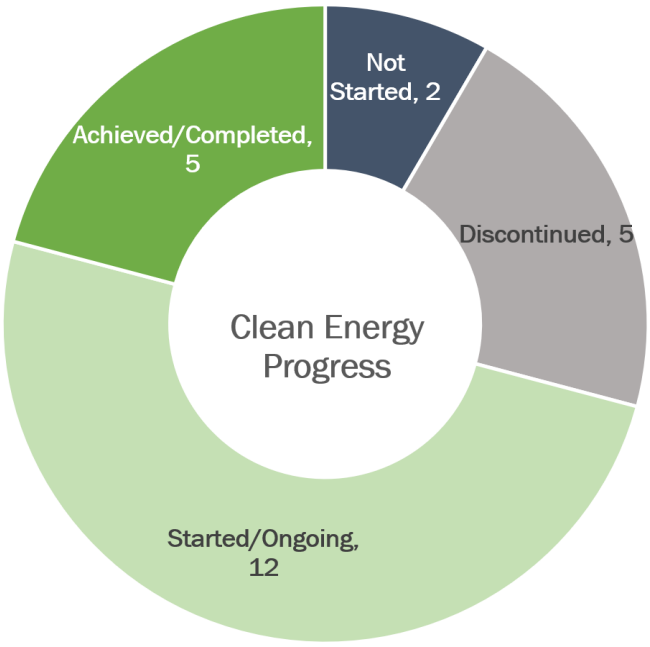
Clean Energy

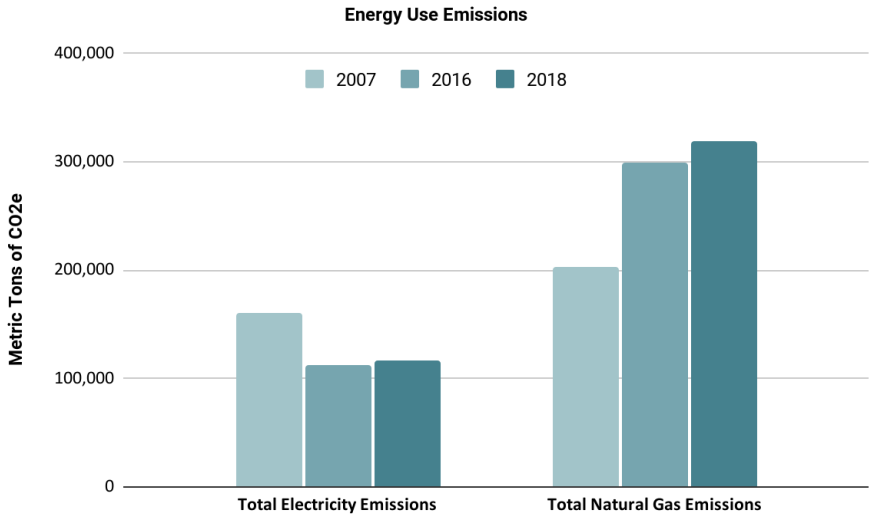
(Image Source: Tri-County Regional Energy Network)

This section encompasses the 2015 ECAP sections of Community Choice Energy, Built Environment, Renewable Energy, and Industrial Energy Efficiency.

Since 2007, electricity and natural gas usage has increased by 34% and 23% respectively, despite a modest 7% increase in population. The increase can be attributed to growth in economic activity.

Emissions from electricity have not increased as sharply due to increasing use of renewable energy for electricity generation by PG&E and SCE.





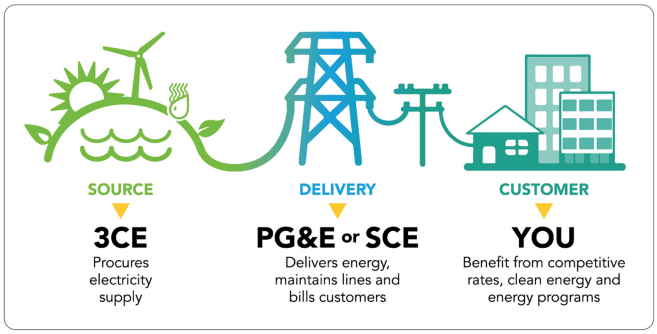
Highlights

Significant transformations have taken place in which local governments have taken greater roles in the energy landscape. In collaboration with Ventura and San Luis Obispo counties, the County launched the Tri-County Regional Energy Network (3C-REN), to provide tailored programs and services to increase energy efficiency in new and existing buildings, through customer programs, workforce development and training.

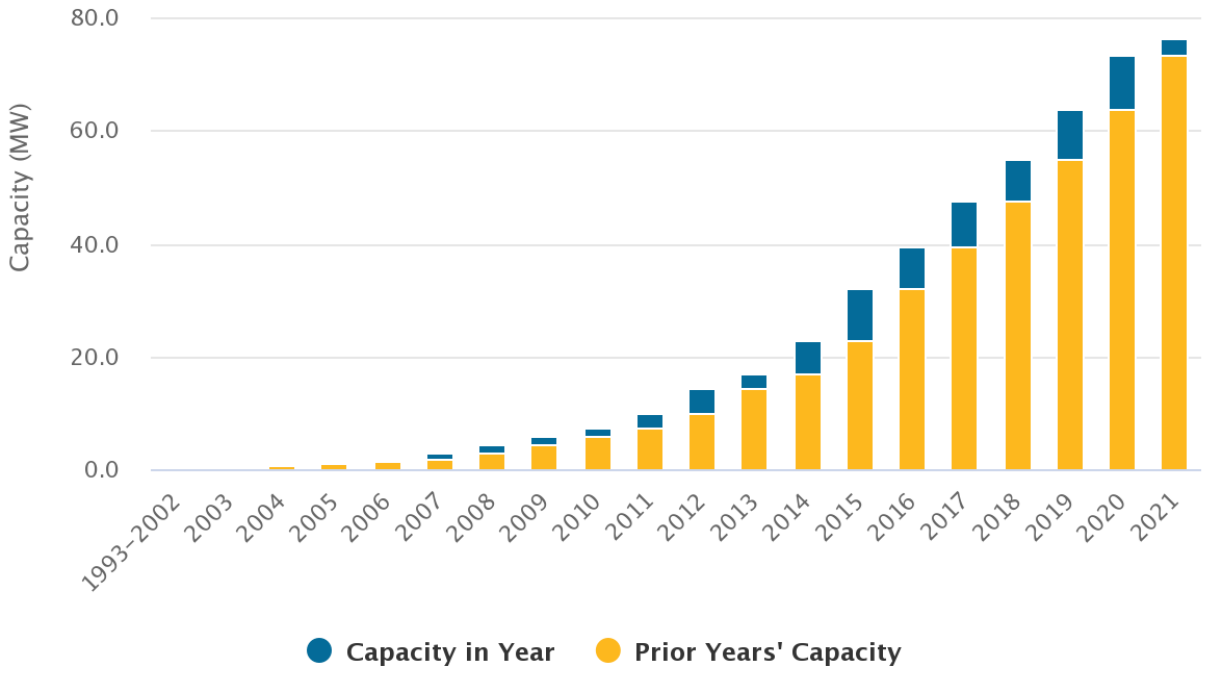
In 2020, 3C-REN held over 50 events engaging over 900 attendees in architecture, building trades, construction and code compliance industries. The Energy Code Connect program offered 16 courses dedicated to topics such as Home Energy Rating System (HERS) features, energy modeling, Quality Insulation Installation (QII) and commissioning. The Building Performance Training program held 33 events on topics such as the building envelope, Passive House, business development skills, and Green Designation for realtors.

In 2019, the County joined with Monterey Bay Community Power (MBCP) to implement community choice energy. Cities, with the exception of Lompoc and Santa Barbara, also voted to join MBCP. MBCP soon renamed itself Central Coast Community Energy, or 3CE, to complement its regional identity. In January 2021, 3CE launched its service to residential and commercial customers in North County, Santa Maria, Guadalupe and Solvang. 3CE's default energy product increases customers' use of renewable energy to 31% and puts the County on the path to achieve 100% renewable energy by 2030.

Central Coast Community Energy



Locally Installed Solar Capacity
(Source: California Energy Commission)



In the years since the Thomas Fire, the specter of blackouts and Public Safety Power Shutoff (PSPS) events due to high wind and/or heat events, and local wildfires continues to threaten the public health and safety. These events have increased the need for developing more resilient energy systems to ensure vulnerable populations and critical facilities are not left without power.

Challenges

Residential energy programs are challenging to implement with scale and speed due to a variety of factors. Residents that have the ability to make changes and upgrades within their homes tend to do so based on factors that do not always consider energy implications. Changes in technology, like heat pump water heaters or even solar panels, require thoughtful consideration and planning even before embarking on an installation project that requires financial, technical and bureaucratic savvy to navigate. Future programs need to consider the lengths at which residents have to go in order to adopt these technologies. For renters, future programs should be designed to appeal to both the renters and landlord, offering increased comfort, energy savings, and building investments.

Approximately 41,000 residential customers consume 46% of the natural gas consumed annually in the unincorporated County, whereas approximately 1,200 commercial customers consume 54%. This simple dynamic underscores the need to focus on large commercial customers with both policies and programs in order to efficiently target resources and achieve deep reductions.

Current energy programming (emPower and 3C-REN) is focused on residential customers. The emPower Central Coast program, which provided homeowner energy efficiency education and services since 2011, was discontinued after 2018 due to lack of utility support. However, 3C-REN has permanent status as an energy efficiency program administrator and secured $50 million in funding through 2025. 3C-REN will focus on delivering programs to underserved customer segments, like low-income,

non-English speaking, rural and agriculture sectors. Future programs need to focus on commercial and industrial uses, prioritizing reductions in natural gas consumption, in order to realize significant emission reductions.

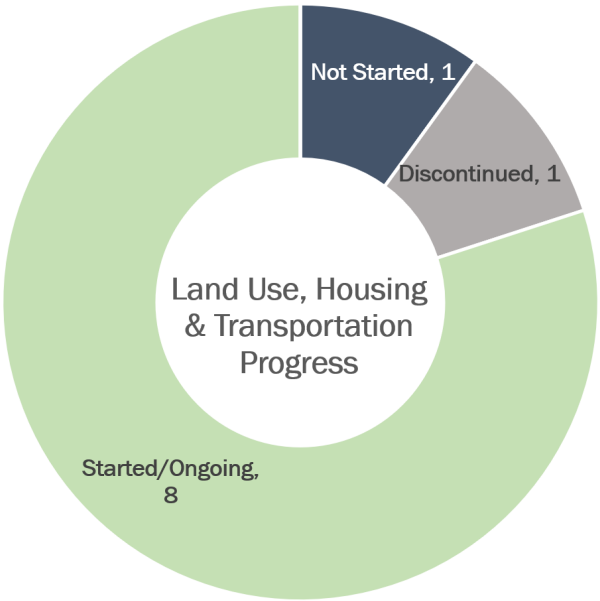
Looking Ahead

- **100% Renewable Energy by 2030:** 3CE has developed a new power procurement strategy to achieve 100% renewable energy by 2030 that will generate and support local energy projects and job creation.
- **Building Electrification:** Both 3C-REN and 3CE are offering customer incentive programs focused on building electrification. The City of Santa Barbara recently adopted a local health and safety code that prohibits natural gas infrastructure in new buildings, excluding restaurants. The State Green Building Code will be updated in 2022, requiring 'electric-ready' construction. Building electrification is seen as the most effective approach to reducing building emissions.
- **Energy Resilience:** The Sustainability Division recently launched an Energy Assurance and Auditing Service to identify critical community facilities and assess the potential for renewable and resilient energy systems and are developing a utility-scale solar ordinance for private landowners.

Land Use, Housing & Transportation

(Source: SBCAG)

The transportation sector accounts for 49% of local carbon emissions. These emissions include the fossil fuels consumed by personal and commercial vehicles, public buses, and aviation activity at the Santa Ynez Airport. Taken together, transportation emissions are the single largest source of emissions in Santa Barbara County. This section encompasses the 2015 ECAP sections of Sustainable Communities Strategy, Land Use Design & Transportation.

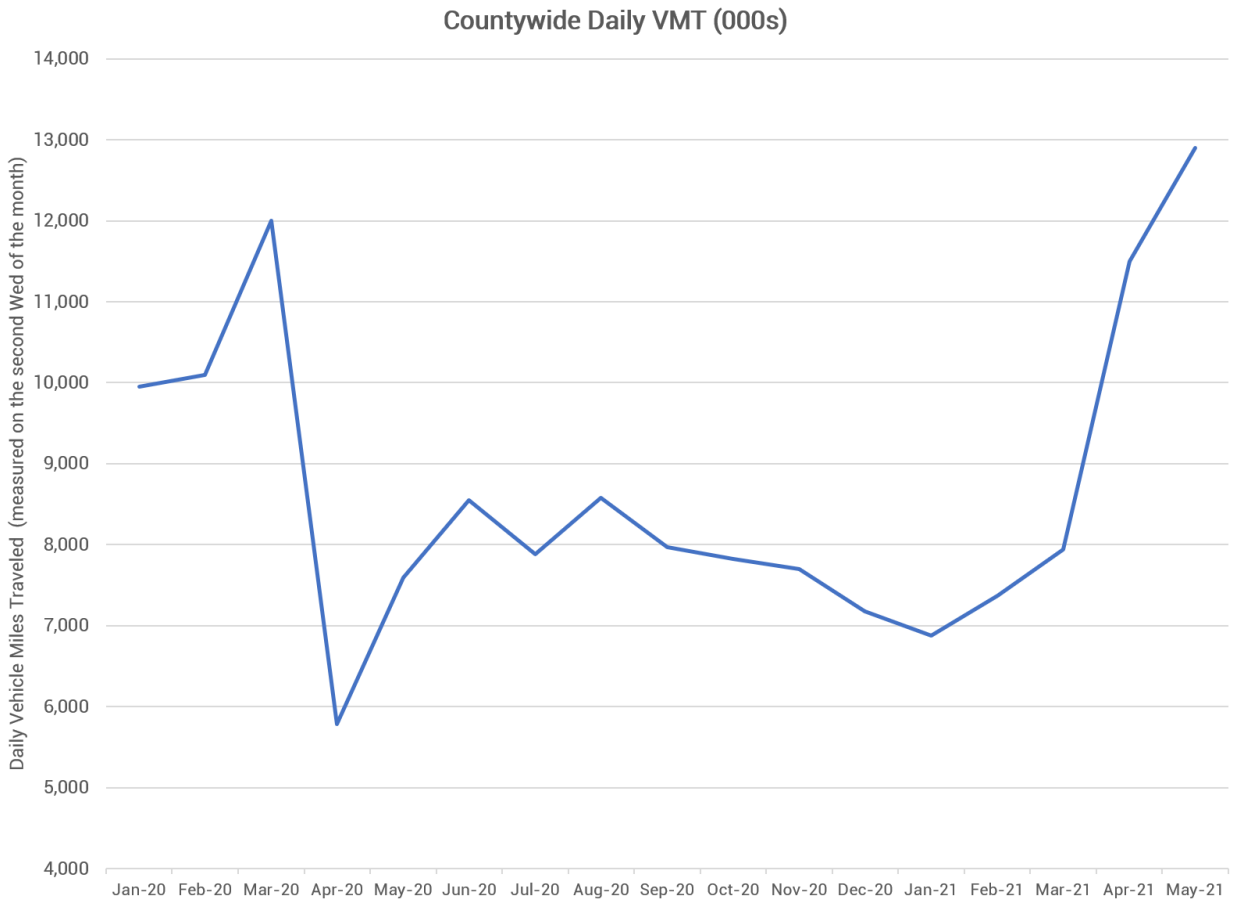


Highlights

Passenger cars, mostly commuters, contribute to 46% of total vehicle miles traveled (VMT) and over 30% of transportation emissions. Passenger vehicle transportation emissions are influenced by the region's suburban and rural makeup necessitating long distance commutes.

Long range commuting is driven by a complex and complicated confluence of housing availability and affordability, economic opportunities, transportation policies and investments. The Transportation

measures primarily focused on reducing vehicle trips by promoting carpooling and active transportation such as walking and biking. Most measures were implemented modestly or not at all due to the County's limited influence on transit operators and commuting behaviors. The COVID-19 pandemic significantly impacted commuting patterns throughout the region. In March 2020 alone, daily vehicle miles traveled (VMT) dropped over 40%, but has sustained an average 20-30% below pre-pandemic activity in the past year. Rebounding economic activity Rebounding economic activity has returned commuting to pre-pandemic levels.

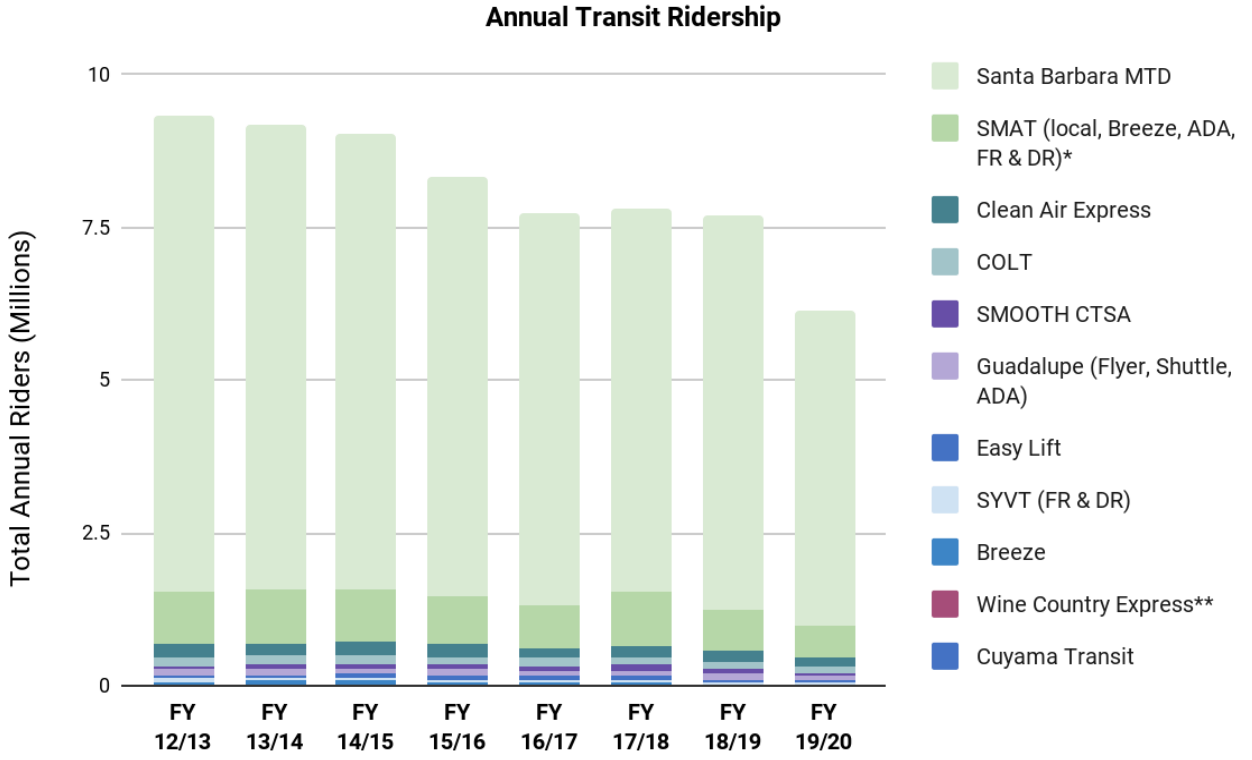


Sustainable Communities Strategy (SCS) seeks to tie land use and transportation planning to reduce GHG emissions from passenger vehicles. The county's regional transportation planning body, the Santa Barbara County Association of Governments (SBCAG), incorporates SCS principles into its Regional Transportation Plan (RTP) that outlines county-wide transportation priorities over 20+ years. Despite the plan, regional per capita vehicle miles traveled did not meet the established target. This was largely as a result of housing production in North County outpacing South County.

The RTP-SCS only covers passenger vehicles. Commercial vehicles that move goods and materials in and out of the County account for less than 10% of the region's vehicle miles traveled (VMT) and 25% of the transportation-related carbon emissions. Going forward, transportation strategies must prioritize the commercial sector in order to meaningfully reduce emissions.

The Land Use Design measures were successful in meeting the 2020 targets for infill development and affordable housing, both of which have the potential to permanently reduce vehicle trips due to long commutes, but are limited given the respective impact compared to existing land use patterns.

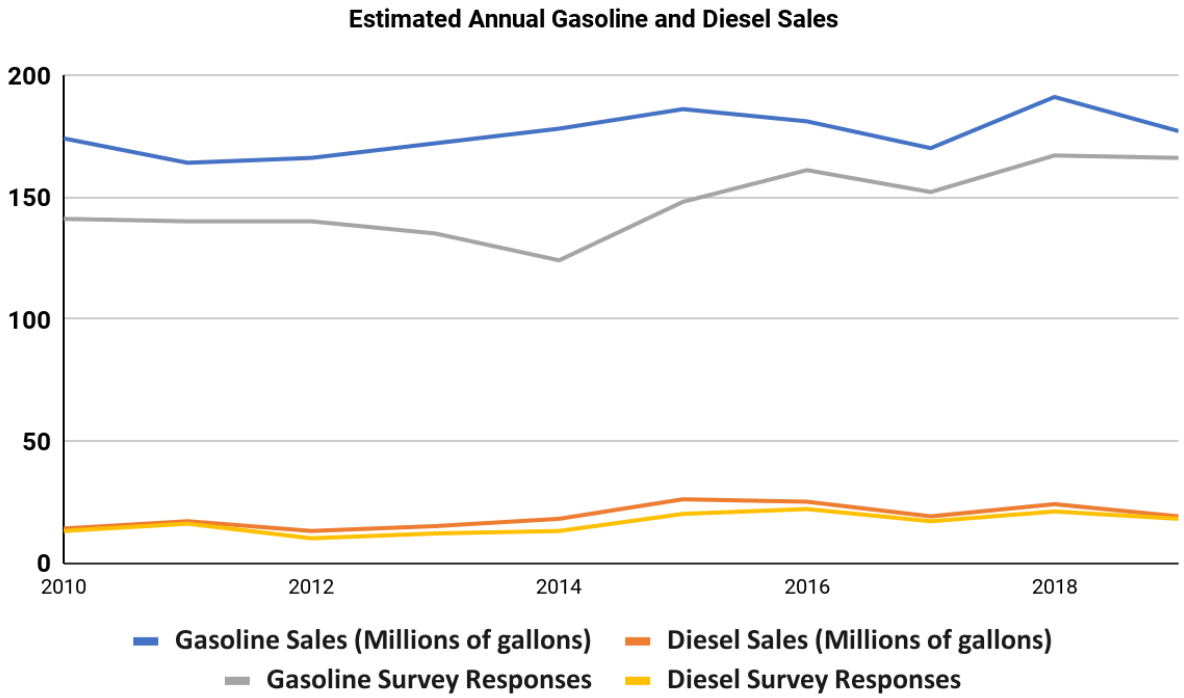
Recognizing that commuter traffic had dropped to unprecedented levels, SBCAG's Traffic Solutions division launched a South Coast Measure A funded effort to help businesses and employees overcome the immediate challenges that arose with the sudden transformational shift to a then unknown world of telework. Traffic Solutions' vision to support the shift to telecommuting, and to embrace opportunities for its success, expanded to become a regional collaboration with the San Luis Obispo Council of Governments, Ventura County Transportation Commission, Transportation Agency for Monterey County, and Kern Council of Governments. Together the regional transportation agencies conducted a telework survey and subsequently analyzed 544 responses which informed and developed a four-part webinar series available for free for managers and employees. Hundreds of people tuned into the webinar resources which were also recorded and posted as a series called Best Practices and Tips for Telework: COVID-19 and Beyond at www.TrafficSolutions.org.



Transit ridership, particularly on commuter focused services such as the Clean Air Express and Coastal Express services, have fallen by 60-70% since March 2020. However, transit ridership has slowly been declining for many years in general.

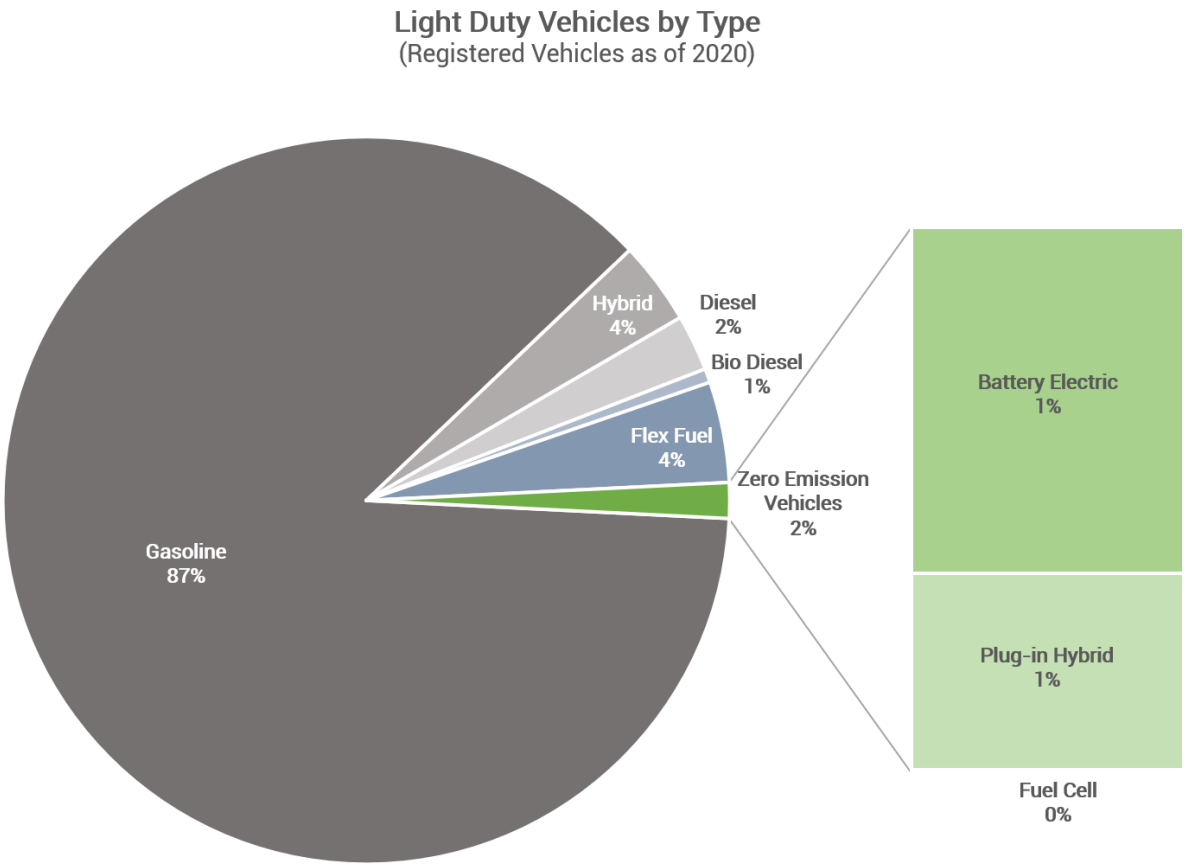
Challenges

An annual survey conducted by the California Energy Commission of fueling stations within the County shows that local fuel consumption has stayed relatively flat over the past decade. This could be considered good news when considering the fact that the County population increased by 18% over the same period.



Building affordable and accessible housing near job centers is the most sustainable solution to reducing vehicle trips. However, it is one of the most complex and drawn-out solutions due to the complexities with local policy, environmental analysis, community engagement, financing hurdles, and ultimately, the design and construction phases. The county as a whole is to accommodate 24,856 more dwellings within the next decade to meet the State requirement under the Regional Housing Needs Assessment. The County and local jurisdictions must update their respective housing elements, zoning codes and policies, where available land is sparse and expensive, in order to facilitate this significant increase in population.

In order to address the vehicles on the road that cannot be mitigated through community design and housing, transitioning to low-emission vehicles is necessary. Across the County, adoption of electric vehicles has barely reached 1% of all passenger vehicles. Even if electric vehicles constituted 15% of all vehicles (matching the State's 2025 goal to reach 15% of sales), the resulting emissions reduction would be less than 2%.



Light, medium and heavy duty trucks (primarily used for construction and goods movement) constitute 54% of total VMT and roughly 70% of emissions. With the majority of emissions and congestion coming from commercial activity, the County's efforts would be more impactful by focusing on programs and policies that affect commercial vehicles rather than passenger vehicles.

While there is a lot of activity and hype in electric options for passenger vehicles, less progress has been achieved in goods movement (freight). Several automakers have previewed all electric freight trucks and the investor owned utilities (IOUs) have announced funding for fast charging for commercial vehicles. Both are anticipated to become available in the coming years.

Businesses that rely on goods movement vehicles need technical support, funding, public infrastructure and regulatory certainty in order to adequately assess, plan, prepare and invest in a future electric fleet. This is an area that is not well researched or developed from a public policy perspective, particularly in the Central Coast region.

Travel modeling and policies currently rely on resource-intensive models and estimates that are ultimately outdated once they are created. Near ubiquitous smart phones provide real time user data that can be anonymously tracked for the purposes of urban planning and transit services. The County can work collaboratively with SBCAG and other jurisdictions to procure a regional subscription to real time travel data services to inform a variety of policies and projects.

Looking Ahead

- **Trip Efficiency:** The County adopted a new framework for evaluating and limiting the transportation impacts from development projects by establishing VMT (vehicle miles traveled) thresholds for development review. The new thresholds will seek to improve the VMT 'efficiency'

of projects through location selection, project design, transit and pedestrian infrastructure, and travel demand management programs. Projects that are unable to reduce VMT onsite, may have to pay in-lieu fees or finance projects in the region that reduce VMT elsewhere.

- **Vehicle Electrification:**
    - The California Electric Vehicle Incentive Project (CALeVIP) is slated to bring up to $15M in funding for Level 2 and DC Fast Charging in the tri-county region starting in Fall 2021. The goal would be to fund enough charging infrastructure in the region to support the state's goal of 1.5 million zero-emission vehicles in California by 2025. CALeVIP is being delivered in partnership with Central Coast Community Energy, Clean Power Alliance, Ventura County Regional Energy Alliance, Central Coast Clean Cities Coalition, Community Environmental Council, and the air pollution control districts of Santa Barbara, Ventura and San Luis Obispo counties.
    - SBCAG and the Central Coast Coalition were awarded $200,000 under the Fiscal Year 2021-22 Caltrans Sustainable Transportation Planning Grant Program to develop a Central Coast Zero Emission Vehicle Strategy.
    - SBCAG will purchase an electric bus for its Clean Air Express commuter service, becoming one of the first intercity service electric coaches in the state and across the nation. SBCAG has partnered with the County to develop a bus charging location at the Calle Real campus, leveraging the County's current project to install more than 40 electric vehicle chargers at this location.

Waste Reduction

(The anaerobic digester facility at Tajiguas Landfill will process organic waste material, generating methane for energy generation and compost. Source: Resource Recovery & Waste Management Division)

Close to 70% of the carbon emissions from the food and goods that we buy are associated with producing, transporting and selling those products. While recycling and composting help reduce disposal emissions, the majority of carbon emissions are generated before we even purchase the products. To achieve carbon reduction goals, individuals, businesses, governments, and other organizations not only need to recycle and compost but also make more sustainable production and purchasing decisions.

Highlights

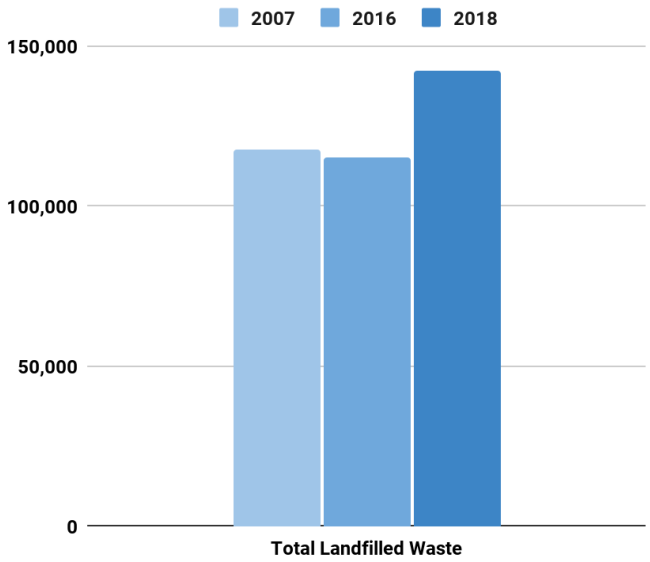
In 2017, the General Services Department adopted an Environmentally Preferred Purchasing Policy (EPPP). The EPPP encompasses the best practices of requesting and using products and/or services that are environmentally friendly & sustainable.

County staff conducted outreach to all commercial customers who must comply with the organics recycling provisions of AB 1826 to ensure compliance. The Business Food Scraps Collection program saw increased participation, including one school in the unincorporated county and six in Goleta in 2017. Participation has increased to 76 business customers and is continuing to expand. Additionally, the County launched the Food Forward initiative to give the community the tools they need to keep food out of the landfill.

In 2019, the County collaborated with MarBorg Industries to provide drop-off locations for textiles at the South Coast Recycling and Transfer Station and MarBorg's recycling facility in Goleta. Textiles that cannot be reused are shredded and converted into industrial rags. This program has the potential to divert significant amounts of textiles from the approximately 5,000 tons of textiles currently buried at the Tajiguas Landfill each year.

In 2021, the County completed the construction of the ReSource Center (formerly known as the Tajiguas Resource Recovery Project). This facility serves the County's unincorporated communities of the South Coast, Santa Ynez Valley, and Cuyama Valley as well as the cities of Santa Barbara, Goleta, Buellton, and Solvang.

This facility is one of the largest greenhouse gas reduction initiatives for the County to date. Total reductions from green energy, increased recycling, and avoidance of future landfill methane emissions is the equivalent of over 28,000 vehicles on the road per year. This facility will also increase the total waste diversion rate for affected communities above 85%.



Challenges

The County recognizes that while consumption patterns carry a carbon footprint beyond what is sustainable for a stable climate, many of our community members lack resources to purchase basic goods and services they need for their families to thrive.

This has been especially true during the COVID-19 pandemic as use of personal protective equipment has become nearly universal. Restaurants have resorted to using plastic bags and single-use cutlery in order to stay in business through takeout operations.

The pandemic also impacted the ReSource Center construction delaying its completion several months as labor was reassessed, reassigned, and trained to comply with social distancing rules and other safety practices.

As government and community work to address the issue of sustainable consumption, this tension between reducing emissions from consumption for some, while seeking to increase access to necessary goods and services for others, must be considered.

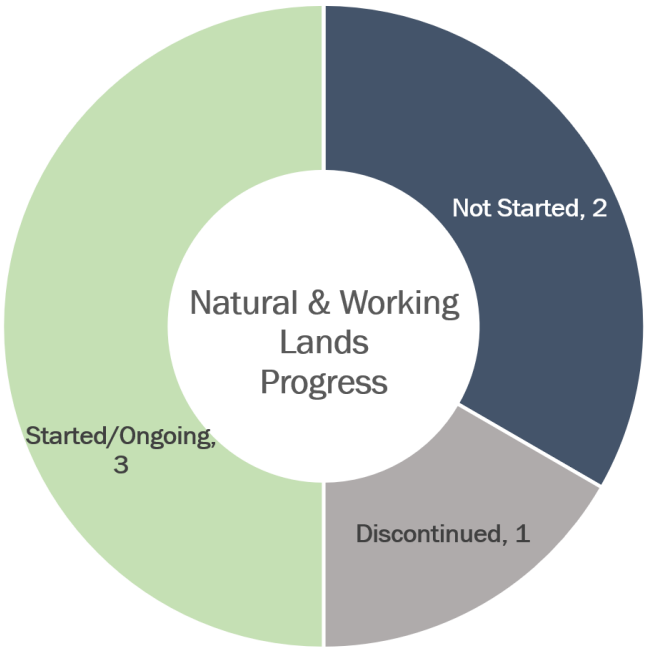
Looking Ahead

- **Managing Resources Responsibly:** With the opening of the ReSource Center, programs, services and education may need to adjust in order to ensure residents and businesses continue to understand the value of source separation in the age of advanced materials recovery.

Natural & Working Lands

Credit: Mark Bright

Land stewardship that sequesters carbon will be essential to meeting the County and State's future climate goals as well as enhancing biodiversity, increasing water retention, and fostering wildfire resilience. This section expands upon the Agriculture section of the 2015 ECAP.



Highlights

The ECAP measures for Agriculture focused on improving efficiency of operations, localizing distribution of food and supporting carbon sequestration. The County, however, lacks both authority and capacity to meaningfully encourage or enforce changes in land management, and must work with partners such as the Cachuma Resource Conservation District and the Land Trust of Santa Barbara County.

To support this growth area of climate action, the County secured two grants totaling over $870,000 in 2019.

A $154,000 grant from the California Department of Conservation is enabling the County to utilize a new GIS tool that will estimate the carbon stock of the region's agricultural and natural lands. This tool, called TerraCount, would enable the County and local landowners to understand and value the carbon and ecosystem benefits and tradeoffs in land use and land management practices.

A $716,860 grant from the California Natural Resources Agency is supporting the design and construction of the New Cuyama Greenway Project. The project will significantly enhance one of the only active recreational parks in the Cuyama Valley by planting 175 drought tolerant trees and constructing a 0.65 mile pedestrian pathway.

Challenges

Land owners, farmers and ranchers understand and appreciate the need to improve soil health and carbon sequestration on the lands they manage. Some are motivated and eager to implement projects to increase biodiversity and biomass such as habitat restoration or native planting. Unfortunately, these kinds of activities are suppressed by a complicated mix of financial and regulatory barriers.

Land managers need financing in order to implement new projects, some of which could yield valuable benefits like carbon offsets (or mitigation units[2]). However, entry into a carbon market can be cost-prohibitive and time-intensive. Conversely, local governments and organizations with carbon reduction goals, and project developers in need of offsets for plan approvals, need available projects with a strong preference for local ones that meet a certain standard.

In order to facilitate local sequestration projects, the County will need to engage with a variety of public and private stakeholders to address existing barriers and provide supportive services.

Looking Ahead

- **Promoting Land Stewardship:** The County and regional partners recognize the need for enabling local landowners and managers to invest in carbon sequestering practices. The County is participating in informal working groups across the region to explore the development of a regional carbon offset market and other means to spur local projects. A regional carbon offset market could streamline processes, lower costs to developing carbon offset projects and increase connections to local prospective buyers of offsets.

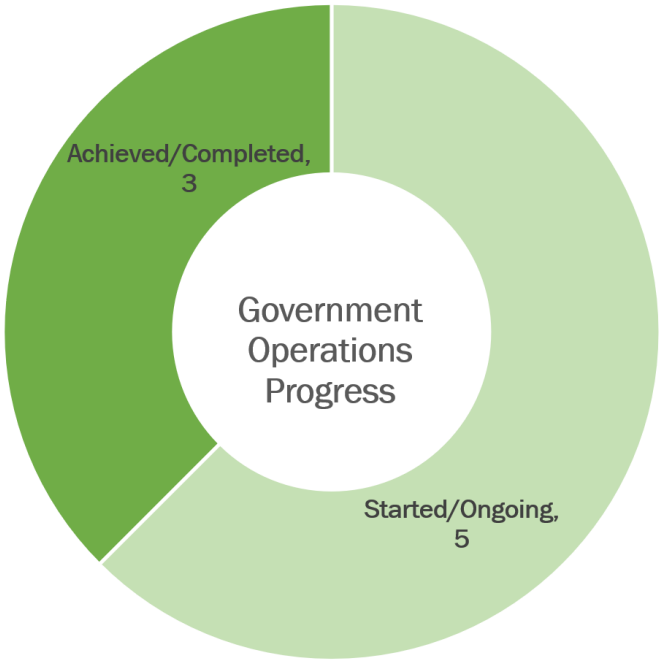
[2] Forward mitigation units are ex ante credits for a project that is expected to reduce or sequester carbon in the future.

Government Operations

(Source: SBCAPCD)

The County has the greatest potential and opportunity to reduce emissions with direct control over its facilities and operations.

The General Services Division has solar and energy efficiency projects underway at Betteravia Campus and Fire Station 12 (Goleta) with the intent to achieve Zero Net Energy (ZNE), energy resilience, carbon emission reductions and reduced utility and maintenance costs. The Betteravia Campus project includes 800 kW solar system, a lithium ion battery energy storage system, daylight harvesting solar tubes, and LED lighting and building controls. In addition, the project includes connections for up to 30 future electric vehicle charging stations. The Fire Station 12 project includes LED lighting upgrades and a solar system.



General Services initiated the procurement of 56 electric vehicles to replace fossil-fueled fleet vehicles. General Services is currently in the process of installing 67 Level 2 charging stations and 3 fast charging stations for fleet and public use at facilities across the county. Approximately 240 sedans of the 965 Light Duty fleet vehicles would eventually be eligible to be replaced with full electric vehicles in the upcoming vehicle procurement cycles.

Prior to COVID, various departments piloted teleworking on a limited basis as a means to improve employee satisfaction and reduce commuting trips, with less than 5% of employees participating. During the shutdown, over 33% of employees were telecommuting.

Challenges

The General Services Division has been overwhelmed and understaffed with existing workload, new projects and unforeseen challenges posed by COVID-19. Additionally, sustainability projects must compete for funding and staff time among other projects that may have priority.

Looking Ahead

- **Zero Net Energy:** General Services continues to advance a multitude of energy projects including: zero net energy construction of Santa Barbara Probation Headquarters, Cuyama Fire Station; backup energy storage at the Emergency Operations Center; and the Calle Real Master Plan.
- **Work, Reimagined:** Emerging from the post-shutdown period, the Human Resources Department proposed a Distributed Teams Hybrid Work Model that would allow employees to work remotely or onsite, based on function and preferences. This would continue to avoid commuting trips, and perhaps lead to consolidation of workspaces and offices.

Community Engagement & Climate Resilience

Credit Joe Mahany on behalf of Community Environmental Council

Collaborative partnerships and an engaged community are key to meeting the County's climate action and adaptation goals. County staff have initiated and partnered on several collaborative efforts to enhance regional capacity to respond to climate change and to build partnerships to support the development of the 2030 Climate Action Plan and other efforts.

Highlights

The Sustainability Division partnered with the Community Environmental Council to implement a series of Climate Resilience Roundtables, focusing on the six key climate challenges for the Central Coast. Two events on wildfire and smoke and sea level rise were held, gathering nearly 300 participants, offering resources and ideas to tackle the region's challenges.

Four additional Roundtables were initially planned through 2020 to cover extreme heat, drought, extreme precipitation and decreased snowpack (water supply), however the pandemic forced the program to pivot. The next two roundtables focused on elevating voices from frontline populations who are already experiencing climate change impacts. The final two events convened key stakeholders to sift through and prioritize potential collaborative initiatives to bolster regional resilience. Of over 700 ideas that were generated from the series of events, 16 were prioritized.

In partnership with local jurisdictions and agencies, the Sustainability Division launched the Santa Barbara County Regional Climate Collaborative. The Collaborative is a regional membership-based

network of agencies, nonprofit and for-profit entities and community-based organizations focused on identifying regional challenges and solutions that no one single entity can address. At the time of drafting this report, the Collaborative has 18 dues-paying members and four subcommittees including: Clean Energy Assurance, Land Stewardship & Carbon Farming, Sea Level Rise Adaptation, and Equity Advisory & Outreach.

The Sustainability Division and SBCAG Traffic Solutions collaborated to pilot the Cool Blocks program in Isla Vista. Cool Blocks is a community-oriented program that recruits and trains citizen leaders to organize their neighbors to learn about sustainability and emergency preparedness and implement lifestyle changes to reduce their carbon footprint.

Staff have also engaged with the Central Coast Climate Justice Network (CCCJN). The CCCJN is composed of Ventura and Santa Barbara community-based organizations that focus on environmental and social justice issues. County staff seek to partner with the CCCJN order to engage residents that have been traditionally excluded from community planning efforts and decision-making.

Before the end of 2020, the County launched the One Climate Initiative to reaffirm its leadership and provide a platform to launch several high profile efforts. In addition to the 2030 Climate Action Plan, other projects include:

- **Active Transportation Plan (ATP) –** The ATP will combine the update efforts of the Bicycle Master Plan (led by the Public Works Department) and the Circulation Element (led by the Planning & Development Department). The ATP will provide an opportunity to communicate goals, projects, policies and programs to address the County's current and future transportation needs.
- **Safety Element & Adaptation Plan** – The Safety Element must be updated to address climate adaptation and resilience strategies, per SB 379. Various studies have been prepared assessing sea level rise and transportation infrastructure vulnerability but a comprehensive assessment has not been prepared for the inland areas or other impacts such as drought, increased temperatures and extreme heat. The climate change vulnerability assessment will inform land use policy updates and a separate climate change adaptation plan.
- **Central Coast Community Energy (3CE) Enrollment** – In 2019, the Board joined 3CE (formerly Monterey Bay Community Power) to implement community choice energy. Community choice energy enables local governments to have greater control of where their energy comes from and invest in local projects and programs, delivering local benefits and jobs. In 2021, 3CE will enroll all residential and commercial electric customers.

- **Strategic Energy Plan (SEP)/Energy Assurance Plan (EAP)** – In 2019, the Board of Supervisors adopted the SEP, which calls for the development of an Energy Assurance Plan to prepare communities for the increased frequency and duration of power outages through resilient, low carbon energy systems like solar and energy storage. The EAP will engage operators and stakeholders of critical facilities and community centers that would serve as places of refuge during power outages and emergencies.
- **Environmental Justice Element** – The Environmental Justice Element is a new component to the County's General Plan. This will address the historical challenges that communities of color and low-income populations have faced due to their proximity and exposure to environmental hazards, both manmade and natural.
- **Housing Element** - The Housing Element (Update) will assess the County's housing inventory of undeveloped or underdeveloped parcels, and update zoning policies and housing programs to ensure the County can meet future regional housing needs for all income levels.

One Climate provides a branding and marketing platform to engage the community with simple and easy-to-understand language and a one-stop shop for the County's climate-related efforts.

Challenges

Collectively, public agencies face challenges in meaningfully engaging with the community, outside of interested stakeholders. Residents face many barriers to civic engagement from language and technology access, to childcare and lost wages.

The Equity Advisory & Outreach Committee was established by the Sustainability Division and is now transitioning to the Collaborative. The Committee faces complex policy topics and issues presented by just one agency and will continue to be further burdened as more Collaborative members engage them.

Looking Ahead

- The State of California recently adopted a $15 billion Climate Resilience Budget to build wildfire resiliency, address drought impacts and bolster water resilience, protect vulnerable communities from climate risks, advance the state's zero emission vehicle goals, promote climate smart agriculture, and support the circular economy providing the County with a historic opportunity to address a multitude of climate and equity challenges and reshape the regional economy.
- The Sustainability Division is leading a collaborative effort with several County departments, the City of Santa Barbara and the Tri-County Regional Energy Network to work with the Santa Barbara County Promotores to engage the Spanish-speaking community on a range of sustainability and urban planning issues. This pilot project may serve as a model for sustained engagement across the region.

Conclusion

The Energy & Climate Action Plan provided an important roadmap over the last five years to ensure continued progress toward the County's carbon reduction goals.

The plan was written knowing that circumstances would change, and the scientific body of knowledge would also grow. Scientific understanding and our lived experiences of the climate crisis have changed substantially in recent years. The need for bold action on climate has never been greater, nor has the opportunity or the urgency for the County to lead been more important.

The residents, businesses and organizations of our community have in many ways been the true leaders over the past several decades and in more recent years, especially during the Thomas Fire, 1/9 debris flow and the COVID-19 pandemic.

This spirit of community support and solidarity will be needed as we look ahead to write a new chapter of bold climate action. In conclusion, there is a lot more left to do. The need to go farther and be better aligned with community priorities is clear. County leadership and staff stand ready to do so.

We are One County with One Future.

Appendix I - Implementation Final Evaluation Table

County of Santa Barbara 2015 Energy & Climate Action Plan Implementation Tracker								Total Emissions Achievement	100,754	226,760	44%
Action #	**Action Name**	**Description**	**Agency/Dept Lead**	**Status**	**Metric**	**2017 Progress**	**2020 Actual**	**2020 Target**	**Achieved Reductions**	**Anticipated Reductions**	**Percent Achievement**
AG 1	Local Food Programs	Increase local food production and distribution.		Started/Ongoing	Not measured			No target	N/A	N/A	N/A
AG 2	Agricultural Conservation Practices	Promote the use of science-based agricultural practices.	Cachuma Resource Conservation District	Started/Ongoing	Not measured			No target	N/A	N/A	N/A
AG 3	Agriculture Equipment	Work with the SBCAPCD to increase the use of alternatively fueled equipment in agricultural operations through education, incentives, or revisions to existing regulations.	County Community Services	Started/Ongoing	Number of tractors and bailers replaced through Carl Moyer program	31 (in 2017)	131 (total since FY15/16)	1,515	512	5,800	9%
AG 4	Energy Efficient Agriculture Operations	Increase agriculture-related energy conservation through appropriate and technology.	Cachuma Resource Conservation District	Not Started	Not measured			No target	N/A	N/A	N/A
AG 5	Agriculture Irrigation Improvements	Continue to support the programs of the USDA Natural Resource Conservation Service, Resource Conservation Districts, UCCE/Farm Advisor, utility companies, and others that address efficient irrigation because of their associated energy benefits.	Cachuma Resource Conservation District	Discontinued	Not measured			No target	N/A	1,660	N/A
AG 6	Agricultural and Open Space Conservation Easements	Facilitate the increased use of policies to protect carbon-sequestering environments and to support local resource-based industries.	Land Trust of Santa Barbara County; County Planning & Development; County Community Services	Not Started	Not measured			No target	N/A	N/A	N/A
BE 1	Energy Efficiency Education and Outreach	Increase public energy conservation and awareness; provide information and education to the general public, businesses, and organizations on the importance of energy conservation and available programs, products, and incentives regarding energy efficiency and alternatives; promote existing low-income energy conservation and weatherization programs; and coordinate with local utility providers and nonprofit corporations to develop additional energy-efficiency programs.	County Community Services	Discontinued	Not measured			No target	N/A	3,150	N/A
BE 10	Construction Equipment Operations	Implement best management practices (BMPs) for construction equipment operation; examples of BMPs include reduced equipment idling, use of alternative fuels or electrification of equipment, and proper maintenance and labeling of equipment.	County Planning & Development	Discontinued	Not measured			No target	N/A	990	N/A
BE 11	Energy Code Training	Maintain and strengthen the existing training of Planning and Development, Building and Safety Division personnel to remain proficient and consistent in reviewing plans for compliance with the energy code.	County Community Services	Started/Ongoing	New metric: Percent of jurisdictions with staff receiving energy policy technical assistance		21%	No target	N/A	N/A	N/A
BE 2	Energy-Efficient Renovations	Incentivize homeowners and commercial and industrial building owners to improve the energy efficiency of existing buildings upon renovation or alteration; support and provide resources for tax credits, grants, loans, and other incentives to assist the public, businesses, and local agencies with the purchase of energy-efficient equipment.	Energy Utilities	Not Started	Number of retrofitted homes	1,072	1,626	4,530	5,606	15,480	36%
BE 2	Energy-Efficient Renovations	Incentivize homeowners and commercial and industrial building owners to improve the energy efficiency of existing buildings upon renovation or alteration; support and provide resources for tax credits, grants, loans, and other incentives to assist the public, businesses, and local agencies with the purchase of energy-efficient equipment.	Energy Utilities	Not Started	Number of retrofitted non-residential buildings	58	72	120	0	0	60%
BE 3	Green Business Participation	Increase participation in the Santa Barbara County Green Business Program (GBP).	Santa Barbara County Green Business Program	Achieved/ Completed	Number of Certified Green Businesses	27	94	100	4,578	4,870	94%
BE 4	Energy Scoring and Audits	Educate and promote energy efficiency upgrades of buildings, and disclose energy use history when nonresidential buildings are leased or sold.	County Community Services	Not Started	Not measured			No target	4,883	20,670	
BE 5	Community Forestry	Maintain and expand the drought-tolerant and native tree population.	County Public Works	Started/Ongoing	Number of trees planted	990	1,211	3,000	258	640	40%
BE 6	Smart Grid Technology	Support the local utility providers' implementation of smart grid technology in new and existing residential and nonresidential properties.	Energy Utilities	Achieved/ Completed	Percent of electricity customers with smart meters	95%	100%	85%	3,941	3,350	118%

County of Santa Barbara 2015 Energy & Climate Action Plan Implementation Tracker								Total Emissions Achievement	100,754	226,760	44%
Action #	**Action Name**	**Description**	**Agency/Dept Lead**	**Status**	**Metric**	**2017 Progress**	**2020 Actual**	**2020 Target**	**Achieved Reductions**	**Anticipated Reductions**	**Percent Achievement**
BE 7	Lawn and Garden Equipment	Increase the use of electric or alternative-fuel lawn and garden equipment through the development of an exchange or rebate program.	SBAPCD	Started/Ongoing	Number of electric landscaping equipment funded	0	293	2,690	5	50	11%
BE 8	Energy Efficiency and Green Building Standards	Implement energy efficiency and green building practices in new and existing developments to exceed the California Green Building Standards Code (Title 24) standards.	County Planning & Development	Achieved/Completed	Number of new homes exceeding Title 24 requirements	130	239	420	1,201	2,110	57%
BE 9	Efficient Building Design	Assist architects, builders, and others in using state-of-the-art energy technology, design, and spatial orientation for more efficient buildings; increase the use of passive solar design and daylighting in existing and new structures	County Community Services	Started/Ongoing	Number of unique Building Performance Training (BPT) attendees	N/A	296	No target	N/A	N/A	N/A
CCE	Community Choice Energy	Increase the amount of renewable energy used to a minimum of 50% by 2020 through a CCE program or other renewable energy procurement programs.	County Community Services	Started/Ongoing	Percent of default renewable energy provided to the community	SCE 32%/ PG&E 33%	SCE 35.1% / PG&E 28.5% (2019)	50	0	37,520	0%
GO 1	Energy Efficiency and Retrofits, Education, and Financing	County facilities shall be retrofitted and designed to improve energy efficiency, particularly where a reasonable return on investment can be realized. Promote energy conservation through educational and competition-based programs and expand efforts to finance energy-efficiency projects.	County General Services	Started/Ongoing	Percent electricity reduction in County facilities	13	13	25	1,175	2,260	52%
GO 2	Zero Net Energy	Design and construct all new Santa Barbara County-owned facilities and major renovations to achieve zero net energy.	County General Services	Started/Ongoing	kWh produced by solar energy systems on County buildings	3,619,100	3,619,100	4,080,310	860	970	89%
GO 3	Fuel-Efficient and Alternative Fuel Vehicle Fleet	The County shall purchase fuel-efficient and alternative fuel vehicles for the County fleet, to the maximum extent feasible.	County General Services	Achieved/ Completed	Percent of new vehicles to be fuel efficient	4.8	38	5	760	100	760%
GO 4	Commute Trip and Fuel Use Reductions	The County shall continue to make every effort to meet its Transportation Demand Management (TDM) objectives to reach its designated rate of participation specified in the TDM Ordinance, and to reduce fuel use during business activities.	County General Services; Human Resources	Achieved/ Completed	Reduction in County fleet emissions from TDM practices (from 2007)	9.6	17.7	10	1,734	980	177%
GO 5	Environmentally Preferable Procurement	The County shall procure products made from recycled materials to the maximum extent possible and as budget constraints allow.	County General Services	Started/Ongoing	Not measured			No target	N/A	N/A	N/A
GO 6	Water Efficiency & Conservation	Reduce water use in County facilities by 20 percent over forecasted levels by 2020 following SBX7 (the Water Conservation Act of 2009) and by 20 percent over forecasted levels by 2035.	County Public Works	Achieved/ Completed	Percent reduction in indoor water use at County facilities	27	30	20	N/A	N/A	150%
IEE 1	Efficient Equipment Incentives	Support legislation for tax credits, grants, loans, and other incentives to assist the public, businesses, and local agencies with the purchase of energy-efficient equipment.	County Community Services	Discontinued	Not measured			No target	N/A	1,710	N/A
IEE 2	Energy Management Programs	Increase industrial energy user participation in energy management programs such as the EnergyStar Benchmarking Program to ensure the efficient use of energy resources and proper operation of equipment and facilities.	Energy Utilities	Discontinued	Not measured			No target	N/A	310	N/A
IEE 3	Efficient Upgrade Incentives	Implement energy-efficiency upgrades at industrial facilities through streamlining permit review, providing rebates for audits, and highlighting best practices among similar energy users.	Energy Utilities	Discontinued	Not measured			No target	N/A	5,190	N/A
IEE 4	Efficient Equipment	Increase the use of energy-efficient or EnergyStar-rated equipment at new or renovated industrial facilities.	Energy Utilities	Discontinued	Not measured			No target	N/A	1,050	N/A
LUD 1	Infill Development	Promote Infill Development	County Planning & Development	Achieved/ Completed	new units built in infill locations	389	672	420	736	460	160%
LUD 2	Transit-Oriented Development	Coordinate office, commercial, industrial, and high-density residential developments with mass transit service and existing or proposed bikeways.	County Planning & Development	Started/Ongoing	Sq ft of new mixed use developments	192,967	213,289	508,510	510	1,240	42%
LUD 3	Affordable Housing	Work to increase workforce and affordable housing in Santa Barbara County.	County Planning & Development; Community Services	Achieved/ Completed	Number of new housing units developed to be affordable	574	1,960	850	1799	780	231%

County of Santa Barbara 2015 Energy & Climate Action Plan Implementation Tracker								Total Emissions Achievement	100,754	226,760	44%
Action #	**Action Name**	**Description**	**Agency/Dept Lead**	**Status**	**Metric**	**2017 Progress**	**2020 Actual**	**2020 Target**	**Achieved Reductions**	**Anticipated Reductions**	**Percent Achievement**
RE 1	Alternative Energy Development	Increase the use of alternative energy technology in appropriate new and existing development.	County Community Services	Achieved/ Completed	Total residential renewable electricity systems installed	2,646	4,098	300	8,648	1,660	1366%
RE 1	Alternative Energy Development	Increase the use of alternative energy technology in appropriate new and existing development.	County Community Services	Started/Ongoing	Total non-residential renewable electricity systems installed	77	124	200			
RE 2	Solar Water Heaters	Increase the replacement of existing water heaters with high-efficiency, tankless, or solar water heaters.	Energy Utilities	Started/Ongoing	Number of solar heaters installed	41	49	60	32	40	82%
RE 3	Alternative Energy Incentives	Adopt a policy or program that offers incentives (such as streamlined permitting, permit waivers, or fee waivers) to encourage a switch in electricity generation from fossil fuels to renewable sources through small-scale renewable electricity generation.	Community Environmental Council	Started/Ongoing	Number of Solarize participants	84	368	420	719	1,480	88%
RE 4	Utility-Scale Renewable Energy Projects	Promote the use of clean alternative energy production by encouraging development of utility-scale renewable electrical generation facilities.	County Planning & Development	Achieved/ Completed	MW of renewable energy constructed	42	42	30	16,954	10,610	140%
SCS	Sustainable Community Strategies			Started/Ongoing	Per capita vehicle miles traveled	22.8	23.8	22	0	29,150	-8%
T 1	Car Sharing and Ride Sharing	Create new, additional, or improve existing, car-sharing and ride-sharing programs.	SBCAG	Not Started	Commute to work modeshare of carpool	14%	15%	25%	231	5,770	60%
T 2	Commuter Incentives	Work cooperatively with major local employers and/or Traffic Solutions to offer incentives and services that decrease single-occupant automobile commuting.	SBCAG	Started/Ongoing	Commute to work modeshare of carpool	14%	15%	25%	231	3,460	60%
T 3	Alternative-Fuel Vehicles and Incentives	Increase the use of alternative-fuel vehicles, and plan for the development of alternative-fuel infrastructure.	County General Services	Started/Ongoing	Number of publicly accessible EV Charging Stations	55	499	1,400	595	1,670	36%
T 4	Alternative Transportation	Enhance alternative and active transportation.	SBCAG	Started/Ongoing	Percent of residents within 1/4 mile from transit in a single year	61%	61%	65%	1,248	1,330	94%
T 5	Integrated Bikeway System	Complete an integrated bikeway system, linking residences with commercial centers, work locations, schools, parks, and mass transit facilities, to be high priority for promoting the use of the bicycle as a primary mode of transportation.	County Public Works	Started/Ongoing	Miles of bike lane installed	16.5	17.5	60	466	1,720	29%
T 6	Pedestrian Improvements	Improve pedestrian convenience, comfort, and safety.	County Public Works	Started/Ongoing	Percent of students using alternative modes	24%	No 2020 activity due to COVID	30%	0	2,020	0%
T 7	Vehicle Idling	Reduce vehicle idling through enforcement and education targeted toward commercial vehicle operators, school parents, and government employees.		Discontinued	Percent reduction in commercial vehicle idling			No target	N/A	6,590	0%
T 9	Commuter Rail Connections	Develop commuter rail connections between employment centers.	SBCAG	Started/Ongoing	Commute to work modeshare of train	0%	0%	2%	0	2,030	0%
T 8	Traffic Signal Synchronization	Implement traffic signal synchronization and detection technologies or traffic calming measures to reduce idling emissions.	County Public Works	Started/Ongoing	Not measured			No target	N/A	N/A	N/A
WE 1	Water Conservation Programs	Decrease energy use associated with the reduced pumping, distribution, heating, and treating of water and wastewater.	County Public Works, Community Services Districts	Started/Ongoing	Not measured			No target	N/A	290	0%
WE 2	Water-Efficient Building and Landscape Standards	Maximize end-user water efficiency by encouraging the implementation of prescriptive or performance measures included in the California Green Building Standards Code in all new and existing development.	County Public Works	Started/Ongoing	Not measured			No target	N/A	20	0%
WE 3	Water-Efficient Landscaping	Increase the use of native, drought-tolerant landscaping and smart irrigation technologies in new and renovated developments and at public parks and facilities.	County Public Works	Started/Ongoing	Not measured			No target	N/A	270	0%
WR 1	Waste Reduction	Continue to support the programs associated with efficient waste collection and recycling, public school education, and composting.	County Public Works	Achieved/ Completed	Annual tons of organic material diverted	6,096	30,486	24,170	23,990	19,020	126%
WR 2	Increased Recycling Opportunities	Seek additional opportunities for county residents to recycle cardboard, glass, paper, and plastic products.	County Public Works	Achieved/ Completed	Annual tons of recyclable material diverted	5,244	22,856	20,790	17,986	16,360	110%

County of Santa Barbara 2015 Energy & Climate Action Plan Implementation Tracker								Total Emissions Achievement	100,754	226,760	44%
Action #	**Action Name**	**Description**	**Agency/Dept Lead**	**Status**	**Metric**	**2017 Progress**	**2020 Actual**	**2020 Target**	**Achieved Reductions**	**Anticipated Reductions**	**Percent Achievement**
WR 3	Construction & Demolition Waste Recycling	Increase the recycling and reuse of construction waste to reduce energy consumption associated with extracting and manufacturing virgin materials.	County Public Works	Started/Ongoing	Not measured			No target	N/A	10,330	0%
WR 4	Landfill Disposal Reductions	Reduce or minimize GHG emissions from waste materials deposited into landfills.	County Public Works	Started/Ongoing	Million kWh generated from renewable energy	0	0	7.6	0	870	0%
WR 5	Clean Waste Collection Vehicles	Reduce GHG emissions from waste collection vehicles through the use of alternative fuels.	County Public Works	Achieved/ Completed	Vehicles converted to compressed natural gas (CNG)	40	66	44	1,095	730	150%

Appendix II - 2018 Greenhouse Gas Inventory Memo

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December 30, 2021
Project No: 20-09336

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Via email: gwong@co.santa-barbara.ca.us

Subject: County of Santa Barbara 2018 Greenhouse Gas Emissions Inventory and Forecast Memorandum

As part of the *Community GHG Inventory* of the County of Santa Barbara 2030 Climate Action Plan (CAP), Rincon Consultants, Inc. (Rincon) has updated the County's current (2018) community greenhouse gas (GHG) emission inventory and projected future greenhouse gas (GHG) emissions forecasts for each sector associated with land use in the County of Santa Barbara. The GHG emissions forecasts are based on the 2018 GHG emissions inventory and utilize County of Santa Barbara specific demographics projections to estimate future GHG emissions in the County. The forecasts were developed to better understand how population and job growth in the County of Santa Barbara could affect future GHG emissions in the years 2025, 2030, 2035, 2040, 2045, and 2050. The GHG emissions forecast presents two scenarios:

- Business-as-Usual Scenario (BAU) projects GHG emissions levels that scale with population, employment and transportation growth consistent with regional projections, and;
- Adjusted Scenario (Adjusted) accounts for GHG reductions expected to occur from adopted State legislation.

The presentation of these two forecast scenarios allows for an understanding of how GHG emissions levels may evolve without further action and how State legislation will contribute to reducing future GHG emissions levels.

Inventory Background

Rincon completed an evaluation of the County of Santa Barbara's existing GHG inventories including the 2007 baseline inventory, 2016 inventory and draft 2018 GHG inventory. Rincon conducted a review of these inventories and concluded that there were several inconsistencies in both the activity data utilized and methodologies applied. These findings are detailed in the C*ounty of Santa Barbara Historic Inventory Data Evaluation and Methodology Memorandum* submitted to the County November 5th 2021 and the *County of Santa Barbara 2018 Greenhouse Gas Emissions Inventory Data Evaluation and Methodology Memorandum* provided to the County on September 17th 2021. Based on these findings, Rincon has updated the County's 2018 inventory using activity data provided by the County, following the Local Governments for Sustainability (ICLEI) *United States Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (Community Protocol)[1] and applied methodology verified and confirmed by the County. The following sections detail the methodology, data, and assumptions utilized to update and

[1] ICLEI. July 2019. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emission.

finalize the 2018 inventory consistent with the ICLEI Community Protocol. See the C*ounty's Historic Inventory Data Evaluation and Methodology Memorandum* and the *2018 Greenhouse Gas Emissions Inventory Data Evaluation and Methodology Memorandum* for details on how this inventory compares and was updated accordingly.

Greenhouse Gases

The updated GHG community emission inventory for 2018 was developed based on methodologies outlined in ICLEI's Community Protocol. The Community Protocol states that local governments should assess emissions of all six internationally recognized GHGs. These gases are outlined in Table 1, which includes their sources and global warming potential (GWP).[2] This inventory incorporates the latest 100-year GWP values published in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5). The GWP refers to the ability of each gas to trap heat in the atmosphere. For example, one pound of methane has 28 times more heat capturing potential than one pound of carbon dioxide. This inventory focuses on the three GHGs most relevant to local government policymaking: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases comprise a large majority of GHG emissions at the community level. Other gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluorides are emitted primarily in private sector manufacturing and electricity transmission and are the subject of regulation at the state level and therefore, have been omitted from this inventory. GHG emissions are reported in metric tons of carbon dioxide equivalent (MT CO_2e) units, per standard practice. When dealing with an array of emissions, the gases are converted to their carbon dioxide equivalents for comparison purposes.

Table 1 Summary of Greenhouse Gas Emission

Greenhouse Gas	Formula	Primary Source(s)	GWP (CO_2e)
Carbon Dioxide	CO_2	Fuel combustion	1
Methane	CH_4	Fuel combustion, anaerobic decomposition of organic waste (landfills, wastewater treatment plants), fuel handling	28
Nitrous Oxide	N_2O	Combustion and wastewater treatment	265
Hydrofluorocarbons	Various	Leaking refrigerants and fire suppressants	4 – 12,400
Perfluorocarbons	Various	Aluminum production, semiconductor manufacturing, HVAC equipment manufacturing	6,630 – 11,100
Sulfur Hexafluoride	SF_6	Transmission and distribution of power	23,500

Source: Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report AR5, Chapter 8 Anthropogenic and Natural Radiative Forcing. 2014. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf. Accessed October 5, 2020.
GWP: Global Warming Potential

[2] According to the United States Environmental Protection Agency (USEPA), the GWP was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide (USEPA 2017; https://www.epa.gov/ghgemissions/understanding-global-warming-potentials. Accessed October 5, 2020)

Calculating GHG Emissions

Consistent with ICLEI's Community Protocol, GHG emissions are estimated using calculation-based methodologies to derive emissions using activity data and emissions factors. To estimate emissions, the basic equation below is used:

Activity Data x Emission Factor = GHG Emissions

Activity data refers to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles travelled. Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g., lbs. CO_2/kWh).

GHG Emissions Sectors and Sources

ICLEI recommends that local governments examine their emissions in the context of the sector that is responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures.

The community inventory reports emissions by the following sectors:

- Energy
- Transportation
- Solid Waste
- Water Consumption and Wastewater Treatment
- Agricultural Emissions

The GHG emissions sectors and associated sources included in this analysis are provided in Table 2.

Table 2 County of Santa Barbara GHG Emissions Sectors and Sources

GHG Emissions Sector	GHG Emissions Source
Energy[1]	Residential Electricity Consumption[2]
	Residential Natural Gas Consumption
	Non-residential Electricity Consumption[2]
	Non-residential Natural Gas Consumption
Transportation	Passenger On-Road Transportation – EV Adjustment
	Commercial On-Road Transportation – EV Adjustment
	Off-Road - Diesel
	Off-Road - Gasoline
	Off-Road - Natural Gas (LPG)
Solid Waste	Methane Commitment of Solid Waste Generated by Community
Water	Electricity Consumption for Water Delivery
Wastewater	Process Emissions from Wastewater Treatment Plants
	Fugitive Emissions from Septic Tanks
	Electricity Consumption for Wastewater Collection and Treatment
Agriculture	Application of N_2O as Fertilizer
	Enteric Fermentation
	Manure Management

Notes: EV = electric vehicle; LPG = liquefied petroleum gas

1 Propane usage is not included in this inventory as accurate data was not available for the inventory year. Additionally, as detailed in *County of Santa Barbara Historic Inventory Data Evaluation and Methodology Memorandum*, the previously used methodology for extrapolating propane are not standard practice, used unsubstantiated assumptions, and the methodology does not account for changes in household energy use such as electrification.

[2] Electricity Consumption includes electricity provided by Pacific Gas and Electric Company and Southern California Edison.

County of Santa Barbara 2018 GHG Emissions Inventory

The 2018 GHG emissions inventory includes an assessment of the County of Santa Barbara's community-wide GHG emissions that serves as the basis for the GHG emissions forecast. The 2018 community GHG inventory includes all emissions occurring within the County of Santa Barbara's geo-political control (i.e., sources of emissions over which the County has significant influence or jurisdictional authority).

The reporting and calculation of GHG emissions are consistent with the recommendations of ICLEI.[3] The community inventory reports GHG emissions by their source sector, which includes energy, transportation, solid waste, water, wastewater, as well as emissions associated with agriculture. The calculation of GHG emissions uses the best available data and guidance of the ICLEI methodologies.

Community Energy

The community energy sector includes GHG emissions resulting from the consumption of electricity and natural gas. Both energy sources are used in residential, commercial, and industrial buildings and for

[3] ICLEI. July 2019. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emission.

agricultural power needs throughout the County of Santa Barbara. In 2018, the County's electricity was provided by PG&E and SCE. Natural gas was provided by SoCalGas.

Pursuant to the California Public Utilities Commission (CPUC) Energy Data Request Program (EDRP) established by decision 14-05-016.[4], when local governments request data from investor owned utility providers such as PG&E, SCE, and SoCalGas, the data must meet aggregation rules to protect consumer privacy. This aggregation rule is commonly referred to as the *15/15 Aggregation Rule*. Public data sets must have a minimum of 100 residential customers, a minimum of 15 non-residential customers with no single non-residential customer accounting for more than 15% of the total consumption. If the rule isn't met, non-residential usage will be combined with other sectors. As such, agricultural and industrial data has been aggregated for both the SCE and Southern California Gas (SoCalGas) data sets. Community electricity information was provided from PG&E in the form of total kilowatt hour (kWh) of electricity retail sales to residential, commercial, and agricultural customers; industrial customer class data was not included in the inventory due to not passing the 15/15 aggregation rule. See Table 5 below.

The energy consumption by sector has been redacted to ensure no violations of the EDRP non-disclosure agreement.

Natural Gas

Natural gas use provided by SoCalGas for 2018 included residential, commercial, and industrial natural gas consumption in unincorporated County. SoCalGas does not report data under a separate agricultural category, therefore natural gas use associated with agricultural activities is included in the other SoCalGas categories. Because industrial customers are subject to state policies, including the California Air Resources Board (CARB) Cap-and-Trade Program and are largely outside of the County's jurisdictional control, industrial emissions are often not included in community GHG emission inventories. As such, emissions associated with industrial natural gas usage are excluded from this inventory, but provided below in Table 3 for informational purposes. All natural gas consumed by the unincorporated County was provided by SoCalGas in annual therms.[5] Natural gas use from residential and the commercial customer class are included in the inventory, as shown in Table 3.

Vandenberg Space Force Base

Natural gas consumption by Vandenberg Space Force Base (VSFB) is included in the total unincorporated County natural gas consumption data provided by SoCalGas. As VSFB is outside of the jurisdictional control of the County, it is most appropriate to back out the natural gas consumption by VSFB from the total unincorporated County natural gas usage data. However, at the time of preparation of the 2018 inventory, 2018 natural gas consumption data was not available from VSFB for the 2018 inventory year nor any previous years that could be used as a proxy to back out of the total unincorporated County's natural gas consumption. It is anticipated in future years that VSFB natural gas consumption data will be available directly from VSFB such that it can be excluded from all future inventories and the 2018 inventory can be updated to exclude VSFB natural gas consumption data. Additionally, Federal Executive Order 14057 was signed on December 8, 2021 that directs the federal government to achieve net-zero emissions from overall federal operations by 2050, including a 65 percent emissions reduction by 2030. It is unclear at the time of this inventory how VSFB will comply with this Executive Order.

[4] California Public Utilities Commission Decision 14-05-016. Accessed September 2021. https://docs.cpuc.ca.gov/publisheddocs/published/g000/m090/k845/90845985.pdf

Table 3 Natural Gas Use by Source

Source		Units
Residential	[redacted]	Therms
Commercial[1,2]	[redacted]	Therms
Agriculture[3]	N/A	Therms
Industrial[4]	[redacted]	Therms

[1] Source category included in the inventory.
[2] Includes VSFB.
[3] SoCalGas reports natural gas consumption under the following categories: residential, commercial and industrial. SoCalGas does not report data under a separate agricultural category, therefore natural gas use associated with agricultural activities is combined with other categories.
[4] Industrial natural gas usage is excluded from the inventory and presented here for informational purposes only.
N/A = not available

Emissions Calculations

GHG emissions from community natural gas consumption were calculated using the ICLEI Community Protocol Method BE.1.1. Emissions from natural gas were calculated by multiplying the activity data from the SoCalGas billing history (therms of natural gas consumption in the unincorporated County of Santa Barbara) by the emission factor for natural gas (Table 4). The emission factor for natural gas (MT CO_2e/therm) was determined based on the Environmental Protection Agency's (EPA) *Emission factors for Greenhouse Gas Inventories* document, published April 2021.[6]

In addition to direct natural gas consumption, emissions are also released from methane leakage both at the natural gas compressor stations and from leakage at the meter. Based on recent studies, there is a leakage rate of approximately 2.8% of all natural gas delivered.[7,8] Although emissions from methane leakage are outside of the County's operational control, emissions related to methane leakage are directly related to natural gas use within the community and should be included in the community emissions similar to electricity transmission and distribution loss. Methane leakage associated with natural gas consumption was determined by multiplying the total community natural gas consumption in 2018 by 2.8%, the methane leakage rate. GHG emissions from community methane leakage were calculated by multiplying the quantity of natural gas leaked by the emission factor for fugitive emissions from natural gas distribution system. The fugitive emission factor for natural gas was calculated by multiplying cubic meter of natural gas per therm (2.776 cubic meter/therm)[9] by the density of natural gas (0.000712 MT/cubic meter)[10] by the percent of methane in natural gas by methane's 100-year GWP factor. Table 4 provides the activity data, emission factor, and GHG emission calculation results for community methane leakage.

[6] Emissions Factors for Greenhouse Gas Inventories. U.S. Environmental Protection Agency. April 2021. Accessed September 2021 via online: https://www.epa.gov/climateleadership/ghg-emission-factors-hub
[7] Alvarez, Ramón & Zavala-Araiza, Daniel & Lyon, David & Allen, David & Barkley, Zachary & Brandt, Adam & Davis, Kenneth & Herndon, Scott & Jacob, Daniel & Karion, Anna & Kort, Eric & Lamb, Brian & Lauvaux, Thomas & Maasakkers, Joannes & Marchese, Anthony & Omara, Mark & Pacala, Stephen & Peischl, Jeff & Robinson, Allen & Hamburg, Steven. (2018). Assessment of methane emissions from the U.S. oil and gas supply chain. Science. 361. eaar7204. 10.1126/science.aar7204.
[8] Marc L. Fischer, Wanyu R. Chan, Woody Delp, Seongeun Jeong, Vi Rapp, and Zhimin Zhu. (2018). An Estimate of Natural Gas Methane Emissions from California Homes. Retrieved from https://pubs.acs.org/doi/pdf/10.1021/acs.est.8b03217
[9] https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/
[10] https://www.unitrove.com/engineering/tools/gas/natural-gas-density

Table 4 GHG Emissions from Natural Gas

Data	2018
Activity Data (therms)[1]	43,476,673
Emissions factor (MT CO_2e/therm)[2]	0.00531
Consumption Emissions (MT CO_2e)	**230,924**
Methane Leakage (% of consumption)	2.8%
Methane Leakage (therms)	1,217,347
Emission factor (MT CO_2e /therm)[3]	0.0525
Methane Leakage Emissions (MT CO_2e)	**63,935**
Total Emissions	**294,859**

[1] Activity data includes natural gas usage from residential and commercial customer classes as detailed above and shown in Table 3.

[2] EPA's Emission Factors for Greenhouse Gas Inventories

[3] Calculated by multiplying cubic meter of natural gas per therm (2.776) [source:https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/] by density of natural gas (0.000712 MT/ cubic meter) [source: https://www.unitrove.com/engineering/tools/gas/natural-gas-density] by methane content of natural gas (94.9%) [source: North American Energy Standards Board]. Adjusted for GWP of CH_4.

Electricity

The County provided 2018 electricity use data for the unincorporated County from both PG&E and SCE.

PG&E Electricity Data

Community electricity information was provided from PG&E in the form of total kilowatt hour (kWh) of electricity retail sales to residential, commercial, and agricultural customers; industrial customer class data was not included in the inventory due to not passing the 15/15 aggregation rule. See Table 5 below.

Vandenberg Space Force Base

VSFB receives electricity from PG&E which is included in the total electricity data for the unincorporated County. As VSFB is outside of the jurisdictional control of the County, it is most appropriate to back out the electricity usage by VSFB from electricity data. Additionally, Federal Executive Order 14057 was signed on December 8, 2021 that directs the federal government to achieve net-zero emissions from overall federal operations by 2050, including a 65 percent emissions reduction by 2030. It is unclear at the time of this inventory how VSFB will comply with this Executive Order. At the time of preparation of the 2018 inventory, 2018 electricity usage data was not available from VSFB to back out of the total unincorporated County's PG&E electricity usage. However, the County did have PG&E electricity usage data for VSFB for 2016 and 2017 provided by VSFB. Given the limited annual growth of VSFB as demonstrated in the Demographics Section, it was conservatively assumed that electricity usage would not vary much annually and the average annual electricity usage for 2016 through 2017 served as a proxy for electricity usage by VSFB in 2018. It is anticipated in future years that VSFB electricity usage data will be available such that it can be exclude from all future inventories and the 2018 inventory can be updated to exclude VSFB electricity usage data from 2018. Average electricity usage provided by PG&E for VSFB for 2016 and 2017 is provided in Table 5, as a proxy for the 2018 VSFB electricity usage, and is excluded from the 2018 inventory

Table 5 PG&E Electricity Use by Source

Source		Units
Residential	[redacted]	kWh
Commercial	[redacted]	kWh
Industrial[1]	Data Not Available	kWh
Agricultural	[redacted]	kWh
VSFB Electricity[2]	[redacted]	kWh

[1] Electricity usage from the industrial customer class was dropped due to the category not passing the 15/15 aggregation rule.
[2] VSFB provided electricity usage data for 2016 and 2017 from PG&E. The average electricity usage for those two years was used as a proxy for 2018 inventory year in the absence of new data. These emissions are provided for informational purposes but not included in the GHG inventory.

SCE Electricity Data

SCE categorized unincorporated County electricity data for 2018 in two data sets. For one data set, SCE provided electricity data separated into four categories including residential, commercial, industrial and agricultural; however, agriculture and industrial electricity usage was dropped from this data set due to not passing the 15/15 aggregation rule. For the other data set, SCE also categorized data as residential and non-residential where the non-residential category includes an aggregate of commercial, industrial and agricultural customer classes. By subtracting out commercial usage from the total non-residential category, an aggregate of electricity usage for agricultural and industrial customers could be calculated. Because County agricultural area remained relatively constant between 2016 and 2018, it was conservatively assumed that agricultural electricity usage remained constant from 2016, where electricity usage by the agricultural customer class was reported by SCE. Therefore, 2016 agricultural usage reported from SCE was used as a proxy for agricultural electricity usage in 2018. Industrial electricity usage in 2018 was estimated by subtracting the 2016 value for agricultural electricity usage from the aggregate of agriculture and industrial. As previously discussed, energy usage by industrial customers is subject to state polices and outside the jurisdictional control of the County. Therefore, industrial electricity usage has been

excluded from this inventory. Electricity usage provided by SCE for the unincorporated County are provided in Table 6.

Table 6 SCE Electricity Use by Source

Source		Units
Residential[1]	[redacted]	kWh
Commercial[1]	[redacted]	kWh
Industrial[2]	[redacted]	kWh
Agricultural[1,3]	[redacted]	kWh

[1] Source category included in the inventory.
[2] Industrial electricity usage is excluded from the inventory and presented here for informational purpose. Industrial electricity usage is estimated by subtracting commercial use and proxy agricultural usage from the total non-residential electricity usage reported by SCE (199,995,357 kWh).
[3] SCE did not report agricultural electricity usage as a category by itself in 2018 due to not passing the 15/15 aggregation rule. Therefore, it was conservatively assumed that agricultural electricity usage in 2018 remained the same as reported by SCE in 2016 and therefore 2016 data was used as a proxy for 2018 agricultural electricity usage.

Emissions Calculations

GHG emissions from community electricity consumption were calculated using the ICLEI Community Protocol Method BE.2. Emissions associated with electricity usage were separated and reported in the inventory as residential and non-residential customer classes, where non-residential includes commercial and agricultural usage. Emissions from electricity were calculated by multiplying the activity data from PG&E and SCE by the emission factor for PG&E and SCE electricity, respectively, for 2018 (Table 7). The PG&E emission factor is based on estimated CO_2 emission factor provided with PG&E electricity data and supplemented with CH_4 and N_2O emission factors from the eGRID-CAMX since PG&E did not include CH_4 or N_2O emission factors. The emission factor for SCE electricity was determined based on SCE's 2018 Sustainability Report.[11]

To avoid double counting of electricity emissions associated with electric vehicles (EV) charging that is accounted for in the transportation section, consumption of electricity for EVs in 2018 was backed out of the total unincorporated County electricity consumption. EMFAC2021 was utilized to estimate the electricity consumption associated with electric vehicle (EV) charging in 2018 in the County of Santa Barbara. Electricity consumption for EV charging was allocated to the unincorporated County based on the percent of County VMT attributed to the unincorporated County (44.6%).

[11] 2018 Sustainability Report. Edison International. Accessed October 2021 via online: https://www.edison.com/content/dam/eix/documents/sustainability/eix-2018-sustainability-report.pdf

Table 7 GHG Emissions from Electricity

Data	2018
PG&E	
Activity Data (kWh)	[redacted]
VSFB Activity Data (kWh)[1]	[redacted]
Adjusted Activity Data (kWh)[2]	274,272,746
Emissions factor (MT CO_2e/kWh)[3]	0.000115
PG&E Emissions (MT CO_2e)	**31,601**
SCE	
Activity Data (kWh)	258,407,175
Emissions factor (MT CO_2e/kWh)[4]	0.000233
SCE Emissions (MT CO_2e)	**60,130**
Total Electricity Emissions (MT CO_2e)	**91,731**
EV Charging Electricity Emissions (MT CO_2e)[5]	**887**
Adjusted Building Electricity Emissions (MT CO_2e)	**90,843**

[1] Annual average VSFB electricity usage based on 2016 and 2017 data years serves as a proxy for 2018 VSFB electricity usage until 2018 VSFB electricity usage data is obtained.

[2] PG&E electricity data has been adjusted to exclude the annual average VSFB electricity usage so that PG&E reported electricity data here is representative of the unincorporated County electricity usage under County jurisdictional control

[3] PG&E emission factor based on estimated CO2 emission factor provided with PG&E provided electricity data and supplemented with CH4 and N2O emission factors from the eGRID-CAMX since PG&E did not include CH4 or N2O emission factors

[4] SCE emission factor on Edison International 2018 Sustainability Report.

[5] Electricity associated with EV charging is subtracted from total electricity usage to avoid double counting with the transportation sector.

EF = emission factor; kWh = kilowatt-hour; MT. = metric tons, EV = electric vehicle

Electricity Transmission and Distribution Losses

In addition to energy consumption, the amount of emissions generated due to electricity transmission and distribution (T&D) losses were determined, as recommended by the ICLEI Community Protocol. T&D losses occur as electricity is transported from its generation source to its final end use destination. Transmission losses occur in the form of heat as electricity meets the small resistance in wires, and distribution losses occur when electricity is transformed from higher to lower voltage wires. Although emissions generated due to electricity T&D losses are outside of the County's operational control, emissions related to T&D losses are directly related to electricity use within the community and should be included in the community emissions.[12] GHG emissions from community T&D losses were calculated using the ICLEI Community Protocol Method BE.4. T&D loss associated emissions were determined by multiplying the total community electricity consumption in 2018 by 4.8%, the grid loss factor for the California sub-region (CAMX) most recently determined by the United States Environmental Protection Agency (USEPA) *Emissions and Generating Resource Integrated Databases (eGRID)*.[13] Table 8 provides the activity data, emission factor, and GHG emission calculation results for community T&D losses.

[12] ICLEI 2019. U.S. Community Protocol for Account and Reporting Greenhouse Gas Emissions. Pg. 36.
[13] USEPA's 2018 eGRID database, March 2020. https://www.epa.gov/egrid/egrid2018-summary-data

Table 8 GHG Emissions from Electricity T&D Losses

Data	2018
PG&E	
Adjusted Activity Data (kWh)[1]	274,272,746
Grid Loss Factor[2]	4.8%
T&D Loss (kWh)	13,165,092
Emissions factor (MT CO_2e/kWh)[3]	0.000115
PG&E T&D Loss Emissions (MT CO_2e)	**1,517**
SCE	
Activity Data (kWh)	258,407,175
Grid Loss Factor[22]	4.8%
T&D Loss (kWh)	12,403,544
Emissions factor (MT CO_2e/kWh)[4]	0.000233
SCE T&D Loss Emissions (MT CO_2e)	**2,886**
Total T&D Loss Emissions (MT CO_2e)	**4,403**

[1] PG&E electricity data has been adjusted to exclude the annual average VSFB electricity usage based on 2016 and 2017 data years, which serve as a proxy for 2018 VSFB electricity usage

[2] The grid loss factor for the California sub-region (CAMX) most recently determined by the USEPA eGRID for 2018

[3] PG&E emission factor based on estimated CO2 emission factor provided with PG&E provided electricity data and supplemented with CH4 and N2O emission factors from the eGRID-CAMX since PG&E did not include CH4 or N2O emission factors

[4] SCE emission factor on Edison International 2018 Sustainability Report.

EF = emission factor; kWh = kilowatt-hour; MT. = metric tons, EV = electric vehicle

Community Transportation

The transportation sector for the 2018 Community GHG Inventory consists of GHG emissions from on-road commercial and passenger vehicle travel and off-road equipment.

Community On-Road Transportation

Santa Barbara County Association of Governments (SBCAG) provided the County the trip data from *SBCAG Fast Forward 2040 Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS)* for Scenario one, where Scenario one represents the future baseline trips based on existing, adopted General Plan land uses and assumes sub-regional growth trends will continue. The base year 2010 estimates are shown in Table A-3 of the Appendices for *SBCAG Fast Forward 2040 RTP & SCS.* The provided SBCAG model included 2010, 2020, 2035 and 2040 data on interregional trips for the entire county disaggregated by jurisdiction, including unincorporated county trips. The data was further disaggregated to include internal:internal (I:I), internal-external:external-internal (I:X), and external:external (X:X) trips. To account for trips occurring inter-regional (i.e. between SBCAG and neighboring counties) SBCAG coordinated with neighboring regions (San Luis Obispo Council of Governments [SLOCOG] and Southern California Association of Governments [SCAG]) to obtain data from inter-county trips.

The SBCAG travel demand model also provided total county-wide daily vehicle miles traveled (VMT) of 9,365,328 which included all VMT from I:I trips, IX:XI trips and X:X trip within SBCAG. SBCAG calculated VMT from X:X trips and IX:XI trips by multiplying the number of daily drips by an average trip distance for

each trip type as shown in Table 9. SBCAG calculated I:I VMT within the SBCAG region by subtracting the calculated X:X VMT and SBCAG IX:XI VMT from the SBCAG modeled county-wide daily VMT. Because the SBCAG travel model only modeled VMT for SBCAG, VMT for the trips between SBCAG and SLOCOG and SCAG needed to be accounted for outside the SBCAG travel demand model. SBCAG calculated VMT from IX:XI inter-regional daily trips by multiplying IX:XI inter-regional daily trips by the average trip distance per trip type as shown in Table 9. SBCAG utilized this methodology to allocate county-wide daily VMT from the travel demand model to I:I, IX:XI and X:X trips for 2010, 2020, 2035 and 2040. Table 9 through Table 12 shows the County-wide regional trip data provided by SBCAG and SBCAG's VMT calculations by trip type for 2010, 2020, 2035 and 2040.

Table 9 On-road Transportation SBCAG Data for 2010

Data	O-D Trip Type[1]	Avg Trip Distance (miles)[1]	Daily VMT[2]
SBCAG Travel Demand Model 2010			
SBCAG Total VMT	N/A	N/A	9,365,328
X-X Trips	4,123	90	371,106
IX:XI	124,449	26.8	3,335,224
I-I[2]	1,178,953	N/A	*5,658,997*
Subtotal (I:I + 50% IX:XI)	1,241,177	N/A	7,326,610
SLOCOG & SCAG Travel Demand Model 2010			
SCAG IX-XI	66,500	26.8	1,782,200
SLOCOG IX-XI	70,700	26.8	1,894,760
Subtotal (50% IX:XI)	68,600	26.8	1,838,480
2010 Total (I:I + 50% IX:XI)	**1,309,777**	**N/A**	**9,165,090**

[1] Regional trip information and average mileage per trip provided by SBCAG for 2010.

[2] SBCAG provided total County-wide daily VMT and calculated X:X VMT and IX:XI VMT by multiplying the trip number by the average trip distance. I:I VMT in SBCAG was calculated as SBCAG Total VMT – X:X VMT – IX:XI VMT = I:I VMT

N/A = not applicable (i.e. not available in provided data)

Table 10 On-road Transportation SBCAG Data for 2020

Data	O-D Trip Type[1]	Avg Trip Distance (miles)[1]	Daily VMT[2]
SBCAG Travel Demand Model 2020			
SBCAG Total VMT	N/A	N/A	10,578,880
X-X Trips	7,023	90	632,079
IX:XI	142,640	26.5	3,779,962
I-I[2]	1,217,241	N/A	*6,166,839*
Subtotal (I:I + 50% IX:XI)	1,288,561	N/A	8,056,820
SLOCOG & SCAG Travel Demand Model 2020			
SCAG IX-XI	68,900	26.5	1,825,850
SLOCOG IX-XI	76,460	26.5	2,026,190
Subtotal (50% IX:XI)	72,680	26.5	1,926,020
2020 Total (I:I + 50% IX:XI)	**1,361,241**	**N/A**	**9,982,840**

[1] Regional trip information and average mileage per trip provided by SBCAG for 2020.

[2] SBCAG provided total County-wide daily VMT and calculated X:X VMT and IX:XI VMT by multiplying the trip number by the average trip distance. I:I VMT in SBCAG was calculated as SBCAG Total VMT – X:X VMT – IX:XI VMT = I:I VMT

N/A = not applicable (i.e. not available in provided data)

Table 11 On-road Transportation SBCAG Data for 2035

Data	O-D Trip Type[1]	Avg Trip Distance (miles)[1]	Daily VMT[2]
SBCAG Travel Demand Model 2035			
SBCAG Total VMT	N/A	N/A	12,678,986
X-X Trips	9,246	90	832,121
IX:XI	159,147	26.3	4,185,558
I-I[2]	1,400,654	N/A	*7,661,307*
Subtotal (I:I + 50% IX:XI)	1,480,228	N/A	9,754,086
SLOCOG & SCAG Travel Demand Model 2035			
SCAG IX-XI	74,336	26.3	1,955,024
SLOCOG IX-XI	85,100	26.3	2,238,130
Subtotal (50% IX:XI)	79,718	26.3	2,096,577
2035 Total (I:I + 50% IX:XI)	**1,559,945**	**N/A**	**11,850,663**

[1] Regional trip information and average mileage per trip provided by SBCAG for 2035.

[2] SBCAG provided total County-wide daily VMT and calculated X:X VMT and IX:XI VMT by multiplying the trip number by the average trip distance. I:I VMT in SBCAG was calculated as SBCAG Total VMT – X:X VMT – IX:XI VMT = I:I VMT

N/A = not applicable (i.e. not available in provided data)

Table 12 On-road Transportation SBCAG Data for 2040

Data	O-D Trip Type[1]	Avg Trip Distance (miles)[1]	Daily VMT[2]
SBCAG Travel Demand Model 2040			
SBCAG Total VMT	N/A	N/A	13,076,704
X-X Trips	10,133	90	911,993
IX:XI	166,576	26.3	4,380,959
I-I[2]	1,440,428	N/A	*7,783,751*
Subtotal (I:I + 50% IX:XI)	1,523,717	N/A	9,974,231
SLOCOG & SCAG Travel Demand Model 2040			
SCAG IX-XI	76,199	26.3	2,004,034
SLOCOG IX-XI	88,334	26.3	2,323,179
Subtotal (50% IX:XI)	82,266	26.3	2,163,606
2040 Total (I:I + 50% IX:XI)	**1,605,983**	**N/A**	**12,137,837**

[1] Regional trip information and average mileage per trip provided by SBCAG for 2040.

[2] SBCAG provided total County-wide daily VMT and calculated X:X VMT and IX:XI VMT by multiplying the trip number by the average trip distance. I:I VMT in SBCAG was calculated as SBCAG Total VMT – X:X VMT – IX:XI VMT = I:I VMT

N/A = not applicable (i.e. not available in provided data)

SBCAG did not separately calculate unincorporated County VMT to allocate to unincorporated County I:I, IX:XI and X:X trips. However, VMT for county-wide and the unincorporated County were reported in *SBCAG Fast Forward 2040 RTP & SCS* for 2010 and 2040. Based on VMT reported in *SBCAG Fast Forward 2040 RTP & SCS*[14], approximately 44.8% of county-wide VMT in 2010 was associated with the unincorporated County and 49.5% of county-wide VMT in 2040 was associated with the unincorporated County. Linear interpolation between 2010 and 2040 of the percent of county-wide VMT associated with the unincorporated County was calculated for interim years 2020 and 2035, and multiplied by the calculated county-wide VMT to estimate unincorporated County VMT. Table 13 shows how unincorporated County daily VMT was calculated from the daily County-wide VMT calculated and provided by SBCAG for 2010, 2020, 2035 and 2040. For the 2018 inventory year, the unincorporated County daily VMT was calculated via linear interpolation between 2010 and 2020.

[14]SBCAG 2017. SBCAG Fast Forward 2040 RTP & SCS; Table 20 and Table 21 < http://www.sbcag.org/uploads/2/4/5/4/24540302/ff2040_final.pdf>

Table 13 Unincorporated County Daily VMT

Data Year	County-wide Daily VMT[1]	% Unincorporated County[2]	Unincorporated County Daily VMT[3]
2010	9,165,090	44.8%	4,108,930
2020	9,982,840	46.4%	4,630,373
2035	11,850,663	48.7%	5,772,423
2040	12,137,837	49.5%	6,006,429

[1] Calculated and provided by SBCAG, same as data in Table 9.

[2] Percentage of county-wide daily VMT associated with unincorporated County daily VMT calculated for 2010 and 2040 based on daily VMT reported in *Table 20* and *Table 21* of *SBCAG Fast Forward 2040 RTP & SCS* for 2010 and 2040 Future Baseline. Percentage for 2020 and 2035 were estimated using linear interpolation between 2010 and 2040.

[3] Calculated by multiplying the percent of county-wide VMT associated with unincorporated County by county-wide daily VMT.

VMT = vehicle miles traveled

To calculate GHG emissions specific to vehicle category, the model data needed to be disaggregated into commercial and passenger vehicle categories, and then the respective emissions factors applied to the VMT totals for two disaggregated vehicle categories, passenger and commercial, to account for all VMT. CARB's EMFAC2021 reports VMT by vehicle class on a County-wide basis. Vehicle classes with a gross vehicle weight rating (GVWR) less than 6,000 pounds were considered passenger vehicles and those with a GVWR greater than 6,000 pounds were considered commercial vehicles. EMFAC2021 was used to estimate the portion of total County-wide 2018 VMT data associated with passenger vehicles and commercial vehicles by aggregating VMT as passenger or commercial following the above definition. In the absence of specific data differentiating the number of unincorporated County VMT that was due to passenger vehicles versus commercial vehicles, it was assumed that the unincorporated County VMT followed a similar trend as county-wide. Therefore, the percent of total county-wide VMT attributed to passenger vehicles and commercial vehicles obtained from EMFAC2021 was applied to the total unincorporated county daily VMT to estimate unincorporated County passenger VMT in 2018 and all future SBCAG model years (i.e. 2020, 2035, 2040)

EMFAC2021 provides detailed data on a county-wide basis that includes annual electricity use by electric vehicles (EV) in kilowatt-hours (kWh), VMT associated with electricity powered vehicles, VMT associated with internal combustion engine vehicles (ICE), total VMT, and annual emissions. The data is aggregated into passenger and commercial vehicle categories. EMFAC2021 data is used to determine the percent of EV penetration in 2018 by dividing electric VMT by total VMT and to determine the energy efficiency for passenger and commercial electric vehicles by dividing total energy consumption in kWh by electric VMT for each vehicle category. Annual electric VMT is calculated by multiplying the unincorporated county VMT, shown in Table 13, by the EMFAC2021 EV penetration percentage. Annual electricity usage by vehicle category is determined by multiplying electric VMT by the energy efficiency (kWh/mile). Data is not available to identify the utility provider for all EV charging electricity, therefore, a weighted electricity emission factor was calculated for 2018 for passenger EV vehicles by dividing the total MT CO_2e from the residential electricity sector by the total kWh consumed by the residential customer class in 2018. A weighted emission factor for commercial EV vehicles was developed by dividing the total MT CO_2e from the non-residential electricity sector by the total kWh consumed by the non-residential customer class in

2018. The EV emission factors were applied to the annual kWh data to obtain 2018 emissions from passenger EVs and commercial EVs. These emissions factors and associated activity data are found in Table 14 below.

Annual ICE VMT is calculated by subtracting the estimated annual electric VMT from the total unincorporated County VMT for each vehicle category. Emissions due to passenger vehicle operation are calculated using the recommended Community Protocol Method TR.1.A. Because emissions data were not provided, only VMT, ICLEI Methods TR.1.B.2 and TR.1.B.3 are used to convert provided VMT data into emissions data and calculate regional emission factors from CARB's EMFAC2021 model for ICE passenger vehicles by dividing annual CO_2, CH_4 and N_2O emissions by the ICE VMT. Based on EMFAC2021 data, a weighted emission factor is calculated using the mix of vehicle class specific to the county. EMFAC2021 characterizes the vehicle class mix for each county based on the most recent Department of Motor Vehicle (DMV) registration data as well as several other sources for the heavy-duty vehicle population such as International Registration Plan (IRP) Clearinghouse data, vehicle data from California Highway Patrol (CHP), and the National Transit Database (NTD). Emissions from freight and service trucks (i.e., medium and heavy-duty trucks) are calculated using Community Protocol Method TR.2.C, which is similar to calculating passenger emissions.

The activity data, emission factors and total GHG emissions from on-road transportation are provided in Table 14. Activity data is provided in Origin-Destination (O-D) format, with VMT categorized based on whether the associated trips originate and end within the incorporated County (I-I), begin outside of the unincorporated County and end within (X-I), or vice versa (I-X).

Table 14 Community On-road Transportation GHG Emissions

Data	2018
Daily VMT [1]	
Daily VMT Attributed to Unincorporated County (VMT)	4,526,085
Annual Aggregated Activity Data (Annual VMT)[2]	1,570,551,343
Passenger Vehicle	
Total Passenger VMT[3]	1,430,552,745
Passenger ICE Vehicle VMT[4]	1,417,100,802
Emission Factor (g CO_2e/mile)[5]	373.3341
Passenger ICE Vehicle Emissions (MT CO_2e)	529,052
Percent of Passenger EV Penetration (%)[4]	0.94%
Passenger EV VMT[4]	13,451,943
Passenger Fuel Efficiency (kWh/mile)[6]	0.358
Passenger EV Vehicles kWh	4,821,128
Emission Factor (MT CO_2e/kWh)[7]	0.000179
Passenger EV Vehicle Emissions (MT CO_2e)	865
Total Passenger Vehicle Emissions (MT CO_2e)	***529,917***
Commercial Vehicle	
Total Commercial VMT[3]	139,998,599
Commercial ICE Vehicle VMT[4]	139,931,822
Emission Factor (g CO_2e/mile)[5]	1220.3526
Commercial ICE Vehicle Emissions (MT CO_2e)	170,766
Percent of Commercial EV Penetration (%)[4]	0.05%
Commercial EV VMT[4]	66,777
Commercial Fuel Efficiency (kWh/mile)[6]	2.053
Commercial EV Vehicles kWh	137,100
Emission Factor (MT CO_2e/kWh)[8]	0.000164
Commercial EV Vehicle Emissions (MT CO_2e)	23
Total Commercial Vehicle Emissions (MT CO_2e)	***170,789***
Total On-road Emissions (MT CO_2e)	**700,706**

[1] For the 2018 inventory year, the unincorporated County daily VMT was calculated via linear interpolation between 2010 and 2020 (data shown in Table 9 through Table 12).
[2] Weekday to annual conversion of 347 is used per CARB guidance on VMT modeling.
[3] Based on EMFAC2021, ~91% of SBCAG County-wide VMT was attributed to passenger vehicles and ~9% attributed to commercial vehicles.
[4] California Air Resource Board's EMFAC2021 model provides detailed data on electric vehicles electricity use (in annual kilowatt-hours), number of miles traveled by electric vehicles, number of miles traveled by ICE vehicles, and total number of vehicle miles traveled. Percent of EV penetration is calculated as electric VMT divided by total VMT. Total VMT is adjusted by using EV penetration percentage to determine VMT from ICE vehicles vs EVs.
[5] Emission factors obtained from EMFAC2021 for ICE vehicles where model years and speed were aggregated for each fuel type by vehicle class.
[6] Fuel economy for EVs obtained from EMFAC2021 by dividing annual electricity usage by total electric VMT for each vehicle category.
[7] A weighted emission factor for passenger EV vehicles was developed by dividing the total MT CO_2e from the residential electricity sector by the total kWh consumed by the residential customer class in 2018.
[8] A weighted emission factor for commercial EV vehicles was developed by dividing the total MT CO_2e from the non-residential electricity sector by the total kWh consumed by the non-residential customer class in 2018.
MT CO_2e = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled; ICE = internal combustion engine; EV= electric vehicle; kWh = kilowatt hour

Community Off-Road Transportation

GHG emissions from off-road transportation were estimated using ICLEI Community Protocol Method TR. 8, based on the CARB's OFFROAD2021 model. The model provides annual GHG emissions and fuel consumption from various types of off-road equipment operating in Santa Barbara County. Categories that were not under the jurisdictional control of the County were excluded from the inventory including cargo handling equipment, commercial harbor craft, forestry, locomotive, military tactical support, ocean going vessels, oil drilling, and outboard marine tanks. The OFFROAD results were allocated to the unincorporated County using unincorporated population, jobs, household data, and acres of agricultural as detailed Table 15.

Table 15 2018 Community Off-Road Transportation Data

Equipment	Attribution (% of unincorporated County/entire County)[1]	Attribution Metric
Agricultural Equipment	95%	Acres of agricultural land use
Airport Ground Support Equipment[1]	31%	Population
Construction and Mining Equipment	30%	Jobs
Industrial Equipment	30%	Jobs
Lawn and Garden Equipment	31%	Households
Light Commercial Equipment	30%	Jobs
Oil Drilling[2]	100%	Not Scaled
Other Portable Equipment	30%	Jobs
Pleasure Craft	31%	Population
Recreational Equipment	31%	Population
Transport Refrigeration Units	30%	Jobs

[1] Equipment was attributed to the unincorporated county based on the percent of the attribution metric associated with the unincorporated county compared with the entire county.
[2] As the County controls permitting of oil drilling occurring within the County, Oil Drilling has been included as a category. Per County provided information, it is assumed that 100% of oil drilling operations occur within the unincorporated County.

Annual fuel consumption was multiplied by the emission factor for the corresponding off-road equipment for each fuel type using EPA's emission factors for non-road vehicles. [15] Table 16 summarizes the total annual fuel consumption and GHG emissions by fuel type. Off-road equipment powered by electricity is not included in this estimate to avoid double-counting with the electricity sector.

Table 16 GHG Emissions from Off-road Equipment

Data	2018
Diesel	
Activity Data (gallons)[1]	5,871,186
Emission Factor (MT CO_2e/gallon)[2]	0.01034
Diesel Emissions (MT CO_2e)[1]	60,731
Gasoline	
Activity Data (gallons)[1]	1,397,771
Emission Factor (MT CO_2e/gallon)[2]	0.00907
Gasoline Emissions (MT CO_2e)[1]	12,672
LPG[3]	
Activity Data (gallons)[1]	354,948
Emission Factor (MT CO_2e/gallon)[2]	0.00580
LPG Emissions (MT CO_2e)	2,059
Total Emissions (MT CO_2e)	**75,463**

[1] Activity data is the sum of annual fuel consumption by equipment type by fuel type.

[2] Emission factor is weighted based on fuel consumption by equipment type.

[3] Natural Gas is not typically used in off-road equipment, LPG is used instead.

MT = metric tons

Community Water and Wastewater

Water sector GHG emissions include those generated from electricity used in water consumption (i.e., conveyance, treatment and delivery), electricity used to collect and treat wastewater, and fugitive emissions from centralized wastewater treatment plant (WWTP) processes and septic systems. The inclusion of these emission sources in the water sector is based on the guidance of the ICLEI Community Protocol.

Vandenberg Space Force Base

Water data provided by the County included water provided specifically to VSFB. The City of Lompoc wastewater treatment system serves VSFB. As VSFB is outside of the jurisdictional control of the County, it is most appropriate to exclude water use by VSFB and treatment of wastewater from VSFB from the total unincorporated County water and wastewater data. Therefore, water provided to VSFB and emissions from wastewater treatment plants serving VSFB were excluded from the 2018 inventory.

[15] Emissions Factors for Greenhouse Gas Inventories. U.S. Environmental Protection Agency. April 2021. Accessed September 2021 via online: https://www.epa.gov/climateleadership/ghg-emission-factors-hub

Community Water Supply

The County receives its water from numerous surface and groundwater sources throughout the County as well as the California State Water Project (SWP). The County provided water consumption data for 2018 for all water purveyors serving the County including VSFB. To allocate the total water supplied to the County, to the unincorporated County population, the total acre-feet for groundwater, surface water and imported water were each multiplied by the fraction of the population that resides in the unincorporated county excluding VSFB population (31%, California Department of Finance population data). [16] As approximately 94.5 percent of agricultural land in the County is located in the unincorporated County, 94.5 percent of agricultural water use provided by County purveyors was allocated to the unincorporated County. As detailed above water provided to VSFB was excluded from this sector.

Water supplied to the community indirectly contributes emissions through the use of energy to extract, convey, treat, and deliver water. The amount of energy required for community water usage was calculated following ICLEI Community Protocol Method WW.14 and using specific energy intensity factors for the water providers and water source when obtainable. Each energy intensity factor is associated with a specific water source and conveyance process (e.g., groundwater extraction and conveyance, water treatment, surface water conveyance, imported surface water conveyance). Many water providers for the County publish Enhanced Urban Water Management Plans (UWMP) which contained system wide energy intensity values. The average energy intensity for locally sourced groundwater from local water providers (i.e. City of Lompoc, City of Santa Maria, Goleta Water District, and City of Santa Barbara) was utilized to represent the energy intensity for all groundwater supplied to the County. City of Santa Barbara's 2020 Enhanced UWMP energy intensities for SWP sourced water, local surface water sourced from Cachuma, and surface water sourced from local reservoirs were used as a proxy for SWP County-wide water supply of SWP water and other imported purchased water, Cachuma surface water and other local reservoir surface water, respectively. Local water providers did not inlude an energy intensity value for recycled water, therefore, the energy intensity for recycled water obtained from the California Energy Commission (CEC) report.[17]

The total water volume from each type of supply (i.e. groundwater, SWP, local surface, recycled etc.) was multiplied by the energy intensity for that water supply as described above to determined energy consumption. The electricity consumption associated with water supplied by SWP is calculated using the eGRID 2018 emission factor for the CAMX subregion since the electricity used to import water is supplied by multiple electricity providers across the state. The electricity consumption associated with local water supplied from within the County was calculated using an emission factor that was weighted based on the unincorporated electricity use from SCE and PG&E. The total water demand values for the unincorporated population by water supply, energy intensities, electricity consumption totals, and emission factors used in GHG emissions calculations for water supplied to the community are provided in Table 17.

[16] California Department of Finance. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2021 with 2010 Census Benchmark. Accessed August 2021.

[17] California Energy Commission (CEC). 2006. Refining Estimated of Water-Related Energy Use in California. Table 9. https://www.sandiegocounty.gov/content/dam/sdc/pds/ceqa/Soitec-Documents/Final-EIR-Files/references/rtcref/ch3.1.3/2014-12-19_CEC2006.pdf

Table 17 GHG Emissions from Water Consumption

Data	2018
Groundwater	
Water Supplied to Unincorporated County (MG)	3,237
Groundwater Energy Intensity (MG/kWh)[1]	3,897
Electricity Consumption (kWh)	12,612,571
Local Weighted Emission Factor (MT CO_2e/kWh)	0.000181
Groundwater Emissions (MT CO_2e)[2]	**2,286**
Local Surface Water[3]	
Water Supplied to Unincorporated County (MG)	585
Local Water Energy Intensity (MG/kWh)[4]	1,381
Electricity Consumption (kWh)	807,308
Local Weighted Emission Factor (MT CO_2e/kWh)	0.000181
Local Surface Water Emissions (MT CO_2e)[2]	**146**
Recycled Water	
Water Supplied to Unincorporated County (MG)	204
Recycled Water Energy Intensity (MG/kWh)[5]	2,220
Electricity Consumption (kWh)	452,340
Local Weighted Emission Factor (MT CO_2e/kWh)	0.000181
Recycled Water Emissions (MT CO_2e)[2]	**82**
Imported Water[6]	
Water Supplied to Unincorporated County (MG)	3,286
Imported Water Energy Intensity (MG/kWh)[7]	9,115
Electricity Consumption (kWh)	29,946,498
CAMX Emission Factor (MT CO_2e/kWh)[8]	0.000226
Imported Water Emissions (MT CO_2e)	**6,772**
Total Emissions (MT CO_2e)	**9,286**

[1] Average energy intensity for groundwater supplied from local water providers including City of Lompoc, City of Santa maria, Goleta Water District, and City of Santa Barbara.

[2] Weighted emission factor based on SCE and PG&E electricity usage in the County excluding VSFB.

[3] Local surface water supply includes surface water from Cachuma, other local surface water, and "Special" water supply.

[4] Energy intensity for local surface water supply obtained from City of Santa Barbara 2020 Enhanced UWMP used as a proxy for County-wide surface water supply.

[5] Energy intensity for recycled water obtained from the California Energy Commission (CEC) report (2006).

[6] Imported water includes water from SWP and other purchased imported water such as from Central Coast Water Authority (CCWA), which is primarily SWP water.

[7] Energy intensity for imported water supply obtained from City of Santa Barbara 2020 Enhanced UWMP for SWP and used as a proxy for County-wide imported water supply.

[8] CAMX eGRID 2018 emission factor used for imported water since the electricity used to import water is supplied by multiple electricity providers across the state

MG = million gallons, kWh = kilowatt-hour; MT = metric tons

Community Wastewater

Communities generate wastewater that is either piped to a wastewater treatment plant (WWTP) or treated on-site via the use of a septic tank system. Wastewater treatment generates emissions via on-site process, stationary, and fugitive GHG emissions. The degradation of organic matter contained in wastewater under anaerobic (no oxygen) conditions generates methane emissions. Wastewater treatment also produces nitrous oxide as an intermediate product (ICLEI, Appendix F, Wastewater and Water Emission Activities and Sources). The electricity consumed to power these treatment devices is included in the energy sector of this inventory. Rural communities use on-site septic systems to treat wastewater in septic tanks via physical settling and biological treatment which emits CH_4.

There are numerous WWTPs that treat wastewater originating from the unincorporated County population. To estimate the emissions associated with the unincorporated County's wastewater treatment, the wastewater treatment methods and technology must be understood for each WWTP. This allows for calculation methods and emissions factors to be determined to reflect the treatment methods at each facility. Additionally, an understanding of how much of the wastewater treated at each facility originates from the unincorporated population must be understood. The water treatment methods at each wastewater treatment plant were confirmed by reviewing annual reports for National Pollutant Discharge Elimination System permits for each facility. The County provided data on the unincorporated population served by each of the facilities in 2018 and provided notes on the data sources. The known WWTP service population data was approximately half of the unincorporated population served by WWTP.

To calculate the emissions associated with septic tank use, septic tank user survey data for the unincorporated County found in the County's Onsite Wastewater Treatment Systems report (revised 07/21/15) was extrapolated to 2018 by using the percent increase (10%) in the unincorporated population since the survey was taken in 2003.[18,19] This methodology yielded an increase from 8,749 survey septic tanks in the 2003 survey to approximately 9,665 septic tanks in 2018. Based on the average household size of 2.85 in 2018, a total population of 27,588 in the unincorporated County was estimated to use septic systems in 2018. After accounting for the known WWTP and septic system service population data, there remains approximately 49,887 persons with unknown wastewater services out of the total unincorporated County population. The information provided in Table 18 contains the data reviewed and vetted from the draft 2018 inventory and NPDES reports for each facility. As described above, the VSFB population served by WWTP and the wastewater data for VSFB were excluded from this sector as VSFB is outside the jurisdictional control of the County.

Table 18 Wastewater Treatment Data Summary

Data		
Unincorporated population served by known WWTP[1]	53,597	Persons
Unincorporated population served by unknown WWTP	52,357	Persons
Unincorporated population served by septic systems	27,588	Persons

[18] Onsite Wastewater Treatment Systems (2014) . Local Agency Management Program. Santa Barbara County Public Health Department. Environmental Health Services. Accessed August 2021. https://www.countyofsb.org/uploadedFiles/phd/PROGRAMS/EHS/CH%20EHS%20LAMP%20Plan%20Document.pdf

[19] Santa Barbara County and VSFB population census data for 2000 and 2010 was obtained from SBCAG's Regional Growth Forecast 2010-2040 (http://www.sbcag.org/uploads/2/4/5/4/24540302/regional_growth_forecast_2010-2040.pdf) and compared against 2018 census data to determine growth of unincorporated population. VSFB population data was excluded from estimates.

Per Capita Wastewater Generation Rate	83.8 Gallons per day
Facility (location of operation)	**Treatment Method for Emission Calculations**
Laguna County Sanitation District (unincorporated)	Stationary emissions + nitrification/ denitrification
Mission Hills Community Services District (unincorporated)	No nitrification/ denitrification
Montecito Sanitary District (unincorporated)	No nitrification/ denitrification
City of Lompoc (incorporated)[2]	Nitrification/ denitrification
Carpinteria Sanitary District (incorporated)	Nitrification/ denitrification
City of Santa Barbara (incorporated)	Nitrification/ denitrification
Cuyama Community Services District (unincorporated)	No nitrification/ denitrification
Goleta Sanitary District (incorporated)	Nitrification/ denitrification
Los Alamos Community Services District (unincorporated)	No nitrification/ denitrification
Summerland Sanitary District (unincorporated)	Stationary emissions + nitrification/ denitrification
Santa Barbara County Parks Department (unincorporated)	No nitrification/ denitrification
Unknown WWTP	Stationary emissions + nitrification/ denitrification

[1] Excludes VSFB data

[2] Serves the incorporated City of Lompoc and VSFB and therefore is excluded from the inventory – presented here for informational purposes only

A WWTP's emission levels are highly defined by their use of denitrification/nitrification technology. If a WWTP has denitrification technology installed, then overall WWTP process emissions will be higher than a facility without denitrification technology. The known service population data obtained from each WWTP indicated that approximately 70% of the population was served by WWTPs using denitrification/nitrification methods. Therefore, 70% of the remaining population wastewater emissions were calculated using ICLEI methods (WW.1 (alt), WW.2 (alt), WW.7, WW.12(alt)) under the assumption that the population's WWTP facilities used denitrification/nitrification technology.[20] The remaining 30% of the population wastewater was assumed to be treated by a WWTP without denitrification/nitrification technology. Additionally, it was conservatively assumed that 60% of the population in which the wastewater treatment system is unknown was served by a WWTP that combusted digester gas. This is based on approximately 60% of the known service population was served by a WWTP with stationary combustion.

The wastewater treatment methods for each service population detailed above were used to calculate wastewater treatment emissions using ICLEI Wastewater calculation methods (WW.1(alt), WW.2(alt), WW.6(alt), WW.7, WW.8, WW.12(alt) and WW.15). For WWTP that combust digester gas, emissions associated with anaerobic digesters were calculated based on population served and using ICLEI Community Protocol Method WW.1(alt) and WW.2(alt). Fugitive missions associated with or without the nitrification-denitrification process and effluent discharge from the plant were calculated based on population served and using ICLEI Community Protocol Method WW.7, WW.8 and WW.12(alt). The emissions associated with septic system use were calculated using WW.11(alt). Energy-related emissions associated with the collection and treatment of wastewater generated in the unincorporated County of Santa Barbara were calculated using ICLEI Community Protocol Method WW.15 where emissions are due

[20] Community Protocol defined in ICLEI Appendix F Wastewater and Water Emission Activities and Sources details the calculation methods for N_2O process emission calculations. For WWTPs using denitrification/nitrification technology, equation WW.7 must be applied to calculate N2O process emissions, as it has a higher emission factor for N_2O emissions. If the WWTP does use denitrification/nitrification technology, then WW.8 is applied, which has a as lower emission factor for N_2O emissions.

to the amount of energy required to collect and treat wastewater. To avoid double counting of electricity emissions from WWTP within the unincorporated County area that were already captured in the energy sector, energy-related emissions associated with the collection and treatment of wastewater only include the population served by WWTP that are not within the unincorporated County (i.e. located in an incorporated City).

Table 19 provides details on the activity data used, calculation methodologies, default ICLEI values and presents total GHG emissions from wastewater in the community.

Table 19 GHG Emissions from Wastewater

Data	2018
Stationary Emissions from Combustion of Digester Gas[1]	
Activity Data (population served by WWTP with Stationary Emissions)[2]	63,355
Digestor Gas Production [Digester Gas] (scf/day)	1
CH_4 fraction of Digestor Gas [fCH_4]	0.65
BTU Content of Digestor Gas [BTU_{CH4}] (BTU/scf)	1,028
Emission Factor [EF_{CH4}] (kg CH_4/Btu)	0.0032
Emission Factor [EF_{N2O}] (kg N_2O/BTU)	0.00063
Stationary Emissions (MT CO_2e)	**4.0**
N_2O Process Emissions with or without Nitrification[3]	
Activity Data (population served by WWTP with nitrification)[2]	74,041
Activity Data (population served by WWTP without nitrification)[2]	31,913
Factor for insignificant industrial/commercial discharge [$F_{ind-com}$]	1
Emission factor for WWTP *with* nitrification/denitrification [EF nit/denit] (g N2O/person/year)	7
Emission factor for WWTP *without* nitrification/denitrification [EF **no** nit] (g N2O/person/year)	3.2
N_2O Process Emissions (MT CO_2e)	**164.4**
Fugitive N_2O Emissions from Effluent Discharge[4]	
Activity Data (population served by WWTP with nitrification)[2]	74,041
Activity Data (population served by WWTP without nitrification)[2]	31,913
Factor for insignificant industrial/commercial discharge [$F_{ind-com}$]	1
Total N Load (kg N/person/day)	0.26
N uptake -aerobic (kg N kg BOD_5)	0.05
BOD_5 (kg BOD_5/person/day)	0.09

Effluent emission factor for river [EF Effluent] (kg N2O-N/kg sewage-N discharge)	0.005
Fraction of nitrogen removed from WWTP **with** nitrification/denitrification [F*plant nit/denit]*	0.7
Fraction of nitrogen removed from WWTP **without** nitrification/denitrification [F*plant]*	0.0
Effluent N_2O Emissions (MT CO_2e)	**1,051.7**
Methane Emissions from Septic Systems[5]	
Activity Data (population served by septic system)[2]	27,588
BOD_5 (kg BOD_5/person/day)	0.09
Maximum CH4 producing capacity for domestic wastewater [Bo] (kg CH_4/kg BOD_5)	0.6
CH4 correction factor for septic systems [MCF]	0.22
Septic Emissions (MT CO_2e)	**3,352**
Wastewater Collection and Treatment[6]	
Wastewater generated per person per day (gpcd)	83.8
Activity Data (population served by WWTP)[2,7]	16,445
Total Million Gallons generation (annual)	503
Wastewater Collection and Treatment Energy Intensity (MG/kWh)[8]	3,580
Electricity Consumption (kWh)	1,802,190
Local Weighted Emission Factor (MT CO_2e/kWh)[9]	0.000181
Wastewater Collection and Treatment Emissions (MT CO_2e)	**326.6**
Total Emissions (MT CO_2e)	**4,899**

[1] Emissions from combustion of digester gas calculated following ICLEI Community Protocol Method WW.1(alt) and WW.2(alt) using the following equation: (Population X Digester Gas X f_{CH4} X BTU_{CH4} X 10^{-6} X EF_{CH4} X 365.25 X 10^{-3} X GWP_{CH4}) + (Population X Digester Gas X f_{CH4} X BTU_{CH4} X 10^{-6} X EF_{N2O} X 365.25 X 10^{-3} X GWP_{N2O})

[2] Based on information available for individual WWTP and County for septic systems.

[3] N2O emissions from WWTP with or without nitrification/denitrification were calculated following ICLEI Community Protocol Method WW.7 and WW.8 using the following equation: (Population X $F_{ind\text{-}com}$ X EF nit/denit X 10^{-6} X GWP_{N2O}) + (Population X $F_{ind\text{-}com}$ X EF **no** nit/denit X 10^{-6} X GWP_{N2O})

[4] Fugitive N2O emissions from effluent discharge were calculated following ICLEI Community Protocol Method WW.12(alt) using the following equation: (Population X $F_{ind\text{-}com}$ X (Total N load – N uptake X BOD_5 load) X EF effluent X 44/28 X (1 – F*plant nit/denite)* X 365.25 X 10^{-3} X GWP_{N2O}) + (Population X $F_{ind\text{-}com}$ X (Total N load – N uptake X BOD_5 load) X EF effluent X 44/28 X (1 - F*plant)* X 365.25 X 10^{-3} X GWP_{N2O})

[5] Septic system emissions were calculated following ICLEI Community Protocol Method WW.11(alt) using the following equation: (Population X BOD_5 load X Bo X MCFs X 365.25 10^{-3} X GWP_{CH4})

[6] Emissions for indirect electric usage for the collection and treatment of wastewater going to WWTP were calculated following ICLEI Community Protocol Method WW.15

[7] To avoid double counting of electricity emissions already captured in the energy sector for the unincorporated County, this population value only includes the population served by WWTP located outside of the unincorporated County area (i.e. those located in incorporated Cities)

[8] Energy intensity based on median ICLEI default values for wastewater

[9] Weighted emission factor based on SCE and PG&E electricity usage in the County excluding VSFB.

WWTP = wastewater treatment plant; MT = metric tons; gpcd = gallons per capita per day

Wastewater treatment technology specifications can vary widely between jurisdictions, as a result of process specifics, influent characteristics, and the age of infrastructure. As noted in the ICLEI Community Protocols, the wastewater emissions calculation methodologies used here were designed as a generalized top-down approach for counties where detailed information was not available; they are a simplified approach that sacrifice accuracy. These methods have a range of accuracy for CH_4 emissions of +37% to -47% and +76% to -93% for N_2O, compared to direct source measurements.[21] While there is significant uncertainty in the fugitive and process emissions associated with wastewater treatment, providing estimates of their emissions provides a general understanding of the magnitude of this emission source in comparison to others.

Solid Waste

GHG emissions result from solid waste management and decay of organic material in solid waste. ICLEI Community Protocol provides multiple accounting methods to address both emissions arising from solid waste generated by a community (regardless of where it is disposed of) as well as emissions arising from solid waste disposed of inside a community's boundaries (regardless of where it was generated). GHG emissions from the decomposition of organic material in this sector are broken down into two parts:

- Methane emissions from solid waste generated by the community in the year of the inventory, using ICLEI Community Protocol Method SW.4.
- Methane emissions from existing solid waste-in-place at landfills located within the community limits (waste-in-place), using ICLEI Community Protocol Method SW.1.

It is important to note that calculating emissions using both of the above described methodologies can lead to double counting of emissions if a communities waste is sent to a waste disposal facility inside of a community boundary. To be compliant with the ICELI Community Protocol, communities are required to estimate emissions generated from the waste generated by the entire community, regardless of whether or not the receiving landfill is located inside or outside of the community boundary. Waste-in-place emissions from an in-boundary facility, however, is optional to include in a community inventory and is more commonly included in a municipal or local government inventory. The Tajiguas Landfill is a County-owned and operated facility that receives waste from the unincorporated County as well as several other municipalities in the County. To avoid double counting of community-generated waste emissions, solid waste decay methane emissions were estimated using only ICLEI Community Protocol Method SW.4 to calculate the methane generation from solid waste generated by the unincorporated population in 2018.

In addition to the GHG emissions resulting from the decomposition of solid waste in landfills, the collection, transportation, and processing of solid waste also produces GHG emissions. The emissions from the collection of solid waste are included in the transportation sector; therefore, they are not included in the solid waste sector total emissions. The following ICLEI methodologies are used to quantify solid waste process emissions:

- Process emissions, generated at landfills, associated with landfilling of community-generated waste, using ICLEI Community Protocol Method SW.5.

[21] ICLEI 2019. U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions. Appendix F – Wastewater and Water Emission Activities and Sources.

Community Generated Waste

The County and Department of Public Works provided community waste disposal data for unincorporated and incorporated annual landfill disposal. The Department of Public works provided a 2018 Landfill Summary for Lompoc, Tajiguas, Santa Maria and Vandenberg Air Force Base that included the amount of waste and alternative daily cover (ADC)[22] received from the unincorporated County population. Additionally, the County provided data on all other waste facilities that received mixed waste from the unincorporated county. This data was updated with revised 2018 Tajiguas landfill disposal data provided by the County. Waste data from VSFB was excluded from this sector as the County does not have jurisdictional control of VSFB.

Overall, in 2018 the unincorporated County of Santa Barbara produced 105,505 tons of waste and approximately 37,892 of ADC which was disposed of in landfills. ICLEI Community Protocol Method SW.4.1 was used to calculate methane emissions based on the mass of waste landfilled, organic content of waste, and the landfill gas (LFG) capture rate of the facilities to which waste was sent. It was assumed that all landfills in which the unincorporated County waste was sent met the LFG laws, therefore the industry standard capture rate of 75% was assumed. The default oxidation rate of 0.1 and emission factor for mixed waste of 0.06 metric tons of methane per ton of waste (MT CH_4/ton) provided in the Community Protocol is used to estimate emissions from solid waste. Because the composition of the waste stream and the ADC stream are unknown, the emission factor for mixed solid waste was utilized for the entire waste and ADC stream. GHG emissions generated by waste collection and transport are not included in this sector to avoid double counting, per ICLEI Appendix E Solid Waste Emissions Activities and Sources. The activity data, calculation details, emission factors, and GHG emissions from community generated waste are provided in Table 20.

Landfilling Process Emissions

Landfilling process emissions encompass the contribution of the unincorporated County of Santa Barbara's waste to the emissions associated with operations at the destination landfill. These emissions were calculated using ICLEI Community Protocol Method SW.5. The primary destination landfills for County of Santa Barbara's waste are assumed to use natural gas to fuel their equipment.[23] The activity data, calculation details, emission factors, and GHG emissions from landfill processing equipment are provided in Table 20.

Table 20 GHG Emissions from Waste

Data	2018
Landfill Emissions	
Activity Data (short tons)[1]	143,397
Emission Factor (MT CO_2e/short ton)	0.06
Oxidation rate	0.1

[22] ADC refers to cover material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day. CalRecycle has approved the following ADC material types: ash and cement kiln dust, treated auto shredder waste, construction and demolition waste, compost, green material, contaminated sediment, sludge, and shredded tires.
[23] It is assumed that the primary fuel used for processing equipment is natural gas; however, for the primary landfills County of Santa Barbara waste is disposed at, EPA GHG Reports either do not indicate the type of fuel used to power stationary combustion equipment or indicate propane as the fuel. https://ghgdata.epa.gov/ghgp/main.do

LG collection rate	0.75
Landfill Emissions (MT CO_2e)[1]	50,590
Process Emissions	
Landfill Equipment	Natural gas
Activity Data (short tons)[1]	143,397
Emission Factor (MT CO_2e/short ton)	0.011
Process Emissions (MT CO_2e)[3]	1,577
Total Emissions (MT CO_2e)	**52,168**

[1] Activity data includes landfilled waste and alternative daily cover (ADC)

[2] Calculated using ICLEI method SW.4 and default values for oxidation rate, LFG capture rate, and mixed waste emission factor.

[3] Calculated using ICLEI method SW.5. It is assumed that the primary fuel used for processing equipment is natural gas; however, for the primary landfills County of Santa Barbara waste is disposed at, EPA GHG Reports either do not indicate the type of fuel used to power stationary combustion equipment or indicate propane as the fuel type. https://ghgdata.epa.gov/ghgp/main.do

LFG = landfill gas; MT = metric tons

Agriculture

This inventory includes the calculation of agricultural livestock emissions associated with nitrogen-based fertilizer application, enteric fermentation, and manure management.[24] Activity data for agricultural emissions was obtained from the following data sources: the California Department of Food and Agriculture, California Air Resources Board, and California Agriculture Statistics Review. For the 2018 inventory, N_2O emissions were calculated using total tons of nitrogen fertilizer applied in 2018 that were applied in Santa Barbara County. Based on County GIS data from 2016, approximately 94.5% of agricultural acreage in the County of Santa Barbara is within the unincorporated jurisdictional boundary. This percentage was used to allocate the amount of fertilizer used in the unincorporated County by multiplying the total county-wide nitrogen fertilizer application by 94.5%.

Emissions from enteric fermentation and manure management were calculated using ICLEI formulas A.1, A2.1, A2.3, and A2.4. The livestock type and count were obtained from California Agriculture Statistics Review reports (2018-2019) for Santa Barbara County. Emissions factors were obtained from CARB's GHG inventory Query Tool, 14th edition and applied to the livestock counts to calculate annual emissions in MT CO_2e for each livestock category. Table 21 includes the activity data and emissions factors used to derive agriculture emissions. To avoid double-counting, the emissions associated with agriculture equipment were calculated in the off-road transportation analysis.

Table 21 GHG Emissions from Agriculture

Data	2018
Activity Data (tons of nitrogen fertilizer)[1]	13,469
Activity Data (head of Beef Cattle)[2]	28,479
Activity Data (head of Dairy Cattle)[2]	8,662
Activity Data (head of Other Cattle)[2]	7,664
Emissions from N_2O Applied as Fertilizer	
Emissions factor (MT CO_2e/tons N fertilizer)[1]	2.404

[24] *Note: Energy usage and emissions associated with agriculture activities are included in the Energy Sector.*

Emissions (MT CO_2e)	32,380
Emissions from Enteric Fermentation	
Emissions factor (MT CO_2e/head of beef cattle)[3,4]	2.673
Emissions factor (MT CO_2e/head of dairy cattle)[3,4]	4.049
Emissions factor (MT CO_2e/head of other cattle)[3,4]	1.676
Emissions (MT CO_2e)	124,033
Emissions from Manure Management	
Emissions factor (MT CO_2e/head of beef cattle)[2,5]	0.089
Emissions factor (MT CO_2e/head of dairy cattle)[2,5]	3.667
Emissions factor (MT CO_2e/head of other cattle)[2,5]	0.577
Emissions (MT CO_2e)	38,727
Total Agricultural Emissions (MT CO_2e)	**195,140**

[1] Data is scaled to unincorporated agricultural acreage (94.5%). 2018 County-wide data obtained from CDFA Fertilizer report: https://www.cdfa.ca.gov/is/ffldrs/pdfs/2018_Tonnage.pdf

[2] Livestock data obtained from CASR reports, checked for validation with 2018-2019 reports, Santa Barbara County. https://www.cdfa.ca.gov/statistics/PDFs/2018-2019AgReportnass.pdf

[3] Emissions factors are from CARB GHG Inventory Query Tool (14th edition). https://www.arb.ca.gov/app/ghg/2000_2019/ghg_sector.php

[4] Enteric fermentation emission factors have been converted from CH_4 to CO_2e.

[4] Manure management emission factors have been converted from CH_4 and N_2O to CO_2e. Emission factor is average of anaerobic digester, anaerobic lagoon, daily spread, deep pit, and liquid/slurry

Vandenberg Space Force Base Summary

VSFB is outside of the County's jurisdictional control and as such it is most appropriate to exclude data from VSFB from each sector of the inventory. However, not all sectors had activity data that allowed for VSFB data to be disaggregated from the unincorporated County data. Table 22 summarizes the GHG emission sources included in the inventory and whether VSFB data was excluded or not.

Table 22 Inclusion or Exclusion of VSFB data from Inventory

GHG Emissions Sector	GHG Emissions Source	VSFB Data
Energy	Electricity Consumption	Excluded
	Natural Gas Consumption[1]	Included (anticipated to receive data from VSFB in future)
Transportation	On-Road Transportation	Included
	Off-Road[2]	Excluded
Solid Waste	Methane Commitment of Solid Waste Generated by Community	Excluded

Water	Electricity Consumption for Water Delivery	Excluded
Wastewater	Process Emissions from Wastewater Treatment Plants	Excluded
	Fugitive Emissions from Septic Tanks	Excluded
	Electricity Consumption for Wastewater Collection and Treatment	Excluded
Agriculture[3]	Application of N2O as Fertilizer	N/A
	Enteric Fermentation	N/A
	Manure Management	N/A

N/A = not applicable

[1] The County is in the process of obtaining energy use data from VSFB and anticipates being able to obtain this data regularly based on conversations with VSFB.

[2] Emission calculations for off-road sources are calculated by attributing county-wide fuel usage to the unincorporated County using parameters such as population, employment and households. VSFB population, employment and household data was excluded from the unincorporated County values. Therefore, off-road emissions from VSFB are indirectly excluded from the inventory.

[3] There is no VSFB data to be disaggregated to calculate emissions from agriculture.

Stationary Sources

Because of the County's limited influence to regulate emissions from these sources and uncertainty in forecasting future trends, the GHG emissions associated with stationary sources have been included as an informational item. Stationary source information was obtained from the Santa Barbara County Air Pollution Control District and California Air Resources Board.

Stationary Source Sector	2008	2016	2018
Electricity Generation	32,341	13,579	15,313
Oil and Gas Production	387,525	116,799	122,987
Other Combustion Source	56,496	113,552	36,170
Refinery	16,266	23,277	15,218
TOTAL	**492,628**	**267,207**	**189,688**

Community GHG Inventory Results

In 2018, the unincorporated County of Santa Barbara emitted approximately 1,427,766 MT CO_2e. As shown in Figure 1 and Table 23, the transportation sector was the largest source of emissions, generating approximately 776,168 MT CO_2e, or 54% of total 2018 GHG emissions. Electricity and natural gas consumption within the residential and commercial sectors were the second largest source of 2018 emissions, generating 390,105 MT CO_2e, or 27% of the total. Agricultural emissions resulted in 14% of the unincorporated County's emissions. Waste generation, including waste decay and processing resulted in 4% of the unincorporated County's emissions, while water use and wastewater generation resulted in the remaining 1%.

Figure 1. 2018 Community-wide GHG Emissions by Sector

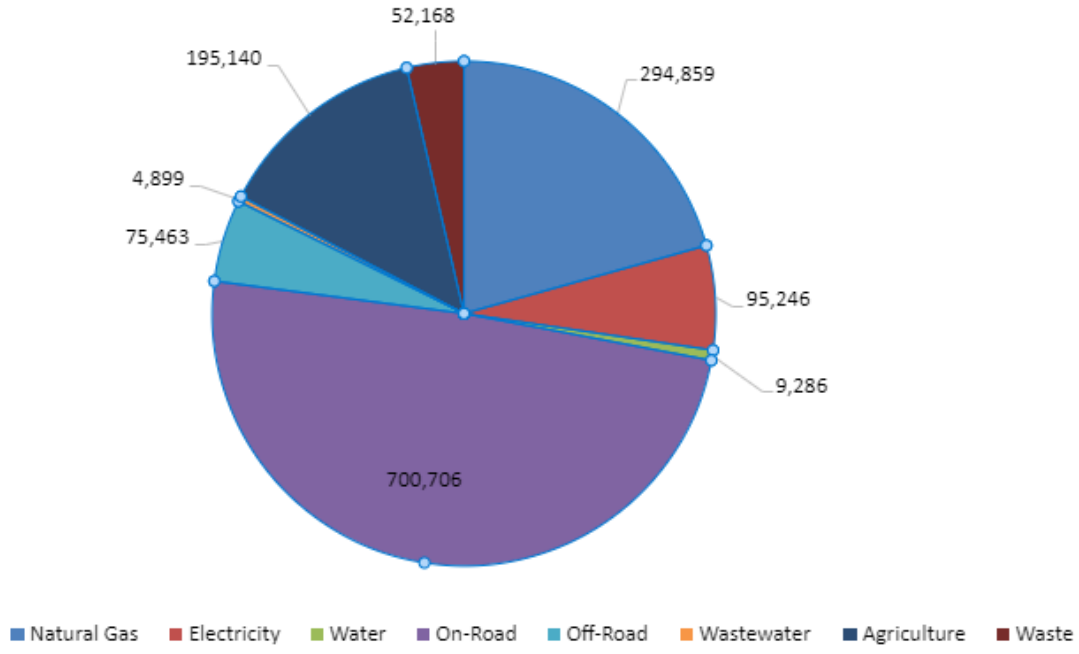

Table 23 2018 Community-wide GHG Emissions Summary by Sector

Sector	Emissions (MT CO_2e)	Percent of Total Emissions
Energy	**390,105**	**27%**
Electricity	90,843	6%
Natural Gas	294,859	21%
Electricity Transmission and Distribution Losses	4,403	<1%
Transportation	**776,168**	**54%**
On-road Transportation	700,706	49%
Off-road Equipment	75,463	5%
Water/Wastewater	**14,184**	**1%**
Water conveyance, distribution, and treatment	9,286	1%
Wastewater collection and treatment	327	<1%
Wastewater Fugitive and Process Emissions	4,572	<1%
Solid Waste	**52,168**	**4%**
Waste Sent to Landfills	50,590	4%
Process Emissions	1,577	<1%
Agriculture	**195,140**	**14%**
N_2O Applied as Fertilizer	32,380	2%
Enteric Fermentation	124,033	9%
Manure Management	38,727	3%
Total	**1,427,766**	**100%**

Notes: Emissions have been rounded and therefore sums may not match
MT CO_2e : Metric tons of Carbon Dioxide Equivalent

County of Santa Barbara Forecasts

The GHG emissions forecasts are based on the 2018 GHG emissions inventory and utilize County of Santa Barbara specific demographics projections to estimate future GHG emissions in the County. The forecasts were developed to better understand how population and job growth in the County of Santa Barbara could affect future GHG emissions in the years 2025, 2030, 2035, 2040, 2045, and 2050. The GHG emissions forecast presents two scenarios:

- Business-as-Usual Scenario (BAU) projects GHG emissions levels that scale with population, employment and transportation growth consistent with regional projections, and;
- Adjusted Scenario (Adjusted) accounts for GHG reductions expected to occur from adopted State legislation.

The presentation of these two forecast scenarios allows for an understanding of how GHG emissions levels may evolve without further action and how State legislation will contribute to reducing future GHG emissions levels.

Business-as-Usual GHG Emissions Forecast

A Business-as-Usual (BAU) GHG emissions forecast uses demographic projections and modeled on- and off-road transportation emissions to estimate future GHG emissions without the influence of adopted GHG reduction legislation or policies. The BAU forecast is based on projected growth trends in population, and employment over time, consistent with local and regional projections. The BAU forecast does not account for GHG emissions reductions associated with local GHG reduction measures or legislative actions. BAU forecasts were estimated for 2025, 2030, 2035, 2040, 2045, and 2050. The BAU GHG emissions projections were calculated based on the guidance of the Association of Environmental Professionals 2012 whitepaper Forecasting Communitywide GHG Emissions and Setting Reduction Targets. To develop a GHG emissions forecast, the appropriate "growth metrics" (e.g., population, housing, and employment projections) are multiplied by BAU "growth indicators", which represent a baseline metric developed from the baseline GHG emissions inventory. This allows for projections of activity data that can be converted into GHG emissions estimates using specific GHG emissions factors, which is assumed to be the same in the future as in the 2018 GHG emissions inventory. The result is a BAU forecast in which GHG emissions change with time in relation to demographics, with the assumption that GHG emissions rates and activity data will continue in the future as they did in 2018, the year of the most recent GHG emissions inventory. This methodology is used for all GHG emissions sectors and sources included in the 2018 GHG emissions inventory, with the exception of off-road transportation emissions. To forecast off-road emissions, the OFFROAD 2021 model was used to project fuel use since no significant GHG emission reduction legislation is included in the model. The following provides an overview of the growth metrics, growth indicators, and GHG emissions factors used to project GHG emissions for the BAU forecast calculations.

Growth Metrics

GHG emissions are largely driven by consumption of fuel and energy, and generation of solid waste and wastewater by residents, households, and employees in a jurisdiction. As such, as population and employment grow over time, it is expected that without changes to behaviors, policies, or technologies, GHG emissions will also grow. In a BAU forecast, this growth is assumed to be the primary metric for

determining changes in future GHG emissions. For the unincorporated County of Santa Barbara planning area, the growth and demographic projections used as the growth metrics for the BAU GHG emissions forecast were drawn from the SBCAG Regional Growth 2050 Forecast.[25] SBCAG updates its regional forecast for population, housing, and employment to support the development of the RTP/SCS, Regional Travel Demand Model, and other planning efforts. Housing data was adjusted to account for a yearly increase in housing stock commensurate with the Regional Housing Needs Assessment (RHNA) allocations for 2023-2031.[26] To estimate housing growth past 2031, the RHNA adjusted housing stock was assumed to grow annually following the same average annual growth (0.5% annually) as indicated in the SBCAG forecasts. Population growth due to RHNA were accounted for by multiplying the housing stock in unincorporated County by the average housing size based on SBCAG forecasts. These adjustments are considered conservative as housing stock changes with RHNA allocations may not be met fully. Population, employment, and housing data for the unincorporated County was further adjusted to exclude data from VSFB. This is consistent with the inventory where VSFB activity data was disaggregated from total unincorporated County activity data by sector and was excluded. VSFB population, employment, and housing data for 2018 was obtained from the United States Census Bureau and assumed to remain constant over time. No other demographic data (i.e. UCSB, Chumash lands, or other non-County areas) was excluded from the unincorporated County demographic data as it was not possible to disaggregate UCSB, Chumash lands or other non-County area activity data from unincorporated County data. Agricultural acreage in the County was obtained from the County and based on 2016 GIS data and assumed to remain constant over time in the absence of forecasted land use for the County. Unincorporated County of Santa Barbara growth metrics for the BAU forecast, are provided in Table 24.

Table 24 Growth Metrics for Unincorporated County of Santa Barbara BAU GHG Emissions Forecast

Growth Metric[1,2,3,4]	2018[1]	2025	2030	2035	2040	2045	2050
Population	137,524	141,223	143,866	146,508	149,151	151,793	154,436
Employment	63,444	64,741	65,667	66,594	67,520	68,447	69,373
Service Population	200,968	205,964	209,533	213,102	216,671	220,240	223,809
Housing	48,402	49,840	50,867	51,895	52,922	53,949	54,976
Agricultural Acres[5]	3,303,260	3,303,260	3,303,260	3,303,260	3,303,260	3,303,260	3,303,260

Notes: Service Population = Population + Employment

[1] 2018 population, employment and housing data was obtained from the United States Census Bureau

[2] 2020-2050 population, employment, and housing forecasts were obtained from SBCAG Regional Growth Forecast 2050 and adjusted to account for RHNA allocations obtained from SBCAG RHNA Plan (2021).

[3] Population, employment and housing data presented excludes VSFB data obtained from the United States Census Bureau. It is assumed that VSFB population, employment and housing remains constant over time in the absence of forecasted values.

[4] Due to slight differences in United States Census Bureau data for 2018 and SBCAG forecasted data starting in 2020, data presented here is an interpolation between the 2018 Census data and SBCAG 2050 forecasts.

[5] Agricultural acreage is based on 2016 Santa Barbara County GIS data and assumed to remain constant over time in the absence of forecasted land use change.

[25] SBCAG. 2018. Regional Growth 2050 Forecast. Available: http://www.sbcag.org/uploads/2/4/5/4/24540302/forecast_2050_draft.pdf. Accessed October 12, 2021

[26] SBCAG. 2021. Regional Housing Needs Allocation Plan. Available: http://www.sbcag.org/uploads/2/4/5/4/24540302/item_5_attach_a_-_rhna_plan.pdf. Accessed October 12, 2021

Growth Indicators

Growth indicators were developed from the baseline 2018 GHG emissions inventories by dividing the activity data for each emissions source by the appropriate metric for the year 2018. The appropriate metric used for each growth indicator is developed based on the relevance of the GHG emissions source. For example, residential energy consumption would be expected to grow with the number of new households, commercial energy consumption would be expected to grow with the number of new jobs, and total solid waste generation would be expected to grow with both residents and employment (service population). Table 25 provides the metrics that were associated with each GHG emissions sector to develop growth indicators and project GHG emissions from each GHG emissions source in the respective sectors.

Table 25 Growth Metrics and Associated GHG Emissions Sectors

GHG Emissions Sector	GHG Emission Source	Associated Growth Metric	Growth Metric Data Source
Energy	Residential Electricity and Natural Gas Consumption	Households	SBCAG Regional Growth 2050 Forecast & SBCAG RHNA Plan 2023-2031
	Non-residential Electricity and Natural Gas Consumption	Employment	
Transportation	All GHG Emissions Sources	Service Population	SBCAG Regional Growth 2050 Forecast & SBCAG RHNA Plan 2023-2031
Solid Waste	All GHG Emissions Sources	Service Population	SBCAG Regional Growth 2050 Forecast & SBCAG RHNA Plan 2023-2031
Water/Wastewater	All GHG Emissions Sources	Service Population	SBCAG Regional Growth 2050 Forecast & SBCAG RHNA Plan 2023-2031
Agriculture	All GHG Emissions Sources	Agricultural Acres	Santa Barbara County provided GIS data

The growth indicators for County of Santa Barbara are provided in Table 26 for each GHG emissions source.

Table 26 Growth Indicators for BAU GHG Emissions Forecast

GHG Emissions Source	Growth Indicator	Units
Energy		
Residential Natural Gas	421.5	Therms/Household
Non-Residential Natural gas	363.7	Therms/Employment
PG&E Residential Electricity (EV adjusted)	2,562.0	kWh/Household
PG&E Non-Residential Electricity (EV adjusted)	2,332.7	kWh/Employment
SCE Residential Electricity (EV adjusted)	3,082.8	kWh/Household
SCE Non-Residential Electricity (EV adjusted)	1,678.7	kWh/Employment
Solid Waste		
Waste Generation	0.52	Short Tons/Service Population
Alternative Daily Cover (ADC)	0.19	Short Tons/Service Population
Water		
Local Surface Water	0.003	Million Gallons/Service Population
Ground Water	0.016	Million Gallons/Service Population
Recycled Water	0.001	Million Gallons/Service Population
Imported Water	0.016	Million Gallons/Service Population
Wastewater		
Emissions from the Combustion of Digester Gas	115.1	scf/year/Service Population
Process N2O Emissions from Wastewater Treatment	3.1	g N_2O/year/Service Population
Emissions Associated with Effluents to River	2.5	kg N/year/Service Population
Emissions Associated with Septic Tanks	4.5	kg BOD/year/Service Population
Wastewater Collection and Treatment Electricity Emissions	0.002	Million Gallons/Service Population
Agriculture		
Nitrogen Applied as Fertilizer	0.004	tons of nitrogen/Ag Acres
Livestock Type - Beef Cattle	0.009	count of livestock/Ag Acres
Livestock Type - Dairy Cattle	0.003	count of livestock/Ag Acres
Livestock Type - Other Cattle	0.002	count of livestock/Ag Acres

Notes: PG&E = Pacific Gas and Electric Company; SCE = Southern California Edison; EV = electric vehicle; kWh = kilowatt-hour; scf = standard cubic foot; g N2O = grams of nitrous oxide; kg N = kilograms of nitrogen; kg BOD = kilograms biochemical oxygen demand

On-Road Activity Data

Activity data for the forecast of on-road transportation was modeled separately from the above growth metrics and growth indicators, using the Santa Barbara County travel demand model. Trip data was allocated based on whether the entirety of a trip took place within the unincorporated County of Santa Barbara jurisdictional area, started or ended within the unincorporated area, or started and ended outside of the unincorporated area. 100 percent of daily trips completely within the jurisdiction, 50 percent of partially-within trips, and 0 percent of outside trips were allocated to the unincorporated community. See *Community On-Road Transportation* for the detailed VMT methodology. Daily VMT data was annualized using the annualization factor of 347, described in the EMFAC2021 documentation. EV penetration

percent was obtained from EMFAC2021 and applied to the total unincorporated County VMT to determine VMT associated with EVs versus ICE vehicles. For the BAU forecast, EV penetration, electricity emission factors and the ICE emission factors remain the same as in 2018. The results for passenger and commercial VMT and electricity usage for EVs are summarized in Table 27.

Table 27 Unincorporated County of Santa Barbara BAU GHG Emissions Forecast On-Road Transportation Data

Growth Metric	2018	2025	2030	2035	2040	2045	2050
Total Passenger VMT	1,430,552,745	1,600,829,922	1,732,431,648	1,860,126,559	1,938,239,225	2,016,351,891	2,094,464,557
Total Commercial VMT	139,998,599	138,006,703	138,502,090	142,904,292	145,991,775	149,079,258	152,166,741
% Passenger EV Penetration	0.94%	0.940%	0.940%	0.940%	0.940%	0.940%	0.940%
% Commercial EV Penetration	0.05%	0.048%	0.048%	0.048%	0.048%	0.048%	0.048%
Passenger ICE VMT	1,417,100,802	1,585,776,809	1,716,141,042	1,842,635,197	1,920,013,345	1,997,391,492	2,074,769,640
Commercial ICE VMT	139,931,822	137,940,877	138,436,028	142,836,130	145,922,140	149,008,150	152,094,160
Passenger EV VMT	13,451,943	15,053,113	16,290,606	17,491,362	18,225,880	18,960,399	19,694,917
Commercial EV VMT	66,777	65,827	66,063	68,163	69,635	71,108	72,581
Passenger Fuel Efficiency (kWh/mile)	0.358	0.358	0.358	0.358	0.358	0.358	0.358
Commercial Fuel Efficiency (kWh/mile)	2.053	2.053	2.053	2.053	2.053	2.053	2.053
Passenger kWh	4,821,128	5,394,982	5,838,495	6,268,841	6,532,090	6,795,339	7,058,588
Commercial kWh	137,100	135,149	135,634	139,945	142,969	145,992	149,016

Notes: VMT = vehicle miles traveled; kWh = kilowatt hour; EV = electric vehicle; ICE = internal combustion engine

Off-Road Activity Data

Activity data for the off-road GHG emissions forecast was modeled separately from the above growth metrics and growth indicators, using the outputs from the CARB OFFROAD2021 model. The OFFROAD2021 model was run for Santa Barbara County for the forecast years to obtain fuel consumption for gasoline, diesel, and natural gas. As with the inventory, the following equipment sectors were included:

- Agricultural Equipment
- Airport Ground Support Equipment
- Construction and Mining Equipment
- Industrial Equipment
- Lawn and Garden Equipment

- Light Commercial Equipment
- Oil Drilling
- Portable Equipment
- Pleasure Craft
- Recreational Equipment
- Transport Refrigeration Units

The results of the OFFROAD2021 model were summarized for the above equipment sectors in Santa Barbara County. Unincorporated County was allocated a percentage of total county fuel consumption for each sector relative to the unincorporated County's proportion of jobs or population in the county. The results are summarized in Table 28. Off-road equipment powered by electricity is not included in this estimate to avoid double-counting with the electricity sector.

Table 28 Unincorporated County of Santa Barbara BAU GHG Emissions Forecast Off-Road Fuel Consumption

Off-road Fuel Category	2020	2025	2030	2035	2040	2045	2050
Diesel	5,782,135	5,666,814	5,531,114	5,433,170	5,355,512	5,296,963	5,257,685
Gasoline	1,427,733	1,496,652	1,550,885	1,608,445	1,666,213	1,727,822	1,794,883
Natural Gas	354,265	355,761	351,645	351,421	348,987	348,987	348,987

Notes: All values are of the unit gallons of fuel and have been attributed from County-wide values to unincorporated County using the attribution metric discussed in the inventory

Source: California Air Resources Board. 2021. OFFROAD2021 – ORION

Emissions Factors

The BAU GHG emissions forecast is representative of a scenario where community activities are generally similar to that of the baseline 2018 GHG emissions inventory. As such, BAU activity data growth is multiplied by the emissions factors used to calculate GHG emissions from the baseline GHG emissions inventory to generate an estimate of future GHG emissions without influence from GHG reduction policies at the State or local level. The BAU GHG emissions factors for the relevant GHG emissions sources and sectors are provided in Table 29, reported in MT CO_2e.

Table 29 BAU GHG Emissions Factors

GHG Emissions Source	GHG Emissions Factor	Units
Energy		
Natural Gas	0.00531	MT CO_2e/Therms
Methane Leakage	0.0525	MT CO_2e/Therms
PG&E Electricity and T&D	0.000115	MT CO_2e/kWh
SCE Electricity and T&D	0.000233	MT CO_2e/kWh
Transportation		
Passenger ICE Transportation	0.0003733	MT CO_2e/VMT
Commercial ICE Transportation	0.0012204	MT CO_2e/VMT
Passenger EV Transportation	0.000179	MT CO_2e/kWh
Commercial EV Transportation	0.000164	MT CO_2e/kWh
Off-Road - Diesel	0.010344	MT CO_2e/Gallons
Off-Road - Gasoline	0.009066	MT CO_2e/Gallons
Off-Road - Natural Gas (LPG)	0.005801	MT CO_2e/Gallons
Solid Waste		
Waste and ADC	0.364	MT CO_2e/short ton
Water		
Local Water	0.0001812	MT CO_2e/kWh
Imported Water	0.0002261	MT CO_2e/kWh
Wastewater		
Emissions from the Combustion of Digester Gas	0.00000017	MT CO_2e/scf/Year
Process N2O Emissions from Wastewater Treatment	0.00026500	MT CO_2e/g N2O/Year
Emissions Associated with Effluents to River	0.00208214	MT CO_2e/kg N/year
Emissions Associated with Septic Tanks	0.00369600	MT CO_2e/kg BOD/year
Wastewater Collection and Treatment	0.0001812	MT CO_2e/kWh
Agriculture		
Nitrogen Applied as Fertilizer	2.404	MT CO_2e/tons N fertilizer
Enteric Fermentation – Beef Cattle	2.673	MT CO2e/beef cattle head/year
Enteric Fermentation – Diary Cattle	4.049	MT CO2e/dairy cattle head/year
Enteric Fermentation – Other Cattle	1.676	MT CO2e/other cattle head/year
Manure Management – Beef Cattle	0.089	MT CO2e/beef cattle head/year
Manure Management – Diary Cattle	3.667	MT CO2e/dairy cattle head/year
Manure Management – Other Cattle	0.577	MT CO2e/other cattle head/year

Notes: PG&E = Pacific Gas and Electric Company; SCE = Southern California Edison; EV = electric vehicle; kWh = kilowatt-hour; scf = standard cubic foot; g N2O = grams of nitrous oxide; kg N = kilograms of nitrogen; kg BOD = kilograms biochemical oxygen demand

BAU GHG Emissions Forecast Results

The following provides a summary of the results of the BAU GHG emissions forecast for each source in the unincorporated County of Santa Barbara. The results have been reported in MT CO_2e. The BAU forecast

projects an increase in GHG emissions above the baseline 2018 GHG emissions inventory from all GHG emissions sources through 2050. Table 30 and Figure 2 provide a summary of the unincorporated County of Santa Barbara BAU GHG emissions forecast.

Table 30 Unincorporated County of Santa Barbara BAU GHG Emissions Forecast Summary (MT CO_2e)

GHG Emissions Source	2018	2025	2030	2035	2040	2045	2050
Energy							
Residential Natural Gas	108,367	111,587	113,887	116,186	118,486	120,786	123,086
Non-residential Natural Gas	122,557	125,063	126,852	128,642	130,431	132,221	134,011
Methane Leakage	63,935	65,520	66,652	67,784	68,917	70,049	71,181
Residential Electricity - PG&E	14,288	14,712	15,016	15,319	15,622	15,925	16,229
Non-residential Electricity - PG&E	17,052	17,401	17,650	17,899	18,148	18,397	18,646
T&D Losses - PG&E	1,517	1,554	1,581	1,608	1,635	1,661	1,688
Residential Electricity - SCE	34,720	35,752	36,489	37,226	37,963	38,699	39,436
Non-residential Electricity - SCE	24,783	25,290	25,652	26,013	26,375	26,737	27,099
T&D Losses - SCE	2,886	2,961	3,014	3,068	3,121	3,174	3,228
Transportation							
Passenger On-Road Transportation - EV Adjust	529,917	592,992	641,741	689,043	717,978	746,913	775,848
Commercial On-Road Transportation - EV Adjust	170,789	168,359	168,963	174,333	178,100	181,866	185,633
Off-Road - Diesel	60,731	58,617	57,214	56,200	55,397	54,791	54,385
Off-Road - Gasoline	12,672	13,569	14,061	14,582	15,106	15,665	16,273
Off-Road - Natural Gas (LPG)	2,059	2,064	2,040	2,039	2,024	2,024	2,024
Solid Waste							
Waste Generation	38,383	39,337	40,019	40,700	41,382	42,064	42,745
ADC	13,785	14,128	14,373	14,617	14,862	15,107	15,352
Water							
Emissions from Indirect Electricity Use	9,286	9,516	9,681	9,846	10,011	10,176	10,341
Wastewater							
Emissions from the Combustion of Digester Gas	4	4	4	4	4	4	4
Process N2O Emissions from Wastewater Treatment	164	168	171	174	177	180	183
Emissions Associated with Effluents to River	1,052	1,078	1,097	1,115	1,134	1,153	1,171
Emissions Associated with Septic Tanks	3,352	3,435	3,495	3,554	3,614	3,673	3,733
Indirect Electricity Emissions	327	335	341	346	352	358	364
Agriculture							
N_2O Applied as Fertilizers	32,380	32,380	32,380	32,380	32,380	32,380	32,380

GHG Emissions Source	2018	2025	2030	2035	2040	2045	2050
Enteric Fermentation	124,033	124,033	124,033	124,033	124,033	124,033	124,033
Manure Management	38,727	38,727	38,727	38,727	38,727	38,727	38,727
TOTAL	**1,427,766**	**1,498,582**	**1,555,130**	**1,615,441**	**1,655,980**	**1,696,766**	**1,737,800**

Notes: Values in this table may not add up to totals due to rounding

All values are of the unit metric tons of carbon dioxide equivalent (MT CO_2e)

To avoid double counting EV emissions in 2018 (the inventory year) and to attribute these emissions to the transportation sector, EV emissions were added to the transportation and removed from residential and commercial electricity. Forecast years do not require an adjustment, but rather an addition in emissions based on projected EV adoption, and consequent energy usage, to the transportation sector.

Forecast emissions are based on the 2018 inventory and do not include VSFB emissions for sectors where data was available. VSFB activity data and associated emissions for in the natural gas source and transportation were not able to be disaggregated and therefore some quantity of natural gas and transportation emissions is due to VSFB.

PG&E = Pacific Gas and Electric Company; SCE = Southern California Edison; N_2O = nitrous oxide; EV = electric vehicle

Figure 2 Unincorporated County of Santa Barbara GHG Emissions Forecasts (MT CO_2e) through 2050

OBJ

Adjusted GHG Emissions Forecasts

The Adjusted Forecast accounts for GHG emissions reductions that can be reasonably expected from State legislation and regulations. The following section describes the State legislation and regulations that are expected to reduce the County of Santa Barbara's future GHG emissions.

GHG Reduction Legislation Included in County of Santa Barbara Forecasts

Several State regulations have been enacted that should directly reduce Count of Santa Barbara's future GHG emissions. The impact of these regulations was quantified and incorporated into an Adjusted Forecast to provide a more accurate depiction of future GHG emissions growth and the responsibility of GHG emissions reduction for County of Santa Barbara beyond established State regulations. The following State legislation were applied to the Adjusted Forecasts based on the unique sectors within the County of Santa Barbara.

- 2019 Title 24 Building Energy Efficiency Standards
- Senate Bill (SB) 100 - California Renewables Portfolio Standard Program: emissions of greenhouse gases
- SAFE Part One and Final SAFE Rule - U.S. EPA and NHTSA Safer Affordable Fuel-Efficient or SAFE Vehicles Rule Part One
- Advanced Clean Trucks (ACT) Regulation
- Advanced Clean Car Program – including the Advanced Clean Cars standards, Assembly Bill 1493 (Pavley Standards), Low-Emission Vehicle Regulation, Zero-Emission Vehicle Regulation
- Executive Order N-79-20 - elimination of new internal combustion passenger vehicles by 2035

GHG Reduction Legislation Calculations

EMFAC2021 was used to model transportation-related GHG emissions for the County of Santa Barbara forecasts. In addition, the following methodology was used to calculate energy-related GHG emissions reduction related to Title 24 and SB 100.

- **Title 24:** It is assumed that all growth in the residential sector is from new construction. Accordingly, Title 24 GHG emissions reduction for natural gas and electricity are calculated as a percentage of the projected increase in energy consumption beyond the baseline 2018 GHG emissions inventory, under the BAU forecast, as provided in Table 30. Overall, the energy consumption reduction impact of Title 24 is:
  - 53 percent reduction beyond the 2018 baseline for residential electricity
  - 7 percent reduction beyond the 2018 baseline for residential natural gas[27]
- **SB 100**: Pacific Gas and Electric Company (PG&E) and Southern California Edison (SCE) currently provide electricity to the unincorporated County of Santa Barbara and are subject to SB 100 requirements. GHG emissions from electricity consumption are largely determined by the emissions factor associated with the supplied electricity. Legislative GHG emissions reductions from SB 100 are calculated as the difference between GHG emissions under the BAU forecast electricity and GHG emissions calculated using a SB 100-adjusted GHG emissions factor for a given forecast year. An adjusted GHG emission factors is calculated by scaling the baseline electricity GHG emissions factor with the Renewable Portfolio Standard (RPS) percentage for eligible renewable electricity required for compliance with SB 100. Both of the electricity providers for the unincorporated County had different electricity emissions factors due to different RPS percentages in their electricity delivery mix. The RPS percentages and associated GHG emissions factors used to determine the Adjusted Forecast electricity emissions are provided in Table 31. Note that while both Title 24 and SB 100 influence GHG emissions reductions in the electricity sector, double counting of these reductions is avoided by accounting for Title 24 reductions first and then accounting for reductions from SB 100.

Table 31 Electricity Provider Forecasted RPS and Electricity GHG Emissions Factors

Energy Provider	2018	2025	2030	2035	2040	2045	2050
Pacific Gas and Electric Company (PG&E)							
Renewable Portfolio Standard Percentage	39%	51%	60%	73%	87%	100%	100%
Adjusted Electricity Emission Factor (MT CO_2e/kWh)	0.000115	0.0000921	0.0000756	0.0000504	0.000025	0	0
Southern California Edison (SCE)							
Renewable Portfolio Standard Percentage	36%	50%	60%	73%	87%	100%	100%
Adjusted Electricity Emission Factor (MT CO_2e/MWh)	0.000233	0.0001818	0.000145	0.000097	0.000049	0	0

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

- **Transportation Legislation**: Major regulations incorporated into the CARB's 2021 transportation modeling include Advanced Clean Car Standards (LEV III, ZEV program, etc.), Innovative Clean Transit

[27] California Energy Commission. 2018. 2019 Building Energy Efficiency Standards Frequently Asked Questions. Available: <https://www.energy.ca.gov/sites/default/files/2020-03/Title_24_2019_Building_Standards_FAQ_ada.pdf>. Accessed June 21, 2021.

(ICT) regulation, Advanced Clean Truck (ACT) regulation, SAFE Vehicle Rules and Actions, and Federal GHG Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles. Additionally, EMFAC2021 forecasts the zero-emission vehicle market share based on consumer choice models rather than a most likely compliance scenario used in previous EMFAC versions. The forecasted EV penetration percent and ICE vehicle emission factors obtained from EMFAC2021 used to determine the Adjusted Forecast on-road transportation emissions are provided in Table 32. Note that while SB 100 influences GHG emissions reduction in the on-road transportation sector from EVs, double counting of these reductions is avoided by subtracting out reductions due to SB 100 from the total transportation legislative reductions accounted for.

Table 32 Unincorporated County of Santa Barbara Adjusted GHG Emissions Forecast On-Road Transportation Data

Growth Metric	2018	2025	2030	2035	2040	2045	2050
Total Passenger VMT	1,430,552,745	1,600,829,922	1,732,431,648	1,860,126,559	1,938,239,225	2,016,351,891	2,094,464,557
Total Commercial VMT	139,998,599	138,006,703	138,502,090	142,904,292	145,991,775	149,079,258	152,166,741
% Passenger EV Penetration	0.94%	4.576%	6.830%	8.435%	9.292%	9.677%	9.843%
% Commercial EV Penetration[1]	0.05%	0.674%	6.325%	18.322%	29.258%	37.274%	42.110%
Passenger ICE VMT	1,417,100,802	1,527,579,901	1,614,098,393	1,703,220,834	1,758,141,071	1,821,238,306	1,888,310,137
Commercial ICE VMT	139,931,822	137,076,583	129,742,082	116,720,826	103,277,677	93,511,956	88,089,582
Passenger EV VMT	13,451,943	73,250,021	118,333,255	156,905,725	180,098,154	195,113,585	206,154,420
Commercial EV VMT	66,777	930,120	8,760,008	26,183,467	42,714,098	55,567,302	64,077,159
Passenger Fuel Efficiency (kWh/mile)	0.358	0.3680	0.3685	0.3690	0.3692	0.3693	0.3693
Commercial Fuel Efficiency (kWh/mile)	2.053	1.0721	1.0328	1.0362	1.0183	1.0193	1.0144
Passenger kWh	4,821,128	26,959,026	43,607,601	57,894,150	66,488,614	72,049,007	76,130,682
Commercial kWh	137,100	997,187	9,047,542	27,131,787	43,496,009	56,640,877	64,998,257

Notes: VMT = vehicle miles traveled; kWh = kilowatt hour; EV = electric vehicle; ICE = internal combustion engine

1 EMFAC2021 reflects several regulations that require the transition of commercial vehicles to ZEV or EV including the Advanced Clean Truck (ACT) Rule and Innovative Clean Transit (ICT). ACT requires that by 2035, zero-emission truck/chassis sales would need to be 55% of Class 2b – 3 truck sales, 75% of Class 4 – 8 vocational truck sales, and 40% of Class 7-8 truck tractor sales. EMFAC2021 reflects ACT by modelling heavy-duty ZEVs/EVs based on the sales percentage requirements for each model year and those percentages were applied to vehicles first sold or certified in California. ICT requires the transition of all transit agencies buses to ZEV or EV. The zero emissions buses introduced through this program are reflected in EMFAC2021.

Adjusted GHG Emissions Forecast Results

State legislation is expected to result in GHG emissions reduction from the BAU forecast in the transportation, residential, and commercial sectors. Both the Pavley regulation, which requires automakers to control GHG emission from new passenger vehicles for the 2009 through 2016 model years, and Advanced Clean Car Program, which combines the control of smog-causing (criteria) pollutants and GHG emissions into a single package of regulations, are expected to reduce GHG emissions from transportation.

Title 24 is expected to reduce GHG emissions from reduced electricity and natural gas consumption in new residential housing units. SB 100 is expected to further reduce GHG emissions in the residential sector through reduced GHG emissions associated with electricity generation, as well as similar reductions in the commercial sector. The expected legislative reductions from SB 100 and Title 24 are summarized in Table 33.

Table 33 Unincorporated County of Santa Barbara Adjusted GHG Emissions Reductions

GHG Emissions Source	2018	2025	2030	2035	2040	2045	2050
Energy							
Residential Natural Gas	108,367	111,426	113,726	116,025	118,325	120,625	122,925
Non-residential Natural Gas	122,557	125,063	126,852	128,642	130,431	132,221	134,011
Methane Leakage	63,935	65,475	66,608	67,740	68,872	70,004	71,137
Residential Electricity - PG&E	14,288	11,621	9,641	6,497	3,284	-	-
Non-residential Electricity - PG&E	17,052	13,835	11,466	7,720	3,898	-	-
T&D Losses - PG&E	1,517	1,232	1,022	688	348	-	-
Residential Electricity - SCE	34,720	27,607	22,329	15,049	7,606	-	-
Non-residential Electricity - SCE	24,783	19,656	15,883	10,694	5,400	-	-
T&D Losses - SCE	2,886	2,292	1,854	1,249	631	-	-
Transportation							
Passenger On-Road Transportation - EV Adjust	529,917	512,033	498,602	496,798	494,534	501,603	516,019
Commercial On-Road Transportation - EV Adjust	170,789	160,448	147,636	130,874	114,822	102,348	96,977
Off-Road - Diesel	60,731	58,617	57,214	56,200	55,397	54,791	54,385
Off-Road - Gasoline	12,672	13,569	14,061	14,582	15,106	15,665	16,273
Off-Road - Natural Gas (LPG)	2,059	2,064	2,040	2,039	2,024	2,024	2,024
Solid Waste							
Waste Generation	38,383	39,337	40,019	40,700	41,382	42,064	42,745
ADC	13,785	14,128	14,373	14,617	14,862	15,107	15,352
Water							
Emissions from Indirect Electricity Use	9,286	7,264	5,754	3,901	1,983	-	-
Wastewater							
Emissions from the Combustion of Digester Gas	4	4	4	4	4	4	4

GHG Emissions Source	2018	2025	2030	2035	2040	2045	2050
Process N2O Emissions from Wastewater Treatment	164	168	171	174	177	180	183
Emissions Associated with Effluents to River	1,052	1,078	1,097	1,115	1,134	1,153	1,171
Emissions Associated with Septic Tanks	3,352	3,435	3,495	3,554	3,614	3,673	3,733
Indirect Electricity Emissions	327	263	216	146	74	-	-
Agriculture							
N2O Applied as Fertilizers	32,380	32,380	32,380	32,380	32,380	32,380	32,380
Enteric Fermentation	124,033	124,033	124,033	124,033	124,033	124,033	124,033
Manure Management	38,727	38,727	38,727	38,727	38,727	38,727	38,727
TOTAL	**1,427,766**	**1,385,755**	**1,349,199**	**1,314,151**	**1,279,050**	**1,256,603**	**1,272,080**

Figure 3 shows the GHG emissions trends in terms of MT CO_2e for the Adjusted Forecast. Adjusted Forecast emissions trend downward over time through 2050.

Figure 3 Unincorporated County of Santa Barbara Adjusted GHG Emissions Forecasts (MT CO_2e) through 2050

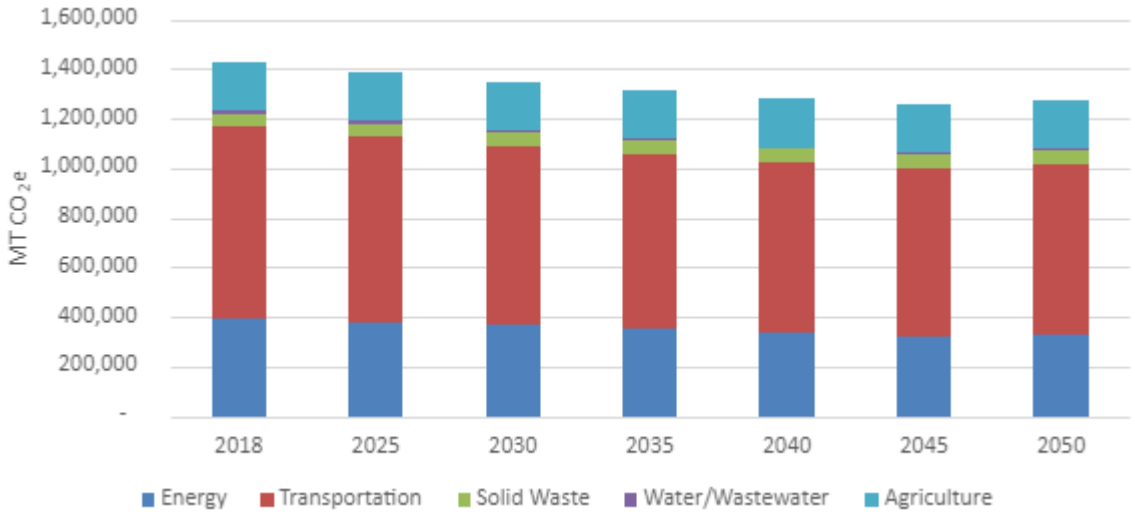

Figure 4 shows the GHG emissions trends in terms of MT CO_2e over the course of the BAU and Adjusted forecasts to illustrate the influence of State legislation on projected emissions. Table 34 provides the results summary of the GHG emissions forecast for unincorporated County of Santa Barbara, including the BAU forecast, Adjusted forecast, and the expected GHG emissions reduction from legislation.

The BAU GHG emissions forecast projects an overall increase of GHG emissions with population, housing, and employment growth. However, State legislation is anticipated to reduce GHG emissions. As shown in Table 34, in 2030 the Adjusted forecast is approximately 13 percent lower than the BAU forecast due to State legislation. By 2050, the current State legislation is anticipated to lead to an Adjusted forecast that is approximately 27 percent lower than the BAU forecast. Title 24 are expected to provide some reductions in GHG emissions resulting from electricity consumption and residential natural gas

consumption in new construction. However, since the population is anticipated to continue growing and natural gas is a large contributor to building energy in the unincorporated County, the GHG reduction impact of this program is minimal. The electricity and water sectors as well as on-road transportation associated with EVs will experience a strong downward trend, approaching near-zero in 2045 due to stringent RPS requirements of SB 100. Although, transportation emissions are expected to decrease sharply in the next 10 to 15 years due to existing fuel efficiency requirements, fleet turnover rates, and increased EV penetration in the market, continued VMT growth minimizes the GHG reduction impact of transportation legislation.

Figure 4 Unincorporated County of Santa Barbara BAU and Adjusted GHG Emissions Forecasts (MT CO_2e) through 2050

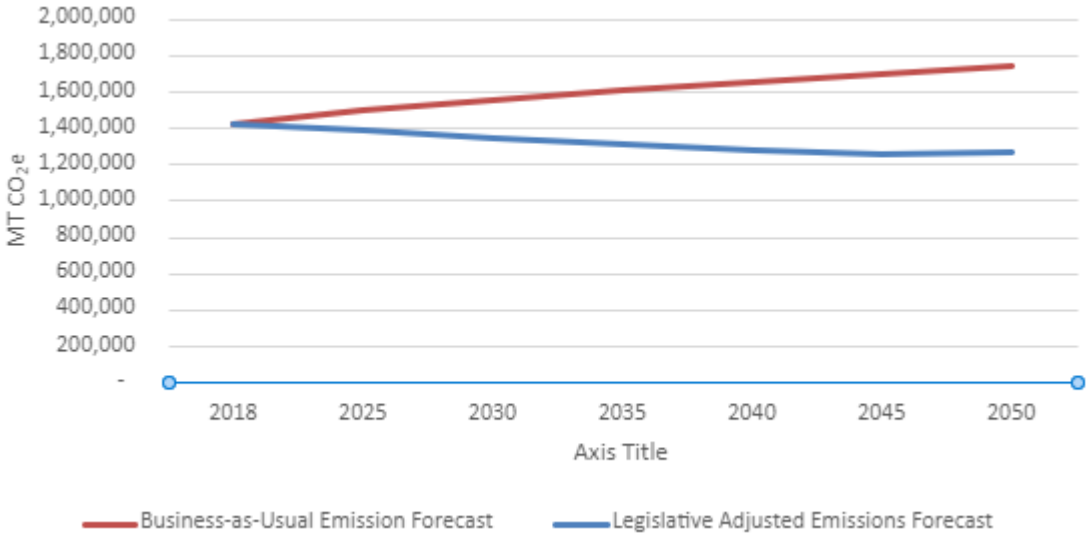

Table 34 Unincorporated County of Santa Barbara GHG Emissions Forecast Results Summary

	2018	2025	2030	2035	2040	2045	2050
Business-as-Usual Forecast	1,427,766	1,498,582	1,555,130	1,615,441	1,655,980	1,696,766	1,737,800
Transportation Reductions	0	-91,813	-169,304	-240,841	-289,566	-323,586	-347,194
Title 24 Reductions	0	-1,051	-1,756	-2,461	-3,166	-3,870	-4,575
SB 100 Reductions	0	-19,963	-34,872	-57,988	-84,198	-112,706	-113,951
Legislative Adjusted Forecast	1,427,766	1,385,755	1,349,199	1,314,151	1,279,050	1,256,603	1,272,080
Percent Reduction in GHG Emissions from Legislation	0.0%	7.5%	13.2%	18.7%	22.8%	25.9%	26.8%

SB = Senate Bill; GHG = greenhouse gas

Target Setting

Once the inventory and forecast are complete, GHG emission reduction targets are developed consistent with State and County goals (i.e., SB 32, EO S-3-05, EO B-55-18). GHG targets are developed relative to baseline emissions levels, and in consideration of future emission forecasts and the effects of ongoing and future legislative actions. GHG reduction targets can be set as either an efficiency target (MT CO_2e per capita or per service population per year) or as a community wide mass emissions target (total MT CO_2e). With CARB's publication in 2017 of the Scoping Plan Update, the state recommended using efficiency metrics for local targets to incentivize growth in a coordinated manner and not penalize jurisdictions which are growing at significant rates.[28]

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. The purpose of target setting is to develop the trajectory toward achieving the state's 2030 goal (SB 32) and prepare for long-term goals, either 80 percent below 1990 levels by 2050 (EO S-3-05) or carbon neutrality by 2045 (EO B-55-18). Based on the County's long-term goal selection, several target pathways will be developed consistent with state reduction goals and the County's reduction goals.

[28] California Air Resources Board. 2017. California's Climate Change Scoping Plan, p. 99-102.