

Greenhouse Gas Inventory Report

Sonoma County
2015 Update

Credits and Acknowledgements:

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Acronyms and Abbreviations:

BayREN	Bay Area Regional Energy Network
CA2020	Climate Action 2020 and Beyond
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
EV	electric vehicle
GPD	gross domestic product
GHG	greenhouse gas
GRP	Global Reporting Protocol
ICLEI	International Council for Local Environmental Initiatives
LGO	Local Government Operations Protocol
MMTCO ₂ e	million metric tons of carbon dioxide equivalent
MTCO ₂ e	metric tons of carbon dioxide equivalent
N ₂ O	nitrous oxide
PG&E	Pacific Gas & Electric Company
RCPA	Regional Climate Protection Authority
SCP	Sonoma Clean Power
SCTA	Sonoma County Transportation Authority
SCWMA	Sonoma County Waste Management Agency
VMT	vehicle miles traveled
WRI	World Resources Institute

Last Updated August 7, 2018

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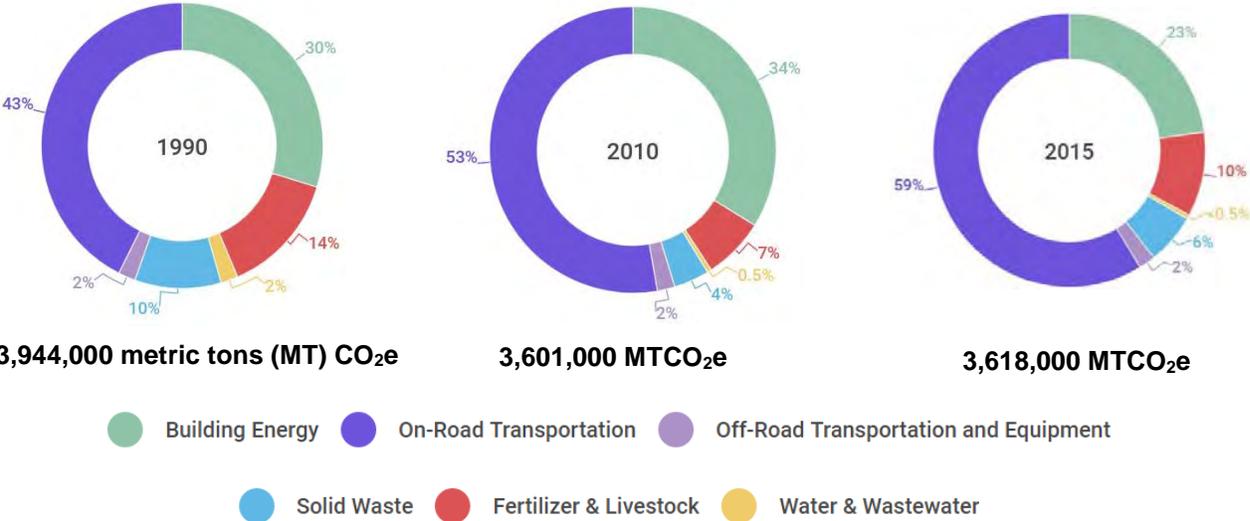
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EXECUTIVE SUMMARY

Sonoma County is committed to measuring, tracking, and reporting our greenhouse gas (GHG) emissions to communicate progress and focus our actions. While our ambitious GHG reduction goals take into account the critical role both regional and state entities play, our GHG inventory reflects the sectors and emissions sources that can be reduced through the actions of local governments and regional entities. The Sonoma County Regional Climate Protection Authority (RCPA) established a baseline communitywide GHG inventory for calendar year 2010 and a back cast inventory for 1990 as part of the Climate Action 2020 and Beyond (CA2020) development process. The RCPA completed this 2015 inventory update to help track progress towards achieving the short and long-term emissions reduction goals established in CA2020.

Sonoma County Emissions in 2015 remain 9% below 1990 levels, while countywide population grew 4% and gross domestic product (GDP) increased 22%.¹ This local trend of GDP and population growth decoupling from emissions is encouraging and in-line with statewide trends.² Yet, without increasing the speed at which our county reduces GHG emissions, we will not achieve the countywide reduction goal of 25% below 1990 levels by 2020.

Greenhouse Gas Inventories by Source



As outlined in CA2020, Sonoma County’s regional approach to reducing GHG emissions recognizes the shared nature of the challenge as well the fact that Sonoma County communities each have a different capacity to achieve emission reductions. Additionally, statewide programs to reduce GHG emissions related to building energy and transportation play a critical role and represent 50% of the local GHG reductions need to reach our 2020 target.

¹ [U.S Census Bureau American Community Survey](#) and the [Sonoma County Economic Development Board](#)
² [California Air Resources Board: California Greenhouse Gas Emissions for 2000 to 2015](#)

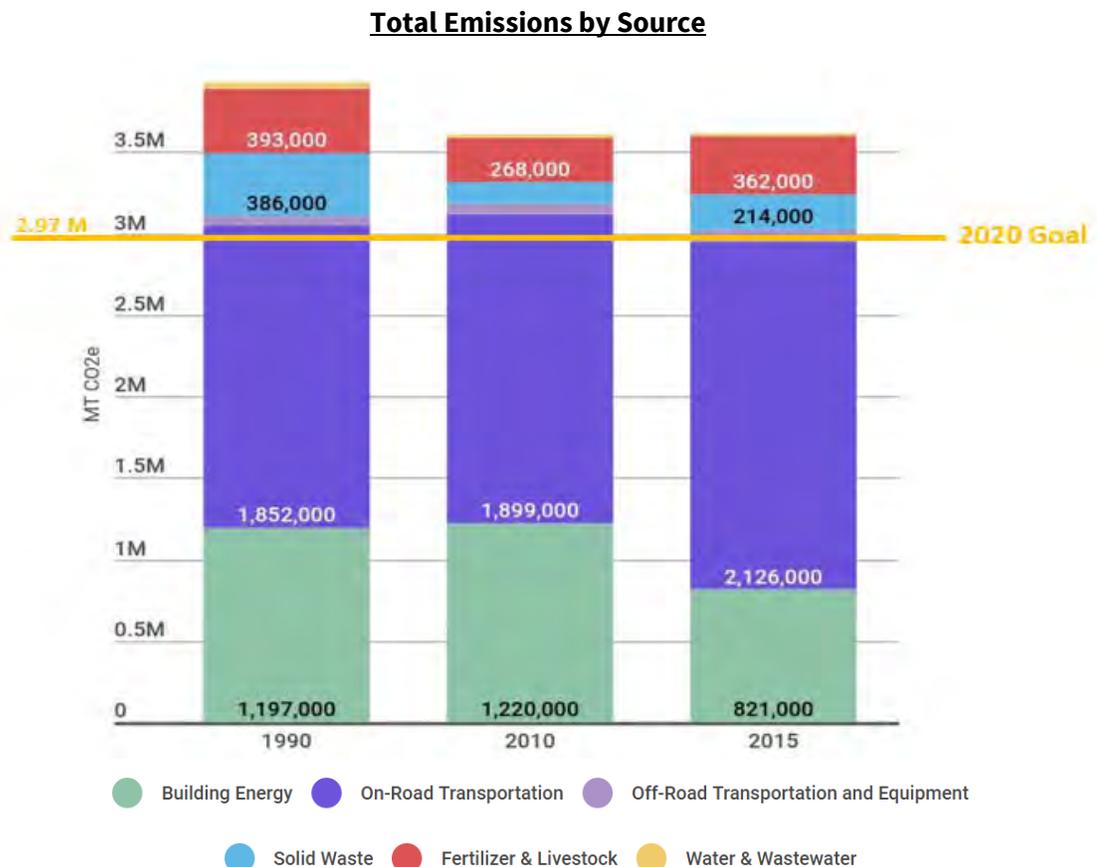
This 2015 inventory report represents a milestone in our work to reduce countywide emissions. Four Sonoma County cities experienced a slight increase in total emissions while five cities showed a slight decrease. Yet, overall, lack of progress in total countywide emission reductions from 2010 highlight significant challenges ahead. We are confident that countywide reduction goals can be reached if each jurisdiction, with support of member agencies, prioritizes emissions reduction efforts by continuing to implement their jurisdiction-specific measures outlined in CA2020.

KEY FINDINGS

Emissions from energy used in buildings decreased 33% between 2010 and 2015, exceeding the short-term CA2020 reduction goal of 27% by 2020. This reduction is largely attributed to new electricity supplier, Sonoma Clean Power, which was created in 2014 to provide cleaner electricity to Sonoma County households and businesses.

Transportation is the largest source of emissions for the county; over 60% of total countywide emissions were from transportation in 2015. Between 2010 and 2015, vehicle miles traveled by residents and employees within the county increased by approximately 260,000 daily miles between 2010 and 2015.

Emissions from waste sent to landfills increased 35% between 2010 and 2015 due to an increase in both landfilled waste and improved reporting methods specific to Sonoma County waste management.



NEXT STEPS

The RCPA is working with our members and partners to better understand and address upward trends in transportation emissions and to take advantage of opportunities to further reduce emissions from existing buildings. The RCPA, along with the Sonoma County Transportation Authority (SCTA) recently released the [Shift Sonoma County Plan](#), which defines and evaluates strategies to shift transportation away from single occupant vehicles towards cleaner, healthier and more efficient modes of transportation. The RCPA also leads Sonoma County's participation in multiple energy and water savings programs through [BayREN](#), a collaboration of the nine Bay Area counties to deliver targeted, integrated, regional-scale climate solutions focused on energy, water and resiliency.

Our next GHG inventory update will reflect our commitment to identifying and addressing key barriers to decreasing transportation emissions by providing more in depth analysis on our community wide fleet. This will also help us track progress on the measures outlined in our Shift Plan which are focused on increasing the number of electric vehicles (EVs) on the road, installing EV infrastructure, and encouraging other clean, efficient modes of transportation. Countywide sales of EVs increased from 76 in 2011 to 3,011 in 2015³ and we plan to continue to work with partners like Sonoma Clean Power and PG&E to procure, site and finance EV infrastructure to support and encourage this promising trend.

The October 2017 wildfires tremendously impacted Sonoma County, its residents, and the environment. The impact of the fires on countywide greenhouse gas emissions will be reflected in our next inventory update which will detail 2018 emissions and will be released in 2020. We are inspired by the strength of our community and the work to rebuild a stronger, more resilient Sonoma County and will continue working with partners to develop strategies towards a low carbon recovery.

³ [Shift Sonoma County: Low Carbon Transportation Plan](#)

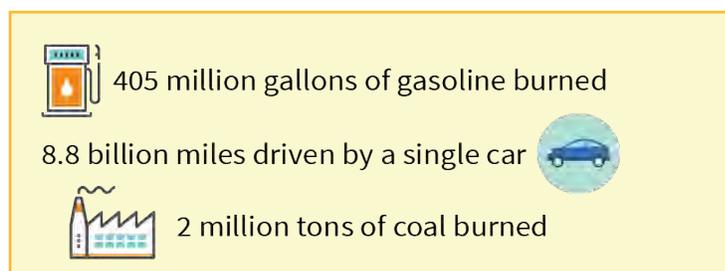
SONOMA COUNTY EMISSIONS

The communitywide greenhouse gas (GHG) emissions inventories⁴ for Sonoma County capture the primary sources of emissions that can be reduced through the actions of local governments and regional entities: energy use in our homes, businesses, vehicles, off-road equipment; emissions from treating and delivering water; emissions from materials that are thrown away; and fertilizer and livestock operations. This approach is known as an “activity-based” inventory. It involves measuring or modeling the primary emissions-generating activities in Sonoma County and translating them into GHG emissions based on standardized or locally specific emissions factors.⁵

Local emissions-generating activities addressed in this report are summarized in the Appendix. The analysis of emissions includes carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Of these gases, CO₂ emissions contribute the most to global warming, both internationally and locally.⁶ All three gases are expressed as metric tons of carbon dioxide equivalent (MTCO₂e), based on the global warming potential of these gases relative to CO₂.

Roughly 3.9 million metric tons of carbon dioxide equivalent (MMTCO₂e) emissions were generated by activities in Sonoma County in 1990. By 2010, emissions were 9% lower, at about 3.601 MMTCO₂e. **Emissions in 2015 remained 9% below 1990 levels, at about 3.62 MMTCO₂e.** In comparison, Unincorporated San Diego County’s population was 455,000 (Sonoma County 2015 population - 503,000) in 2014 and emissions were measured at about 3.2 MMTCO₂e.

How much is 3.6 million metric tons of greenhouse gases?⁷



⁴ In the past, the Center for Climate Protection (CCP) has also estimated annual greenhouse gas emissions in Sonoma County using different methods and data sources than those used in the inventory for CA2020 and this update. CCP recently released their 2016 Greenhouse Gas Report, which outlines the specific emissions sources included in that report and previous CCP inventories.

⁵ [U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions](#)

⁶ [U.S. EPA Greenhouse Gas Emissions](#)

⁷ [U.S. EPA Greenhouse Gas Equivalencies Calculator](#)

SOURCE SPECIFIC FINDINGS

This section provides an overview of 2015 GHG emissions compared with 2010 from five primary countywide sources: building energy, transportation, solid waste, water and wastewater, and livestock and fertilizer management. Transportation source emissions increased by 8% in 2015 and remains the highest source of countywide emissions (61%), while emissions from the other largest emissions producing source in the County - building energy - substantially decreased.

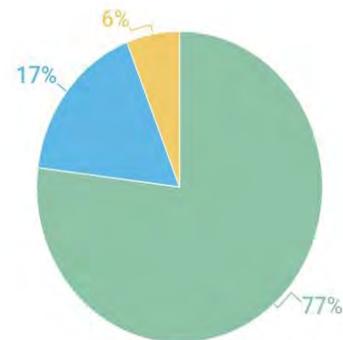
BUILDING ENERGY

Countywide emissions from energy used in our homes decreased about 33% from 2010 to 2015; exceeding the near-term sector-specific, emissions reduction target set in CA2020.

This large reduction in emissions from building energy use results mostly from the 2014 inception of Sonoma Clean Power (SCP) - a community choice energy provider which offers Sonoma County communities the choice of purchasing lower-carbon and zero-carbon electricity delivered through PG&E power lines.

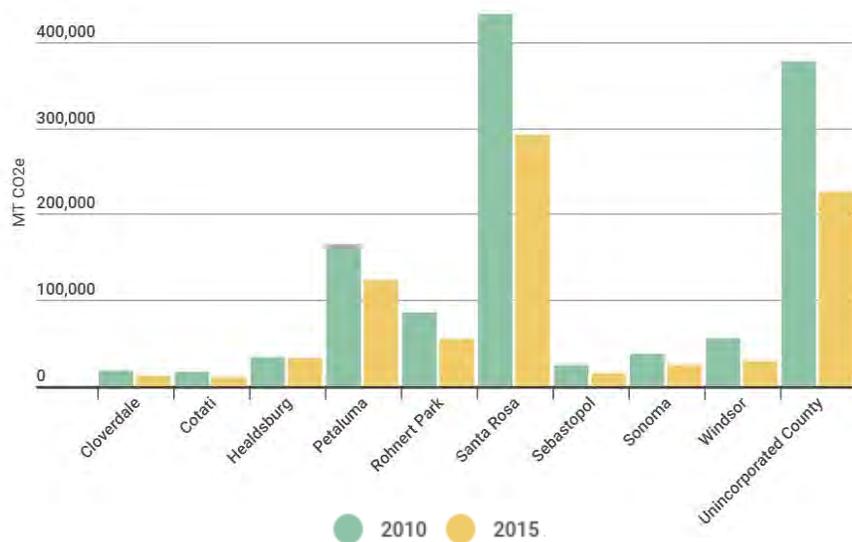
In 2015, Sonoma Clean Power provided electricity to approximately 77% of Sonoma County residents. The chart on the following page shows how this cleaner electricity reduced emissions in the building energy sector for each Sonoma County community.⁸

Population Served by Sonoma County Electricity Providers



● Sonoma Clean Power ● PG&E ● Healdsburg Electric

Building Energy Emissions (MTCO₂e) by Jurisdiction

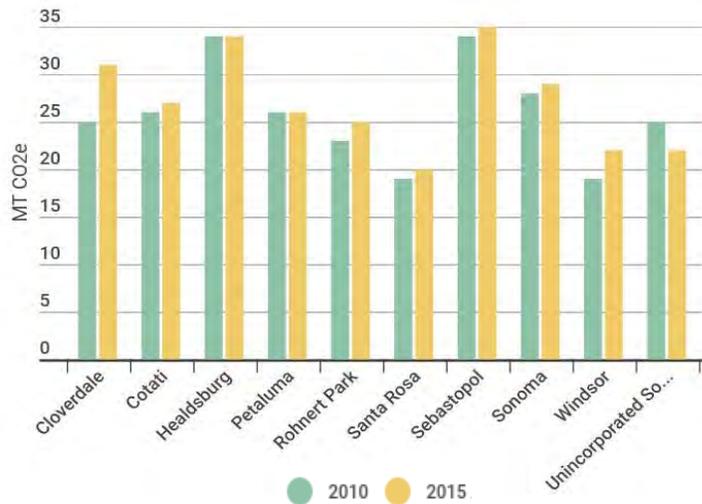


⁸ Healdsburg operates an independent utility and does not receive electricity from Sonoma Clean Power.

TRANSPORTATION

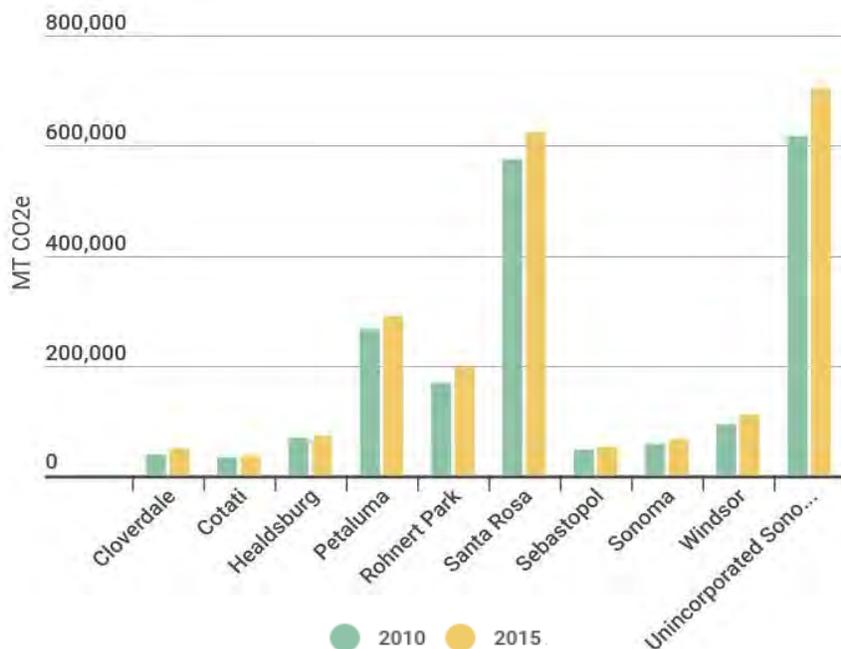
Emissions from on-road driving and off-road driving and equipment are included in the transportation sector, which is the largest source of emissions for the County. Countywide emissions from the transportation sector continue to increase. In 2015, approximately 61% of total countywide emissions are from transportation, or about 2.2 million MTCO₂e. In 2010 emissions from transportation accounted for about 53% of countywide emissions or approximately 1.8 million MTCO₂e.

Per Capita Daily Vehicle Miles Traveled per Jurisdiction



Sonoma County residents drove 260,000 more miles a day in 2015 than in 2010. The chart to the left demonstrates how this countywide increase in vehicle miles traveled (VMT) resulted in a per capita increase in each community, excluding the unincorporated county.

Transportation Emissions (MTCO₂e) per Jurisdiction

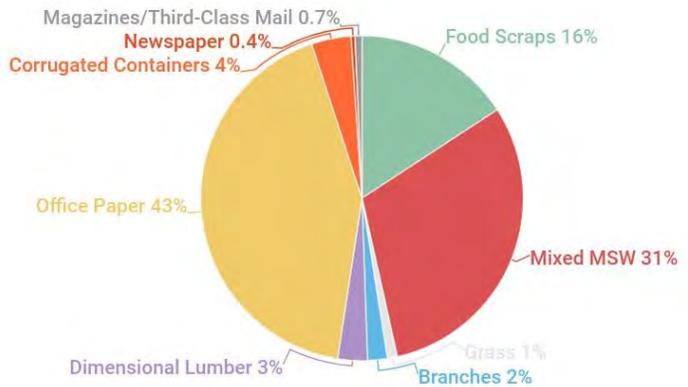


SOLID WASTE

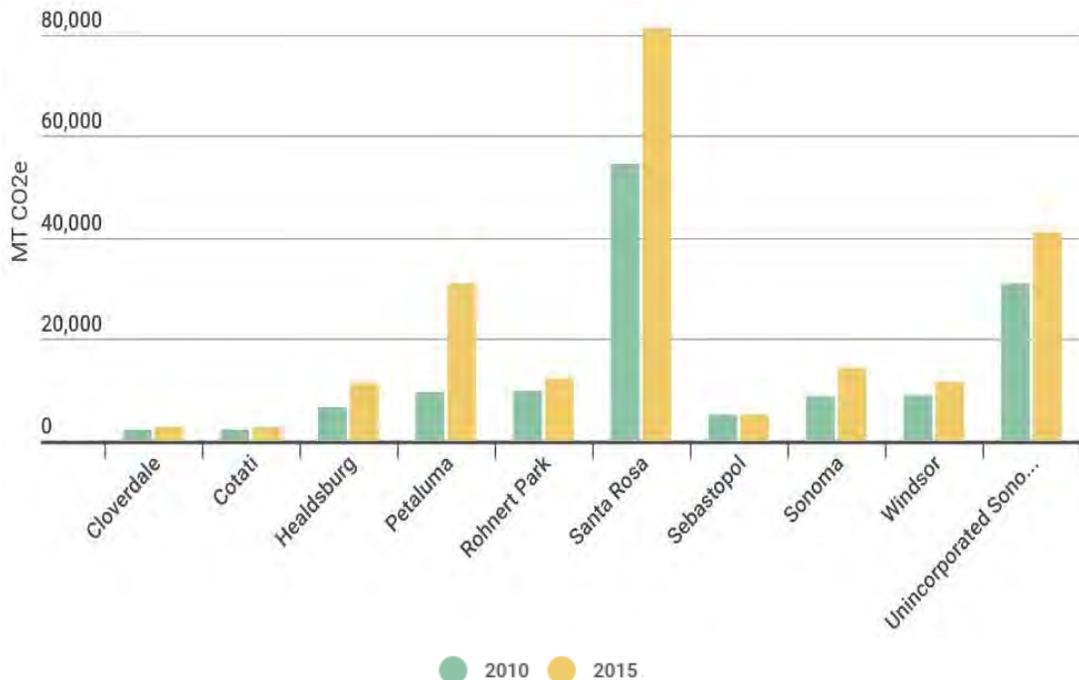
Approximately 388,000 tons of waste generated in Sonoma County was landfilled, emitting about 214,000 MTCO₂e (about 6% of total 2015 emissions). Total emissions from this sector increased by 35% from 2010 due to more accurate accounting of methane collection efficiency rates provided for the landfills that receive Sonoma County waste.

A landfill's efficiency in reducing methane leaks is critical in calculating GHG emissions from landfilling solid waste. In 2015, the Redwood Landfill processed about one fourth of Sonoma County waste. The Redwood Landfill's methane collection efficiency rate was recorded at 90% for the 2010 GHG Inventory. In 2015, this efficiency percentage was updated to 75% (the state average, per the ICLEI U.S. Protocol), resulting in a sharp decrease in total emissions from the solid waste sector.

Sonoma County Waste Characterization



Solid Waste Emissions (MTCO₂e) per Jurisdiction

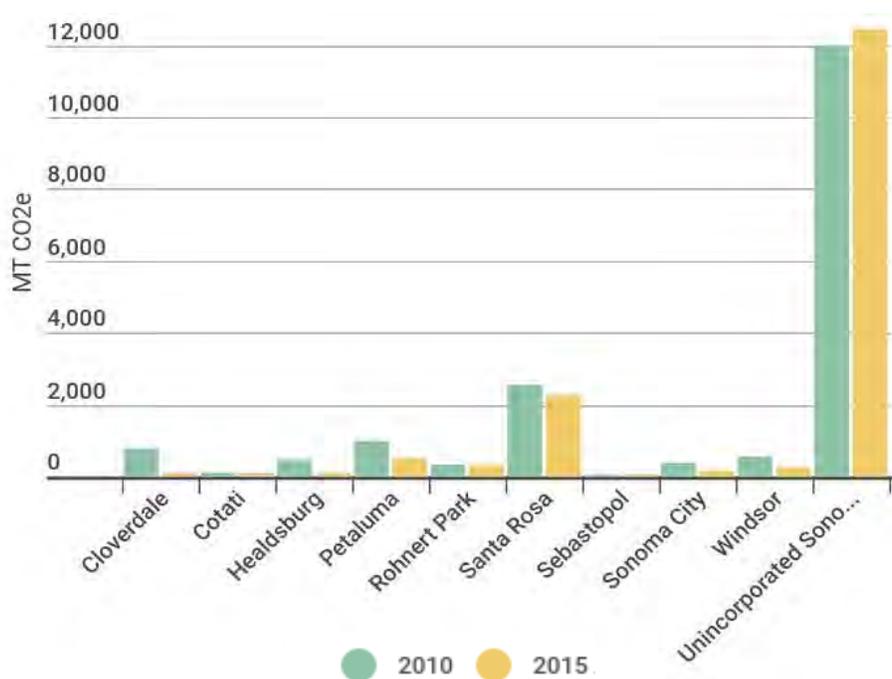


WATER AND WASTEWATER

Countywide emissions from Water & Wastewater decreased from about 19,000 MTCO₂e in 2010 to 16,000 MTCO₂e in 2015. Emissions result from wastewater treatment and water conveyance. The majority of emissions in this sector result from wastewater treatment. Wastewater treatment includes a variety of different processes, which release methane and nitrous oxide.

Decrease in water conveyance emissions resulted from increased pumping efficiency and use of renewable energy by the Sonoma County Water Agency. The Water Agency manages most of the water conveyance within the county. Since 2015, the Water Agency has contracts to procure 100% of its electricity needs through renewable and carbon free resources, thus achieving a carbon neutral electricity supply to power the Water Agency's water conveyance and wastewater processing systems.⁹ Even with the Water Agency's carbon neutral electricity supply, there are still emissions such as nitrous oxide and methane that occur through wastewater treatment processes.

Water and Wastewater Emissions (MTCO₂e) per Jurisdiction



⁹ [Sonoma County Water Agency](#)

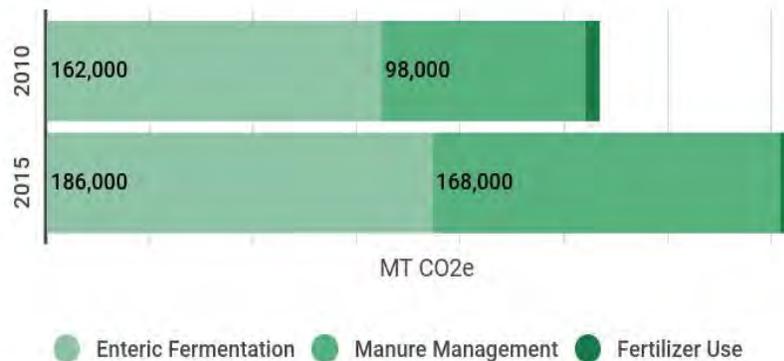
LIVESTOCK AND FERTILIZER

Livestock and fertilizer emissions are the third largest source of emissions in Sonoma County. The primary emissions are generated by enteric (digestive) fermentation and manure management. Emissions from this sector increased due to livestock population growth between 2010 and 2015 and improved methodologies for calculating emissions from livestock management and fertilizer application.

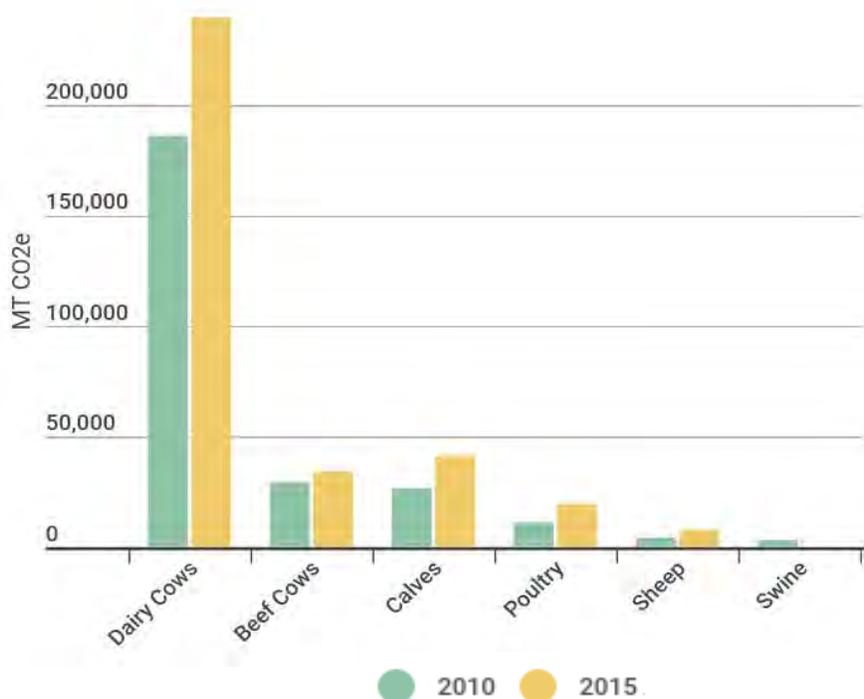
Updates to the federal methodology source for calculating livestock and fertilizer emissions played a large role in the increase emissions from livestock and manure management.¹⁰

Emissions from this source are included in the countywide inventory, but not allocated to any specific jurisdiction.

Livestock and Fertilizer Emissions by Source



Livestock Emissions (MTCO₂e) by Livestock Type



¹⁰ [Inventory of United States Greenhouse Gas Emissions and Sinks: 1990-2016](#)

METHODOLOGY

This greenhouse gas (GHG) inventory update follows the [US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions](#), which provides detailed methodologies tailored for local government jurisdictions and agencies working to track emissions in the United States. The U.S. Community Protocol was created by the International Council for Local Environmental Initiatives (ICLEI), an organization of local, regional, and national governments that have committed to reducing GHG emissions. This protocol is specifically geared towards completing a GHG emissions inventory at the community scale in the United States and includes emissions from businesses, residents and transportation. There are over 600 local governments in the U.S. who are ICLEI members utilizing the U.S. Community Protocol to inventory GHGs.¹¹

This is an activity-based inventory that captures the primary sources of emissions within a jurisdictional boundary that can be reduced through the actions of local governments and regional entities. In contrast, a consumption-based inventory also accounts for emissions that occur outside a jurisdictional boundary as a result of activities taking place within that jurisdictional boundary. In partnership with the World Resources Institute (WRI) and C40 Cities Climate Leadership Group (C40), ICLEI has also developed the Global Reporting Protocol (GRP), which is the global counterpart to the US Community Protocol and utilizes a consumption-based approach. Cities who have signed onto voluntary global networks and initiatives focused on reporting and tracking greenhouse gas reductions and comparing across countries, such as the Global Covenant of Mayors, are encouraged to use the GRP.¹²

Because RCPA follows ICLEI's US Community Protocol, this GHG inventory does not include all human activities in Sonoma County that drive an increase or decrease in atmospheric GHG emissions. Rather than trying to account for every source of emissions, this approach focuses on monitoring progress on the largest emissions sources that can most directly be influenced by local government actions. The emissions categories that were excluded from this inventory update include:

- Carbon sinks through biological carbon sequestration
- Consumption of goods and services imported into Sonoma County
- Industrial and commercial stationary sources
- Air travel

These categories are explored in sections 2.4.1 through 2.4.4 in Climate Action 2020.

Methodologies for calculating greenhouse gas inventories are continually evolving and changing. The RCPA will continue to monitor and incorporate local government best practices for inventorying emissions to meet our ambitious GHG reduction goals.

¹¹ [ICLEI Greenhouse Gas Protocols](#)

¹² [ICLEI Global Reporting Protocol](#)

MEMBER JURISDICTION UPDATES

Sonoma County continues progress towards the cleaner, more sustainable future envisioned in [Climate Action 2020 and Beyond](#) (CA2020). Sonoma County jurisdictions have adopted resolutions codifying their commitment to countywide collaboration on climate action, updating long-term policy goals, and continuing to pursue the implementation of greenhouse gas (GHG) reduction measures outlined in CA2020. Each jurisdiction's focus on climate action and commitment to these goals and measures outlined in CA2020 demonstrates the collective recognition of the need to address climate change at the local and regional level.

The following section offers insight into the status of GHG emission reductions in each community, focusing on the largest emissions source: transportation. This section also highlights what can be done to move the region towards our short and long-term goals given where emissions increased and the opportunities CA2020 highlights for each of our communities.

Four of our member cities experienced a slight increase in total emissions while five cities showed a slight decrease. Yet, overall, lack of progress in total countywide emission reductions between 2010 and 2015 highlights significant challenges ahead. Countywide reduction goals can be reached if each jurisdiction, with support of member agencies, prioritizes emissions reduction efforts by continuing to implement their jurisdiction-specific measures outlined in CA2020.

Findings for each jurisdiction are included in alphabetical order, followed by findings for the unincorporated county.

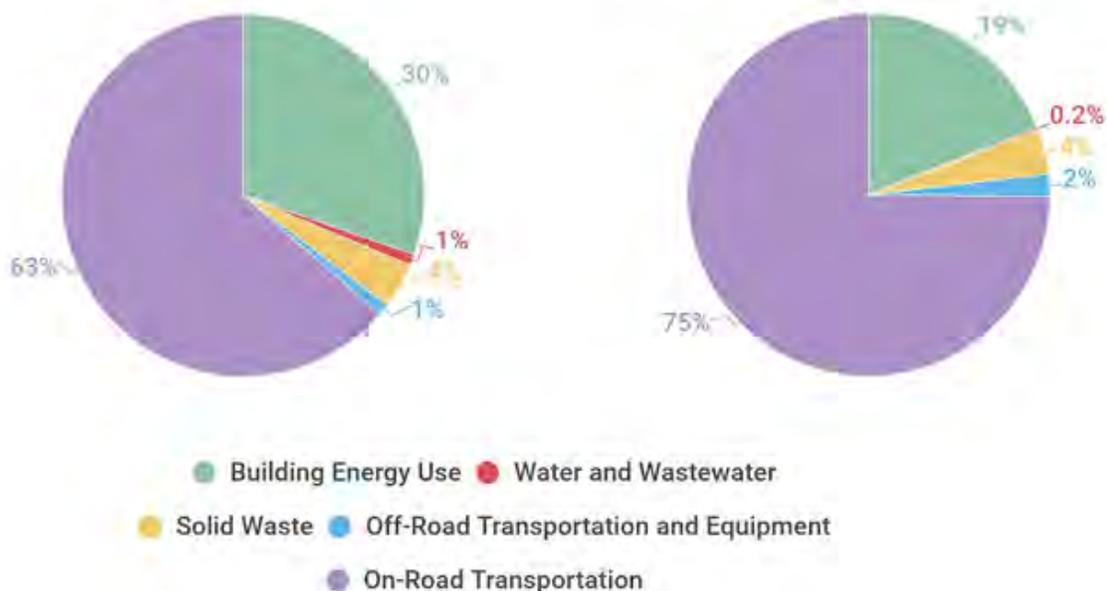
CLOVERDALE

Total greenhouse gas emissions in Cloverdale increased from 2010 to 2015. Communitywide emissions were 3% *above* 1990 levels in 2010, this percentage increased to 11% *above* 1990 levels in 2015. This increase is likely a result of community members driving farther distances each day - Annual vehicle miles traveled (VMT) within Cloverdale increased by almost 20 million annual miles between 2010 and 2015. This equates to a per capita daily VMT increase from 25 to 31 daily miles over this five-year period.

GHG Inventory by Source

2010

2015



	Population	Emissions (MTCO ₂ e)
2010	8,618	59,000
2015	8,735	64,000

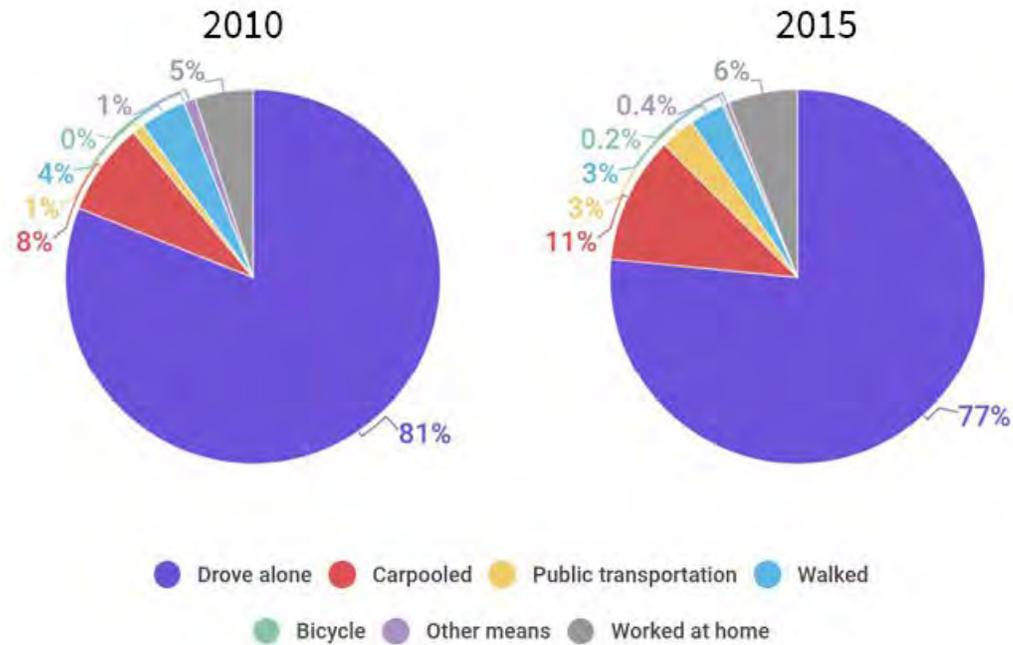
Source: U.S. Census American Community Survey

See the Appendix for Cloverdale's GHG emissions values by source.

Comparing 2010 and 2015 commute modes shows the percentage of commuters driving alone decreased from 81% to 77%, but remained above the county average of 75.4%. Cloverdale is the northernmost city in the county and many people drive an average of 28.1 minutes out of the city to work elsewhere in, or out of Sonoma County.¹³

¹³ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work

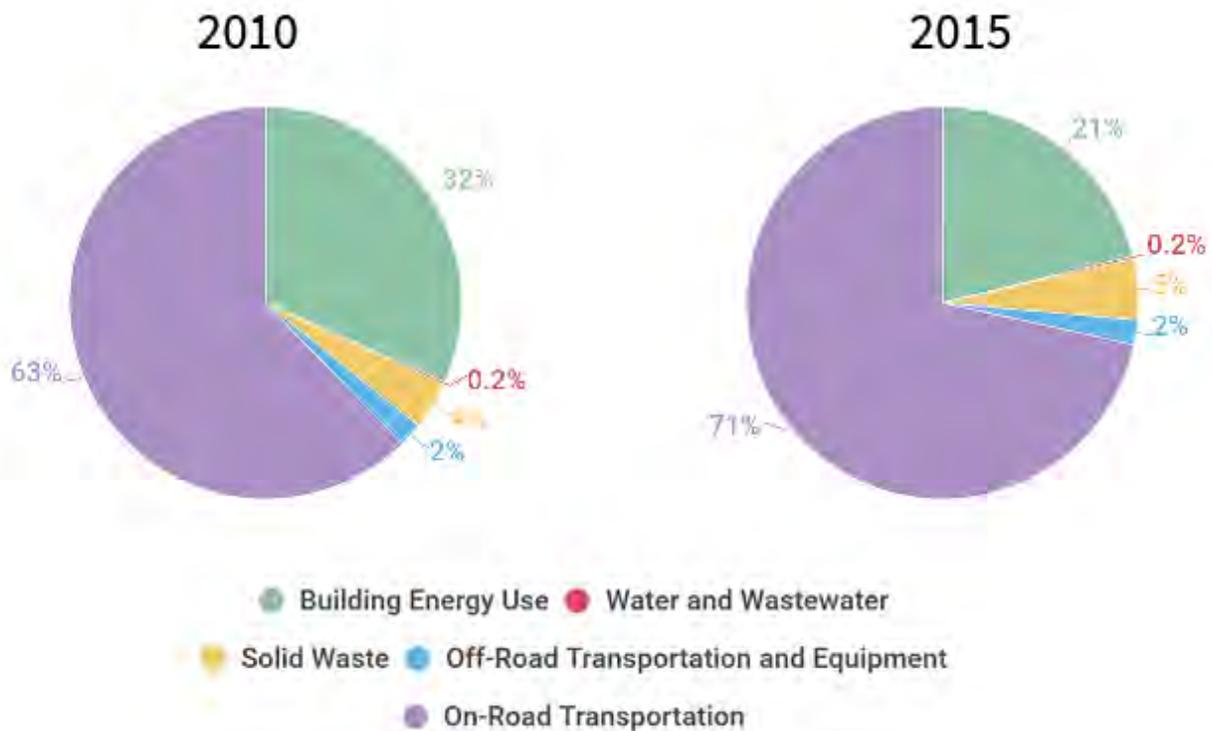


With support from the RCPA and in coordination with city staff, Cloverdale is well positioned to implement the local measures focused on water conservation, adding solar power to non-residential buildings, carpool incentives, and ride-sharing. All measures are outlined in Section 5.1.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

COTATI

Total greenhouse gas emissions in Cotati decreased from 2010 to 2015. Communitywide emissions in 2010 were 1% *above* 1990 levels, this percentage *decreased* to 3% below 1990 levels in 2015. This slight downward trend in Cotati emissions matches the countywide trend.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	7,265	52,000
2015	7,376	50,000

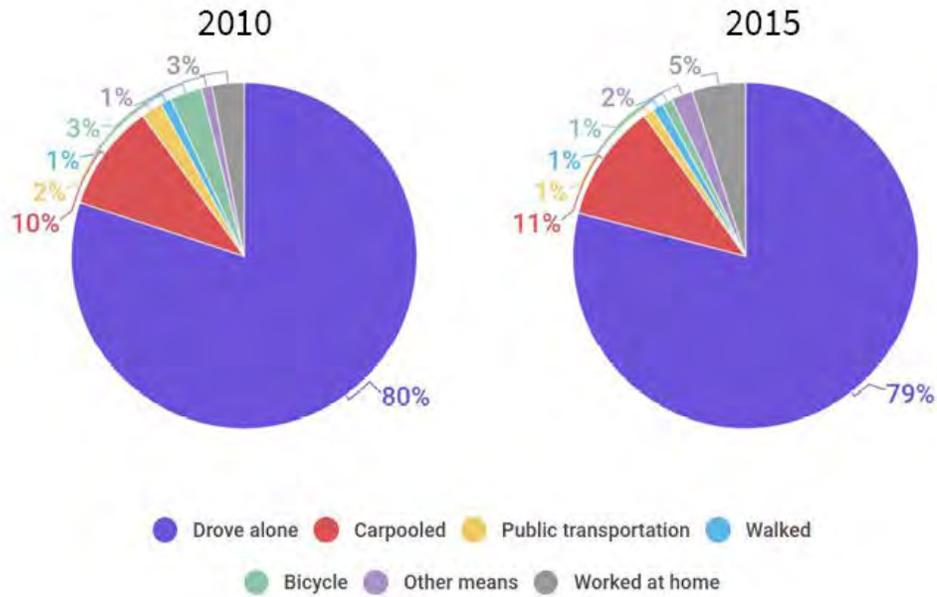
Source: U.S. Census American Community Survey

See the Appendix for Cotati’s GHG emissions values by source.

Comparing 2010 and 2015 commute modes shows the percentage of commuters driving alone remains near 80%, much higher than the county average of 75.4%. Alternative transportation options are not available for many Cotati residents. With the average trip to work for residents taking 28.4 minutes, and limited bus service, riding a bus is not a viable option for many of those who commute from Cotati.¹⁴

¹⁴ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work



With support from the RCPA and in coordination with city staff, Cotati is well positioned to implement the local measures focused on water conservation and adding solar power to non-residential and residential buildings. All measures are outlined in Section 5.2.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

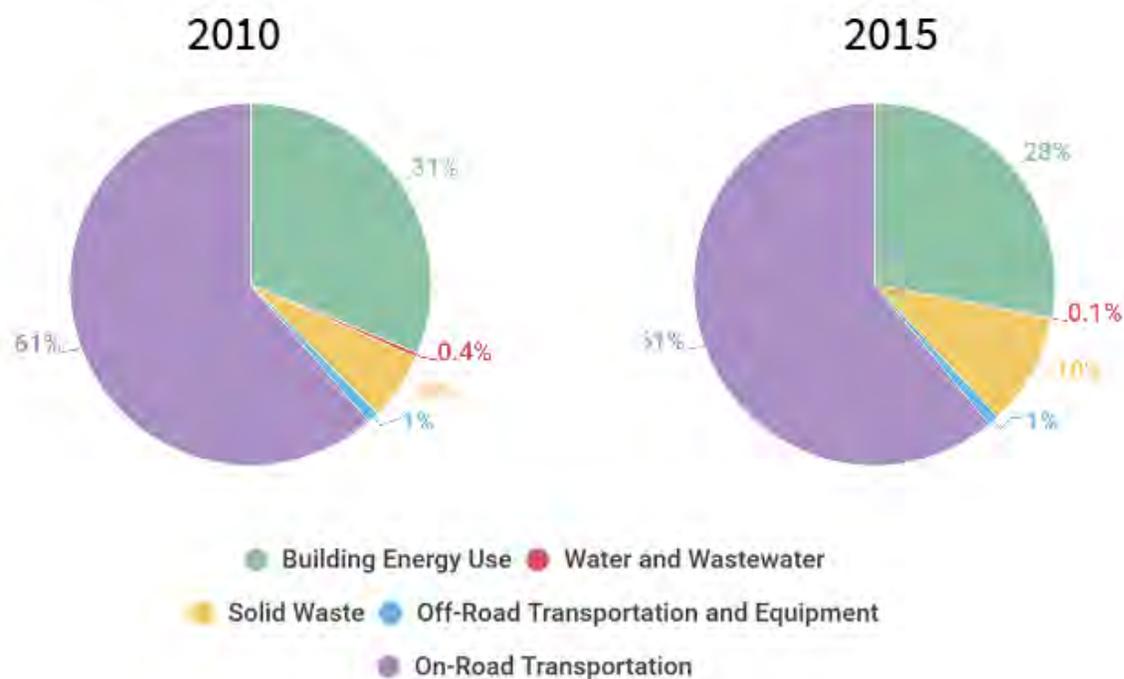
HEALDSBURG

Total greenhouse gas emission in Healdsburg increased from 2010 to 2015. Communitywide emissions in 2010 were 16% *above* 1990 levels, this percentage increased to 25% *above* 1990 levels in 2015.

Unique to other Sonoma County communities, the City of Healdsburg owns and operates its own electricity utility. Though Healdsburg regularly surpassed the state’s Renewable Portfolio Standard (25% by the end of 2016), the 2012-2016 drought caused the city to utilize less electricity generated from hydroelectric plants in 2015 and ultimately provide residents with electricity from less renewable energy sources when compared to the communities served by Sonoma Clean Power.¹⁵

Subsequently, the community’s high annual VMT equates to a per capita daily VMT of about 34 daily miles¹⁶, which is the second highest of Sonoma County communities.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	11,254	109,000
2015	11,539	117,000

Source: U.S. Census American Community Survey

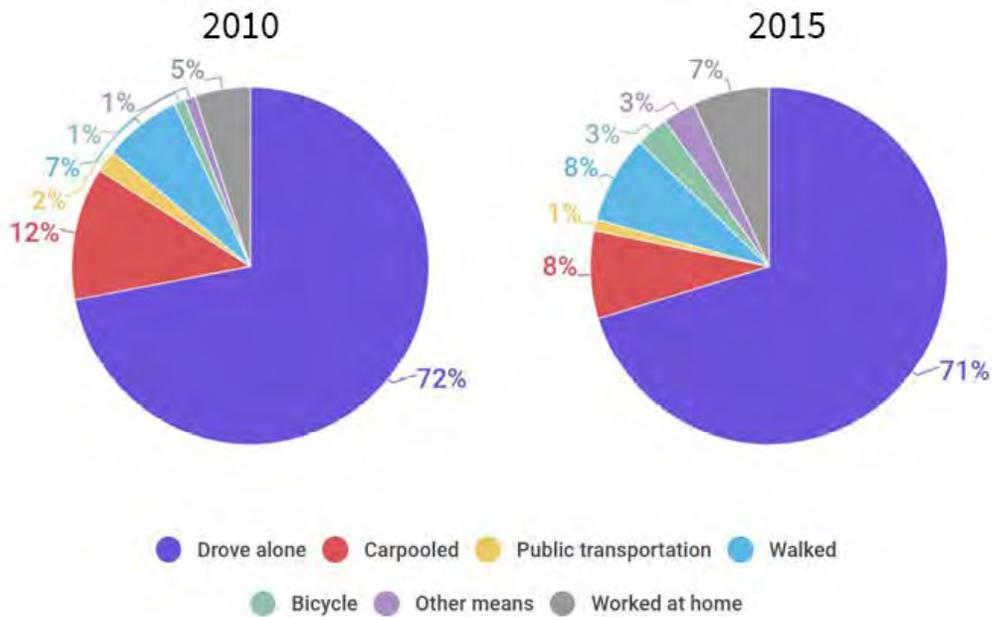
See the Appendix for Healdsburg’s GHG emissions values by source.

¹⁵ Personal Communication with Healdsburg Utility Director, Terry Crowley

¹⁶ [U.S. Census Bureau American Community Survey](#)

In the 2010 and 2015 inventory years, Healdsburg had the highest rate of residents walking to work in the county although, in general, most residents drive alone to work. According to the U.S. Census the average trip to work took 22.4 minutes for Healdsburg commuters.¹⁷

Travel Modes to Work



With support from the RCPA and in coordination with city staff, Healdsburg is well positioned to implement the local measures focused on water conservation, parking regulation, and wastewater processing. All measures are outlined in Section 5.3.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

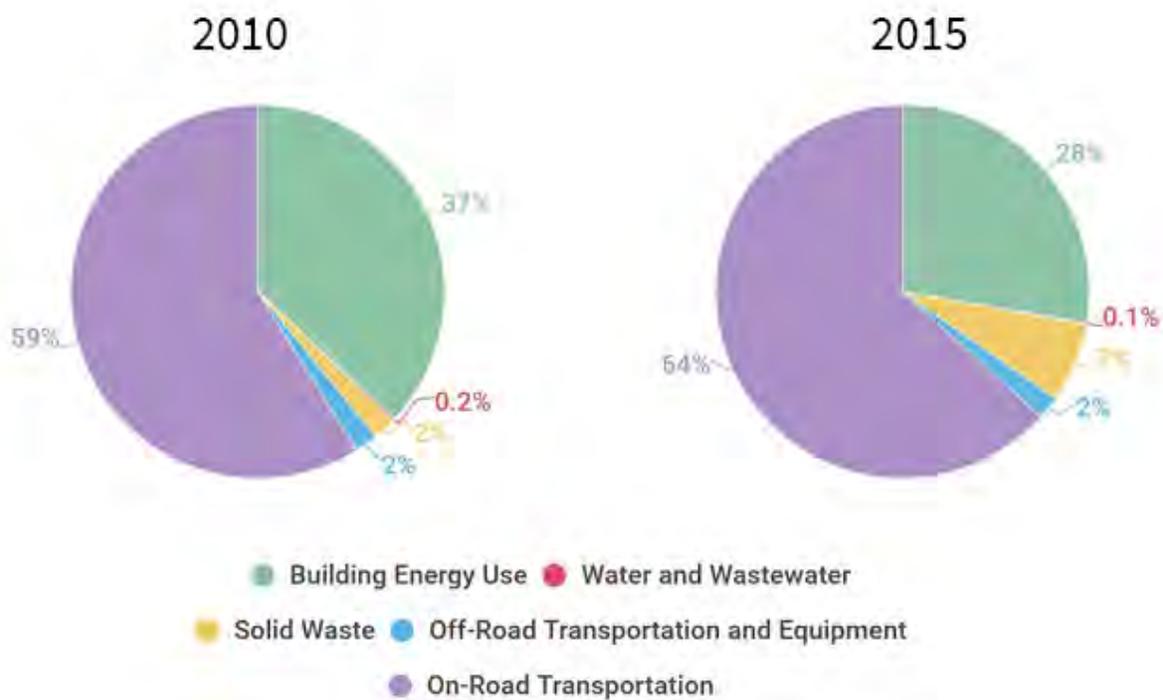
¹⁷ [U.S Census Bureau American Community Survey](#)

PETALUMA

Total greenhouse gas emissions in Petaluma increased from 2010 to 2015. Communitywide emissions in 2010 were 14% *above* 1990 levels, this percentage increased to 15% *above* 1990 levels in 2015.

Petaluma emissions from waste sent to landfills increased by about 20,000 MTCO₂e from 2010 to 2015. Virtually all of the City’s waste is sent to the Redwood Landfill. As previously stated, the Redwood Landfill’s methane collection efficiency rate was recorded at 90% for the 2010 GHG Inventory. In 2015, this efficiency percentage was update to 75% (the state average)¹⁸, resulting in a sharp increase in total emissions from landfilling solid waste.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	57,941	442,000
2015	59,340	445,000

Source: U.S. Census American Community Survey

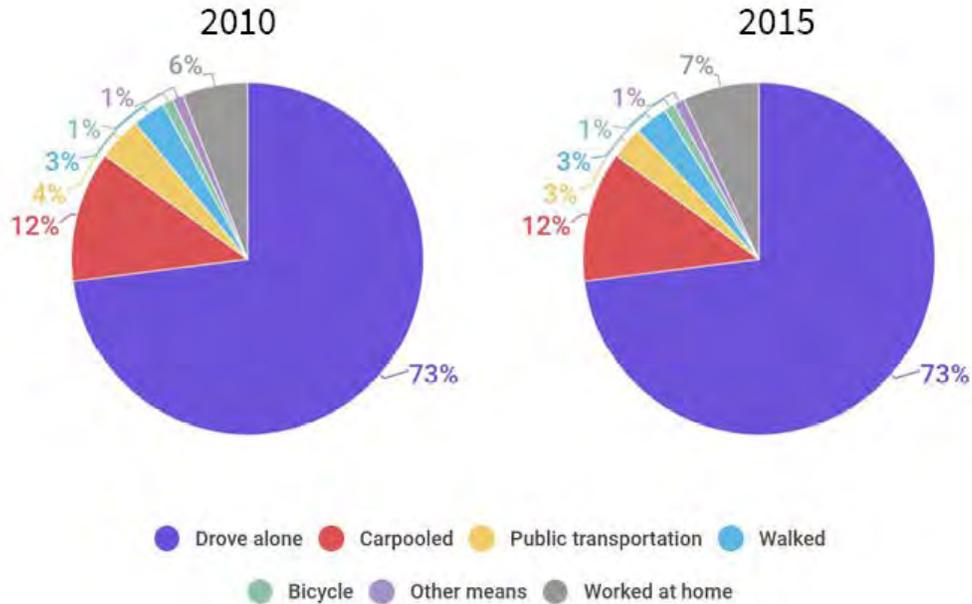
See the Appendix for Petaluma’s GHG emissions values by source.

Petaluma resident’s commute patterns were very similar in 2010 and 2015. Most Petaluma residents continued to drive alone to work (73%) and the average trip to work took 29.3 minutes for these Petaluma commuters.¹⁹

¹⁸ [U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions](#)

¹⁹ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work

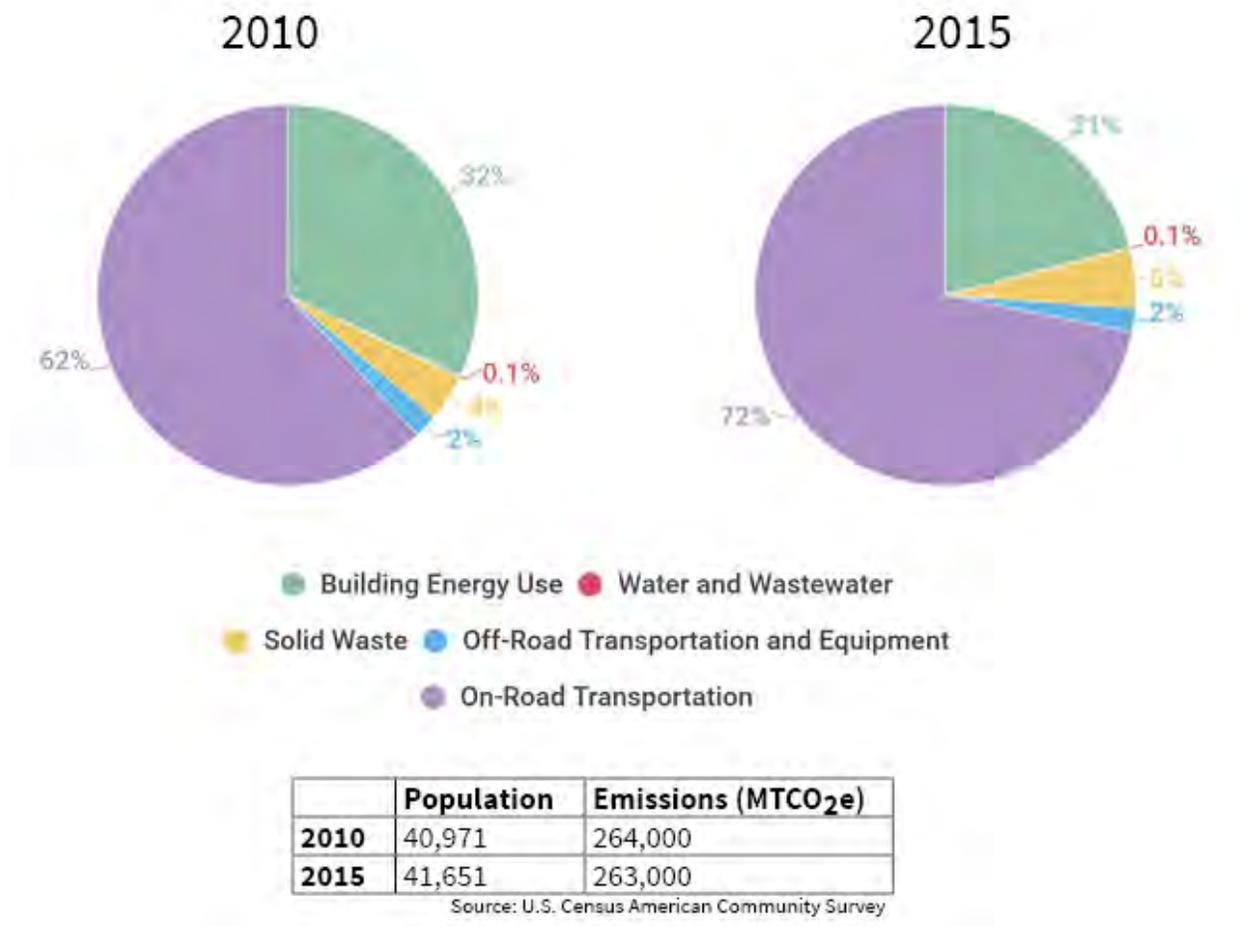


With support from the RCPA and in coordination with city staff, Petaluma is well positioned to implement the local measures focused on adding solar power to non-residential buildings, water conservation, and fossil fuel reduction. All measures are outlined in section 5.4.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

ROHNERT PARK

Total greenhouse gas emissions in Rohnert Park decreased from 2010 to 2015. Communitywide emissions in 2010 were 9% *below* 1990 levels, this percentage increased to about 10% *below* 1990 levels in 2015. This slight downward trend in Rohnert Park emissions matches the countywide trend.

GHG Inventory by Source

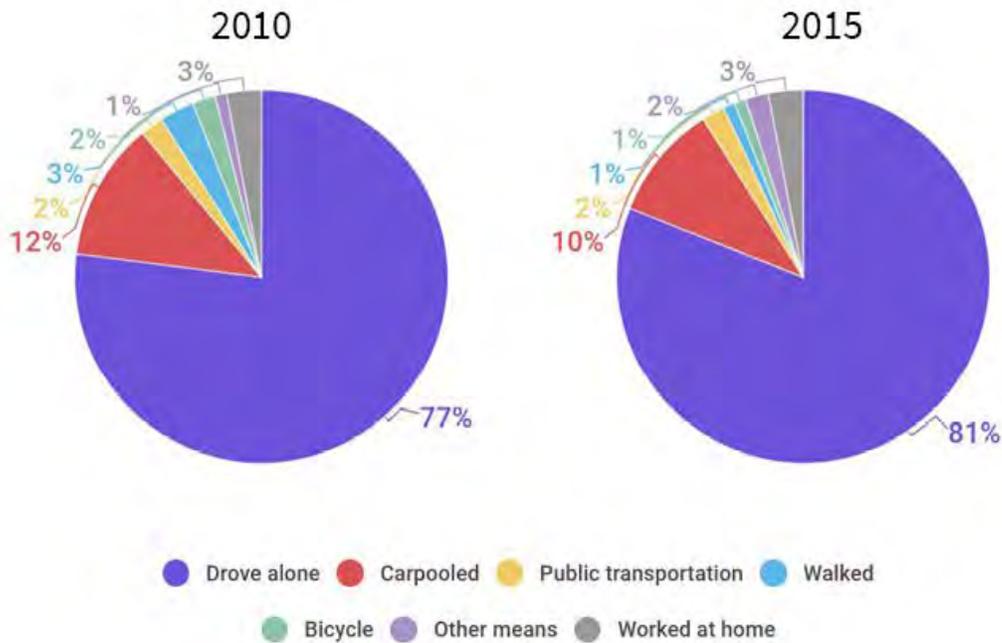


See the Appendix for Rohnert Park’s GHG emissions values by source.

More Rohnert Park residents drove to work in 2015 (81%) when compared with 2010 (71%). According to Census data, it took Rohnert Park commuters an average of 26.7 minutes to travel to work.²⁰

²⁰ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work

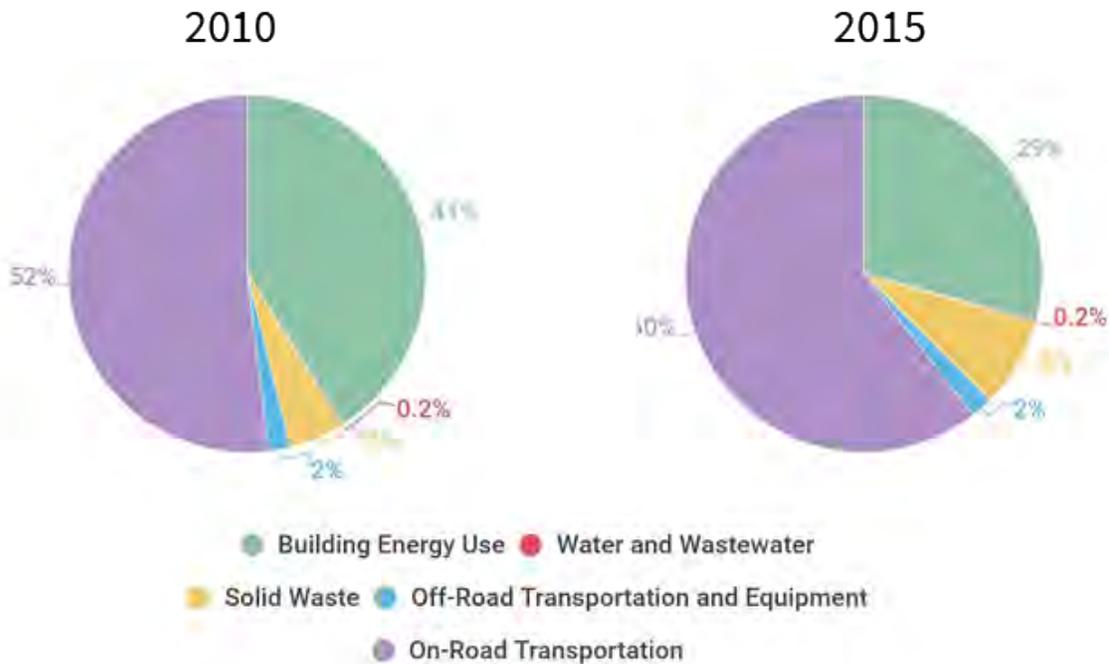


With support from the RCPA and in coordination with city staff, Rohnert Park is well positioned to implement the local measures focused on adding solar power to non-residential and residential buildings and conserving water. All measures are outlined in section 5.5.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

SANTA ROSA

Total greenhouse gas emissions in Santa Rosa decreased from 2010 to 2015. Communitywide emissions in 2010 were 5% *below* 1990 levels, this percentage increased to about 11% *below* 1990 levels in 2015. This downward trend in Santa Rosa emissions matches the countywide trend.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	167,815	1,065,200
2015	172,066	1,002,800

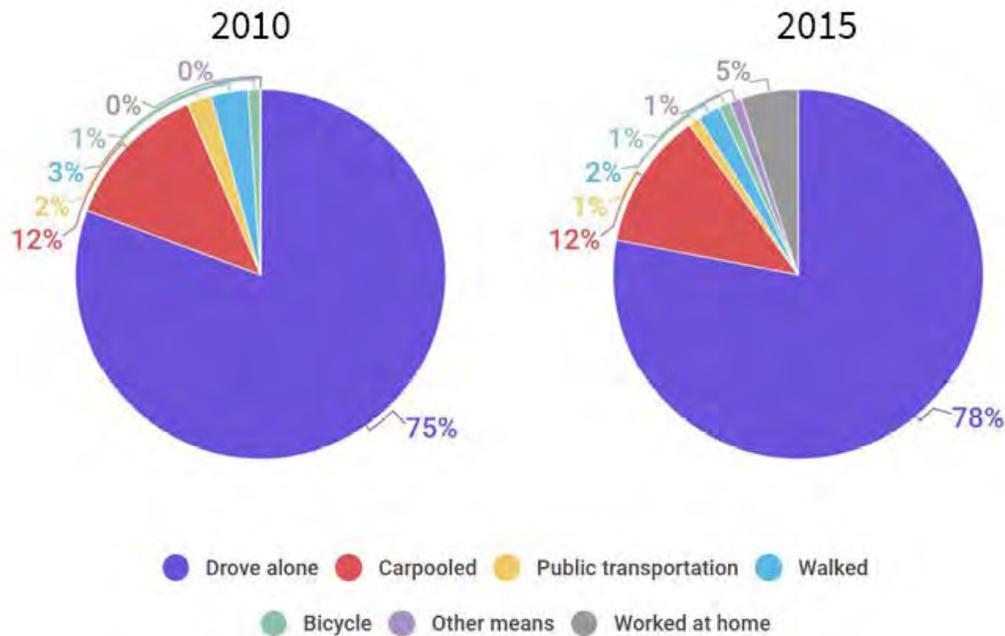
Source: U.S. Census American Community Survey

See the Appendix for Santa Rosa’s GHG emissions values by source.

More Santa Rosa residents drove alone in 2015 (78%) than in 2010 (75%). In 2015, it took commuters 22.2 minutes to travel to work, a slight decrease from the 22.8-minute commute time in 2010.²¹

²¹ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work



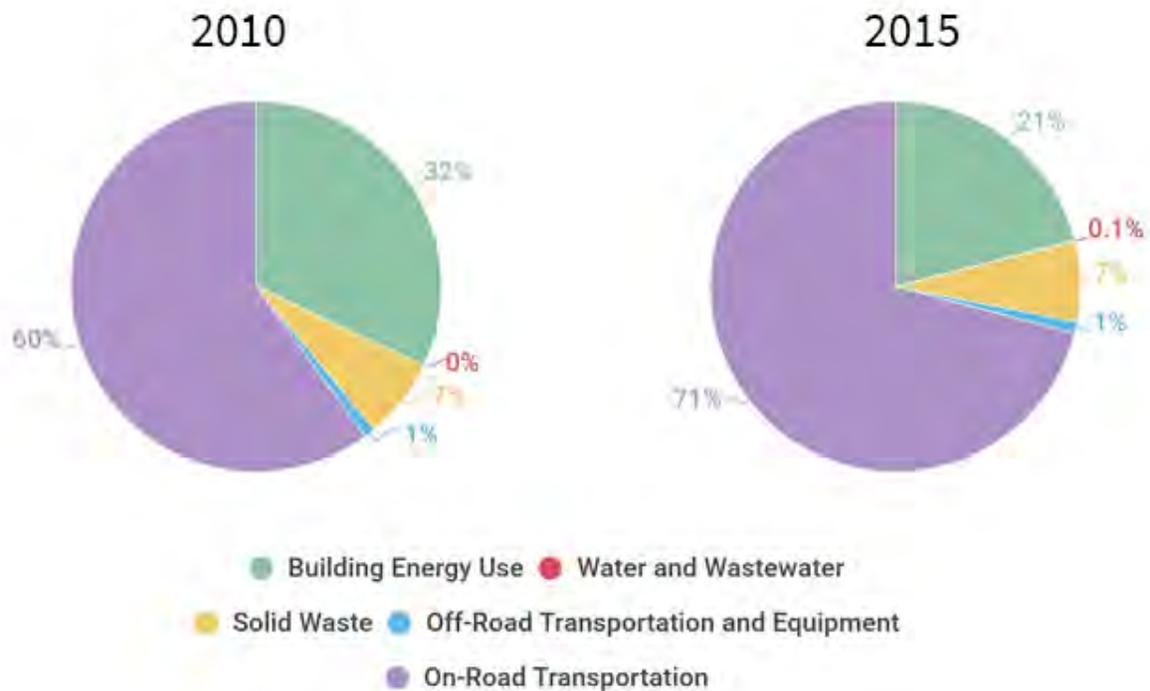
Unlike other Sonoma County jurisdictions, Santa Rosa previously developed an individual climate action plan (CAP) in 2007, with goals and measures to address emissions inventoried for 2007.²² With support from the RCPA and in coordination with city staff, Santa Rosa is well positioned to implement the local measures, outlined in their CAP as well as in CA2020. Both plans highlight the importance of reducing energy use and CA2020 prioritizes energy efficiency. All measures for the City of Santa Rosa are outlined in section 5.6.4 of CA 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

²²[City of Santa Rosa 2012 Climate Action Plan](#)

SEBASTOPOL

Total greenhouse gas emissions in Sebastopol decreased from 2010 to 2015. Communitywide emissions in 2010 were 4% *above* 1990 levels, this percentage shifted downward to about 1% *below* 1990 levels in 2015. This downward trend in Sebastopol emissions matches the countywide trend.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	7,379	76,000
2015	7,583	72,000

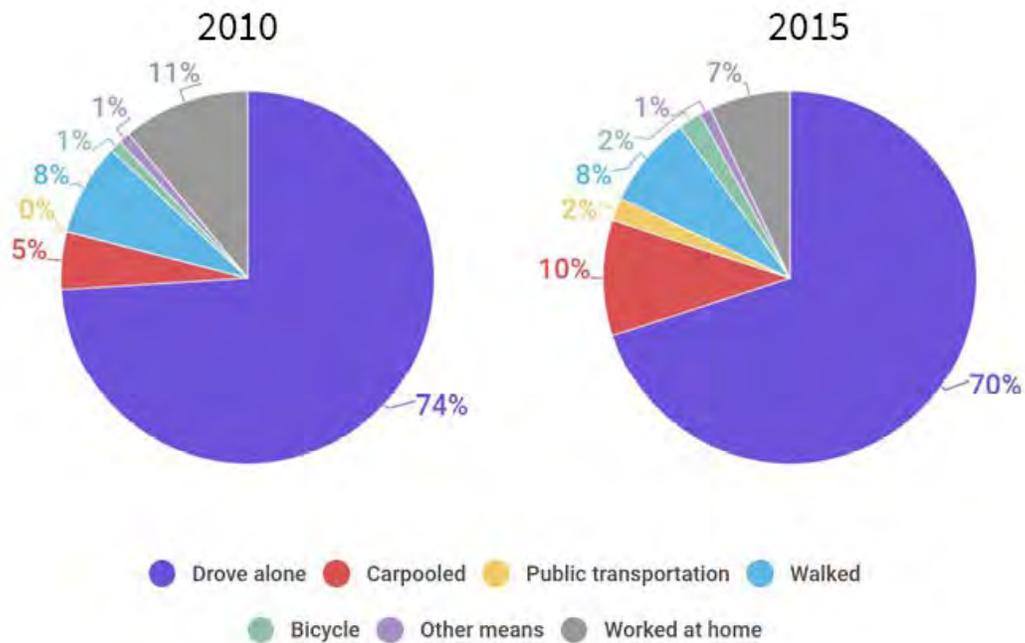
Source: U.S. Census American Community Survey

See the Appendix for Sebastopol's GHG emissions values by source.

More Sebastopol residents carpoolled to work in 2015 (10%) than in 2010 (5%). It took Sebastopol residents an average of 23.4 minutes to travel to work in 2015.²³

²³ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work

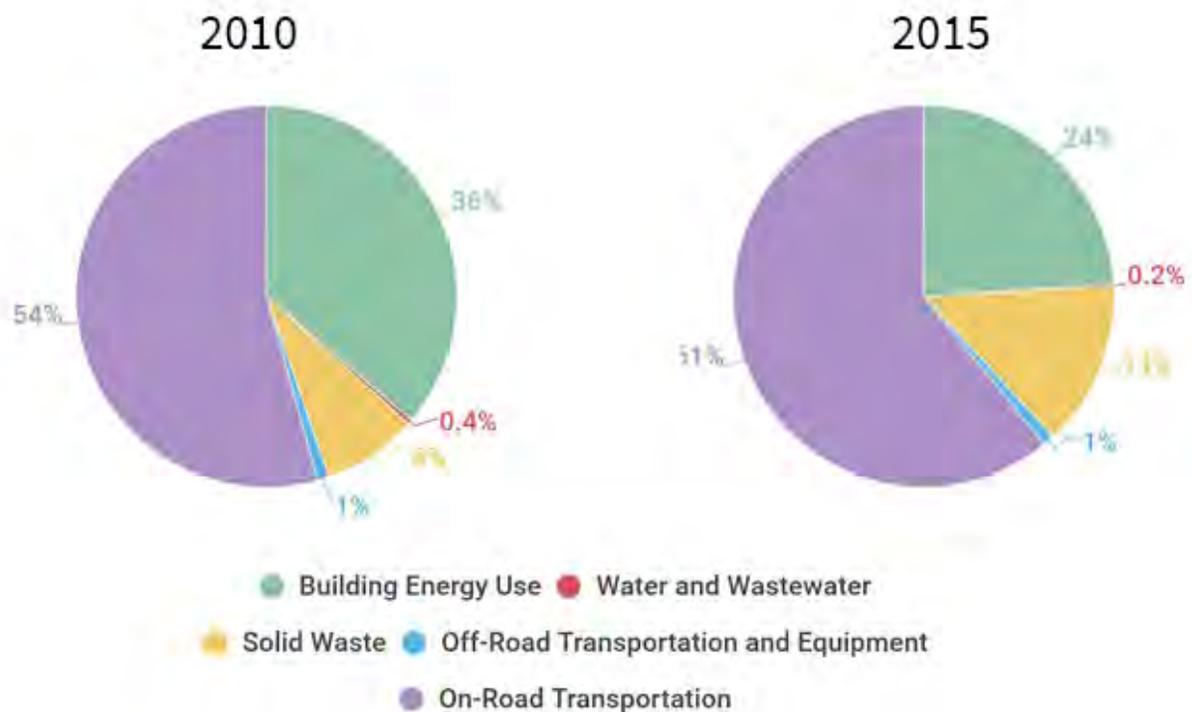


With support from the RCPA and in coordination with city staff, Sebastopol is well positioned to implement the local measures focused on adding solar to existing non-residential buildings, and carpool incentives and ride sharing. All measures are outlined in section 5.7.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

SONOMA

Total greenhouse gas emissions in Sonoma increased from 2010 to 2015. Communitywide emissions in 2010 were 7% *above* 1990 levels, this percentage increased to about 8% *above* 1990 levels in 2015. This increase in emissions is likely a result of community members driving farther distances each day. Community-wide annual vehicle miles traveled (VMT) increased by almost 6 million annual miles between 2010 and 2015. This equated to a per capita daily VMT increased from 28 to 29 daily miles over this five-year period.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	10,648	103,000
2015	10,897	105,000

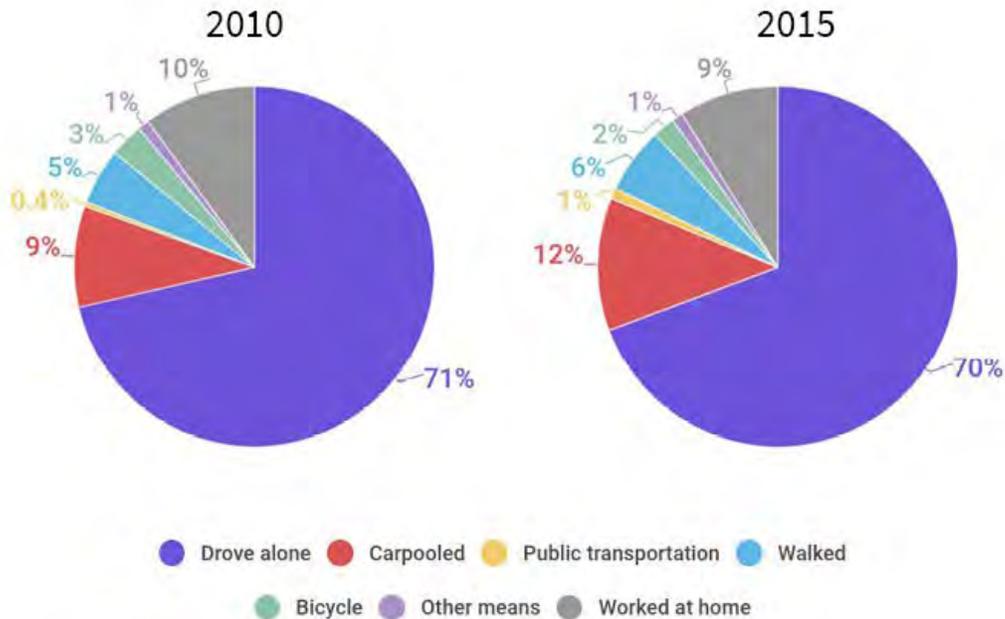
Source: U.S. Census American Community Survey

See the Appendix for Sonoma's GHG emissions values by source.

For many Sonoma residents, alternative transportation options are not available for their commute trip. With limited bus service and the average commute time of 25.4 minutes in 2015, traveling by bus is not a viable options for many residents.²⁴

²⁴ [U.S Census Bureau American Community Survey](#)

Travel Modes to Work

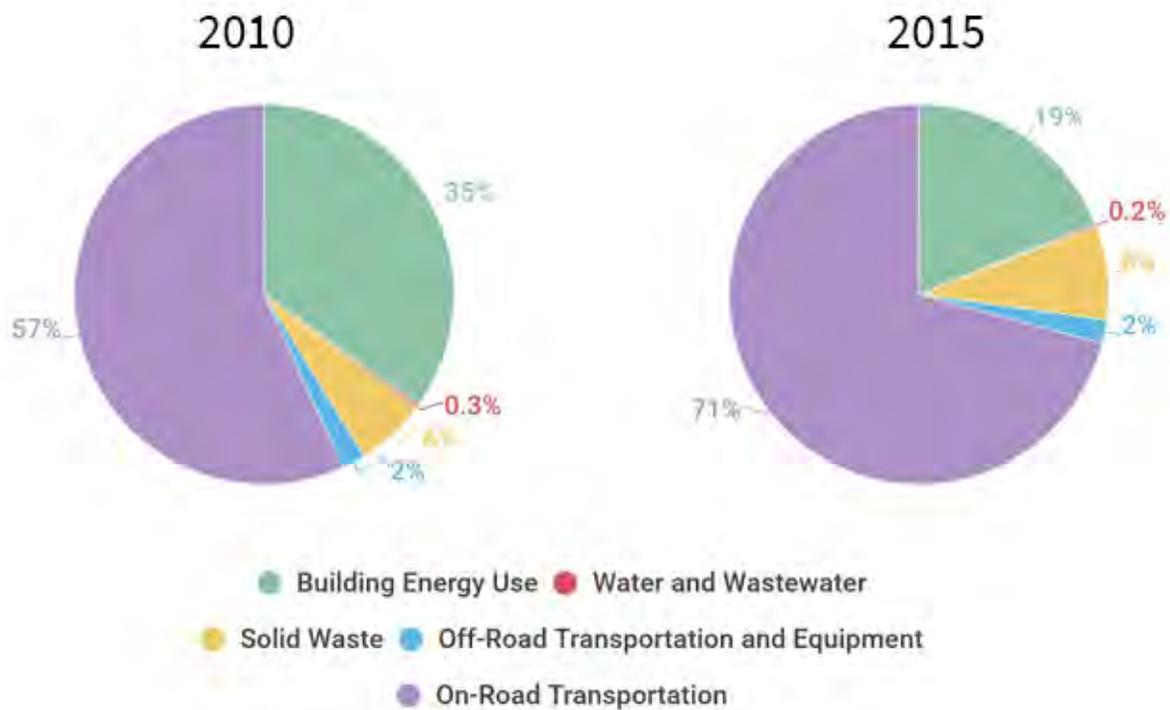


With support from the RCPA and in coordination with city staff, Sonoma is well positioned to implement the local measures focused on water conservation and adding solar to existing non-residential and residential buildings. All measures are outlined section in 5.8.4 of Climate Action 2020. Implementing these local targets will aid the region in progressing towards short and long-term emissions reduction targets.

WINDSOR

Total greenhouse gas emissions in Windsor decreased from 2010 to 2015. Communitywide emissions in 2010 were 19% *above* 1990 levels, this percentage decreased to about 14% *above* 1990 levels in 2015.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	26,801	158,000
2015	27,205	151,000

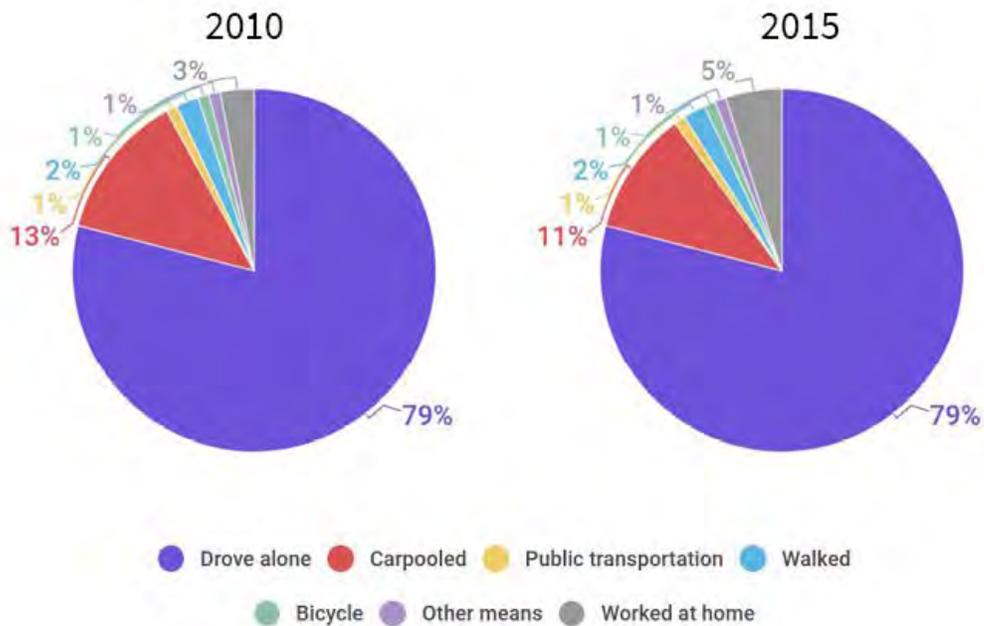
Source: U.S. Census American Community Survey

See the Appendix for Windsor's GHG emissions values by source.

Most Windsor residents drove alone (79%) to work in 2015 and the average trip to work for Windsor residents took 25.2 minutes.²⁵

²⁵ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work

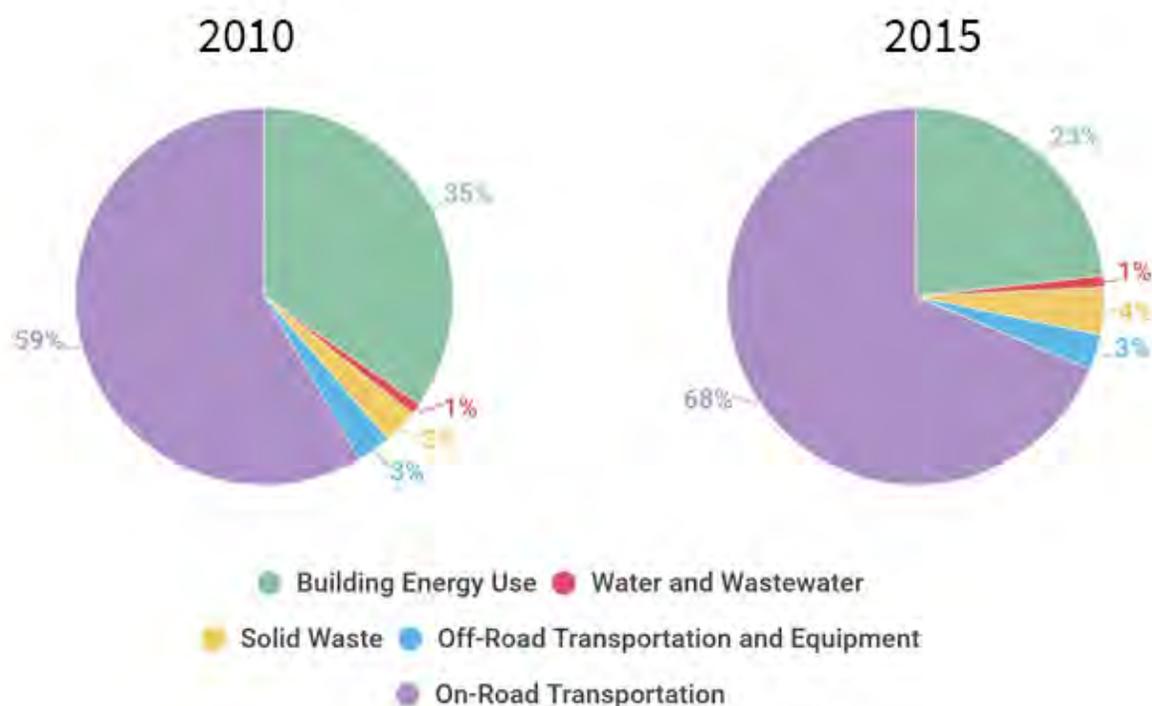


With support from the RCPA and in coordination with the town's staff, Windsor is well positioned to implement local measures focused on adding solar to existing non-residential and residential buildings and water conservation. All measures are outlined in section 5.9.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

UNINCORPORATED SONOMA COUNTY

Total greenhouse gas emissions in Unincorporated Sonoma County decreased from 2010 to 2015. Communitywide emissions in 2010 were 19% below 1990 levels, this percentage increased to about 21% below 1990 levels in 2015. This slight downward trend in emissions in the unincorporated county matches the countywide trend.

GHG Inventory by Source



	Population	Emissions (MTCO ₂ e)
2010	145,754	1,007,000
2015	155,754	983,000

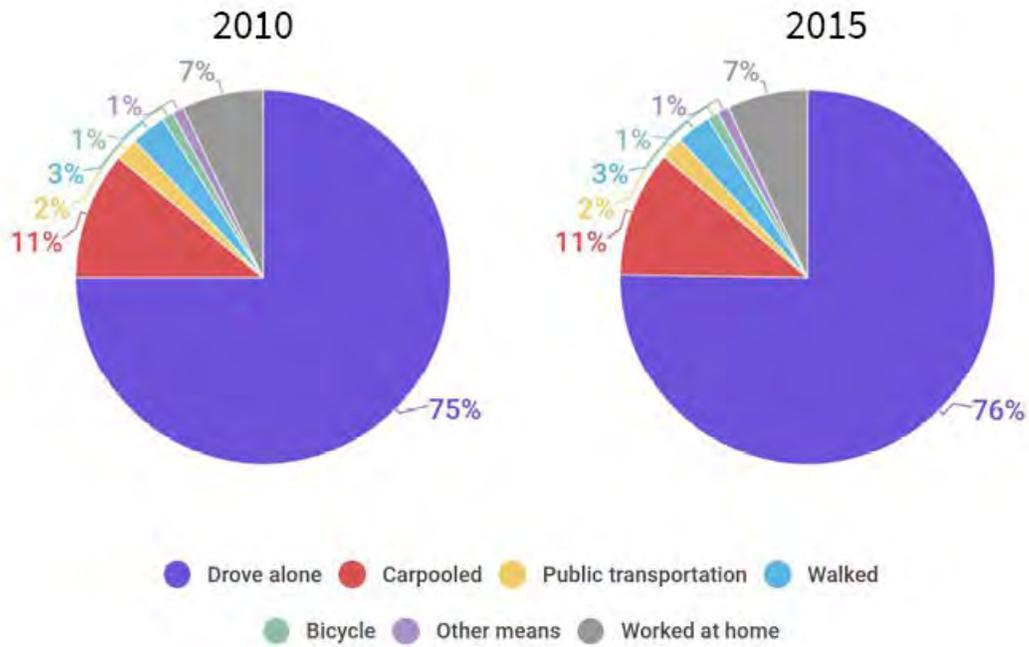
Source: U.S. Census American Community Survey

See the Appendix for the unincorporated county's GHG emissions values by source.

Most residents of the unincorporated county drove alone (76%) in 2015 and the average trip to work for residents of the unincorporated county took 25 minutes.²⁶

²⁶ [U.S. Census Bureau American Community Survey](#)

Travel Modes to Work



With support from the RCPA and in coordination with county staff, the unincorporated county is well positioned to implement local measures focused on adding solar to existing non-residential and residential buildings and water conservation. All measures are outlined in section 5.9.4 of Climate Action 2020. Implementing these local measures will aid the region in progressing towards short and long-term emissions reduction targets.

CONCLUSION

The RCPA is working with our members and partners to better understand and address upward trends in transportation emissions and to take advantage of opportunities to further reduce emissions from existing buildings. The RCPA, along with the Sonoma County Transportation Authority (SCTA) recently released the [Shift Sonoma County Plan](#), which defines and evaluates strategies to shift transportation away from single occupant vehicles towards cleaner, healthier and more efficient modes of transportation. The RCPA also leads Sonoma County's participation in multiple energy and water savings programs through [BayREN](#), a collaboration of the nine Bay Area counties to deliver targeted, integrated, regional-scale climate solutions focused on energy, water and resiliency.

Our next GHG inventory update will reflect our commitment to identifying and addressing key barriers to decreasing transportation emissions by providing more in depth analysis on our community wide fleet. This will also help us track progress on the measures outlined in our Shift Plan which are focused on increasing the number of electric vehicles (EVs) on the road, installing EV infrastructure, and encouraging other clean, efficient modes of transportation.

By March of 2015, approximately 1,500 EVs were on the road in Sonoma County²⁷ and in 2017, Santa Rosa lead the state in EV growth, largely due to Sonoma Clean Power's Drive EverGreen program which has thus far incentivized the sale of 772 EVs in Sonoma County. The RCPA continues to support Sonoma Clean Power's efforts to further increase EV sales and leasing through their Drive EverGreen program and our 2018 inventory will reflect three rounds of the incentive program from 2016, 2017 and 2018. Countywide sales of EVs increased from 76 in 2011 to 3,011 in 2015²⁸ and we plan to continue to work with partners like Sonoma Clean Power and PG&E to procure, site and finance EV infrastructure to support and encourage this promising trend.

The October 2017 wildfires tremendously impacted Sonoma County, its residents, and the environment. The impact of the fires on countywide greenhouse gas emissions will be reflected in our next inventory update which will detail 2018 emissions and will be released in 2020. We are inspired by the strength of our community and the work to rebuild a stronger, more resilient Sonoma County and will continue working with partners to develop strategies towards a low carbon recovery.

²⁷ [Electric Vehicles in Sonoma County: White Paper on EV Status and Paths to Adoption](#)

²⁸ [Shift Sonoma County: Low Carbon Transportation Plan](#)

APPENDIX

TOTAL EMISSIONS BY JURISDICTION

	Emissions (MTCO2e)					
	Backcast	Inventory		CA2020 Business as Usual Forecasts		
	1990	2010	2015	2020	2040	2050
<i>Emissions by Jurisdiction</i>						
Cloverdale	57,000	59,000	63,800	73,300	93,200	93,800
Cotati	51,500	52,100	49,900	61,300	69,000	70,900
Healdsburg	93,500	108,800	116,800	121,000	123,700	121,100
Petaluma	387,000	441,900	445,900	545,000	580,900	588,600
Rohnert Park	291,300	264,300	263,700	372,700	371,800	378,600
Santa Rosa	1,123,100	1,065,200	1,002,800	1,396,900	1,844,700	2,027,500
Sebastopol	73,200	76,300	72,500	93,000	96,500	97,100
Sonoma City	96,900	103,400	105,400	122,200	132,500	131,200
Windsor	133,000	157,800	151,900	188,100	212,000	216,500
Unincorporated Sonoma County	1,244,300	1,004,500	983,300	1,128,800	1,205,600	1,218,300
<i>Emissions Not Assigned to Individual Communities</i>						
Fertilizer and Livestock	392,800	267,600	361,800	242,600	193,500	169,000
Sonoma County Total	3,943,600	3,600,900	3,617,800	4,344,900	4,923,400	5,112,600

TOTAL COUNTYWIDE EMISSIONS BY SOURCE

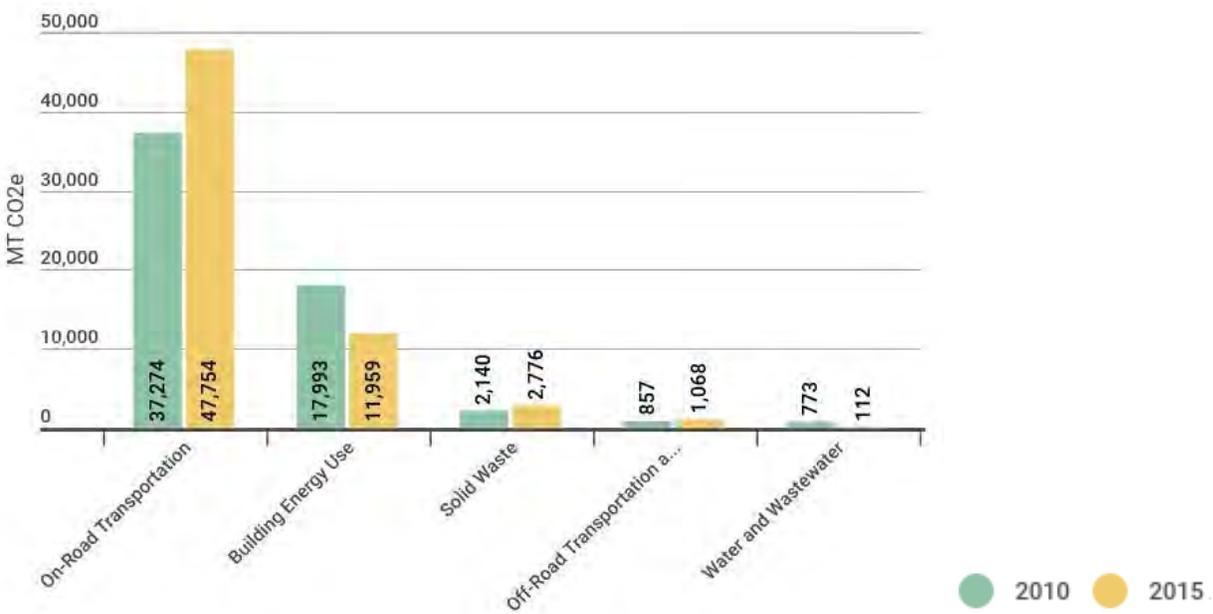


Sector	2010	2015	Percent Change
Building Energy	1,220,000	821,000	-33%
On-Road Transportation	1,899,000	2,126,000	12%
Off-Road Transportation & Equipment	62,000	75,000	21%
Solid Waste	134,000	214,000	60%
Fertilizer & Livestock	268,000	362,000	35%
Water & Wastewater	19,000	16,000	-16%

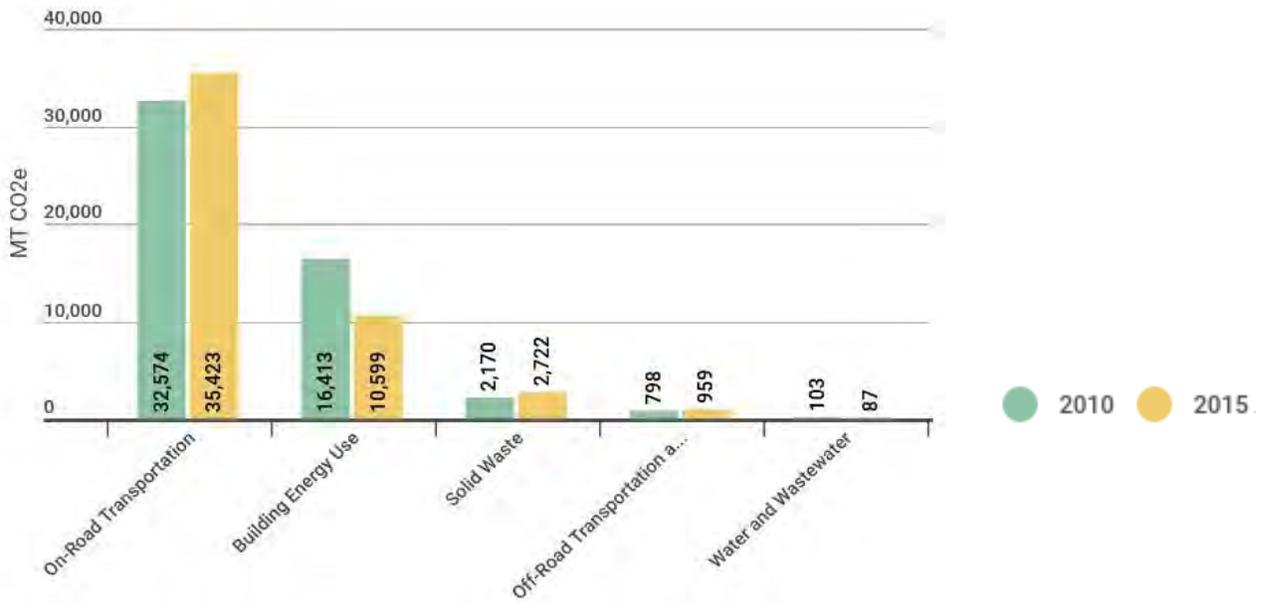
Units: MTCO₂e

TOTAL EMISSIONS BY JURISDICTION

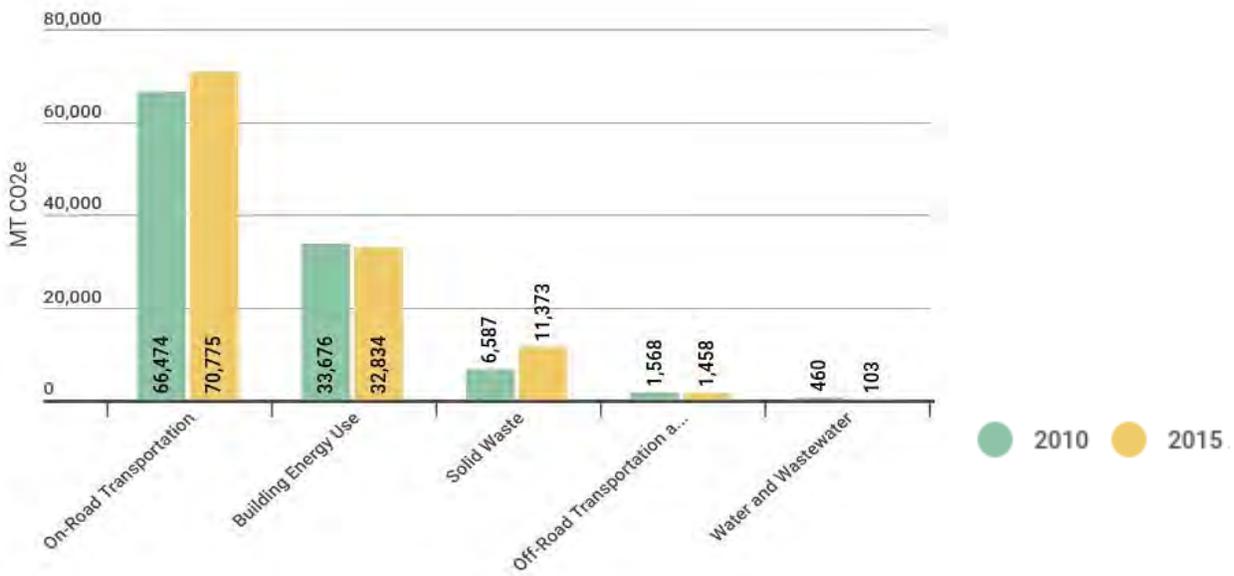
Cloverdale



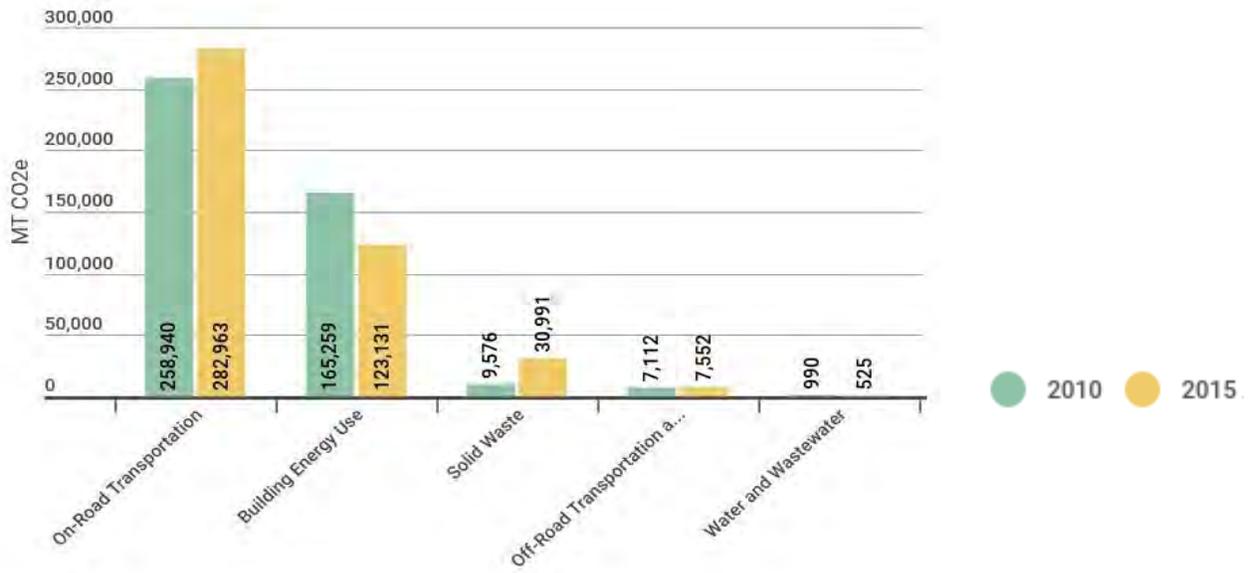
Cotati



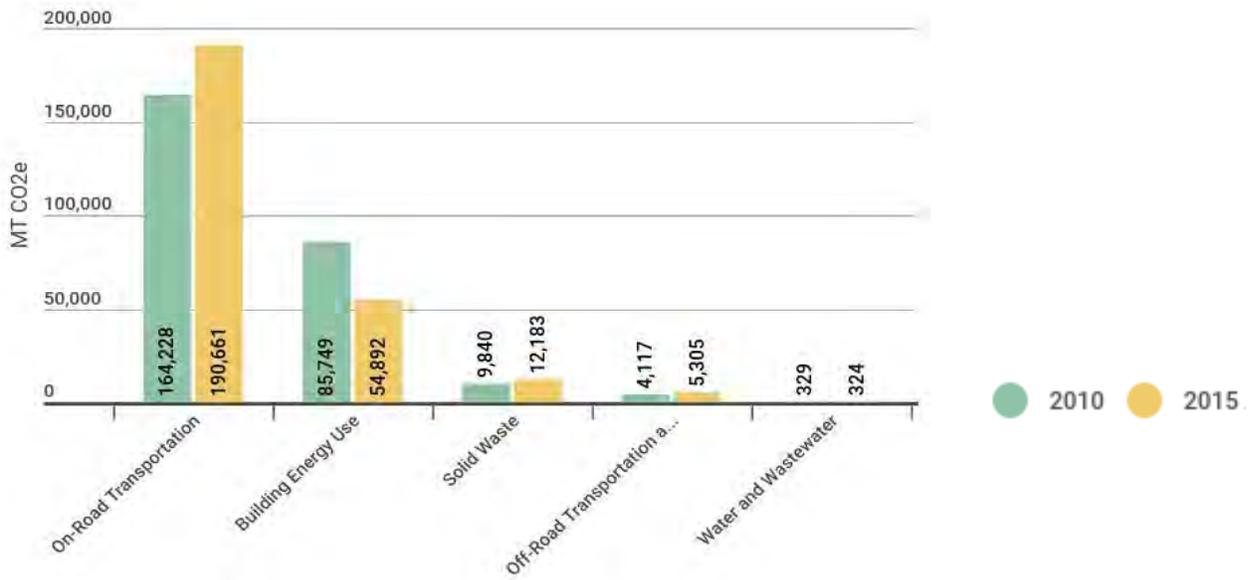
Healdsburg



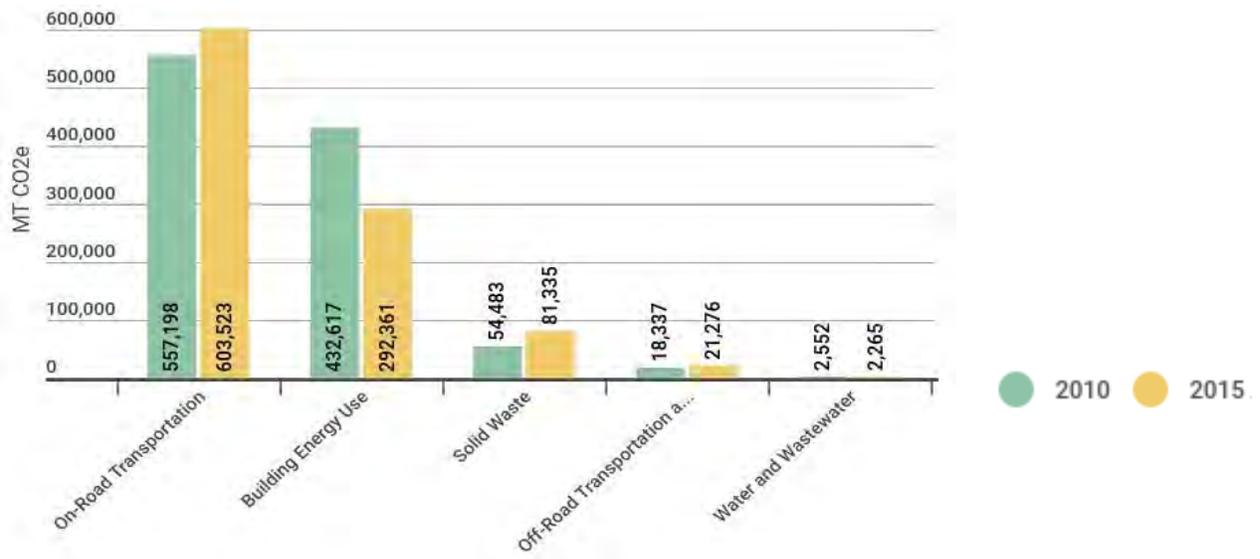
Petaluma



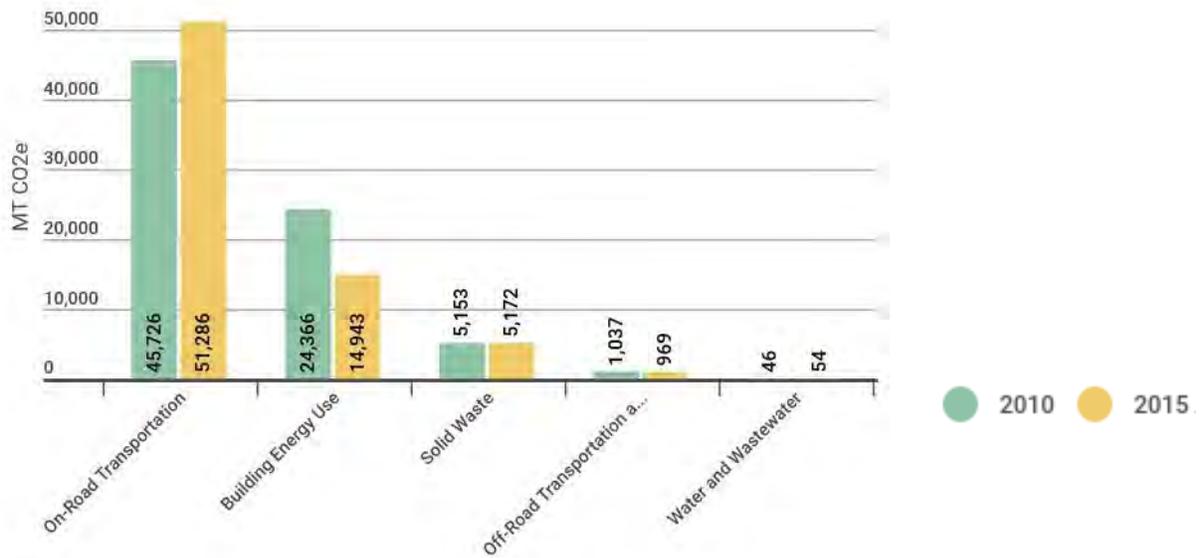
Rohnert Park



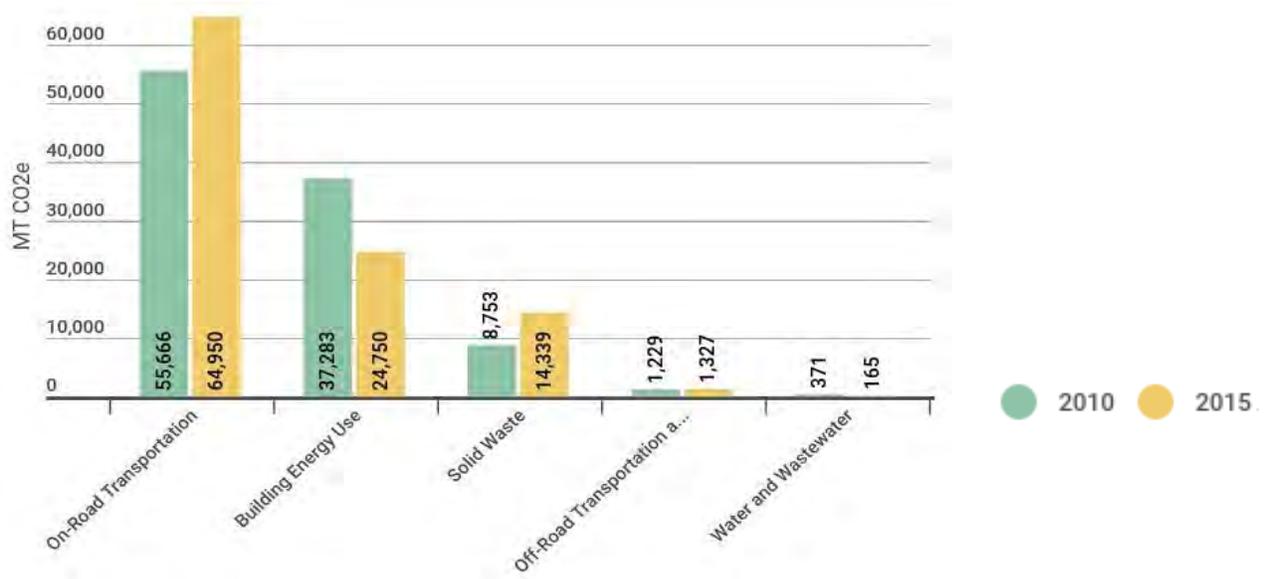
Santa Rosa



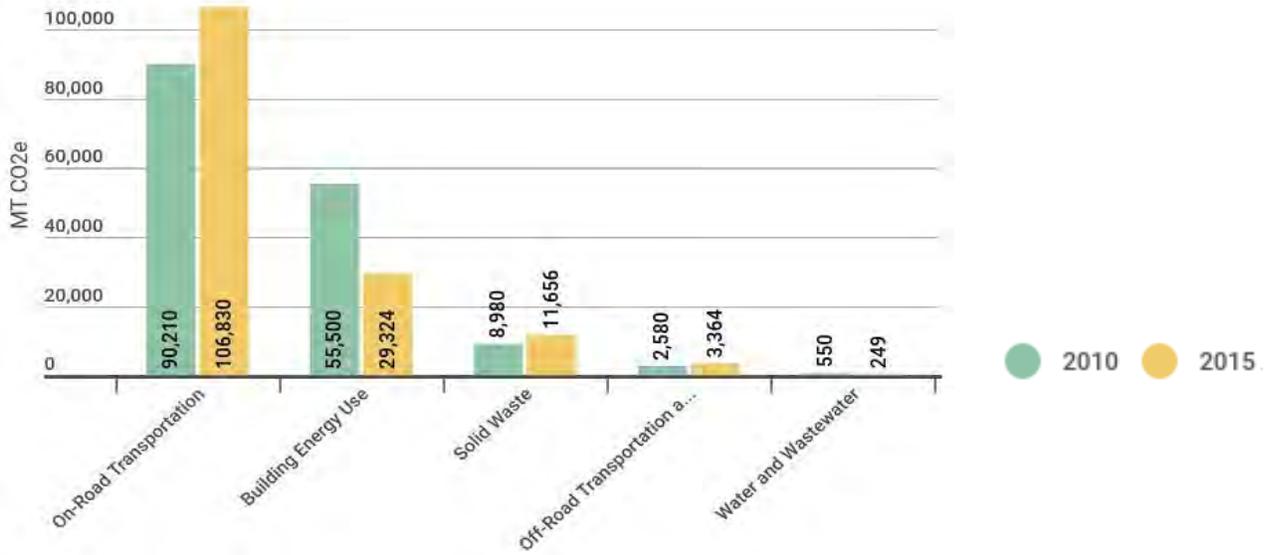
Sebastopol



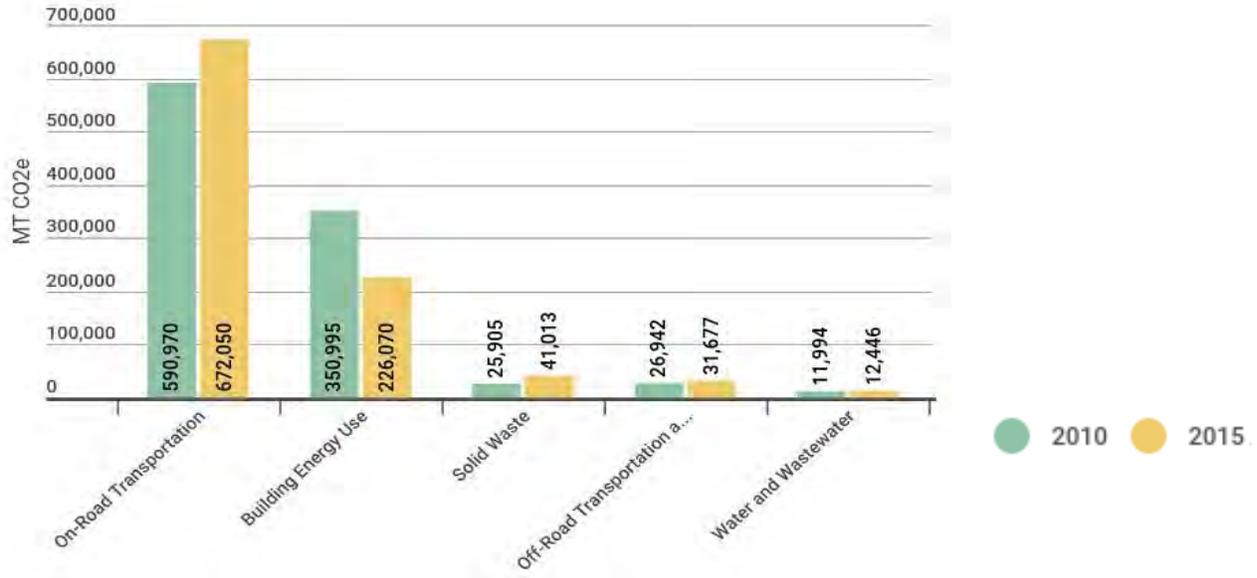
Sonoma



Windsor



Unincorporated Sonoma County



ACTIVITY DATA BY GHG SOURCE

Source	Primary Emissions Source	Key Activity Data	Data Sources
Building Energy	Production of electricity (emissions generated at power plants) Combustion of natural gas	Total electricity use (megawatt hours) Total natural gas use (therms)	Electricity providers: PG&E, Healdsburg Electric, Sonoma Clean Power Natural gas provider: PG&E
On-Road Transportation	Combustion of gasoline and diesel fuel in vehicles	Vehicle miles traveled Fuel type and fuel economy of countywide vehicle fleet Travel patterns	Sonoma County Transportation Authority California Air Resources Board's (ARB) EMFAC2014 Model
Off-Road Transportation and Equipment	Combustion of fossil fuels in equipment (e.g., cranes, bulldozers, lawn mowers) Combustion of fossil fuels in off-road vehicles (e.g., tractors, boats, ATVs)	Fuel consumption in off-road vehicles and equipment Socioeconomic data	ARB's OFFROAD2007 and OFFROAD2011 model
Solid Waste	Methane emissions from decomposition of material sent to landfills	Tons of residential and commercial waste sent to landfills Profile of waste material in each jurisdiction (e.g., 19% office paper, 36% food waste)	Sonoma County Waste Management Agency CalRecycle
Wastewater Treatment	Emissions of methane and nitrous oxide that occur during wastewater treatment	Population served by each wastewater treatment plant (WWTP) Method of wastewater treatment at each WWTP Amount of digester gas produced at each WWTP	Sonoma County Water Agency Sanitation districts and jurisdictions that operate a WWTP
Water Conveyance	Production of electricity associated with the pumping and movement of water from source to user	Water consumption Water supply sources (e.g. groundwater, recycled water)	Urban Water Management Plans for each jurisdiction Sonoma County Water Agency
Livestock and Fertilizer	Emissions of nitrous oxide from the application of fertilizer Emissions of methane and nitrous oxide from livestock and manure management	Acres and types of crops grown in the county Livestock populations	Sonoma County Annual Crop Report U.S. Dept. of Ag National Agricultural Statistics Service

METHODOLOGY

This 2015 greenhouse gas (GHG) inventory update follows the [US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions](#), which provides detailed methodologies tailored for local government jurisdictions and agencies working to track emissions in the United States. The U.S. Community Protocol was created by the International Council for Local Environmental Initiatives (ICLEI), an organization of local, regional, and national governments that have committed to reducing greenhouse gas emissions. This protocol is specifically geared towards completing a GHG emissions inventory at the community scale in the United States and includes emissions from businesses, residents and transportation. There are over 600 local governments in the U.S. who are ICLEI members utilizing the U.S. Community Protocol to inventory greenhouse gases.²⁹

This is an activity-based inventory that captures the primary sources of emissions within a jurisdictional boundary that can be reduced through the actions of local governments and regional entities. In contrast, a consumption-based inventory also accounts for emissions that occur outside a jurisdictional boundary as a result of activities taking place within that jurisdictional boundary. In partnership with the World Resources Institute (WRI) and C40 Cities Climate Leadership Group (C40), ICLEI has also developed the Global Reporting Protocol (GRP), which is the global counterpart to the US Community Protocol and utilizes a consumption-based approach. Cities who have signed onto voluntary global networks and initiatives focused on reporting and tracking greenhouse gas reductions and comparing across countries, such as the Global Covenant of Mayors, are encouraged to use the GRP.³⁰

In total, ICLEI has developed four protocols for different emissions areas and needs – In addition to the U.S. Community Protocol and the GRP, the Local Government Operations Protocol (LGO Protocol) provides details guidance on accounting for emissions from municipal buildings, facilities and vehicles and the Recycling and Composting Emissions Protocol provides guidance on accounting for the benefits of recycling and composting community-generated waste.³¹

Because RCPA follows ICLEI’s US Community Protocol, this GHG inventory does not include all human activities in Sonoma County that drive an increase or decrease in atmospheric GHG emissions. Rather than trying to account for every source of emissions, this approach focuses on monitoring progress on the largest emissions sources that can most directly be influenced by local government actions. The emissions categories that were excluded from this inventory update include:

- Carbon sinks through biological carbon sequestration
- Consumption of goods and services imported into Sonoma County
- Industrial and commercial stationary sources

³⁰ [ICLEI Global Reporting Protocol](#)

³¹ [ICLEI Greenhouse Gas Protocols](#)

- Air travel

These categories are explored in sections 2.4.1 through 2.4.4 in Climate Action 2020.

Methodologies for calculating GHG inventories are continually evolving and changing. The RCPA will continue to monitor and incorporate local government best practices for inventorying emissions to meet our ambitious GHG reduction goals.