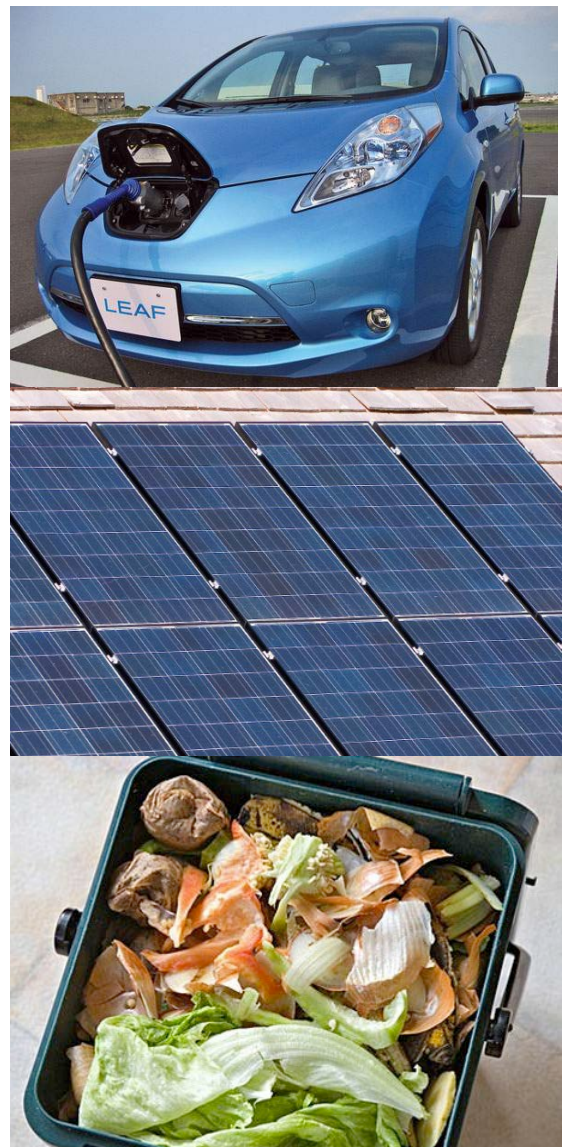


CITY OF BELVEDERE

COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY FOR YEAR 2015

November 2017

Prepared by the
Marin Climate & Energy Partnership



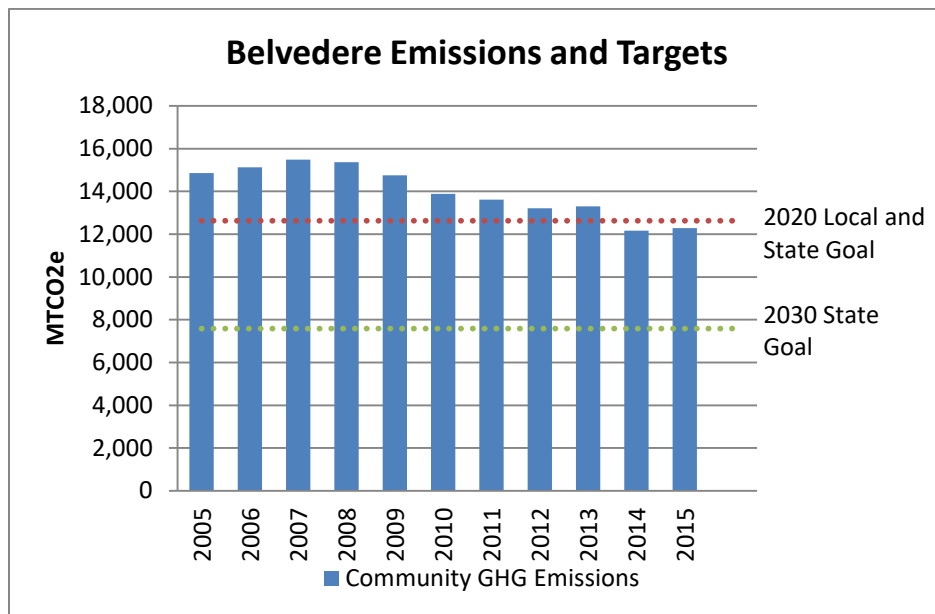
The Takeaway

Belvedere's greenhouse gas emissions dropped 17% between 2005 and 2015, meaning the City has met local and statewide reduction goals for 2020. The largest reductions were due to decreases in residential electricity and natural gas use and emissions. Although Belvedere has met its target to reduce emissions 15% by 2020, the State has enacted a longer-term goal to reduce emissions another 40% by 2030.

Introduction

Belvedere publishes annual community greenhouse gas (GHG) emissions estimates through the Marin Climate & Energy Partnership (MCEP). Annual inventories help the City to more closely monitor its progress in meeting its local goal to reduce community emissions 15% below baseline (2005) emissions by 2020.

This report reviews emissions generated from the community from 2005 through 2015 (the most recent year data is available). The inventory shows that the City has achieved this target, with emissions 17% below baseline emissions in 2015. Emissions dropped from about 14,860 metric tons carbon dioxide equivalent (MTCO₂e) in 2005 to 12,290 MTCO₂e in 2015. The emissions trend and targets are shown below.



Recognizing the need for a collaborative approach to greenhouse gas reductions, city and county leaders launched the Marin Climate and Energy Partnership (MCEP) in 2007. The City of Belvedere is a member

of MCEP and works with representatives from the County of Marin and all of the other Marin cities and towns to address and streamline the implementation of a variety of greenhouse gas reduction measures. Funding for this inventory was provided by the Marin County Energy Watch Partnership which administers public goods charges collected by PG&E. The annual inventories will be available on the MCEP website at marinclimate.org and will be used to update the [Marin Sustainability Tracker](#).

Emissions Reductions by Sector

This annual assessment tracks emissions in the seven sectors.

- The **Residential** and **Commercial** sectors represent emissions generated from the use of electricity, natural gas and propane in Belvedere homes and commercial and governmental buildings and facilities.
- The **Transportation** sector includes tailpipe emissions from passenger vehicle trips originating and ending in Belvedere, as well as a share of medium and heavy-duty vehicles and busses travelling on Marin County roads.
- The **Off-Road** sector represents emissions from off-road vehicles and equipment used for construction and lawn and garden maintenance.
- The **Water** and **Wastewater** sectors represent emissions from energy used to pump, convey and treat water and wastewater, as well as fugitive greenhouse gasses that are created during the wastewater treatment process.
- The **Waste** sector includes fugitive methane emissions that are generated over time as organic material decomposes in the landfill.

Table 1 shows how emissions in these sectors have changed since 2005. The greatest reductions have occurred in the Residential sector (-1,905 MTCO₂e), which accounts for 74% of total reductions. There have also been significant declines in other sectors. The likely reasons for the largest emissions decreases are described in further detail in the remainder of this report.

Table 1: Belvedere Greenhouse Gas Emissions by Sector, 2005-2015

Year	Residential	Commercial	Transportation	Waste	Water	Wastewater	Off-Road	Total	% Change from 2005
2005	7,363	605	5,990	584	93	53	174	14,861	
2006	7,386	634	6,221	580	87	51	169	15,128	2%
2007	7,932	507	6,190	527	101	62	165	15,484	4%
2008	7,996	506	6,086	451	107	63	160	15,369	3%
2009	7,750	493	5,822	386	91	56	155	14,752	-1%
2010	7,087	445	5,719	380	61	47	151	13,889	-7%
2011	6,988	331	5,683	370	50	44	150	13,616	-8%

2012	6,632	288	5,660	385	52	49	148	13,214	-11%
2013	6,462	552	5,638	391	55	50	147	13,295	-11%
2014	5,389	672	5,476	394	44	46	145	12,166	-18%
2015	5,457	772	5,420	410	39	43	145	12,287	-17%
Change from 2005	-1,905	168	-569	-173	-54	-10	-29	-2,573	
% Change from 2005	-26%	28%	-10%	-30%	-58%	-18%	-17%	-17%	

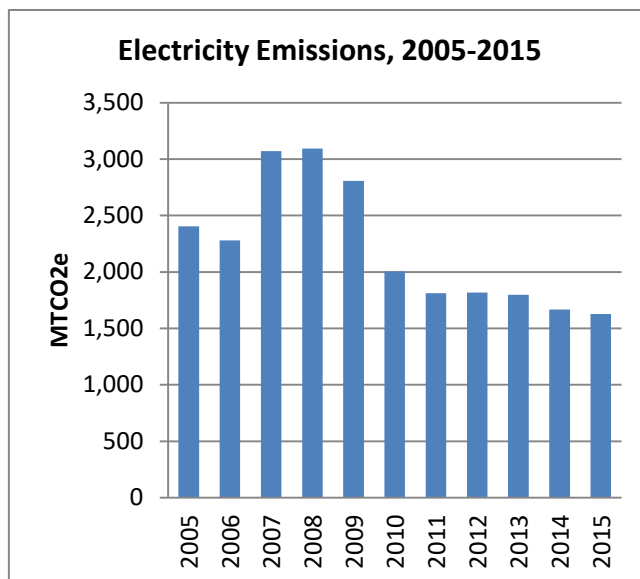
Major Emissions Sources

The following sections provide a year-by-year analysis of the changes in GHG emissions from the City's largest sources: electricity, natural gas, transportation, waste, and water use. Whenever possible, each section discussion includes the change in emissions from previous years and the likely influence of state and local programs or policies and external factors on reducing emissions.

Electricity Use and GHG Emissions

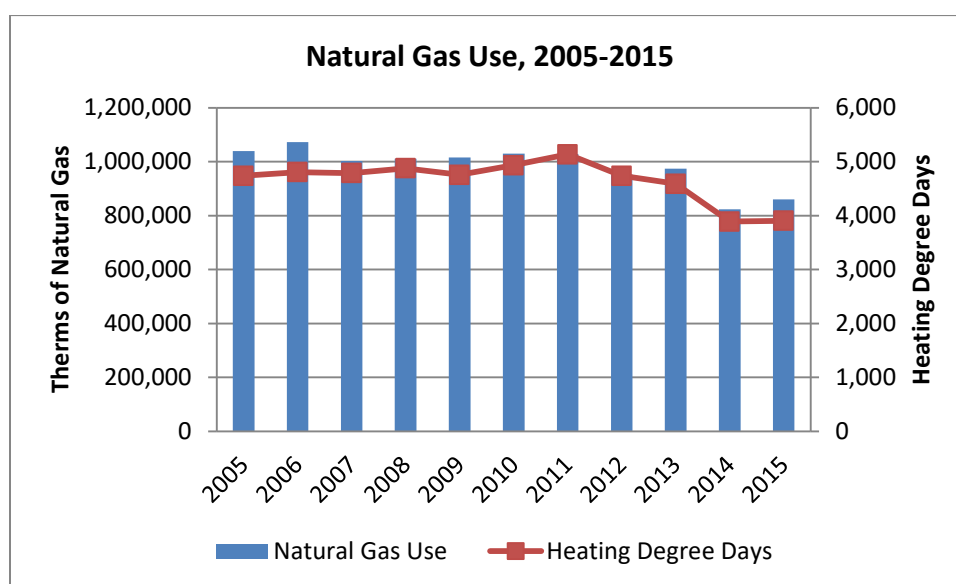
Electricity use in homes and businesses in Belvedere increased about 0.5% between 2014 and 2015, but has dropped nearly 5% since 2005, from about 10.7 million kWh in 2005 to 10.2 million kWh in 2015. The Residential sector, which uses 85% of all electricity in Belvedere, has reduced its electricity use 10% since 2005. Electricity use increased 42% in the Commercial sector over the same period. Electricity reductions in the Residential sector have most likely occurred due to improved energy efficiency, conservation, and solar installation. Countywide, distributed (i.e., rooftop, ground-mount and carport) solar systems have been growing at about 20% annually. Distributed solar currently generates about 4% of the County's electricity needs.

Electricity-related greenhouse gas emissions in the Residential and Commercial sectors decreased 2% between 2014 and 2015. Emissions dropped an impressive 32% since 2005. This is primarily due to the lower carbon intensity of electricity. PG&E electricity has been steadily increasing the amount of renewable energy in its power mix, and its electricity was 17% less carbon intensive in 2015 than it was in 2005. MCE, which began providing electricity to Belvedere customers in 2010, has historically provided electricity that is less carbon intensive than PG&E electricity. In 2015, MCE electricity was 18% less carbon intensive than PG&E. MCE carries about 75% of the electricity load in Belvedere. In 2015, about 2.8% of MCE electricity purchased by Belvedere customers was Deep Green.



Natural Gas Use and GHG Emissions

Natural gas is used in residential and commercial buildings to provide space and water heating and power appliances. Use of natural gas is highly variable depending on the weather conditions in a given year. This variability has led natural gas use consumption in Belvedere to fluctuate from year to year, from a high of 1.07 million therms in 2006 to a low of 0.82 million therms in 2014. Emissions from natural gas consumption increased 4% between 2014 and 2015, most likely due to colder temperatures. The chart below compares natural gas usage in Belvedere to regional heating degree days, a measure of how much energy is required to warm the interior of a building relative to the outside temperature. Warmer days result in fewer heating degree days. As shown below, natural gas consumption is highly correlated to heating degree days. Reduction in energy use may also be attributed to energy efficiency programs and rebates, local green building ordinances, and State building codes. California's goal is to require all new residential buildings to be net zero electricity use by 2020 and all new commercial buildings to be zero net energy by 2030.



Source (heating degree days): U.S. Department of Commerce, National Climatic Data Center

Transportation and GHG Emissions

Transportation activities accounted for approximately 43% of the Belvedere's emissions in 2015. Vehicle miles travelled have decreased approximately 5% since 2005, while transportation emissions have decreased 10% due to more fuel-efficient and alternatively fueled cars. Marin County continues to be a leader in zero emission vehicles (ZEVs) – second only to Santa Clara County – with an estimated 18 ZEVs per thousand residents. ZEVs include battery electric cars, plug-in hybrid electric cars, hydrogen fuel cell cars, and zero-emission motorcycles.

While it is difficult to pinpoint exactly how each land use and transportation policy affects emissions, the City has undertaken many efforts to reduce emissions from transportation to encourage workforce

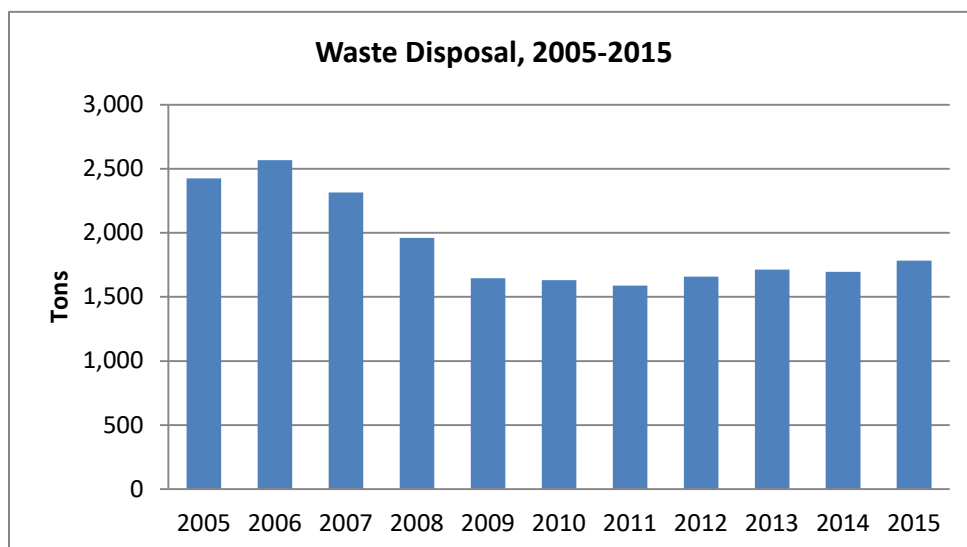
housing and make it easier for residents to use alternative modes of transportation, including bicycling, walking and riding the ferry or other public transportation. A guiding principle of the Belvedere General Plan is to promote alternatives to the automobile by providing safe streets, trails, sidewalks and bike paths. The City has developed goals and policies which promote alternatives to the automobile by encouraging safe streets, trails, sidewalks, and bike paths. The goals and policies focus on, but are not limited to, promoting compact and efficient development, working with neighboring cities and transit providers to increase the frequency and types of transit services available to Belvedere residents, developing and implementing ride share programs, locating bicycle lanes and walking paths at designation points, installing traffic calming measures to control speeding and improve pedestrian and cyclist safety, and the replacement of existing municipal fleet vehicles with electric and/or fuel efficient alternatives. Belvedere has already engaged in several sustainability practices such as:

- Promoting efficient transportation through the use of Belvedere’s hybrid and electricity vehicles and the City’s commitment to provide two electric vehicle charging stations at City Hall.
- The City replaced the electric planning and building vehicle with a new electric vehicle this year.
- The City replaced its electric vehicle with a SMART car.
- Over the last couple of years, the City has been working in a cooperative effort with the Town of Tiburon in developing the Yellow Bus Challenge. The Yellow Bus Challenge was developed to try and get more students in the local schools to ride the bus to help reduce traffic on local streets in Belvedere and the Town of Tiburon.

Waste Disposal and GHG Emissions

Waste generated by the community hit a low in 2011 but has since increased as shown in the chart below (based on countywide data). Emissions from waste disposal were 30% below 2005 levels in 2015.

The decrease in emissions from waste disposal is a result of the community’s and County’s goals to move toward Zero Waste by 2025. Ongoing waste diversion programs include a residential food waste composting program and mandatory food waste recycling for large commercial producers.

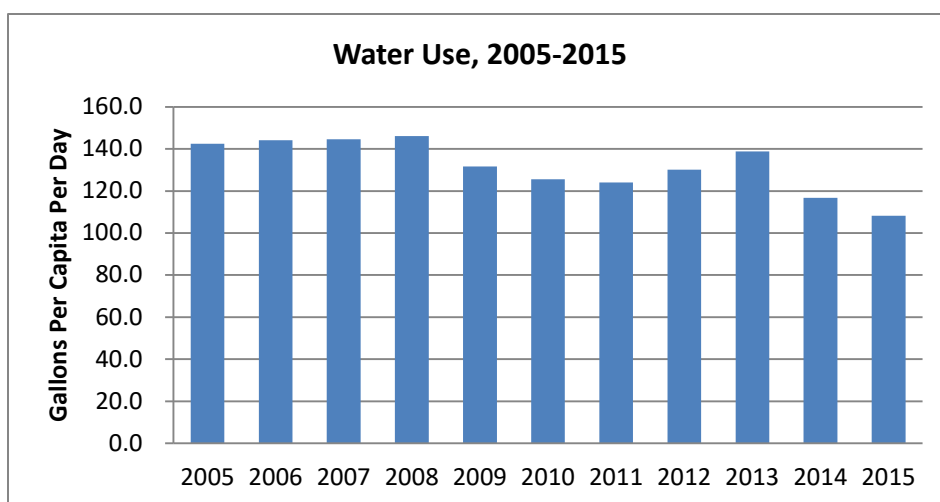


Source: CalRecycle

Water Use and GHG Emissions

Water use declined nearly 7% between 2014 and 2015, and 21% since 2005 (based on district-wide data). Emissions, which are based on an estimate of energy used to pump, treat and convey water to users in Belvedere, dropped 58% between 2005 and 2015 due to the lower carbon intensity of electricity. The Marin Municipal Water District began purchasing MCE Light Green electricity in 2010 and switched to MCE Deep Green electricity in July 2017.

The Marin Municipal Water District (MMWD) provides rebates and programs to reduce water use. Rebates are available to replace fixtures with high-efficiency toilets and clothes washers, and to purchase pool covers, hot water recirculating systems, organic mulch, laundry-to-landscape system components, and rain barrels. MMWD also provides rebates for irrigation improvements for commercial and multi-family customers. MMWD provides free high-efficiency shower heads and faucet aerators, and free home, business, and landscape water use evaluations.



Source: Marin Municipal Water District

Outreach and Coordination

In addition to the programs and actions described above, the City pursued a range of outreach activities and participated in several multi-agency efforts, including:

- Utilized the City's newsletter, social media, and press to promote sustainability efforts.
- Supported and promoted local green festivals, lectures, workshops and activities.
- Participated in and supported the Marin Climate and Energy Partnership.
- Partnered with Resilient Neighborhoods to enroll Belvedere households in a program to learn about sustainability and take actions to reduce household greenhouse gas emissions.

Summary and Next Steps

Belvedere has made significant progress in reducing GHG emissions since 2005 and has met its 2020 reduction target. However, the City will need to continue to implement policies and programs that further reduce emissions to achieve statewide targets to reduce emissions another 38% by 2030.