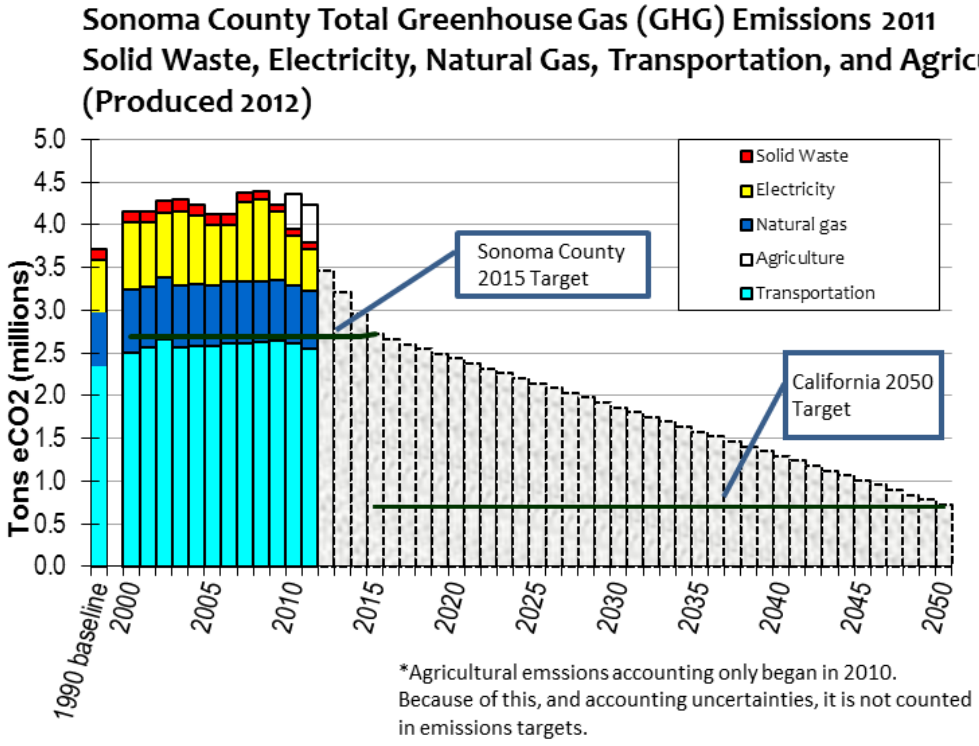
SONOMA COUNTY GREENHOUSE GAS REPORT FOR 2011

CLIMATE PROTECTION CAMPAIGN - ALEX DOLGINOW & ANN HANCOCK - ISSUED NOVEMBER 2012

Total greenhouse gas (GHG) emitted by Sonoma County in 2011 decreased for the third year in a row, down 14 percent since peaking in 2008. Cleaner electricity sources drove the reduction. Sonoma County's quest to attain a 25 percent emission reduction below the 1990 level by 2015 remains a challenge. Concerted action to reduce emissions is needed not only at the local level, but also at regional, state and national levels.



Emissions shown in millions of tons of equivalent carbon dioxide (eCO_2)

BACKGROUND

Sonoma County has taken bold steps for climate protection – including several national precedents:

- 2002 - All nine Sonoma cities, the County and the Water Agency pledged to reduce greenhouse gas (GHG) emissions.
- 2003 - All nine cities and the County completed inventories of the emissions produced by their internal municipal operations.
- 2005 - All Sonoma County mayors signed the U.S. Mayors Climate Protection Agreement.
- 2005 - All nine cities and the County passed resolutions adopting a greenhouse gas emission reduction target aligned with the scientific imperative – 25 percent below 1990 levels by 2015.
- 2008 - The Climate Protection Campaign in partnership with Sonoma County local governments, businesses, and community representatives issued a Community Climate Action Plan that identified the most cost-effective local solutions for significant greenhouse gas reductions (www.coolplan.org).
- 2009 - All nine cities and the County began participating in the Sonoma County Energy Independence Program, and all began participating in the Sonoma County Regional Climate Protection Authority.

Reducing GHG emissions has vast co-benefits such as improving economic vitality, public health, and energy security.

MEASURING GREENHOUSE GASES IS NOT A PRECISE SCIENCE.

The precision of emission calculations varies from sector to sector. For example, electricity and natural gas calculations are more accurate, transportation less. There exists no way to count the type and number of cars and how far they travel within Sonoma County. We must use estimates. However, by using consistent methodology, we are able to detect relative changes over time—allowing us to benchmark progress and see opportunities to further reduce emissions.

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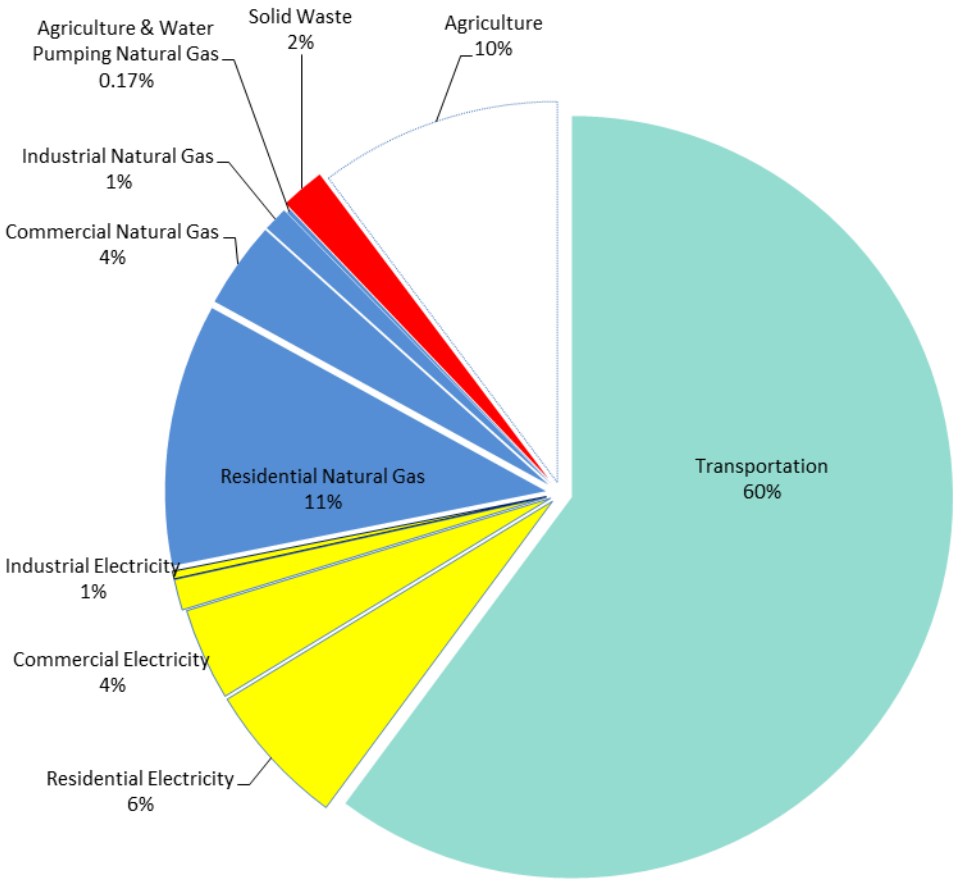
Sonoma County Total Emissions - 2011
4,200,000 tons CO2e



Sonoma County greenhouse gas emissions for the last five years (thousand tons CO_2-equivalent)

	Transportation	*Natural gas*	*Electricity*	*Solid waste*	*Agriculture (not in total)*	***Total***
2007	2,609	735	926	107		**4,378**
2008	2,628	717	951	97		**4,393**
2009	2,648	709	792	85		**4,234**
2010	2,618	674	573	87	404	**3,953**
2011	2,543	677	496	79	434	**3,794**

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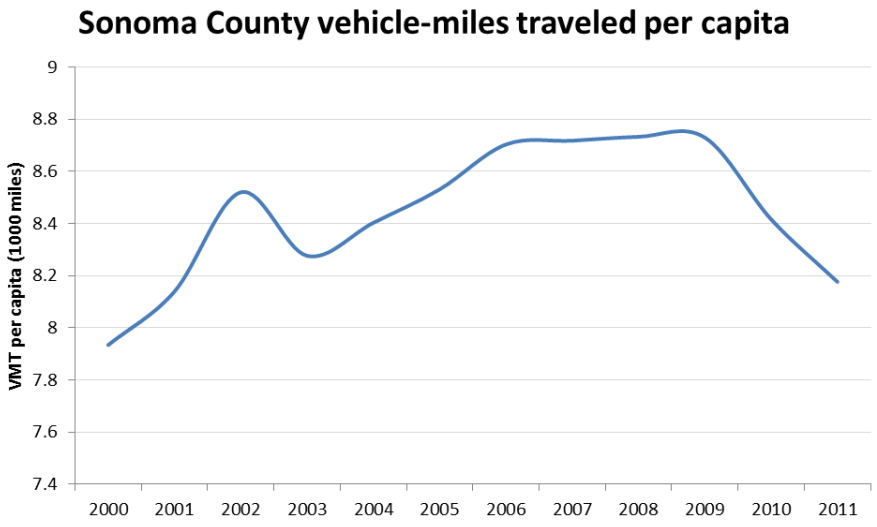
TRANSPORTATION

Transportation accounts for about 60 percent of Sonoma County's total emissions. Emissions in this sector are down slightly from 2010, according to estimates from Highway Performance Monitoring System data. The decrease in driving may be caused by the economic recession, higher gas prices, a shift away from vehicle use, or a combination of these factors.



Applying local measures to reduce emissions in the transportation sector remains very challenging. Multnomah County (Portland), Oregon, widely regarded as a national transportation leader for its urban growth boundary and other initiatives, has succeeded only in keeping transportation emissions flat since 1990. Fuel efficiency standards like those recently adopted by the federal government, a shift to more hybrid vehicles, better mass and alternative transit options, and smart regional planning will be required to successfully reduce emissions. One of the strongest tools in the arsenal for transportation emissions remains honest pricing—that is, stripping away subsidies and adding in the real costs of fossil fuel for our air, water, and climate. California's Global Warming Solutions Act (AB32), which puts a price on carbon throughout the economy, is a major step forward.

Most transportation policy is driven by regional, state, and federal authorities. The greatest impacts that can be leveraged through local policy are smart growth planning (that is, high-density growth rather than car-reliant sprawl) and policies that encourage alternative transportation (such as biking, telecommuting, ridesharing, car sharing).

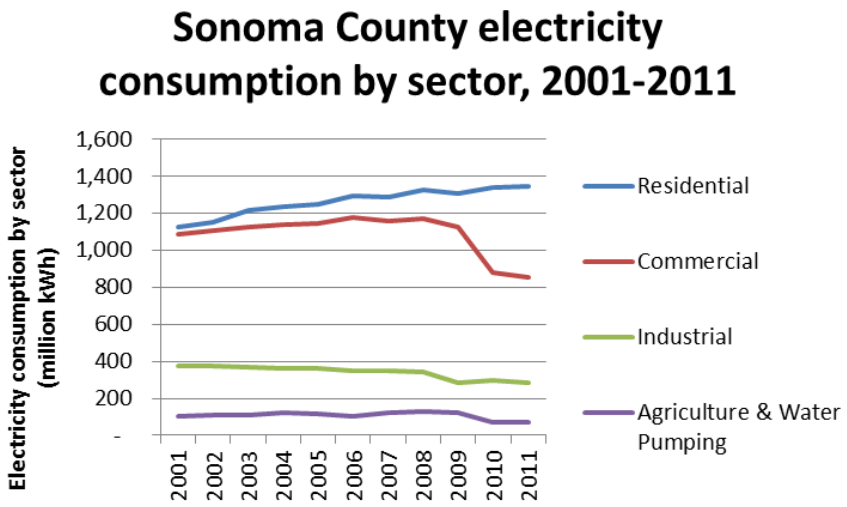
CLEAN ENERGY

Sonoma County's electricity and natural gas emissions fell significantly for the past three years – from a high in 2008 of 950,000 tons of emissions to 500,000 tons in 2011.

Part of this decrease was due to reduced energy use and increased energy efficiency. Electricity demand decreased 16 percent over the three-year period. Most of the reductions were in the recession-hit commercial and industrial sectors, with minor reductions in the agriculture and water pumping slices. Forty megawatts of solar capacity installed throughout Sonoma County also reduced demand.

A big part of the decrease was caused by a cleaner electricity mix. The emissions factor for the power mix, which measures the carbon intensity of power and thus how much CO_2 is emitted per MWh supplied, has decreased significantly in recent years – a 39 percent reduction since 2008. According to PG&E, this decline is due to a rise in hydropower following a few drought years, an increase in zero- and low-emitting electricity sources, and two newly-installed natural gas plants. The overall strong impact of taking fossil fuel out of electricity generation points to the opportunity available with Sonoma Clean Power, a local program that buys and generates electricity for residents and businesses.

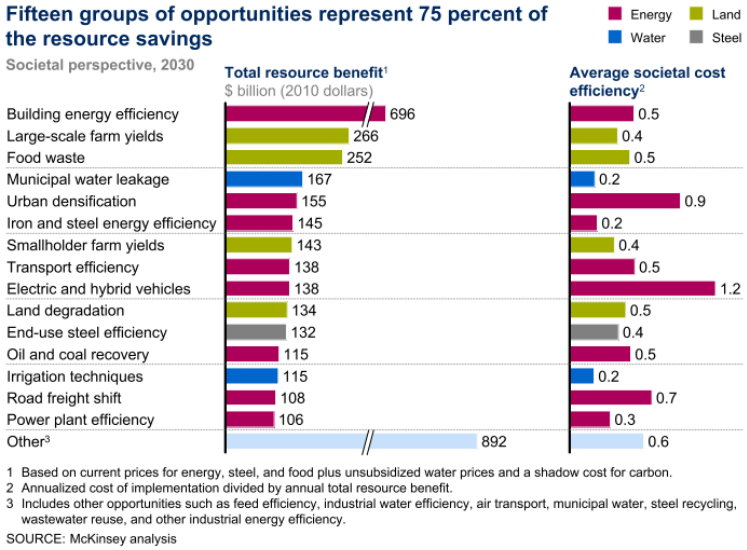
Emissions factor (lbs CO_2e/kWh)
2008 -- 0.641
2009 -- 0.558
2010 -- 0.445
2011 -- 0.388



ENERGY EFFICIENCY

Solutions to reduce the approximately one-third of emissions produced by electricity and natural gas use are well known to Sonoma County. We are a leader in building efficiency and innovative financing programs, including the Sonoma Clean Energy Independence Program, Ygrene Energy, and Windsor Efficiency PAYS®.

A 2011 McKinsey Global Institute analysis titled "Resource revolution: meeting the world's energy, materials, food, and water needs" found that building energy efficiency represented the single biggest opportunity for conservation of resources and that it typically returns $2 for every $1 invested.

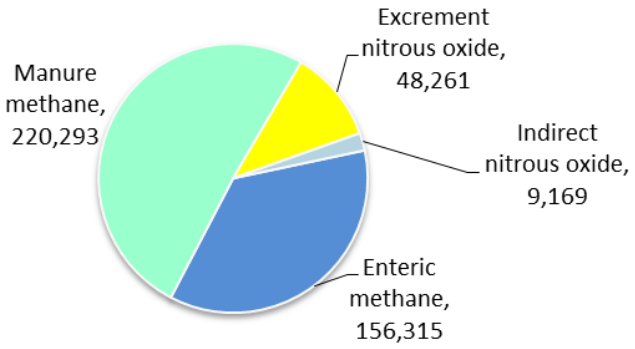


Dobbs et al. "Resource revolution: meeting the world's energy, materials, food, and water needs," McKinsey and Company, November 2011.

AGRICULTURE

Starting in 2010, the Climate Protection Campaign's GHG report quantifies some emissions from the agriculture sector. Known agricultural (mainly dairy) emissions comprise one-tenth of the County's total emissions. An increase in the number of cattle increased emissions slightly in 2011.

Known emissions from Sonoma County agriculture in 2011 (tons CO2e)



EXPLANATION OF EMISSIONS SOURCES

Manure methane: Emissions primarily from manure that is stored in ponds until it is applied to fields. In ponds, manure decomposes anaerobically (without air) and produces methane which is about 23 times stronger than CO_2 over a 100 year period.

Enteric methane: Emissions produced from the digestive processes of ruminants.

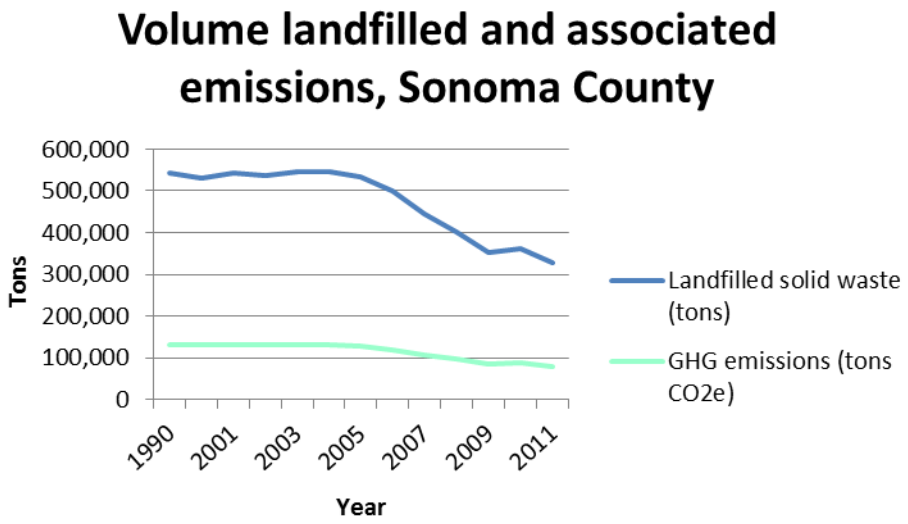
Excrement nitrous oxide: Emissions produced when manure is deposited on pasture land. Some of the nitrogen in the waste ends up being emitted as nitrous oxide, which is nearly 300 times as potent as CO_2.

Indirect nitrous oxide: Emissions from small amounts of nitrous oxide that is released indirectly when nitrogen leaches or runs-off and then later produces nitrous oxide, or through redesposition of volatilized gases.

Because of data limitations, the agriculture inventory only includes emissions of methane and nitrous oxide associated with livestock. Non-quantified sources of agricultural emissions include horses, farm vehicles, fertilizer application, tillage, liming, propane, fermentation, and winery wastewater ponds. (Electricity use is already captured in the electricity sector.) Furthermore, it should also be noted that methane emissions are dependent on how manure is handled. As manure management data is not readily available, agricultural emissions should be viewed as an approximation.

SOLID WASTE

Emissions from solid waste have decreased slightly as less material was landfilled. The ongoing economic recession is probably a driving factor. The fact that recycling volume increased even as landfilled solid waste decreased suggests that policies supporting diversion of material to alternative uses like recycling and compost might also be contributing to the decrease in emissions.



Accounting methods and scope of assessment

Standard GHG accounting protocols developed by Cities for Climate Protection® were used to produce this GHG report. It includes emissions from sources within Sonoma County's geographic area, but excludes aviation fuel. Included are gasoline, diesel, and natural gas, and electricity (PG&E, California system). It also includes estimates of methane and nitrous oxide emissions associated with livestock cultivation. Not included: propane, other fuel oil (bunker fuel, etc.), liquid fuels used for non-agricultural off road vehicles and stationary sources (methanol, red dye diesel, aviation fuels), coal (except from delivered electricity), waste oil, process emissions or leakage (carbon dioxide, methane, nitrous oxide) from industrial processes, methane emissions from human waste or winery wastewater ponds, carbon dioxide or nitrous oxide emissions from certain agricultural practices (soil tillage, pesticide application), fertilizer application, liming, agricultural vehicles, and product lifecycle emissions.

Gases included in inventory are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Not included are: PFC, HFC, SF6. HFCs are refrigerants (e.g., R-134 is used for refrigeration and automobile air conditioning). PFCs are used primarily in the semiconductor manufacturing industry. They have very high global warming potentials, but relatively short atmospheric lifetimes. SF6 is used as an insulator and is also used in semiconductor manufacturing. It has the highest known global warming potential: 23,900 times more potent than carbon dioxide (this and other gas global warming potentials are derived from the IPCC Third Assessment Report, 2001.)

GHG emission figures for municipal operations are not shown in this report because only electricity and natural gas data for municipal operations is currently available at a sufficient level of specificity to allow for meaningful assessment, and because municipal operations account for a small proportion of Sonoma County's overall GHG emissions (about 1-2 percent).

Emissions from forestry and non-livestock biomass are not included in this report due to the lack of an accepted, cost-effective estimation methodology to account for GHG emissions in this sector. Carbon can be emitted or sequestered as a result of land use change, changes in standing carbon stocks, and the creation of forestry-related products. Specific data on these activities, however, are unavailable or impractical to incorporate into the inventory.

DATA SOURCES AND SUPPORT

Richard Alden Feldon, Protocol Manager, ICLEI USA (analytical support)

ICLEI—Local Governments for Sustainability (CAPCA emissions calculation software; "U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions v1.0." Oct 2012.)

Highway Performance Monitoring System data (transportation data)—available at California Department of Transportation Data Library: http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php

Chris Barney, Sonoma County Transportation Authority (transportation support)

Andrea Gough and Steven Mac, California Energy Commission, (electricity and natural gas data)—as this data is not readily available online, you can e-mail the California Energy Commission or the Climate Protection Campaign to obtain the spreadsheet.

City of Healdsburg (electricity emissions coefficient data)—available online at the City of Healdsburg website, http://www.ci.healdsburg.ca.us/index.aspx?page=379

The Climate Registry (electricity emissions coefficient data)—to access this data, go to the climateregistry.org, public reports, view public reports, access public reports, Pacific Gas and Electric. See the "2010 EPS Report" tab titled "Optional Delivery Metrics." See also http://www.pgecorp.com/sustainability/en08_climate.jsp for information about the decrease in emissions factor, and www.pge.com/ for energy mix.

CalRecycle (solid waste data)—available on the CalRecycle website; http://www.calrecycle.ca.gov/DataCentral/Materials.htm

William Hart, Gold Ridge RCD (agriculture—cow/ heifer ratio)

California Air Resource Board (agriculture—OFFROAD model; "California's 1990-2004 Greenhouse Gas Emissions Inventory and 1990 Emissions Level: Technical Support Document" 2009.)

U.S. EPA (agriculture— "Methods for estimating GHG emissions from domestic animals" and "Methods for estimating greenhouse gas emissions from manure management." 1999. Prepared by ICF International.)

Sonoma County Agricultural Commissioner (agriculture—livestock data)—available in the 2010 Crop Report; http://www.sonoma-county.org/agcomm/pdf/2010_crop_report.pdf

Population data obtained from U.S. Census Bureau, via www.google.com/publicdata

Glossary available at: http://epa.gov/climatechange/glossary.html

More on Sonoma County GHG emissions: www.climateprotection.org, and on solutions: www.coolplan.org

Since 2001 the Climate Protection Campaign has worked with government, business, youth, and the broader community to advance practical, science-based solutions for significant greenhouse gas reductions. We create model programs for communities everywhere.

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