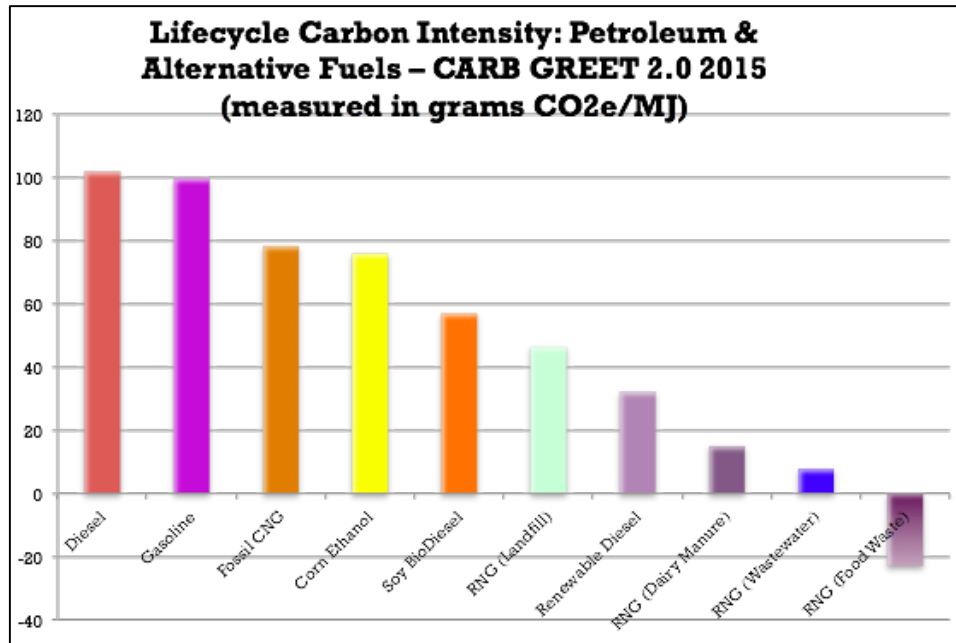




The Power of Waste: *Renewable Natural Gas for California*

Background: Over the last few years, at multiple locations across the U.S., an exciting new green industry is emerging: the production and use of a sustainable energy and fuel made from the biogases emitted by decomposing organic wastes. This fuel, known as **renewable natural gas (RNG)**, is chemically similar to fossil gas and can be used in all the same applications — cooking, heating, power generation, transportation and more. Unlike fossil gas it requires **no drilling**, and is close to **carbon neutral**. According to the California Air Resources Board (see table), on a lifecycle basis RNG use in transportation represents an **80%-or-more reduction in greenhouse gas emissions** compared to diesel. It is even **net-carbon-negative** when the fuel is derived from food waste, making it among the lowest carbon commercially viable energy and fuel sources available today.¹



California has already shown the environmental commitment, and it has the resources to become a leader in production and use of Renewable Natural Gas.

The Promise of “Renewable Natural Gas”: RNG produced from California’s organic waste feedstocks – a huge resource – could supply up to 20 percent of California’s natural gas demand, or almost 300 billion cubic feet per year. If captured and utilized, this resource could generate enough renewable electricity to power 2 to 3 million homes, or enough RNG to replace 75 percent of all the diesel fuel (or more than 2 billion gallons/yr) used by motor vehicles in California.²

California is rich in RNG feedstocks. The state has over 900 wastewater treatment plants³ (WWTPs) and 136 active permitted landfills; another 134 landfills have been closed since 1989,⁴ but still represent a source of biogas. California’s roughly 1.8 million dairy cows⁵ produce about 203 million pounds of manure *daily*.⁶ In 2014, nearly 5.6 million tons of food waste (a particularly high-energy-content feedstock) made up 18.1% of the state’s waste stream.⁷ **As the nation’s most populous state, California has the highest biogas potential**, with nearly 1,200 sites that could support gas production according to the American Biogas Council.⁸

RNG projects up and running in California include the 175-million-gallon-per-day Point Loma WWTP in San Diego and the Sacramento Biodigester. At Point Loma, **1.3 million cubic feet (cu.ft.) of biogas** that used to be flared daily now powers a 2.8MW fuel cell at UC San Diego; waste heat from that process drives 320 tons of air-conditioning capacity on campus. Point Loma gas also powers a 1.4MW fuel cell at San Diego’s South Bay Water Reclamation Plant, providing that facility 24/7 baseload electrical power.⁹ In Sacramento, CleanWorld and Atlas ReFuel **displace more than 500,000 gallons**

of diesel with RNG produced via anaerobic digestion (A.D.) of commercial organic waste. Several other A.D. projects are in development across the state today, including CR&R's Perris, CA facility.

Promoting RNG in California: Various measures in California promote the production of biogas from organic waste. On the feedstock side, as of 2016, **businesses generating organic waste must recycle it**, with the threshold for meeting the requirement falling from 8 cubic yards (cu.yds.) per week in 2016 to 4 cu. yds. in 2017; municipalities are also required to create organics recycling programs for multi-family buildings.¹⁰ On the production side, a 2015 law (SB 350) **requires utilities to provide 50% of their electricity from renewables**.¹¹ The Alternative and Renewable Fuel and Vehicle Technology Program (AB 8) works to build capacity of **California companies to produce economically competitive biofuels from waste-based and renewable feedstocks** and California's **Low Carbon Fuel Standard (LCFS)** has also driven utilities and operators of vehicle fleets to procure RNG. Due in large part to the LCFS, **close to 60% of all natural gas used in transportation in the state is now low-carbon RNG**, with more public and private fleets committing to RNG.

RNG and Emissions: Ultra-low-carbon RNG has the potential to significantly reduce California's climate emissions and health-threatening air pollution.¹² In 2015, 35 of 58 California counties, including Los Angeles, Sacramento, San Diego and San Francisco, exceeded US ceilings for ozone pollution.^{13,14} Also in 2015, 31 counties **received a Grade of "C" or lower for particulate pollution** in the American Lung Association's "State of the Air" report.¹⁵ Conversion of bus or truck fleets from diesel to the new "near zero" natural gas engine, just certified by the US EPA and by CARB, can reduce lung damaging nitrogen oxide and particulate emissions 90% below EPA's current standard. Santa Monica is one of the first cities in the US to order the near zero engine for 100 of its new transit Blue Buses.

The Future of RNG in California: Fostering an in-state RNG industry through continued policy and industry leadership would complement existing initiatives, take advantage of proven technology, and can make California the pace setter in moving toward the most ambitious greenhouse gas reduction, air quality, waste, energy and transportation goals in the country.

For more on RNG, on where it is produced and used today, and on EV's publications, please contact:

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¹ Derived from CA Air Resources Board (CARB) 2015 LCFS Pathway report

² <https://www.socalgas.com/smart-energy/benefits-of-natural-gas/renewable>

³ **2012 California Infrastructure Report Card**, American Society of Civil Engineers, 2013. Accessed 10/19/16 at

<http://www.infrastructurereportcard.org/california/california-infrastructure/>

⁴ California Department of Resources Recycling and Recovery (CalRecycle), "State of Disposal In California," March 2015.

Accessed 10/19/16 at <http://www.calrecycle.ca.gov/Publications/Documents/1524/20151524.pdf>

⁵ **2012 Census of Agriculture**, "United States Summary and State Data, Volume 1," US Department of Agriculture.

http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_US_State_Level/st99_2_011_011.pdf

⁶ Based on 112 pounds per dairy cow per day, USDA Natural Resources Conservation Service, Animal Manure Management, RCA

Issue Brief #7, December 1995; http://www.nrcs.usda.gov/wps/portal/nrcs/detail/null/?cid=nrcs143_014211

⁷ CalRecycle, "2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures," Table 6,

2015. Accessed 10/20/16 at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf>.

⁸ American Biogas Council, "Biogas State Profile: California," 2015. Accessed 10/20/16 at [www.americanbiogascouncil.org/](http://www.americanbiogascouncil.org/State%20Profiles/ABCBiogasStateProfile_CA.pdf)

State%20Profiles/ABCBiogasStateProfile_CA.pdf

⁹ SoCalGas website, "Point Loma Wastewater Treatment Plant." Accessed 10/19/16 at [https://www.socalgas.com/smart-](https://www.socalgas.com/smart-energy/success-stories/point-loma)

[energy/success-stories/point-loma](https://www.socalgas.com/smart-energy/success-stories/point-loma)

¹⁰ California Assembly Bill 1826, accessed 10/20/16 at [http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=](http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826&search_keywords)

[201320140AB1826&search_keywords](http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826&search_keywords)

¹¹ http://www.ucsusa.org/clean_energy/smart-energy-solutions/increase-renewables/renewable-energy-in-california/

¹² <https://www.socalgas.com/smart-energy/benefits-of-natural-gas/renewable>

¹³ EPA Green Book, Current Nonattainment Counties: <https://www3.epa.gov/airquality/greenbook/ancl.html>

¹⁴ EPA Green Book, California Nonattainment Counties: https://www3.epa.gov/airquality/greenbk/anayo_ca.html

¹⁵ **State of the Air 2015**, "Report Card: California," American Lung Association,

<http://www.stateoftheair.org/2015/states/california/>