



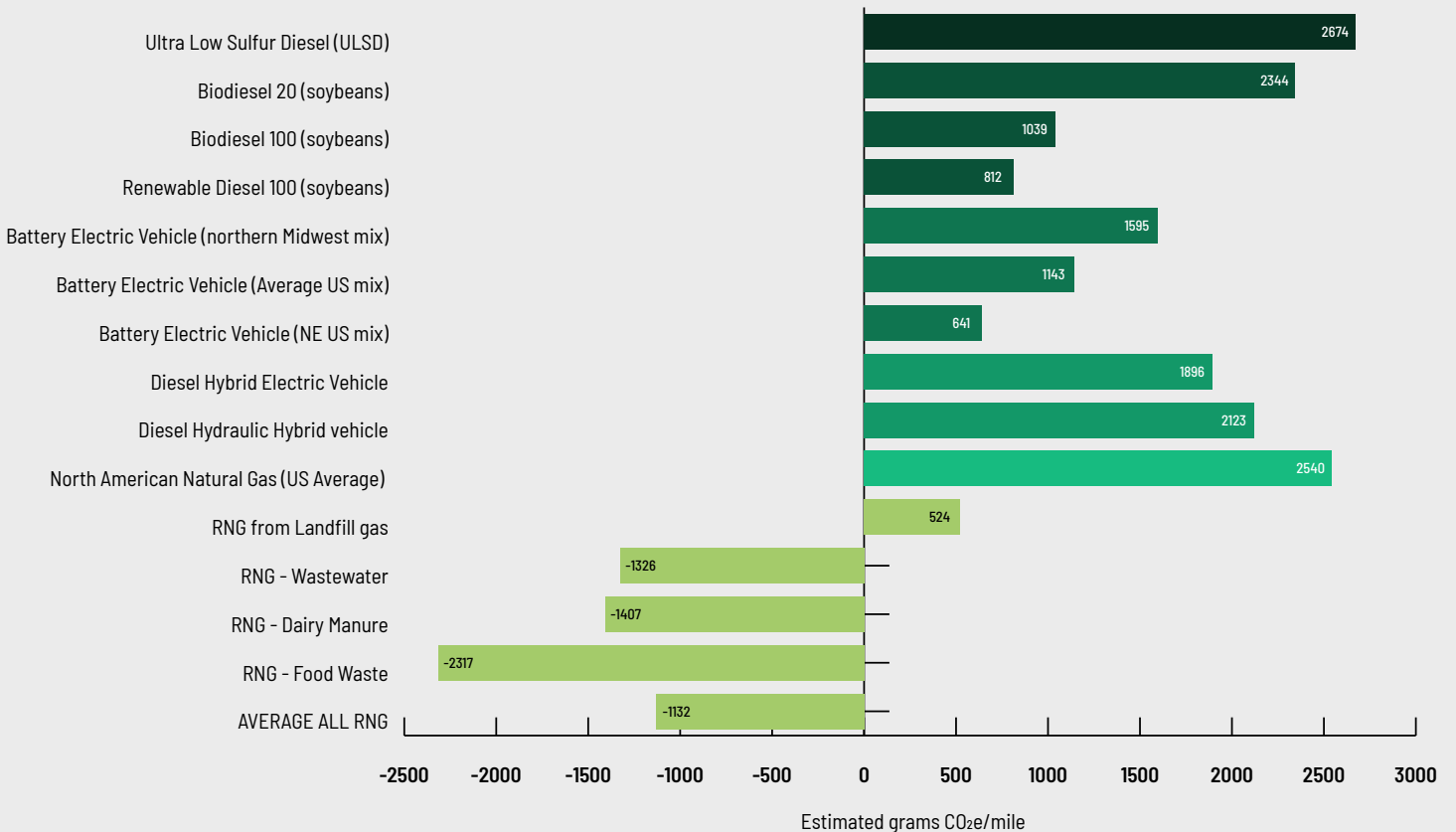
THE POWER OF WASTE: RENEWABLE NATURAL GAS FOR CALIFORNIA

Background

California is by far the biggest market for renewable natural gas (RNG), a gas sustainably produced from organic wastes that 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, RNG requires no drilling. Depending on its feedstocks, RNG is close to carbon neutral or net-carbon-negative. According to the California Air Resources Board, on a lifecycle basis RNG use in transportation represents an 80%-or-more reduction in greenhouse gas emissions compared to diesel when derived from landfill biogas (see chart below). When derived from wastewater, animal manure, or food waste, RNG is deeply carbon-negative, as it captures more greenhouse gases during production than it releases when it is burned. This makes RNG among the lowest-carbon commercially viable energy and fuel sources available today.

Comparative Lifecycle GHG Emissions of Various Transport Fuels

Source: Derived from Argonne GREET (2022)



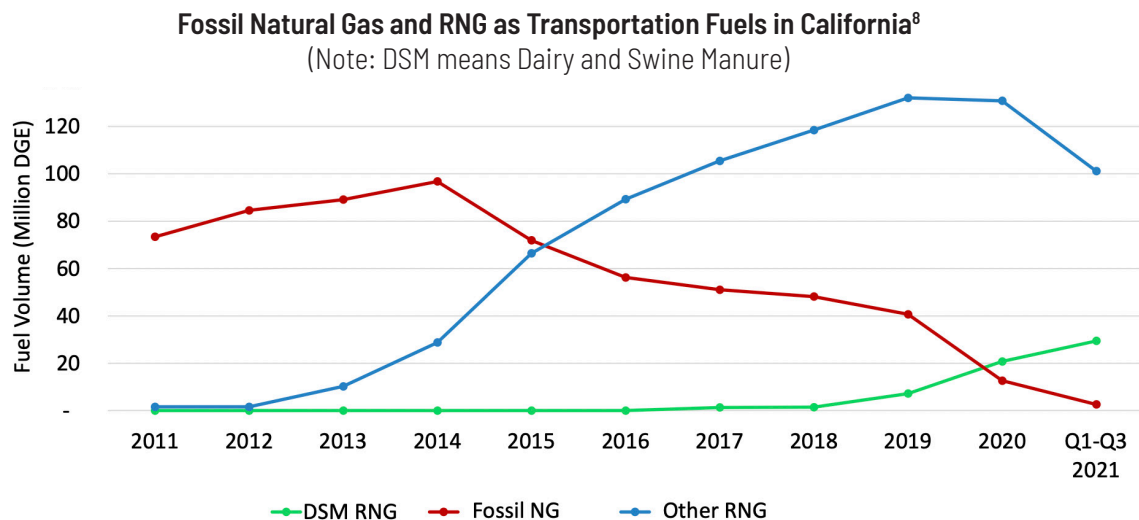
The Promise of Renewable Natural Gas

RNG produced from California's organic waste feedstocks – a huge resource – **could supply up to 28% of the state's total natural gas demand**, or almost 600 billion cubic feet per year.¹ If captured and utilized, this resource could generate **enough renewable electricity to power millions of homes** – well above the 465 billion cubic feet that all of California's residential consumers used in 2019.

California is rich in RNG feedstocks. The state has over 900 wastewater treatment plants (WWTPs) and 134 active permitted landfills; over 260 landfills have been closed for years but many still represent a source of biogas.² California's roughly 1.7 million dairy cows produce about 193 million pounds of manure daily.³ Californians throw away almost 6 million tons of food waste (a particularly high-energy-content feedstock) each year, making up about 18% of the state's waste stream.⁴ **As the nation's most populous state, California has the highest biogas potential**, with nearly 1,600 sites that could support gas production (including over 300 existing ones), according to the American Biogas Council.⁵

RNG projects up and running in California include the Point Loma Wastewater Treatment Plant in San Diego. The plant captures the methane produced as a byproduct and uses it to fuel two continuously running 2,235 kilowatt generators. Besides being energy self-sufficient, through a public-private partnership it also upgrades excess digester gas to RNG and injects it into utility pipelines for credits. Point Loma was the first biogas project to do so in California.⁶ Numerous other RNG projects are operating and in development across the state today.

98% of the fuel used in California's natural gas vehicles in 2021 (174.28 million gallons out of 178.37 million gallons of diesel equivalent) **was RNG** (see chart below), with those fleets achieving carbon negative operations for the second year in a row.⁷



1 RNG Coalition presentation to the California Air Resources Board, "Renewable Natural Gas: Using RNG to Reduce Methane from Organic Wastes and Help Achieve California's Climate Goals" September 8, 2021. https://ww2.arb.ca.gov/sites/default/files/2021-09/rngcoalition_presentation_sp_slcp_september2021_0.pdf Accessed May 2023.

2 CalRecycle, SWIS Facility/Site Activity Search, <https://www2.calrecycle.ca.gov/SolidWaste/Activity> Accessed May 2023.

3 Agricultural Statistics Service, 2022 STATE AGRICULTURE OVERVIEW California, https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=CALIFORNIA Accessed May 2023. Based on 112 pounds per dairy cow per day according to USDA Natural Resources Conservation Service, <https://lplc.org/animal-agriculture-in-the-u-s-trends-in-production-and-manure-management/> Accessed May 2023.

4 CalRecycle, Preventing Food from Reaching the Landfill, <https://calrecycle.ca.gov/organics/food/> Accessed May 2023.

5 American Biogas Council, California Biogas State Profile, <https://americanbiogascouncil.org/wp-content/uploads/2020/06/ABC-2020-State-Profiles-5.pdf> Accessed May 2023.

6 The City of San Diego, "Public Utilities," <https://www.sandiego.gov/public-utilities/sustainability/renewable-energy> Accessed May 2023.

7 NGVamerica, "California Fleets Fueled With Bio-CNG Achieve Carbon-Negativity For Second Straight Year," October 11, 2022. <https://ngvamerica.org/2022/10/11/california-fleets-fueled-with-bio-cng-achieve-carbon-negativity-for-second-straight-year/> Accessed May 2023.

8 California Air Resources Board, Session 9: Overview of Low Carbon Fuel Standard & Dairy/Swine Manure Fuel Pathways. March 29, 2022. <https://ww2.arb.ca.gov/sites/default/files/2022-04/dairy-ws-session-9-CARB.pdf> Accessed May 2023.

Promoting RNG in California

Various measures in California promote the production of biogas from organic waste. On the feedstock side, beginning in 2022, SB 1383 **requires every jurisdiction to provide organic waste collection services to all residents and businesses.**⁹ On the production side, a 2018 law (SB 100) **requires utilities to provide 60% of their electricity from renewables by 2030 and come entirely from carbon-free sources by 2045.**¹⁰

In February 2022, **California approved by far the most ambitious mandated RNG purchasing program in the country.** The state's investor-owned gas utilities will collectively procure up to 72.6 billion cubic feet (~72 million MMBTU) of RNG produced in the state by 2030 - nearly equal to total national RNG production in 2022, which was just under 75 million MMBTU.¹¹

RNG not only qualifies for credits under the federal Renewable Fuel Standard, it also earns credits under the Low-Carbon Fuel Standard implemented in California, Oregon, and Washington (markets in which suppliers from elsewhere can sell RNG, too). **California utility SoCalGas has committed to 20% of all the gas it delivers to homes and businesses being RNG by 2030, and to all of its operations and energy delivered being net-zero carbon by 2045.**¹²

RNG and Emissions

Ultra-low-carbon RNG has the potential to significantly reduce California's climate emissions and health-threatening air pollution. In the American Lung Association's 2023 "State of the Air" report card, 45 of California's 58 counties **received a grade of "C" or lower for particulate pollution, including 41 graded "F."**¹³ Conversion of bus or truck fleets from diesel to "near zero" natural gas engines running on RNG can cut more than 90% of health-threatening nitrous oxide emissions and 60% of particulate emissions.

RNG will continue to be an integral, growing part of California's ambitious environmental goals moving forward.

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

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9 CalRecycle, "New Statewide Mandatory Organic Waste Collection," <https://calrecycle.ca.gov/organics/slcp/collection/> Accessed May 2023.

10 California Public Utilities Commission, "Renewables Portfolio Standard (RPS) Program," <https://www.cpuc.ca.gov/rps/> Accessed May 2023.

11 California Public Utilities Commission, CPUC Sets Biomethane Targets for Utilities, February 24, 2022. <https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-sets-biomethane-targets-for-utilities> Accessed May 2023.

12 Sempra Utilities press release, "SoCalGas Renews Program to Deliver Renewable Natural Gas to Vehicle Fueling Stations," May 9, 2022. <https://www.sempra.com/socialgas-renews-program-deliver-renewable-natural-gas-vehicle-fueling-stations> Accessed May 2023.

13 American Lung Association, "State of the Air 2023 Report Card: California," <https://www.lung.org/research/sota/city-rankings/states/california> Accessed May 2023.