

TURNING ORGANIC WASTE INTO CLEAN & LOW-CARBON ENERGY AND FUEL

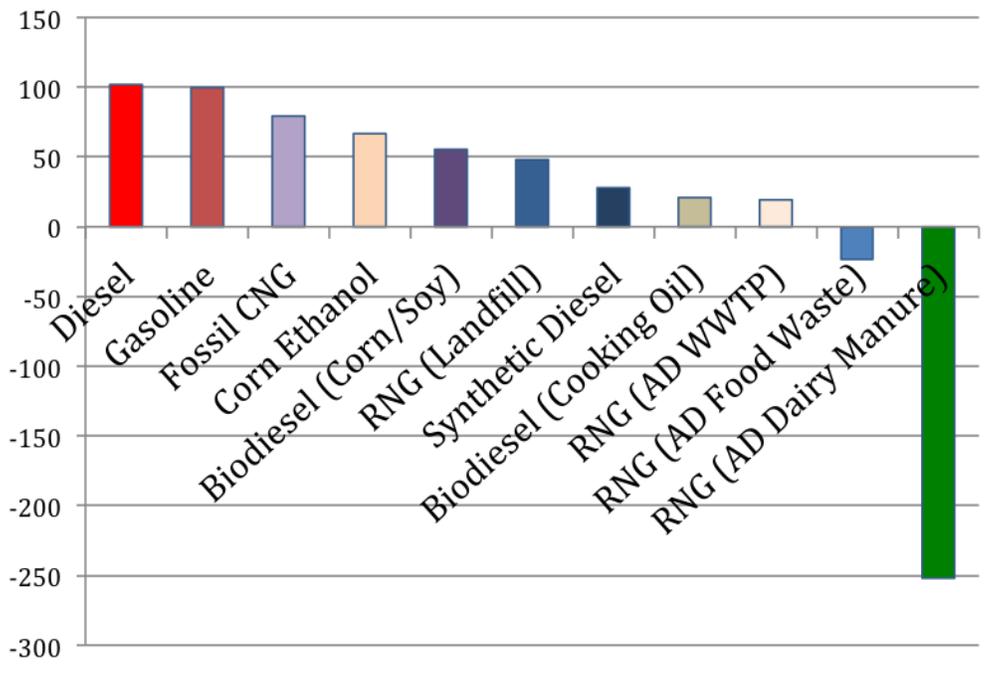


The Potential for Renewable Natural Gas (RNG) in New York

BACKGROUND

Over the last few years, an exciting new green industry has begun to emerge across North America, one that is producing the cleanest, lowest carbon fuel available today: renewable natural gas (“RNG”, also called “biomethane”). RNG is made by capturing and refining the biogases emitted from decomposing organic materials like food scraps, animal manure and sewage. Once refined, this fuel is interchangeable with geologic natural gas, and can be transported and utilized via the same pipelines and infrastructure, but requires no drilling or fracking. As an energy source, RNG can “decarbonize” the gas grid. As a transportation fuel, RNG can readily replace high-carbon diesel in trucks and buses. According to the California Air Resources Board (“CARB”), on a lifecycle basis, the use of RNG in natural gas vehicles represents a 70%-300% reduction in greenhouse gas (GHG) emissions compared to diesel, as it both captures methane emissions from organic waste and displaces emissions from fossil fuels. When derived from separated food waste or dairy manure processed in anaerobic digesters, it is actually net carbon negative (see figure below).¹

Lifecycle Carbon Intensity (g CO₂e/MJ); Petroleum & Alternative Fuels (Source: CARB 2017)



NEW YORK HAS TAKEN STEPS TOWARD A LOW-CARBON ENERGY AND TRANSPORTATION FUTURE

Top priorities for New York include reducing reliance on imported oil and natural gas, and tackling climate change. New York is making important steps to increase its deployment of renewable energy through its Reforming the Energy Vision (“REV”) initiative, which calls for a 40% reduction in GHG emissions statewide by 2030, and 80% by 2050. To date REV’s primary focus has been the electric power sector, and well-known technologies like solar and wind are already widely deployed, and growing, to help achieve the state’s target of 50% renewable electricity by 2030.²

REV and the NY State Energy Plan also recognize the need to move the state's commercial and passenger vehicles off of petroleum, with the Plan putting a heavy emphasis on electrification.³ The NY State Energy Research and Development Authority (NYSERDA) does provide financial incentives for procurement of Class 3 to 8 CNG trucks and buses for private and non-profit fleets operating in NYC, to encourage displacement of diesel models.⁴ Also in New York City, the Hunts Point Clean Trucks program helps fund replacement of diesel trucks servicing the Hunts Point Market in the South Bronx with cleaner models, including natural gas.⁵ A 50% state tax credit supports installation of alternative fueling infrastructure, including natural gas. A state "Biofuel Production Tax Credit" is limited to production of biodiesel and denatured ethanol, but it does not apply to renewable natural gas.⁶ As a non-financial incentive, natural gas vehicles do enjoy some special privileges: they are allowed to exceed state vehicle weight limits by up to 2,000 lbs.⁷

WHY FOCUS ON TRANSPORTATION?

Transportation accounted for almost 31% of total energy use in New York State in 2015.⁸ More than 75% of the petroleum products used in New York go to transportation, and fuel combustion for transportation now accounts for 33% of New York's greenhouse gas emissions (72.75 million metric tons), making it the single largest source.^{9,10} More than 2.3 million buses and trucks consume 1.25 billion gallons of diesel fuel annually in New York.^{11,12} This represents a transfer of more than \$4 billion per year out of state.¹³ Annual on-road diesel use generates approximately 14 million tons of carbon emissions annually, along with an array of health-threatening criteria pollutants.¹⁴

RNG (and CNG) are among the only commercially viable options now available that can substantially displace on-road diesel fuel use. Building a New York RNG industry to produce fuel for heavy-duty fleets is one of the best strategies available for reducing imports, increasing the use of renewables in transportation, combatting climate change and creating local jobs.

ROOM FOR PROGRESS IN TRANSPORTATION

According to the Alternative Fuels Data Center, New York has almost 1,400 "alternative fuel" dispensing facilities, nearly 1,200 of which are open to the public. These stations include electric (1,128); CNG (74); E85 (72); liquid propane gas (65); biodiesel (34 facilities); and hydrogen (1).¹⁵ From 2010 to 2017, annual consumption of natural gas as a vehicle fuel in New York increased by over 23%, from roughly 26.65 million diesel gallon equivalents (DGEs) to 32.88 million DGEs.^{16,17} However, heavy-duty trucks and buses still consume over 1 billion gallons of high-carbon diesel in the state annually (see below).

NEW YORK HAS THE RESOURCES FOR PRODUCING RNG

A 2017 national analysis by Energy Vision for the U.S. Dept. of Energy found only two facilities, both landfills, producing renewable natural gas in New York. While other projects are in development—including at New York City's Newtown Creek wastewater treatment plant (WWTP)—the state's rich organic waste resource is largely untapped:

- Commercial and residential sources of food waste total 3.9 million tons per year in New York.¹⁸ In 2012,

food and beverage manufacturing in New York employed nearly 52,000 people, with a combined payroll of over \$2 billion; almost 500 of these establishments had 20 or more employees.¹⁹ Waste from these facilities could be processed in anaerobic digesters on-site, or “co-digested” in agricultural and wastewater digesters, as at the Synergy Biogas facility in Wyoming County.

- In 2016, New York was the third largest dairy producer in the country;²⁰ manure from the state’s roughly 620,000 dairy cattle alone generated over 13.5 million tons of manure.^{21,22}
- Every day, NY’s 586 publicly-owned WWTPs process roughly 2.5 billion gallons and generate about 1,000 tons of biosolids.²³ Only one quarter of these facilities have some sort of anaerobic digestion capability.²⁴
- As of 2010, 25 NYS landfills were collecting biogas, mostly for electricity generation.²⁵ Fresh Kills on Staten Island and the Seneca Meadows landfill outside Rochester both refine their gas and inject it directly into natural gas pipelines. In each case, though, the RNG produced is delivered into the lucrative California transportation market, where it attracts both Federal and State credits.

REALIZING THE POTENTIAL OF RNG IN NEW YORK

- New York State has an acknowledged need to help improve the economics of its farms and dairies. Incentivizing production of biogas and its upgrading to RNG would open up valuable new markets for farmers, who would have access to markets beyond the sale of biogas-generated electricity into the grid.
- The creation of programs or incentives to cover the incremental cost of natural gas vehicles would encourage private sector investment in RNG production, by ensuring fleet markets for the fuel (much like a Renewable Portfolio Standard guarantees a market for renewable electricity).
- Expertise is available, and a growing number of private companies and consultants can help businesses and communities plan in the new green fuels arena. The place to begin is with projects that are economic and energy winners, especially capturing unutilized landfill and wastewater biogas for vehicle fuel.

An early prioritization of municipalities and public agencies makes sense. They are owners and contractors of truck and bus fleets, while also having responsibility for disposal of huge organic waste streams—primarily municipal solid waste and wastewater—that could become fuel for these fleets. By both owning or managing the “markets” for the fuel, as well as the raw feedstocks from which to make RNG, public agencies can be ideal drivers, community by community, of a revolution in truck and bus fueling. Relevant projects are already afoot in California, Michigan, Wisconsin, Georgia, Indiana, Louisiana, Texas, Colorado and Ohio.²⁶

A waste-based renewable natural gas industry could be a major component of the “green” energy economy in New York State, contributing to enhanced resource recovery, renewable energy, economic development and job growth in urban and rural areas alike. A 2016 analysis by Energy Vision and the Renewable Natural Gas Coalition concluded that a national RNG industry could create upwards of 75,000 non-exportable jobs over the next decade.²⁷

NOTES

1. Based on CARB, LCFS Pathway Certified Carbon Intensities, <https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm>
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3. NYS Energy Planning Board, NYS Energy Plan, Vol.1, The Energy to Lead, 2015. <https://energyplan.ny.gov/-/media/nysenergyplan/2015-state-energy-plan.pdf>
4. US Dept. of Energy Alternative Fuels Data Center (AFDC) New York Laws & Incentives, <https://www.afdc.energy.gov/states/ny>
5. Hunt's Point Clean Truck Program, <http://www.huntspointctp.com/>
6. US Department of Energy, AFDC, op. cit.
7. US DOE AFDC, New York Laws and Incentives for Natural Gas, <https://www.afdc.energy.gov/fuels/laws/NG/NY>
8. US EIA, New York Energy Consumption by End-Use Sector, 2015, <https://www.eia.gov/state/?sid=NY#tabs-2>
9. Table F15, Total Petroleum Consumption Estimates, 2016, https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_fuel/html/fuel_use_pa.html&sid=US
10. NYSEDA, NYS Greenhouse Gas Inventory: 1990-2015, Table S-1, "2015 New York State Greenhouse Gas Inventory," 2018. <https://www.nyserda.ny.gov/-/media/Files/EDPPP/Energy-Prices/Energy-Statistics/greenhouse-gas-inventory.pdf>
11. Registered vehicles in 2010. Federal Highway Administration, Highway Statistics Series, Highway Statistics 2010, <https://www.fhwa.dot.gov/policyinformation/statistics/2010/mv1.cfm>
12. US EIA, Sales of Distillate Fuel by End Use. https://www.eia.gov/dnav/pet/pet_cons_821dst_dcu_SNY_a.htm
13. Based on NYSEDA, Weekly On-Highway Diesel Prices, 5/28/18, <https://www.nyserda.ny.gov/Researchers-and-Policymakers/Energy-Prices/On-Highway-Diesel/Weekly-Diesel-Prices>
14. Based on 22.4 pounds of CO₂e per gallon diesel fuel combusted (US EIA, FAQ: How much carbon dioxide is produced from burning gasoline and diesel fuel? <https://www.eia.gov/tools/faqs/faq.php?id=307&t=11>)
15. US DOE AFDC, "New York Transportation Data for Alternative Fuels and Vehicles," <https://www.afdc.energy.gov/states/ny>
16. Based on US Energy Information Administration (US EIA), New York Natural Gas Vehicle Fuel Consumption, https://www.eia.gov/dnav/ng/hist/na1570_sny_2A.htm
17. Energy Vision calculation, based on 1,020 BTU per cubic foot and US EIA 137,381 BTU to the DGE.
18. NYSEDA, Benefit-Cost Analysis of Potential Food Waste Diversion Legislation, March 2017. www.nyserda.ny.gov/media/Files/Publications/Research/Environmental/Benefit-Cost-Analysis-of-Potential-Food-Waste-Diversion-Legislation.pdf
19. US Census Bureau statistics for New York in 2012, based on searches by NAICS code, 311 for food manufacturing (including animal food) and 3121 for beverage manufacturing. "Guided Search" tool at <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>
20. Farm Bureau of New York, <https://www.nyfb.org/about/about-ny-ag>
21. Amount of manure per dairy cow based on University of Wisconsin Extension, How much fertilizer do your animals produce? <http://learningstore.uwex.edu/assets/pdfs/a3601.pdf>.
22. Values from University of Wisconsin Extension multiplied by 620,000 cows, per New York State Dairy Statistics 2016 Annual Summary, Table 1, NY State Department of Agriculture and Markets, <https://www.agriculture.ny.gov/DI/NYSAnnStat2016.pdf>
23. NYS DEC website, <http://www.dec.ny.gov/chemical/97463.html>
24. NYSEDA, 2007 Market Characterization Study: Anaerobic Digester Gas-to-Electricity for the Municipal Wastewater Sector in New York; <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Environmental/market-characterization.pdf>
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26. A selection of organics-to-fuel (RNG) projects can be found on Energy Vision's "Case Studies" page: <http://energy-vision.org/resources/project-profiles/>
27. Energy Vision, Fueling Economic Growth with Renewable Natural Gas, Dec 2016 <http://energy-vision.org/wp-content/uploads/2017/05/Fueling-Economic-Growth-with-RNG.pdf>

FOR MORE ON RENEWABLE NATURAL GAS, ON WHERE IT IS PRODUCED AND USED, AND ON ENERGY VISION'S PUBLICATIONS, PLEASE CONTACT:

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