SoCalGas A Sempra Energy utility®

Glad to be of service.®

Innovation

CLEAN TRUCKS AND RENEWABLE GAS

Driving a Clean Energy Future for California's Low-income Communities

We have a

DUAL CHALLENGE

FEDERAL CLEAN AIR ACT

Reduce SMOG by at least

55%

by 2031 in the San Joaquin Valley and South Coast Air Basin

CA CLIMATE GOALS (AB32, SB32, SB1383, GOVERNOR'S EO)

Reduce greenhouse gas emissions to

40%

below 1990 levels by 2030

&

Reduce methane emissions by

40%

The good news is, we have a CLEAR FOCUS

The Transportation Sector is responsible for

80%

of the region's smog, and nearly

40%

of its GHG emissions

HEAVY-DUTY Trucks contribute the most smog-forming emissions in our region

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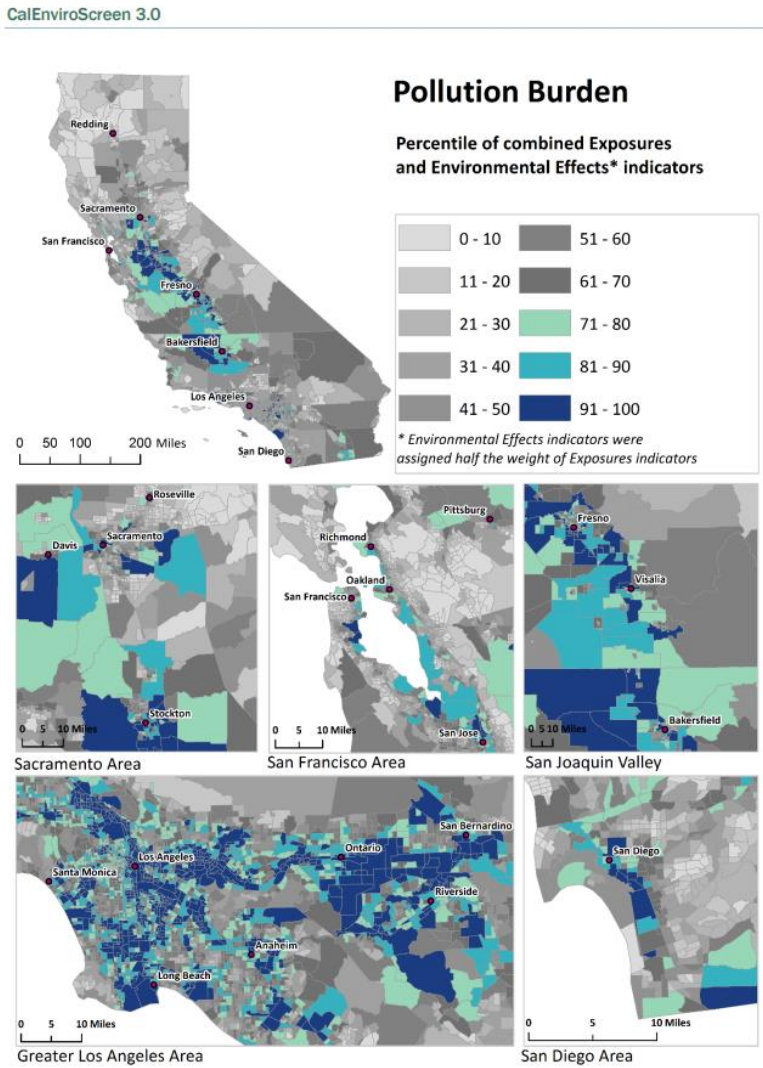
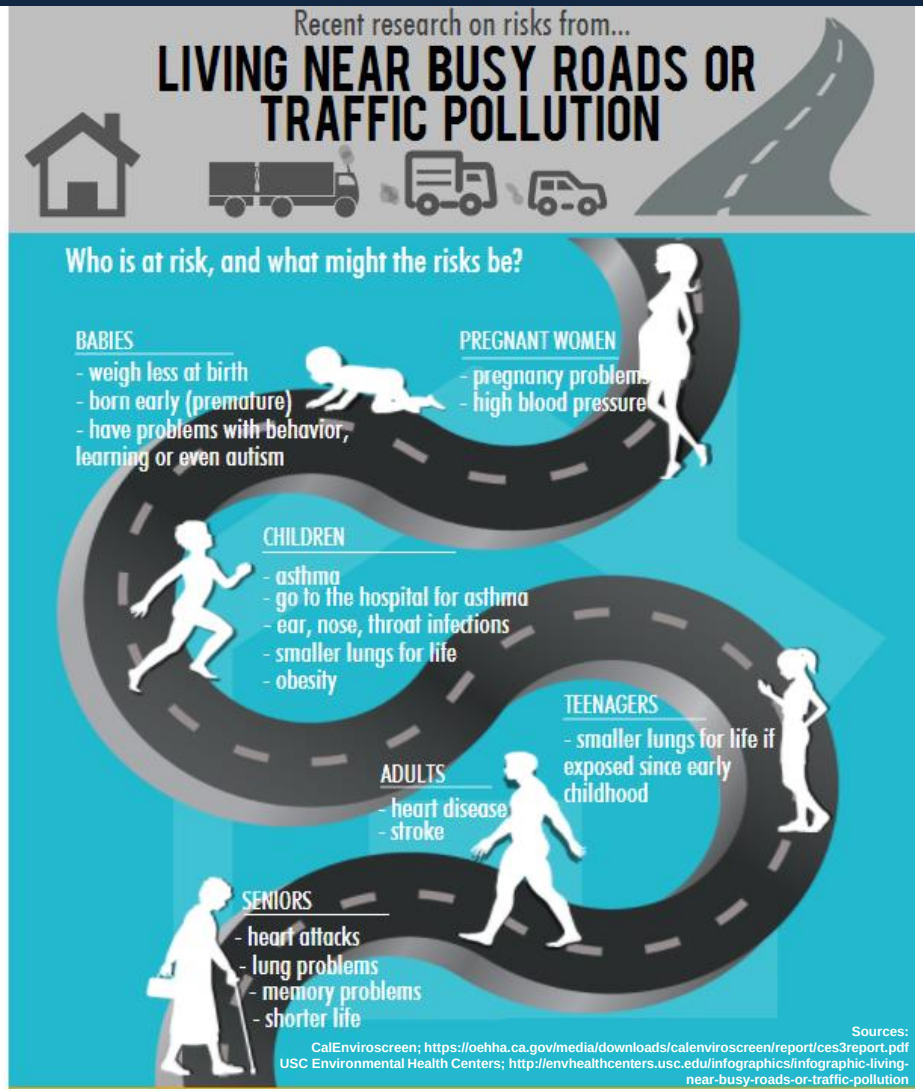
NEARLY 90,000

Heavy-duty Trucks travel on the I-5, I-710, and CA-99 freeways on high traffic days

Sources: 2012 South Coast Air Quality Management Plan & California Air Resources Board (CARB), California GHG Emissions Inventory 200-2012, released in May 2014

These transportation emissions have a **DISPROPORTIONATE IMPACT** on disadvantaged communities





MAKING FREIGHT SUSTAINABLE IN CA

HEAVY-DUTY NGVs using RG are California's best choice for reducing GHG emissions and smog

Near-zero natural gas engines can reduce NO_X emissions by

90% or more

By switching to renewable natural gas, we can reduce vehicle GHG emissions by

80% or more

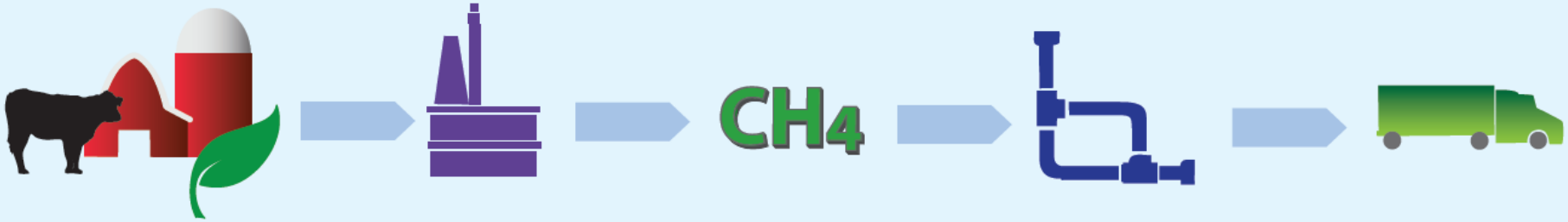
According to the Low Carbon Fuel Standard program, CA's NGVs are fueled with

>60% RG today

Clean, green

RENEWABLE GAS

Putting methane from organic waste to beneficial use



Collect waste from dairies, farms, and communities

Produce biogas, using anaerobic digestion

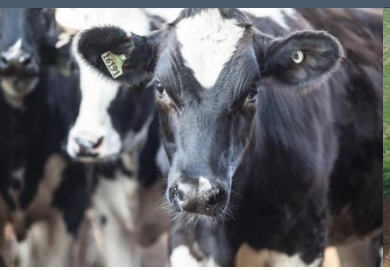
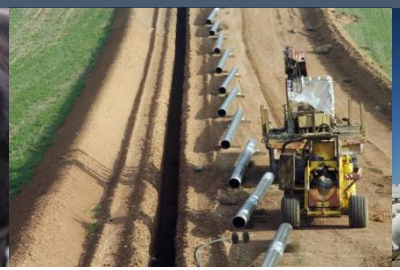
Purify the methane

Put in the Pipeline for future use

To fuel trucks and other natural gas needs

RENEWABLE GAS

Practical benefits for California


Waste to Biogas

- Significantly Reduce Odors
- Better Control of Waste Water
- Enhanced Nutrient Recovery and Plant-availability

Collect in Pipelines

- Efficiently Transport Biogas
- No Truck Traffic, Noise, or Emissions
- Open Access System for Future Growth

Process & Upgrade

- Ensure Gas is Safe for Existing Pipelines
- Ensure Proper Combustion and Consumer Safety

Pipeline Injection

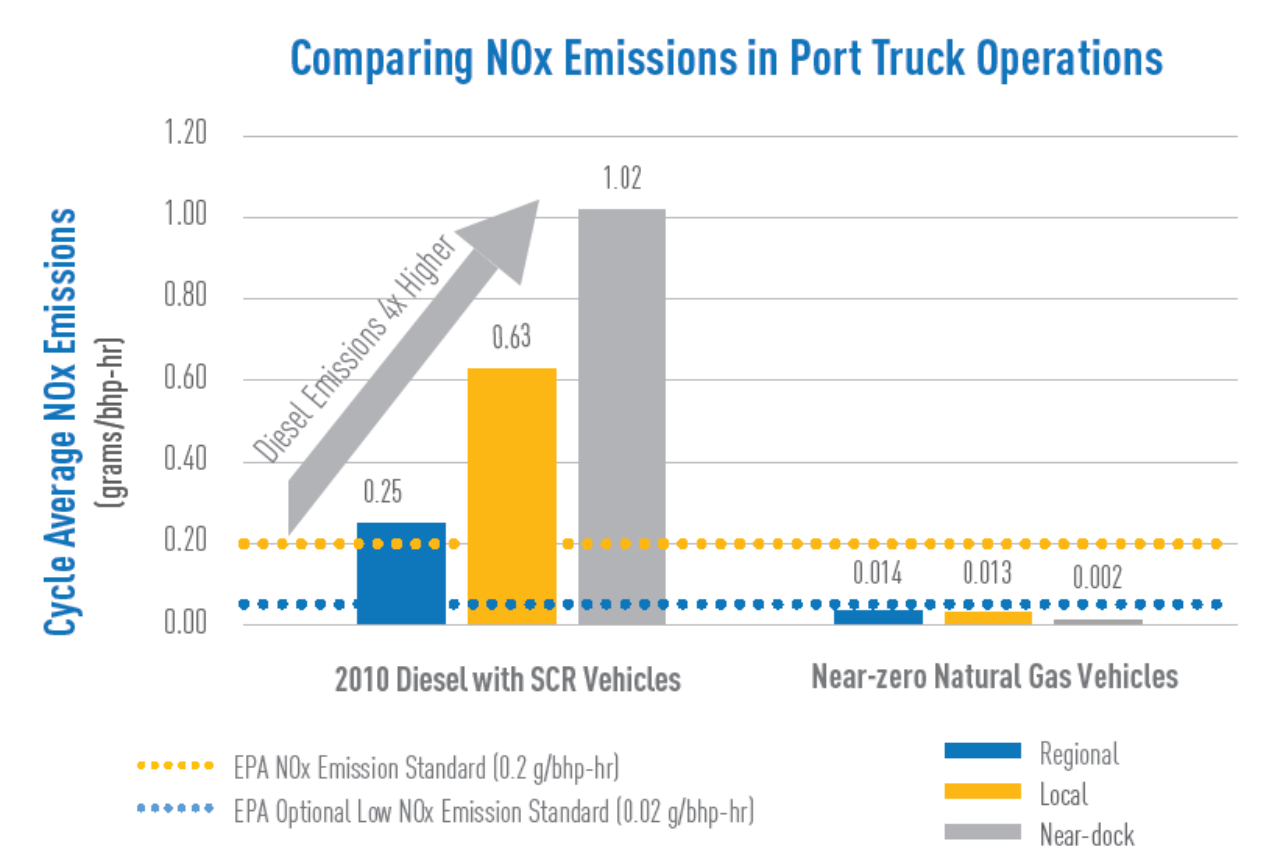
- Efficient Transportation to Existing Customers
- Flexible, Reliable, and Resilient Energy Network
- No New Combustion Source

End Use

- Near-zero Emissions
- Displaces Traditional Fuel
- Clean, Reliable, Resilient Energy

CAN WE WAIT FOR ZERO EMISSIONS?

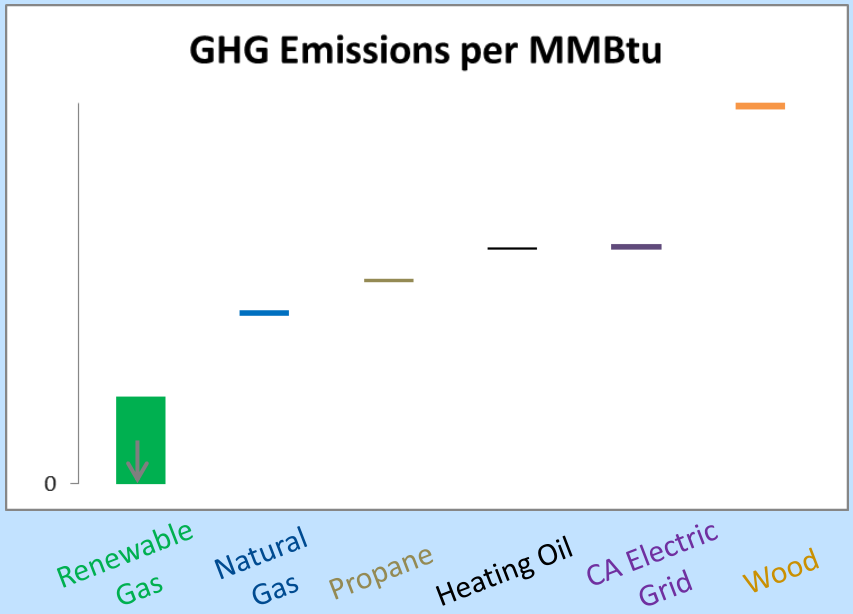
According to a recent study by UC Riverside, in simulated real-world conditions, diesel NOx emissions were 4x higher than expected, while NGVs emitted even less than "near-zero" levels:

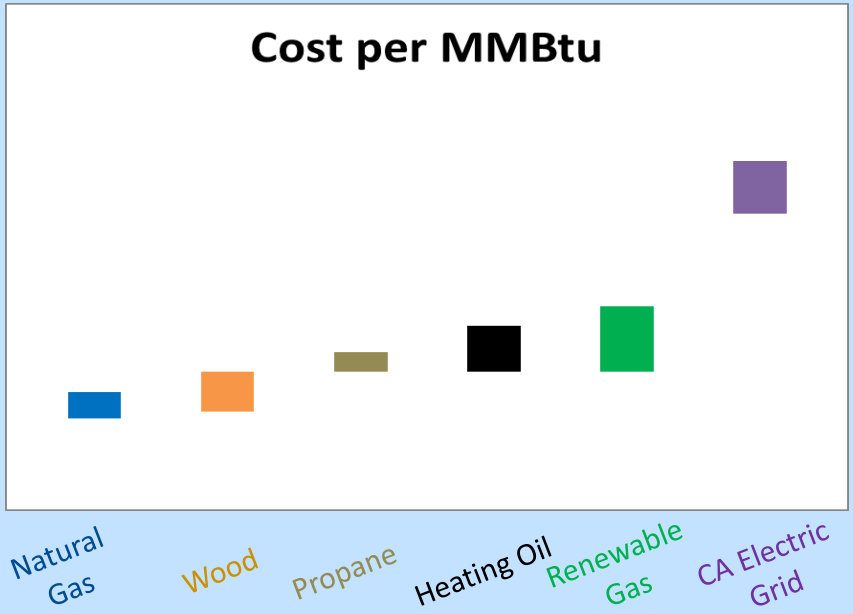


Source: University of California Riverside's College of Engineering-Center for Environmental Research and Technology (CE-CERT)

BY THE NUMBERS

Delivered residential energy characteristics





Estimates do not factor in end-use efficiency. Values estimated using:

1. U.S. EIA 2017 Annual Energy Outlook, Pacific Region, 2017 to 2030 https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2017&cases=ref2017&sourcekey=0
2. U.S. EIA Carbon Dioxide Emissions Coefficients https://www.eia.gov/environment/emissions/co2_vol_mass.php
3. U.S EPA Emissions & Generation Resource Integrated Database (eGRID) 2014 https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid
4. Estimate, assuming RG commodity cost of $10-20/MMBtu
5. Estimated based on CA-GREET model assumptions https://www.arb.ca.gov/fuels/lcfs/ca-greet/ca-greet.htm
6. 28 MMBtu/cord; $150 -250/cord
7. “A look at the Details of CO2 Emissions from burning Wood vs. Coal” http://futuremetrics.info/wp-content/uploads/2013/07/CO2-from-Wood-and-Coal-Combustion.pdf

WHY SOCALGAS?

We are a part of the solution.

- » **Largest natural gas distribution** utility in the US, with 100,000 miles of existing pipelines to transport RG
- » Actively engaged in promoting **NGVs** and **RG**
- » Research new technologies to provide **low-carbon energy solutions** for our customers
- » SoCalGas' customers make up **more than half of all California residents**
- » SoCalGas is an **experienced operator** of natural gas infrastructure – making important investments while maintaining the **lowest fuel cost** for customers.

Conclusion

Developing RG and deploying clean trucks will allow us to:

- **Meet clean-air goals sooner**
- **Diversify our green energy sources**
- **Improve energy reliability**
- **Help win the climate change fight**