Technology-Driven Clean Natural Gas Transportation Strategies

Natural Gas Initiative
Stanford University, CA
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Clean Transportation Strategies

CNG-Hybrid Vehicles

Low Pressure Storage & Conforming Tank

RNG

NZE HD Engines

Rail
Near Zero Emission Engines

New “Near-Zero” Truck Engine to be Ready for Prime Time

- SoCalGas working with agencies and engine manufacturers to deliver truck engine 90% lower emissions for 2018!
- Tailpipe emissions the same as emissions from generating electricity to run similar truck on electricity, years before heavy-duty EV trucks ready for the market

Near Zero Emission Natural Gas Engine
NOx <0.02 gr/bhp-hr
90% NOx Reduction
80% GHG Reduction
Natural Gas Hybrid Vehicles

Compressed natural gas hybrid technologies will provide greater range and lower emissions to the heavy duty transportation sector.

- Utilize CNG engine as a range extender when longer range is needed
- Combines All Electric Range in environmental sensitive areas that require “zero tailpipe emissions”, but capable of transporting goods further than heavy duty EV trucks can
CNG Storage Technology
• Developed new carbon adsorption material and technology to reduce storage pressure from 3600 psi to <1000 psi
• Evaluate low pressure storage system performance and market feasibility
• Demonstrating conforming tank technology

Vehicle Refueling Technology
• Develop advanced compressed natural gas fueling methods to allow for full fills under all vehicle and ambient conditions.
• Design and demonstrate a pre-commercial dispensing system that cost-effectively delivers improved vehicle fills over current state-of-the-art products.
• Demonstrate improvements in cost-effectiveness and efficiency of fueling infrastructure and vehicle costs.
Natural Gas Off-Road Vehicles

- SoCalGas is looking at bigger applications for Natural Gas as a transportation fuel.
- The locomotive industry remains an area predominantly dominated by Diesel.

- Developing and demonstrating a Low NOx natural gas locomotive.
- Achieve Tier 4 certification and near-zero emissions.
RENEWABLE
Natural gas

Convert waste from dairies, farms and landfills
into biogas using anaerobic digestion

\[ \text{CH}_4 \]
extract the methane

put in the pipeline for future use

WHAT’S POSSIBLE

POWER
2-3 million homes

REPLACE
75% of all diesel used by CA vehicles

SUPPLY biogas from food and green waste with a
NEGATIVE carbon intensity

Source: Bioenergy Association of California, CARB May 2014 Look-Up Table 30