

The Energy- Agriculture Nexus

Options and Updates for States

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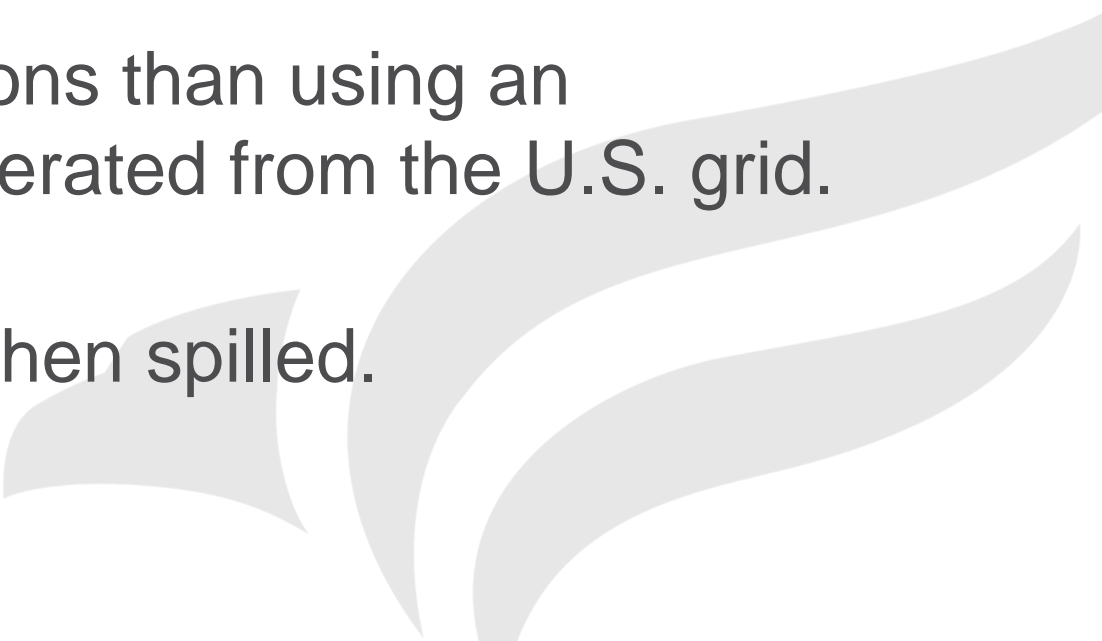








WHY PROPANE

- A **low-carbon alternative fuel** that can produce significantly fewer greenhouse gas emissions than diesel, gasoline, and electricity in a wide range of applications.
 - **43% fewer** greenhouse gas emissions than using an equivalent amount of electricity generated from the U.S. grid.
 - No contamination to groundwater when spilled.
- 



U.S. SUGAR

- Florida's radical wet and dry season makes reliable, consistent engine power for water management critical for Florida farmers.
- Propane irrigation engines:
 - reduce fuel costs by up to 50%
 - do not have complex after-treatment systems, saving valuable time and money
 - can be outfitted with the latest telemetric technologies for remote monitoring, dynamic operations



In 2014, PERC partnered with engine manufacturers, California equipment dealers, and growers to test the performance of propane-powered engines in the state. Eight units were placed in fields to irrigate a variety of crop types, including rice, wine grapes, feed for dairy cattle, fruits, nuts, and vegetables for one growing season.

8 PROPANE-POWERED
8 ENGINES

8 CALIFORNIA
8 PRODUCERS

\$86,470

— TOTAL ESTIMATED —
FUEL SAVINGS¹



H&H Farms | Arvin, CA | Vegetables

30.39% cost reduction

\$11.82 per hour with propane vs \$16.98 per hour with diesel

Mattoli Bros Farm | Robbins, CA | Rice

45.66% cost reduction

\$6.07 per hour with propane vs \$11.17 per hour with diesel

Shandon Hills Ranch | Paso Robles, CA | Wine Grapes

71.05% cost reduction

\$8.40 per hour with propane vs \$29.02 per hour with diesel

ALEX ADAMS

Using a propane-powered generator to power his farm and irrigation system resulted in benefits including:

- The reliability of propane power
- The cost savings compared to California peak power rates
- The flexibility to run his farm on his schedule





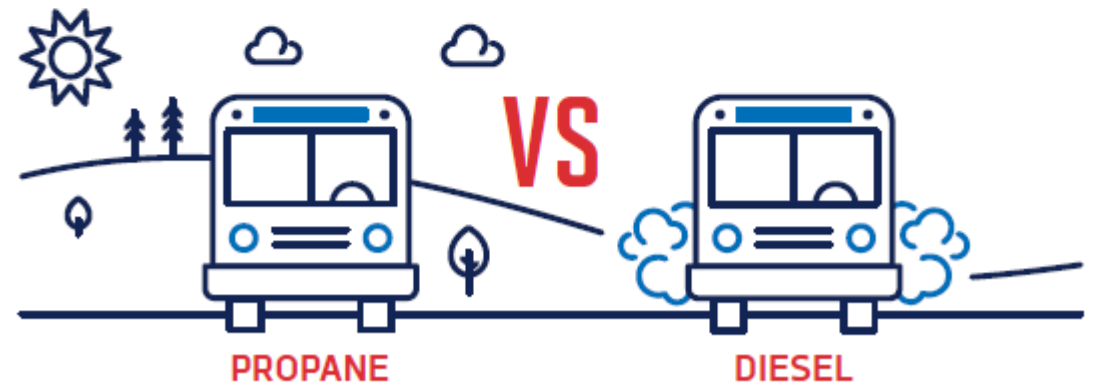
THE PROVEN ROUTE TO CLEANER OPERATION

A new study shows that, when compared with a diesel bus of similar make and model year, propane autogas busses can significantly reduce harmful emissions. When faced with real world operation, even diesel's modern emissions systems couldn't outperform propane autogas.

Source: 2018 West Virginia University Center for Alternative Fuels Engines and Emissions

96%

NO_x REDUCTION VERSUS CLEAN DIESEL BUS



Duty cycle: Low speed, stop-and-go route



PROPANE COMPARED TO DIESEL

- NOx reduction of 96-98% (23-51x cleaner)
- CO2 reduction of 7-17%
- Particulate matter virtually zero

A HEALTHY FUTURE FOR THE FARM AND THE FARMER



- Substitute propane for diesel today
 - Direct use/efficient appliance
- On-site power generation
 - Conventional, CHP
- Renewable propane

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