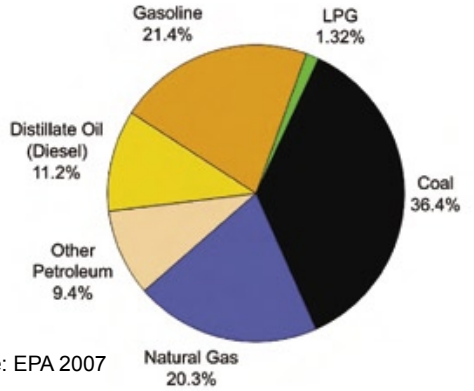
Study Confirms Propane's Lower Greenhouse Gas Emissions

Now is the time to decide what the propane industry position should be on promoting itself as part of the solution to cleaning up emissions and as the nation's supply source for clean, safe, and efficient residential, commercial, and engine fuel, according to Richard Roldan, National Propane Gas Association's (NPGA) president and CEO. Speaking at the association's fall board meeting in October, Roldan's comments noted the nation's growing awareness and acceptance of the possibility of climate change and the need to do something about it, according to opinion polls, and federal and state legislators' increasing calls for action.

Whether or not every NPGA member believes man-made climate change is responsible for temperatures rising globally, Roldan explained, the tenor of voters appears to be changing in favor of that explanation. As an industry, we know propane's many clean and energy-efficient advantages, he said, but we need to move swiftly to define the objectives we as an association want to achieve by lobbying elected officials pushing related legislation. Congressmen have asked NPGA staff if they are on board with further controlling emissions.

SHARES OF ENERGY-RELATED GREENHOUSE GAS EMISSIONS (2005)
(Total 5,571 Million Metric Tonnes CO2)



Source: EPA 2007

NPGA staff has been providing data and materials that support the industry's position, and is now providing the recently-released report, "Propane Reduces Greenhouse Gas Emissions: A Comparative Analysis." Funded by the Propane Education & Research Council (PERC), the report provides further confirmation that using propane in certain applications produces fewer greenhouse gas (GHG) emissions than many other fuels. GHGs are different from other pollutants—carbon monoxide, lead, sulfur dioxide, nitrogen dioxide, ozone, and particulate matter—that have been regulated by the federal government since 1970. GHGs are non-reactive and can remain in the atmosphere for decades or longer. Increasing levels of GHG in the atmosphere is what climate change defenders say is warming temperatures and leading to global climate change.

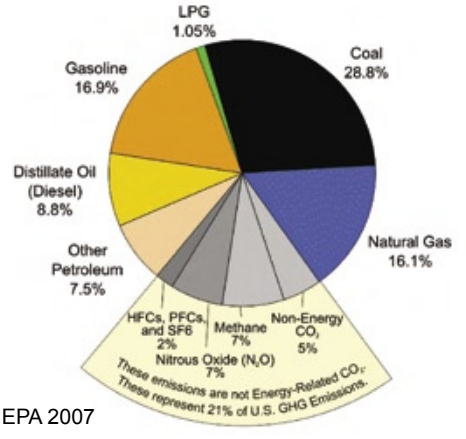
There have been proposals to regulate GHGs at the federal level, but no legislation has been passed. California passed GHG legislation and is fighting the federal government to enforce the new rules at the same time a number of industries have asked courts to delay or kill the state's GHG requirements.

The study took into account both upstream and on-site emissions. For on-site emissions alone, the report noted, propane has lower carbon content than gasoline, diesel, heavy fueloil, and ethanol. The study was conducted by Energetics Inc. (Washington, D.C.), which analyzed emissions from distributed generation, irrigation pumps, forklifts, medium-duty engines, light-duty trucks, residential water heaters, and residential space heating.

While the natural gas industry may argue that methane generates less carbon dioxide (CO2) emissions per Btu than propane, natural gas is chemically stable when released into the air and produces a global warming effect 25 times that of CO2 This means, the report explains, that one pound of methane produces the same effect on climate change as 25 pounds of CO2 Another advantage is that LPG is not a direct greenhouse gas when released in the atmosphere because it is unstable and has a relatively short lifetime. In addition, it has a lower carbon content compared to the other fuels in the report.

The GHG footprint of LPG is relatively small compared to other fuels in terms of total emissions and emissions per unit of energy consumed. Actual life-cycle emission levels depend on the nature and efficiency of the end-use application. Since LPG has a relatively low GHG emission rate, its share of GHG emissions is smaller than its share of energy supply. LPG's share of total U.S. fossil fuel combustion represents about 1 .05% of total emissions.

SHARES OF GREENHOUSE GAS EMISSIONS (2005)
(Total: 7,260 Million Metric Tonnes CO2)



Source: EPA 2007

End-use analysis for each of the applications further corroborates LPG's low-GHG profile. In residential water and space heating applications, the study showed that LPG

performs similarly to natural gas and better than the other fuels. For traditional tank-type water heaters, the use of propane generates 60% less carbon emissions than an electric unit (including electric generation), while residential space heating with LPG emits 12% less carbon emissions than an electric heat pump and 65% less than an electric baseboard heater. In the engine market, LPG's GHG emissions are even more promising when the new propane-fueled Roush Ford F-150 truck was used for the comparison with similar gasoline or ethanol models.

Summing up the report, PERC's president and CEO Roy Willis said, "consumers, businesses, and municipalities using propane can be assured that they are choosing a fuel that helps to reduce carbon emissions without compromising performance. At the same time, because 90% of it is produced domestically, choosing propane as a fuel option can reduce our dependence on foreign oil."

The report is available from PERC and can be downloaded from its website, www.propanecouncil.org.

2007—The Research Builds

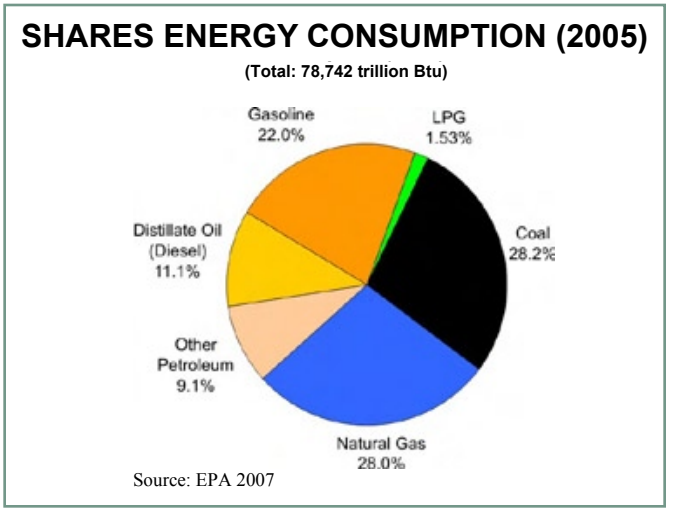
While the report is one more substantiation of propane's benefits, additional research from a variety of academic institutions and other organizations continues to add positive proof. Research has shown that propane can be produced not only from organic materials such as corn, other grains, and grasses, but also from the refining of recycled trash. Docket 12334, the investigation of bio-propane, was approved in 2007 and provides funding to Mississippi State for $19,000. Dr. Rafael Hernandez, an assistant professor in the chemical engineering department, is overseeing the research, which he says confirms that by cracking the lipids in animal and vegetable fats LPG and other fuels can be produced. The project is moving into the next phase to study how to economically produce the fuels and how much fuel can actually be produced. So far, he told ***BPN***, the research is encouraging. He will be reporting his findings to PERC in the near future.

Hernandez also noted that ConocoPhillips (Houston) is researching the production of diesel from animal fats and is evaluating what methods work best. Another firm, LS9 from California, is researching renewable petroleum technologies using industrial microbes that can efficiently produce renewable fuels by converting fatty acid intermediates via fermentation of renewable sugars.

Also announced in 2007 was the start-up of a Massachusetts company that said it could produce propane and other fuels by converting corn or sugar cane through its patent-pending process. C3 BioEnergy was formed by researchers from the Massachusetts Institute of Technology who said they have developed an efficient chemical process for making propane from organic material. Their process depends on supercritical water—which is at a very high temperature and pressure—to facilitate the reaction that turns a botanical compound into propane.

C3 BioEnergy representatives have been in contact with PERC and have been soliciting investors for funds to commercialize the process. The investor presentation notes propane's clean and efficient properties and an already-established distribution infrastructure globally. They are looking for a site to set up their production facility and to further optimize the process' yields. They believe they need about $25 million for the first phase.

Recycled trash is another source for fuels, and a number of petrochemical companies and research organizations have been trying for several years to figure out how to economically and efficiently turn trash into fuels. Methane is already being sourced from municipal dumps and processed for use in vehicle engines and electrical generation.



Last summer, researchers at Purdue University said they had developed a portable "tactical" biorefinery for the U.S. Army that turned a variety of waste streams (food waste and inorganic trash) into a mixture of fuels that could be burned in a modified diesel engine to produce electricity. The process involves three technologies—a bioreactor that uses enzymes and microorganisms to turn food wastes into ethanol; a gasification unit that turns plastics, paper, and other residue into methane and propane; and a modified diesel engine that burns the gases. ethanol, and diesel in variable proportions. Diesel fuel is required to get the machine up and running from a cold start. Two demonstration projects were being set up. The army demonstration unit has to be small enough to fit into a 20-ft shipping container.

Not all of this research has received funding from PERC, but the council has been keeping track of a number of projects and continues to investigate projects it can work in collaboration with other organizations to fund. According to Willis, it is working with the World LPG Association on at least one project. PERC's partnership with NPGA led to the GHG report. The two organizations are now partnering to get the word out on the results in the report and propane's advantages through each of PERC's mission areas. Shortly after releasing the GHG report, it was presented to staff at the Department of Energy Efficiency and Renewable Energy, an agency within the Department of Energy. The initial feedback on the report and efforts to position propane as a clean-burning fuel that also helps reduce GHGs, said Roldan and Willis, has been good so far.

While not everyone agrees with the climate change rhetoric from politicians, both men say it is important to get the message to politicians and policymakers that propane is a widely-available, clean-burning alternative fuel that provides solutions to policymakers interested in reducing greenhouse gas emissions. –Ann Rey