Propane Reduces Greenhouse Gas Emissions: A Comparative Analysis

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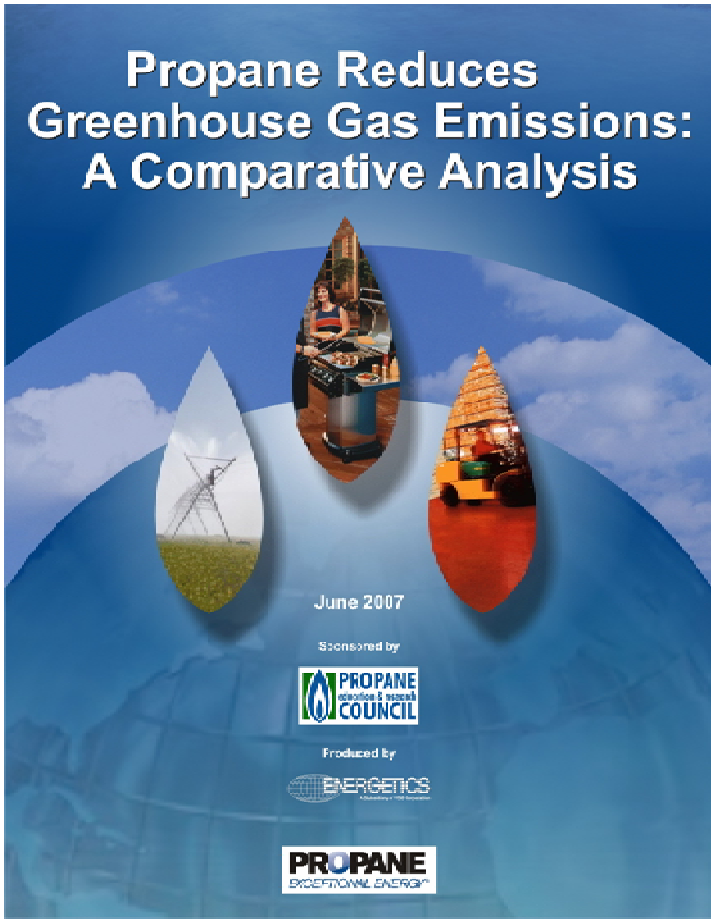
Agenda

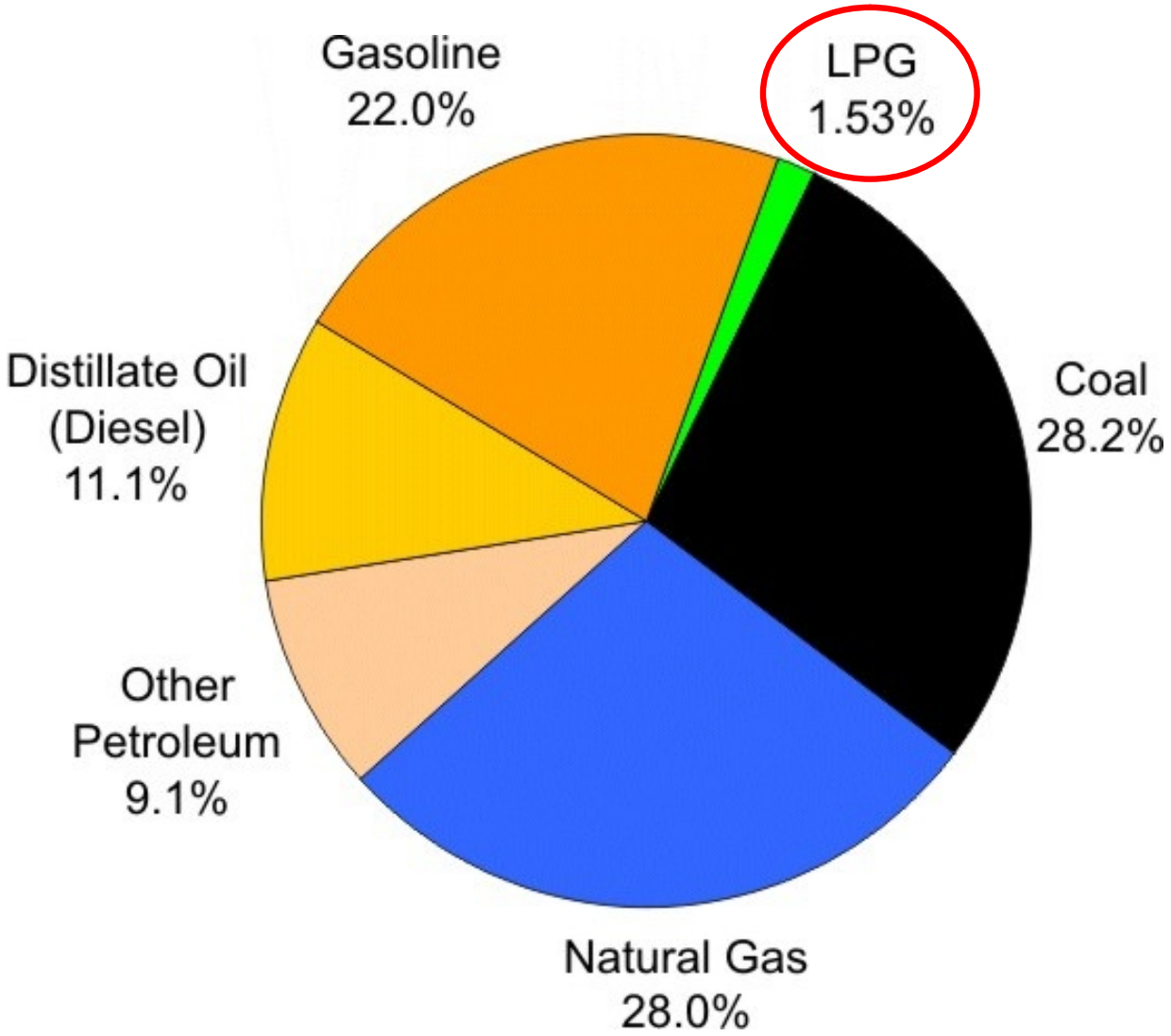
- About the Report
- Overview of Propane and Climate Change
- Summary of Findings
- Detailed Application-Specific Findings

Study Objectives

1) Provide high-level picture of propane's role in U.S. climate change debate
2) Quantify propane's GHG emissions profile in specific applications on lifecycle basis
3) Sponsored by the U.S. Propane Education & Research Council



The Big Picture: U.S. Energy Consumption (2007)



Total: 78,742 trillion Btu ($8.3\ 10^{19}$ J)

Source: US EPA 2007

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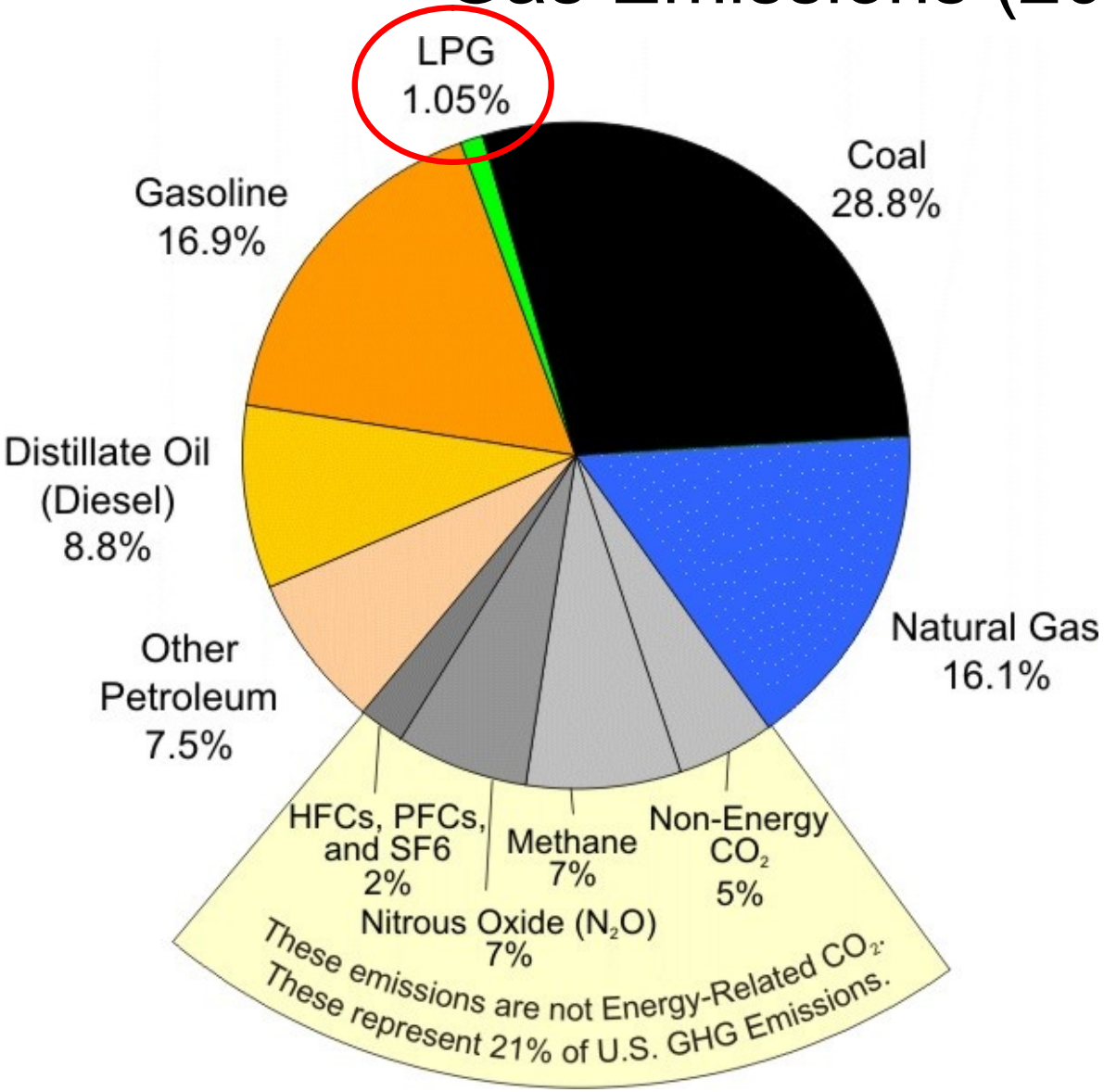
The Big Picture: Shares of U.S. Greenhouse Gas Emissions (2007)



Total: 7,260 million tonnes CO_2

Source: US EPA 2007

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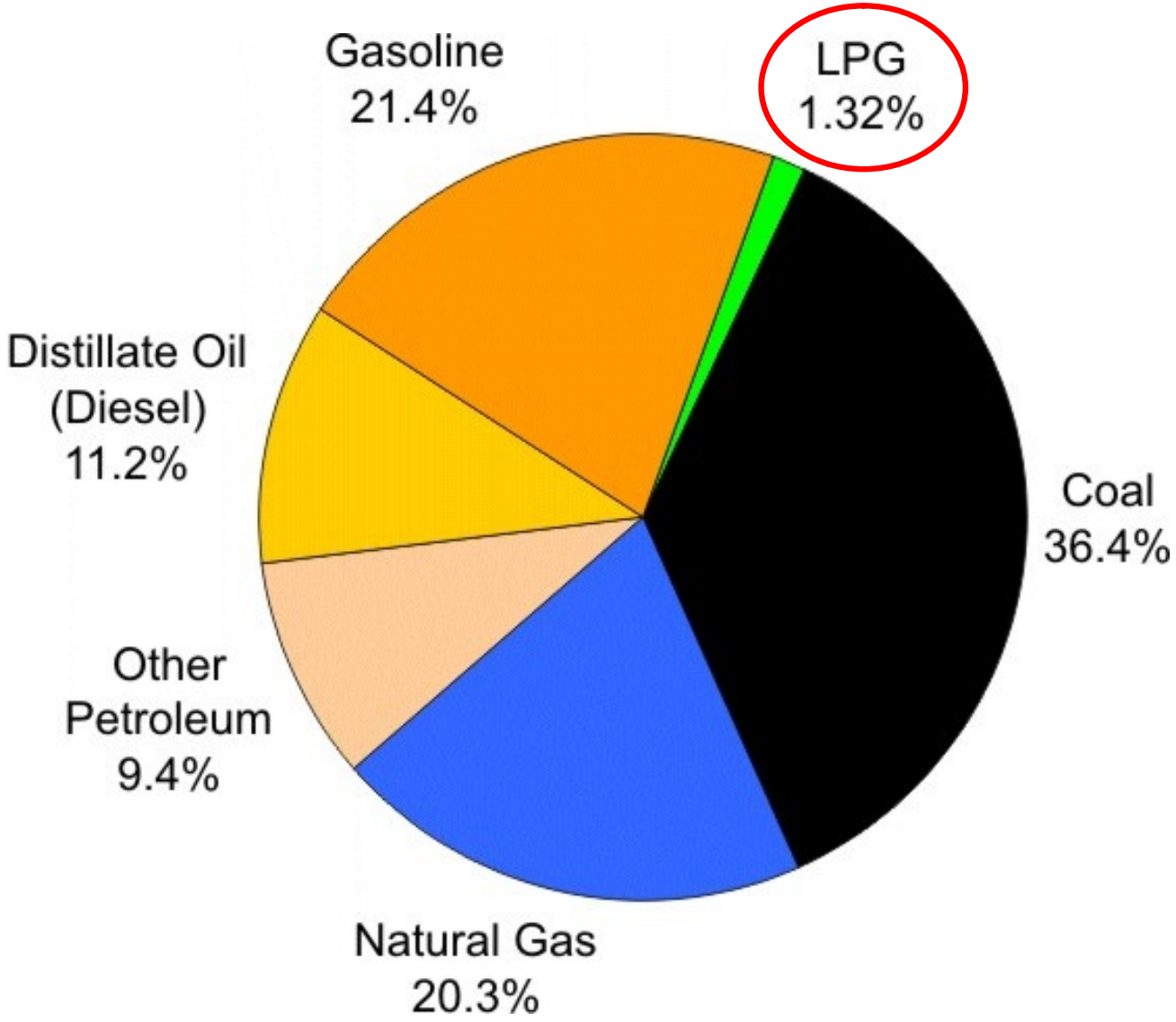
The Big Picture: Shares of U.S. Energy-Related Greenhouse Gas Emissions (2007)



Total: 5,751 million tonnes CO_2

Source: US EPA 2007

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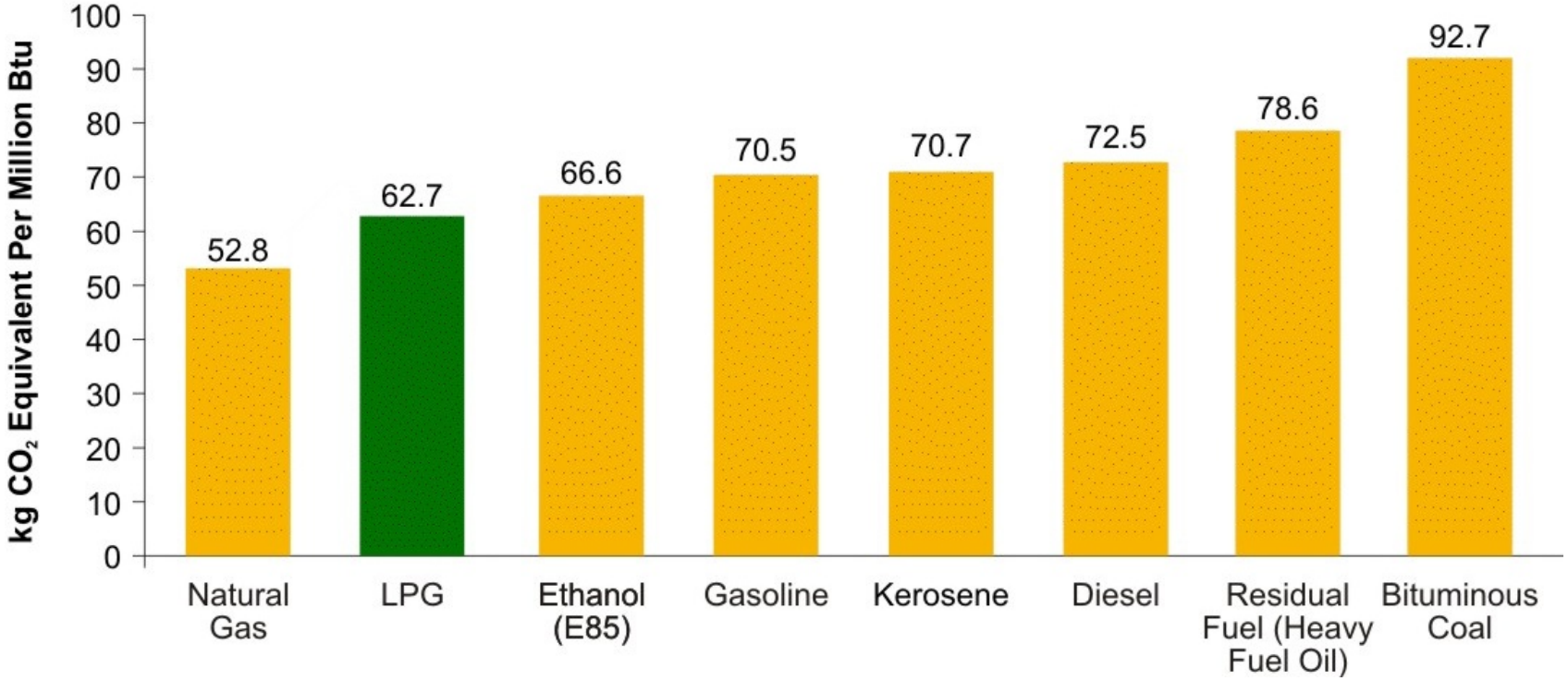
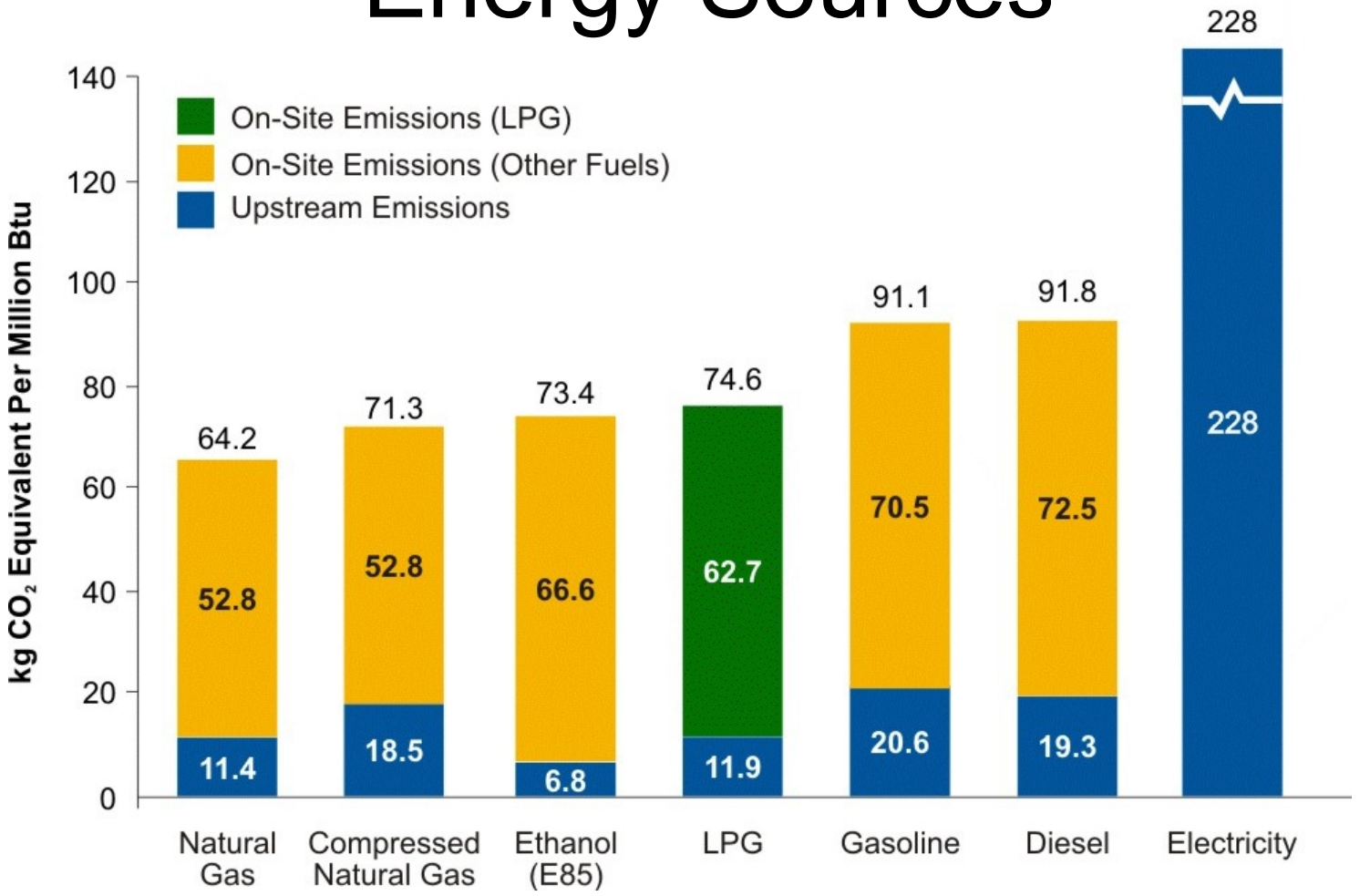
On-Site Carbon Emissions for Various Energy Sources



Total Carbon Emissions for Various Energy Sources



Report Quotes

- ‘‘Propane is not a direct greenhouse gas when released into the air. Propane…is removed from the atmosphere faster than it takes for it…to have impacts on global climate. Current measurements have not found a global climate impact from propane emissions.’’

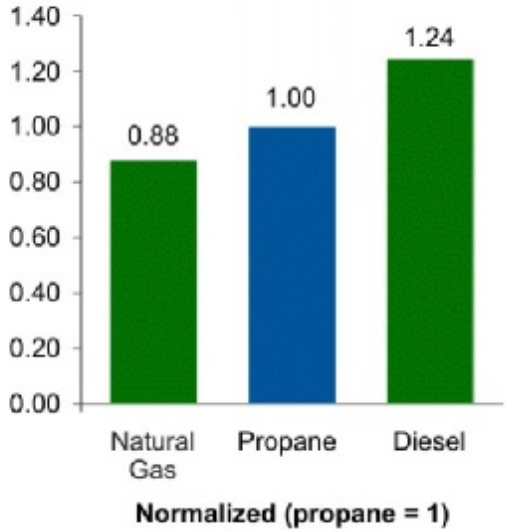
- “With propane’s short lifetime in the atmosphere and low carbon content, it is advantageous compared to other petroleum fuels in many applications.”

Application-Specific Results

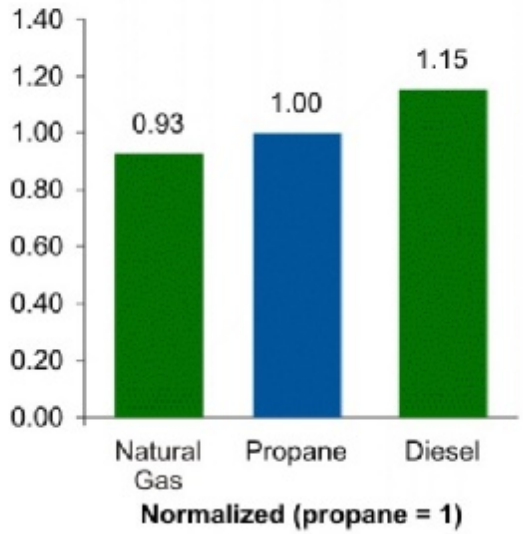
- Study quantifies GHG emissions profiles of propane and other fuels in seven applications:
  - Distributed Power Generation
  - Irrigation Pumps (agriculture)
  - Forklifts
  - Medium-duty Engines
  - Light-duty Trucks
  - Residential Water Heating
  - Residential Space heating

Distributed Power Generation

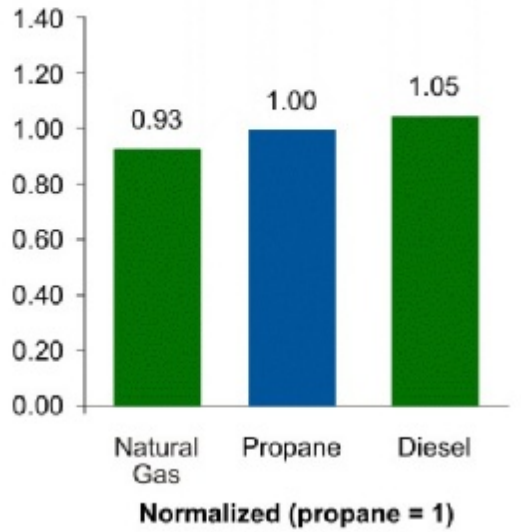
30 kW prime microturbine



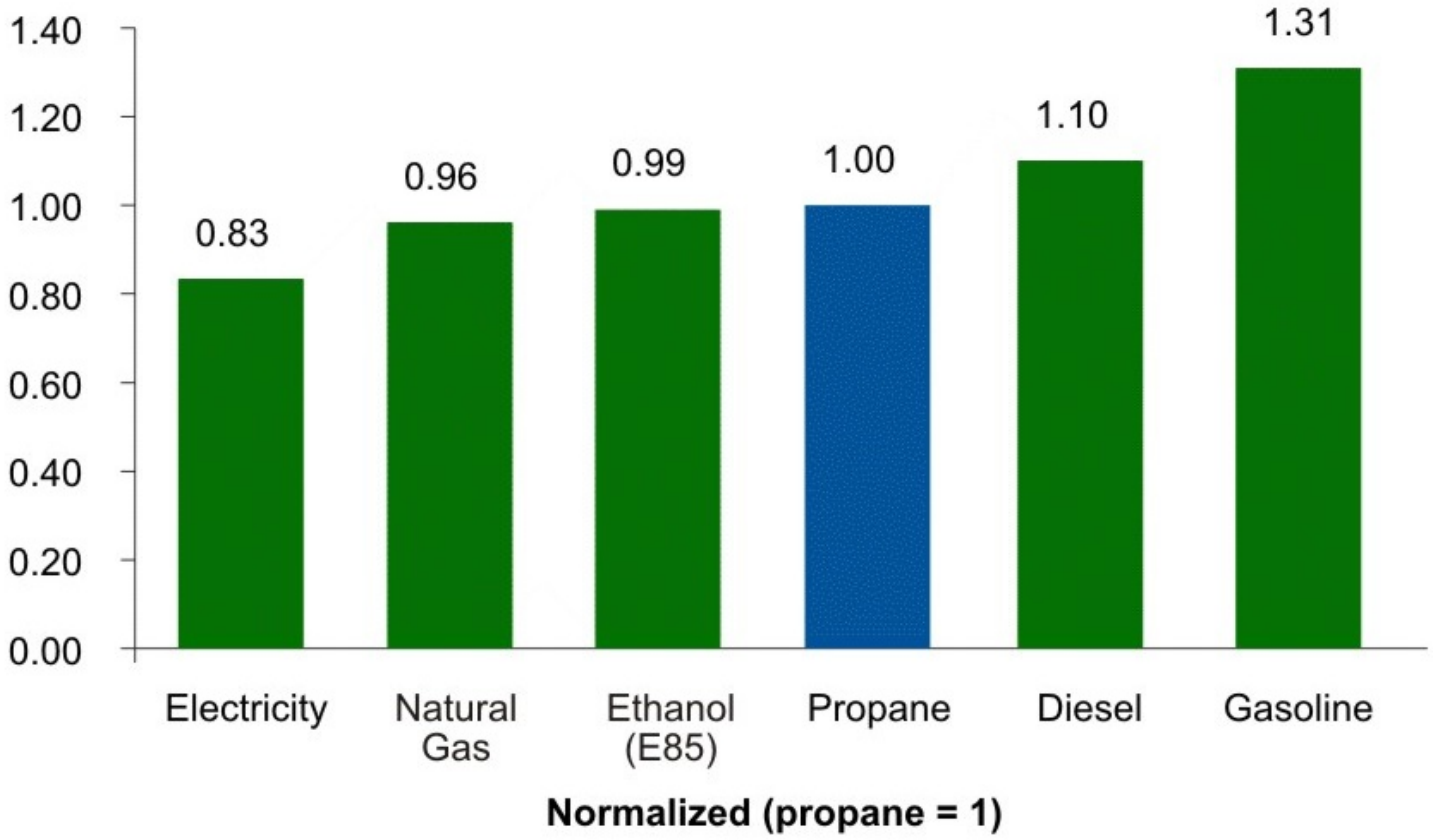
100 kW standby genset



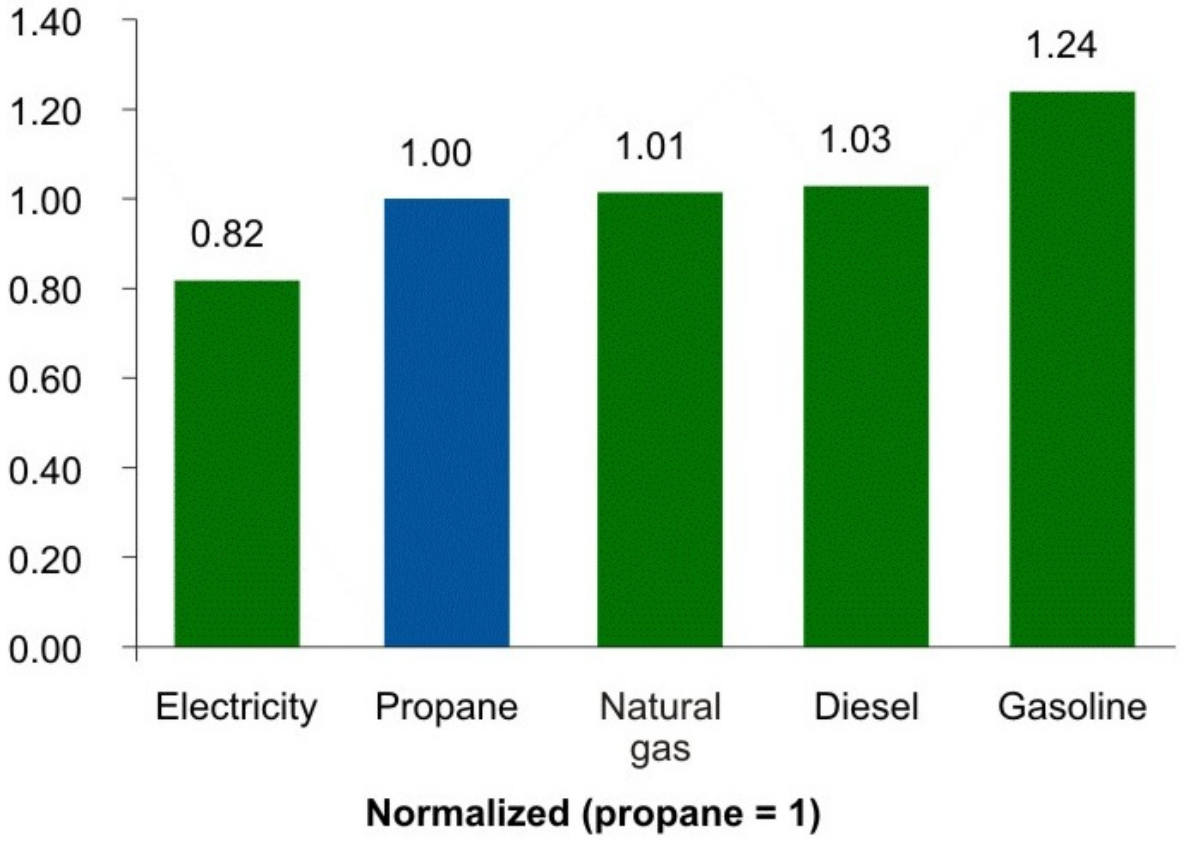
200 kW prime genset



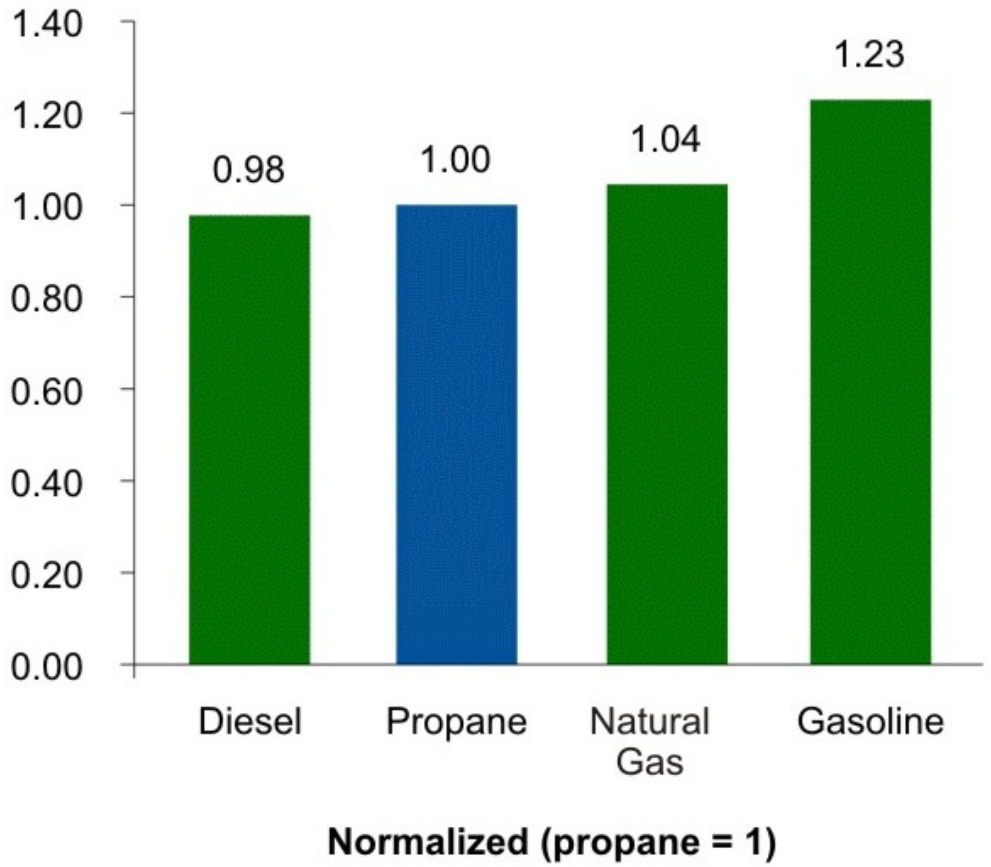
Agricultural Irrigation Pumps



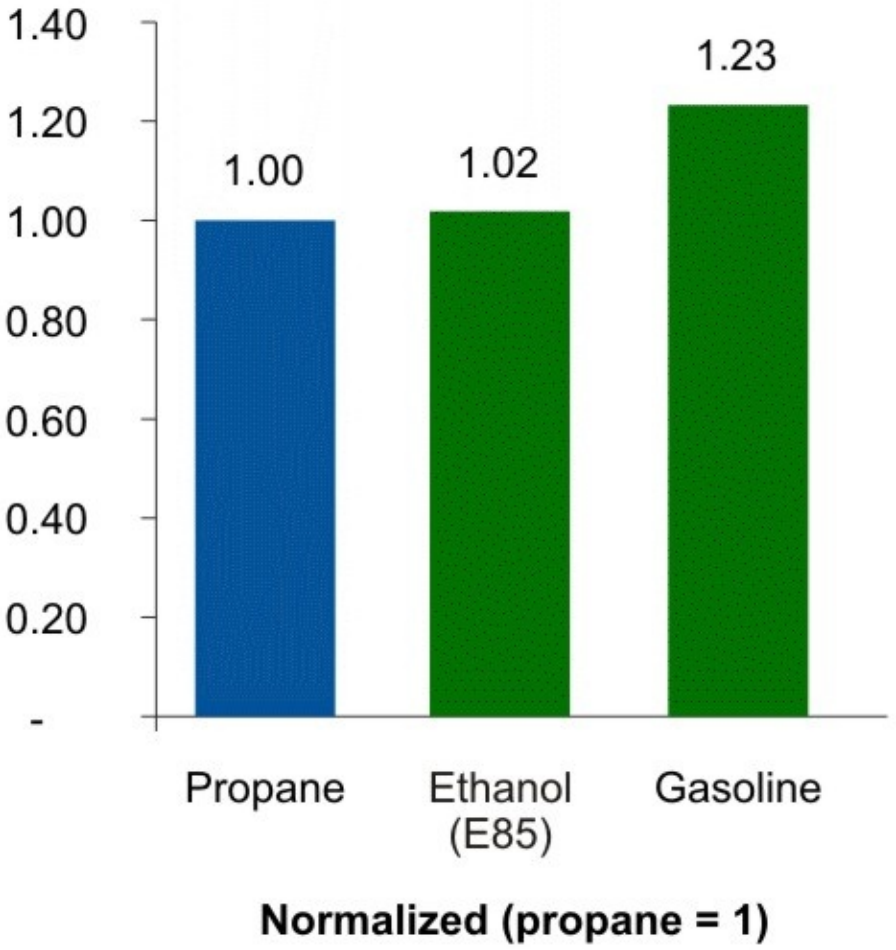
Forklifts


1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.82
1.00
1.01
1.03
1.24
Electricity
Propane
Natural gas
Diesel
Gasoline
Normalized (propane = 1)

Medium-Duty Engines

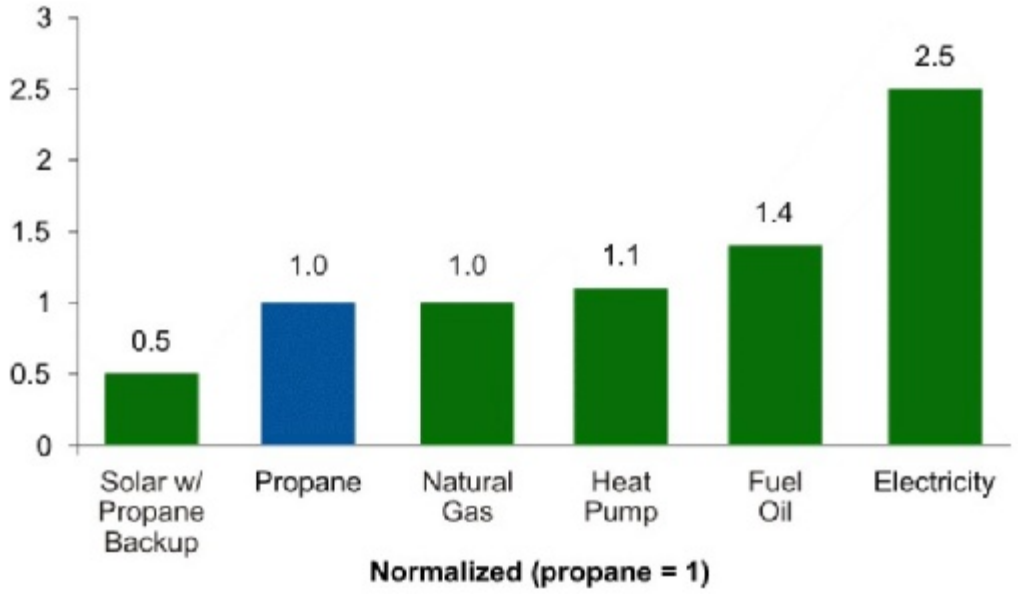


Light-Duty Trucks

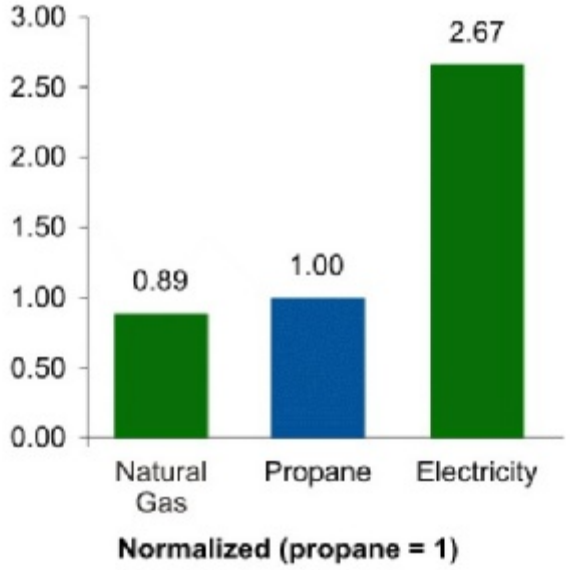


Residential Water Heaters

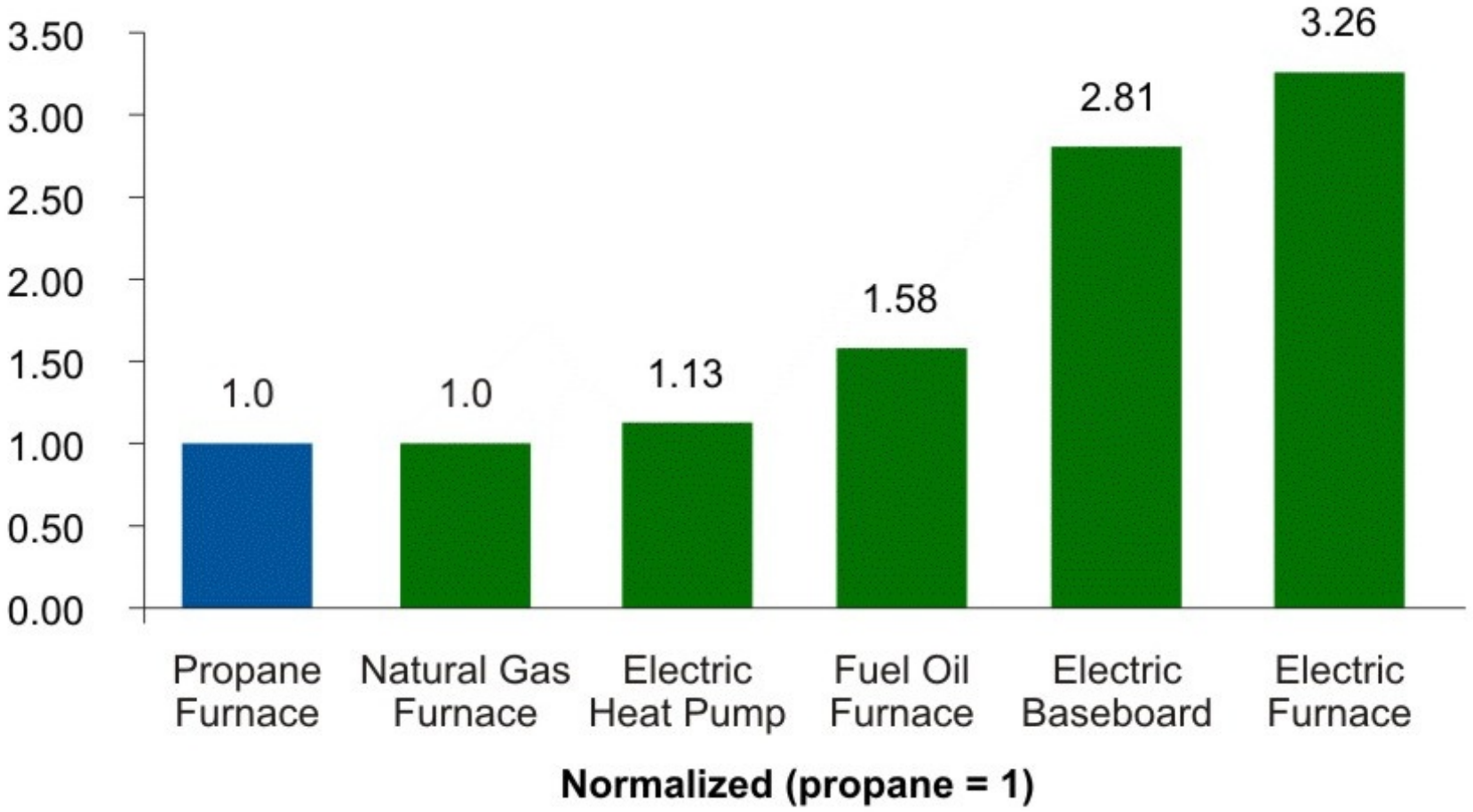
Storage Tank Heater



Tankless Water Heater



Residential Space Heating



Conclusions

- Study clearly demonstrates that propane has potential to significantly reduce GHG emissions in many applications
- Major opportunities:
  - Replacing electric water/space heating appliances
  - Displacing diesel for distributed generation
  - Competing with corn-based ethanol in light-duty trucks

감사합니다

Thank You

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