Natural Gas and the Road to Clean Energy

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Is Natural Gas an Outpost or a Detour on the Road to Clean Energy?

- Domestic supply chain
  - Reduce oil imports
  - Jobs
- Abundant resource base
  - Retail price $1.25-1.50 below diesel
  - Attractive payback for vehicle conversions
- Expanding infrastructure
  - Growing number of stations
  - Increasingly attractive station economics

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- But how green is it? What is the situation today?
  - NG well development
  - NG production
    - Methane leakage (liquid unloading, refracturing); how much? how often?
  - Distribution
    - Venting (supply chain, station, in-use)
    - Storage/dispensing at saturation?
  - End-use efficiency

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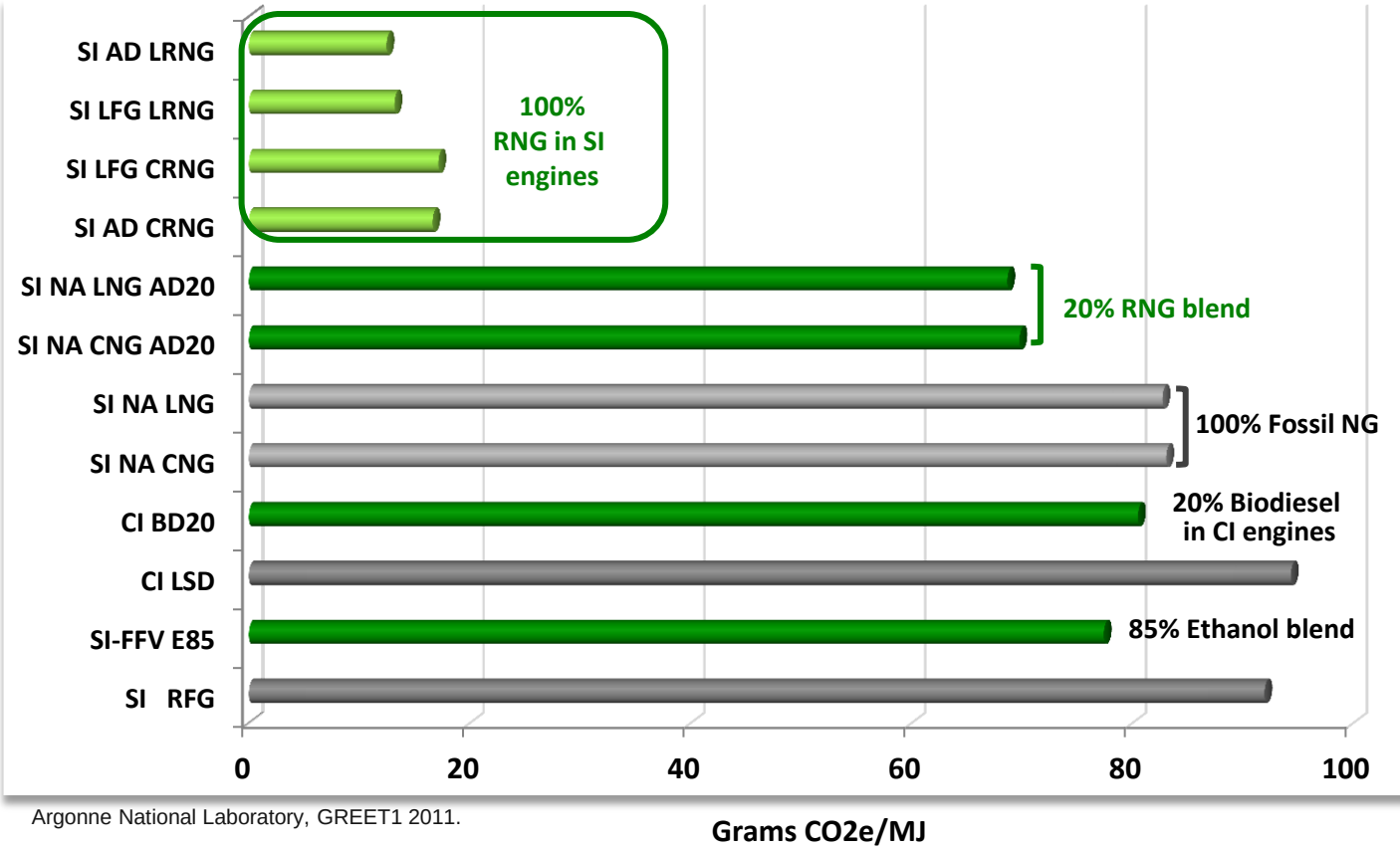
- And how green can it be?
  - Methane capture
  - Unsaturated LNG
  - Renewable natural gas

GREET shows significant reductions in well-to-wheel GHG emissions for RNG pathways*

- With emissions >80% below CI engines on low S diesel, RNG is the only NG significantly below petroleum
- 20% RNG blends reduce GHGs by ~30% from low S diesel, ~15% from BD20 (in g/MJ)
- As modeled, CRNG and LRNG have comparable GHG emissions since RNG powers liquefaction



Argonne National Laboratory, GREET1 2011.

*Compressed renewable natural gas and liquefied renewable natural gas (CRNG and LRNG) GHGs are net of emissions and emission credits of AD as compared with the relevant reference case.

Conclusions and observations

- Look at GHG emissions along entire pathway (WTW)
- Applications
  - Light duty vehicles?
  - Return to home fleets
  - Long haul trucks
  - Rail & marine
- Better data to quantify leakage and climate effect
  - GHG Reporting Program
  - EDF studies
- Tradeoff between cost & complexity of fuel infrastructure equipment and environmental benefits
  - Refueling infrastructure (LNG pumps)
  - On-board storage, especially for LDVs (tanks)

Thank you!

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