Chasing The Prize: Can LNG Challenge King Oil?

LNG for Transportation Seminar

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Why Are We Here?
Technological Advancements on Two Fronts Bring Us Here

- Natural gas has a significant foothold in every sector, with the exception of transportation. Until recently, natural gas could not compete.
- Technological advancements on two fronts bring us here:
  - Shale Gale → hydraulic fracturing and horizontal drilling lead to abundance of low cost supply
  - Engine Advancements → Natural gas now has similar efficiency as diesel

![Bar Chart showing energy sources](chart.png)

Source: IHS CERA.
The Prize is Large
Today, the ultimate potential use of natural gas in transport represents about half of total liquids demand (about $1.7 trillion)

2011 World liquids demand (oil plus biofuels)

- Gasoline
- Light-duty road diesel
- Heavy-duty road diesel
- Ship bunker
- GTL potential
- CNG potential
- LNG potential
- Rest of demand

Source: IHS CERA.

*The barrel numbers and scale in this slide are approximate, using an average of 40 million metric tons (mt) of LNG per year per million barrels per day of liquids (the specific calorific values are in fact 36 mt, 40 mt, and 46 mt per year per million barrels per day for gasoline, diesel, and fuel oil, respectively).
The Economics Are Favorable
Costs Vary as Much as Prices

- Switching to LNG can pay for itself
  - Even after accounting for additional costs (engine, liquefaction, retail, and tax)
  - Per gallon savings range from marginal up to $2.50
- Wide range of prices reflects low penetration and number of buyers.

Source: IHS CERA.
* Highest retail cost assumes a small-scale (15,000 gallon) facility operating at minimum throughput of 885 dge per day.
** Phone survey of LNG prices at public filling stations, April 2012
Timing is Very Important
Relative Economics Come in Two Flavors – Wet and Dry.

- Decisions to switch to depend on relative fuel prices.
  - Oil price declines have the same effect as gas price gains.
  - Pay-back periods and price outlooks will affect investments.
  - Costs and Prices are not the same thing.

Source: IHS CERA.
MMBtu Inequality is Not the Same Everywhere
Penetration Will Vary by Sector and Region.

• Common Theme – quick payback, BUT
  • Economics work differently in different places.
  • Fuel price differentials as varied as gas and diesel prices.
  • Infrastructure costs also vary significantly.

*lower of domestic and industrial gas prices. Does not include liquefaction, retail or taxes. Source: IHS CERA.
Perspective Matters
A Small Slice of a Very Large Pie

- Even after two decades of significant growth, natural gas to make up just 6% of total transportation demand; LNG even less.
Perspective Matters
A Growing Sliver of a Very Large Pie

- LNG’s plays a larger – but still small – role in the smaller marine bunkers and heavy goods sectors.

Consumption in Marine Bunkers and Heavy Goods

Source: IHS CERA.
Trillion Dollar Decisions
Relative Value Depends on Perspective

- In absolute terms, oil has more to lose than LNG has to gain
  - Displaced oil demand accounts for more than $1 trillion over the next two decades.
- But on relative terms, LNG has more to gain than oil has to lose
  - Incremental LNG sales add 20% to global LNG demand.

Source: IHS CERA.
Conclusions
Can LNG Challenge King Oil?

• Natural Gas should offer a formidable challenge in niche markets…
  • LNG in particular has a major role to play in certain sectors, namely high horsepower, high consumption sectors.
  • Globally, LNG is expected to represent about 10% of the Heavy Goods sector, but an even larger 25% of Marine Bunkers by 2035.

• …But ultimately, natural gas will be unable to unseat King Oil.
  • Too many variables will limit its complete penetration.
    • Vast majority of oil demand is in sectors with low fuel consumption.
    • Economic incentives vary regionally. Many remain artificially set.

• Perspective matters
  • Displaced diesel consumption will amount to about 2% of total oil demand, but
  • The transportation sector will account for more than 20% of all LNG demand

• Trillion dollar impact
  • More than $1 trillion in decreased oil revenue over the next 20 years
  • Additional $565 billion in gas sales over the same period
  • Infrastructure build-out will consume a significant portion of those savings.

Source: IHS CERA.
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