



Modeling Hydrogen Fueling Costs and Infrastructure Growth

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Model/Analysis Shortcomings

- **Multiple scenarios are possible, their relative probabilities impossible to ascertain**
- **Driving forces are uncertain**
 - **Strong government incentives/requirements**
 - **Oil crisis or just rapidly rising prices**
 - **Technological breakthroughs**
 - **Combinations of all three**
- **Robust analysis versus “driven by assumptions”?**
Note that the following are more often assumptions than accurate results of analysis:
 - **Technology performance and cost**
 - **Natural gas availability (Are gas hydrates extractable? Robust LNG world market and U.S. import facilities?)**
 - **Consumer behavior/vehicle and fuel choice**



What can we hope to learn from H2 modeling (*despite* the shortcomings)?

- Identify technology advances with special leverage
- Identify crucial data needs
- Identify minimum requirements for a successful hydrogen transition, and what's missing now
- How will alternative scenarios affect costs?
- Identify potential technology/resource roadblocks, R&D needs to address them
- Explore interactions: with stationary H2 applications; with other uses for H2 feedstocks; etc.
- Identify winners and losers

But don't forget.....

- **Need to think about which analysis results are robust, which are basically driven by the assumptions**
- **Even if *some* inputs can be derived by sophisticated analysis, it may not make sense to do so if others are assumptions or derived from crude estimation**
- **At this stage of the “state of art,” cost and transition models are “works in progress”**