Approaches for Selecting Locations for the Hydrogen Infrastructure Network

Presentation by

Edward C. Heydorn

Business Development Manager

CA Energy Commission Workshop

Sacramento, CA

June 22, 2012

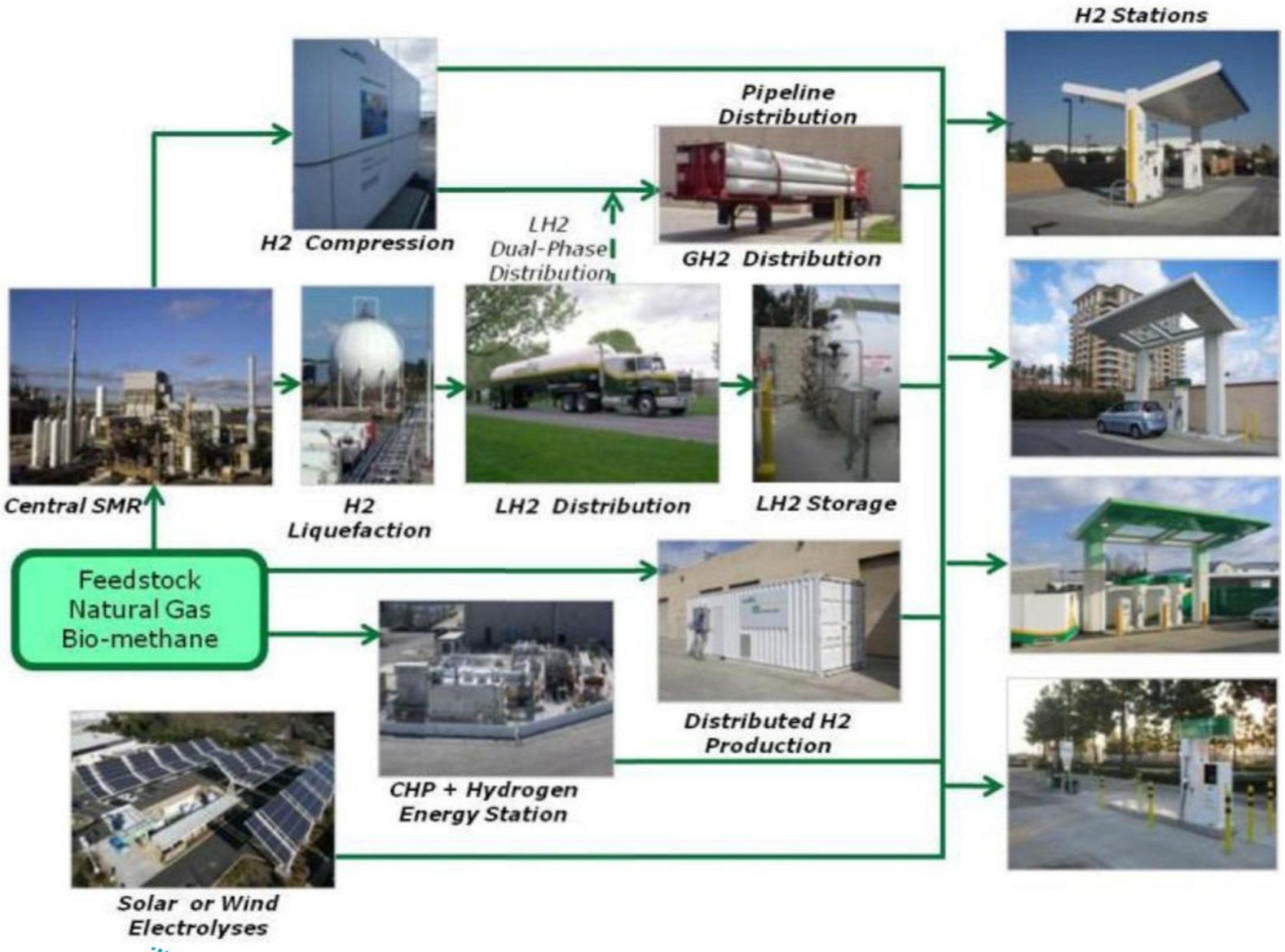
AIR PRODUCTS

Agenda

1. Supply Chain Options for Hydrogen Fueling Stations

2. Optimal Siting for Hydrogen Fueling Stations

Supply Chain Options for Hydrogen Fueling Stations



AIR PRODUCTS

Definition of Terms Related to Siting of Hydrogen Fueling Stations

- Infrastructure is supported in specific regions which consist of one or more clusters and is served by a common mode of:
  - supply,
  - distribution, and
  - maintenance services
- A single region (for example, southern California) with a number of clusters (concentrated early market communities) can provide sufficient information to allow for rollout of infrastructure to follow-on areas
- Connector stations enable travel outside clusters and regions, can be the starting point for a future cluster and require time to achieve a self-sustaining business case
- Destination stations are located outside of a region and will have little to no fuel sales volume for a significant period of time

Key Criteria for Selection of Hydrogen Fueling Stations

- Rely on experience from past (1) programs and (2) analysis as basis for technology selection
- Sources of Information:
  - US Dept. of Energy (DOE) Technology Validation Program
  - Recommendations of the Expert Panel of Hydrogen and Fuel Cell Technology Advisory Committee (HTAC)
  - National Academy of Sciences study
  - National Petroleum Council - Future Transportation Fuels study
- The above resources indicate the need to take advantage of existing infrastructure (production, distribution) to reduce cost barrier and be competitive to gasoline
- Commercially viable and mass deployable today!

AIR PRODUCTS

Critical Elements for Initial Station Rollout

- Need best information on sales potential of fuel cell electric vehicles to select location for fueling stations
  - Automakers have best information on early adopter markets via market research and sales history. Their participation is vital.
  - Commercial station success is completely dependent on OEM ability to sell vehicles in large numbers and where.
- Need to consider cost of infrastructure investment in making decisions on number of clusters and communities within clusters
  - "Build-it and they will come" is not a viable business proposition
  - A major statewide initial build out is not a prudent investment
  - Prove the fueling business case within a single region for sustainable success
  - Operating support is needed for stations with throughput below the point where self-sustaining economics take over
    - Site stations where earliest markets are expected
    - Investments in secondary markets and destination locations should be deferred without guaranteed loading or long-term financial support

AIR PRODUCTS

Optimization of Hydrogen Fueling Network

- Models from UC Irvine and UC Davis provide assessment on driving habits which help identify early fueling needs within key early clusters
  - Important to complete coverage within a single region first before considering addition of either second region or capacity/redundancy within any cluster
- Consider model results in selecting between stations within community (consideration of proximity to freeway or to residential areas)
- Expandable stations can provide early market coverage, follow demand growth with time, and limit initial investment

Thank you…
tell me more