DOE and FreedomCAR & Fuel Partnership Analysis Workshop

U.S. Department of Energy - Washington, DC
January 25, 2006

ACTION ITEMS AND DISCUSSION COMMENTS

Agenda

1. Agenda and Purpose – Mark Paster, DOE-HFCIT

2. On-Board Storage Systems Analysis – Rajesh Ahluwalia, ANL

3. On-Board Storage Cost and Efficiency Analysis – Steve Lasher, TIAX

4. Off-Board Storage and Tube Trailers – Salvador Aceves and Gene Berry, LLNL

5. Forecourt Storage and Compression Options – Mark Richards, GTI

6. H2A Delivery Models and Results: H2A Delivery Team – Marianne Mintz, ANL

7. Delivery Analysis Project, Options, and Trade-Offs – T. P. Chen, Nexant

8. Hydrogen Delivery Demonstrations – Ed Kiczek, Air Products & Chemicals, Inc.

9. Pathway Cost Distributions: Fuel Pathway Integration Tech Team – James Uihlein, BP

10. Discussion

Discussion Summary

Comments on Delivery Infrastructure, Modeling, and Analysis

- Siting issues that need to be considered as part of the delivery infrastructure include: 1) the cost and ability to get air permits to site production units (either central or distributed) in or within reasonable distances from population centers; 2) the cost and availability of ROW for pipelines.
- Below 8-10 inches in diameter, the costs for pipelines do not get much lower (since most of the cost is in labor and ROW – not pipeline materials). Therefore, it might be affordable to oversize pipelines to some extent before they are being fully utilized.
- Include thinking about today's current merchant hydrogen production and its possible use during the transition.
- Consider including cryogenic compressed tube trailers as part of delivery analysis.

Follow-up: These thoughts will be factored into the on-going delivery analysis efforts.

Production and Delivery Analysis and Tools

- There is a need for more coordination and collaboration across delivery and storage (and production) analysis efforts.
    - In conducting well-to-tank or well-to-wheels analyses, modelers need to agree on what is the best set of tools to develop and use.
    - Nomenclature and definitions for key terms need to be consistent (e.g., "efficiency").
    - There needs to be a common understanding of what is included in "production," "delivery," "storage," etc.
    - We need to ensure that software, math, and assumptions are consistent.
    - What should we use as the standard electric grid mix for Current and Future cases? This should be consistent among analyses.

  Follow-Up: DOE will put together a small Delivery and Storage Analysis task group, comprised of people representing the Hydrogen Program and the analysis efforts. The task group will address these issues to ensure a consistent set of tools is developed in a clear and coordinated manner. This group will work together on an on-going basis as appropriate.

- Need to investigate the trade-offs between different storage vessel material costs (i.e., carbon fiber vs. steel) and storage pressure. Also need to better understand the timing of when carbon fiber may be available at reasonable cost.

  Follow-Up: The FreedomCAR Delivery and Storage Tech Teams, along with the DOE Delivery and Storage program elements, will follow- up on this comment.

- There is a lot of uncertainty around how much off-board storage will be needed throughout the production and delivery infrastructure. Off-board storage needs will depend on forecourt station fueling profiles, weekday-to-weekend and summer-to-winter market demand swings, as well as other factors. These demand cycles will interact with the infrastructure capacity factors. All of this will have a significant impact on infrastructure and hydrogen cost.

  Follow-Up: The FreedomCAR Delivery Tech Team and the DOE Delivery program element will follow-up on this issue. A base case forecourt refueling profile will be determined and recommended. More insight into the other aspects of this issue will be gained. This information will be provided to the Delivery and Storage analysis task group for incorporation into the analysis modeling tools, as appropriate.

Comments on the FPITT Pathway Target Cost Contribution "Model"

- Do the H2A models already answer questions about the feasibility of the production and delivery cost targets? How does the FPITT model add more value to what H2A already does?
- The FPITT's pathways discussed were all central production pathways. The model needs to examine other pathways as well (e.g., distributed natural gas reforming, semi-central biomass, distributed ethanol reforming, etc.).
- The method used in the FPITT model of normalizing costs and reducing all costs by the same proportion needs to be re-examined. This method does not give accurate portrayals of cost reduction potentials in production or delivery (and may not be useful for storage cost analysis, either).
- It may be more valuable for FPITT to focus on the interactions and tradeoffs across the entire well-to-wheels path on a cost-per-mile-driven basis rather than focusing on just production and delivery (e.g., production, delivery, storage, and fuel cell).

  Follow-Up: The FPITT will consider these thoughts as it works with the other FreedomCAR Tech Teams on pathway target cost contributions.

Other Comments

- How can we better represent stranded assets in the analyses?
- Incorporate future feedstock potential price variability in production analyses. Also incorporate regional variability in feedstock and energy costs.
- When considering carriers, it would be useful to go beyond capacity analysis and conduct a thorough analysis of the environmental, health, and safety impacts. MTBE has taught us a lesson here.
- Consider and incorporate the impacts of hydrogen purity on the different pathways.

  Follow-Up: DOE will ensure these thoughts are taken into consideration in the overall hydrogen analysis and research efforts.

Final List of Participants

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