Building the Hydrogen Economy:

Enabling Infrastructure Development Workshop

In collaboration with

The United States Energy Association

April 2-4, 2007

Objective :

The overall objective of the Hydrogen Economy Initiative is to convene public and private sector officials in an international strategic process to evaluate transition planning scenarios for the expansion of infrastructure for the hydrogen economy and to inform policymakers on opportunities to accelerate these transition plans through policy instruments. Common methodologies and tools will be used to link existing analyses and additional analyses will be undertaken for key economies (e.g., China, Brazil, and India). Specific sub-objectives include:

1. Convene public and private sector officials in an international strategic dialogue to refine and evaluate infrastructure transition planning scenarios for building out the hydrogen economy
2. Using the IEA Energy Technology Perspectives (ETP) model and other proven tools, quantitatively analyze hydrogen economy scenarios and market transformation planning for key countries and the world out to 2050
3. Inform policy makers of opportunities to effectively advance these transition scenarios and strategies plans policy instruments

Tasks:

1) Convene up to three dialogue and scenario development workshops of key hydrogen economy infrastructure actors from the public and private sectors (e.g., hydrogen highway teams, fueling station teams, China Olympics team, merchant H2 industry, the transport sector, distributed energy sector, other early investors, the finance community, the energy construction community, others). Key H2 infrastructure actors/leaders will offer an update on their specific projects and a candid analysis of past lessons learned and their future plans. We will engage these actors in strategic planning break-out groups and consider key infrastructure development questions. Current and future barriers and opportunities would be explored at the workshops. Scenarios, assumptions and data for the analytical phase of this project will be developed and refined. The outputs from the lessons learned, scenario development and strategic planning sessions will be compiled, reviewed and edited. It is anticipated workshops will be convened in Europe, North America and Asia since strategic planning and scenario development has a regional flavor. A major IEA-IPHE publication, in the form of a book will be produced that synthesizes and summarizes the dialogue and scenario building outputs. The book will be completed in early 2008. Complementary reports, based on the process of strategic planning for individual countries or regions, could be produced if warranted. This task will be coordinated with the IPHE Demonstration and Infrastructure Task Force, allied

IEA and IPHE activities, and complementary activities in Europe, Japan, the US and other national efforts.

2) Employ global energy technology optimization analysis and transition planning models, such as the IEA Energy Technology Perspectives (ETP) Model, to analyze various infrastructure investment and hydrogen economy development scenarios. The ETP model is a MARKAL type model, refined over the past 25 years, produces long-term (e.g., 2050) analysis, is a least-cost decision making model, has full coverage of the energy system (supply and demand side), has a 1000+ technology database, and has footprints in 15 model regions around the world. Other countries will have the opportunity to contribute their transition planning activities and their analytical tools. We propose to collect data at the three strategy workshops to better calibrate ETP and offer best advice on H2 economy infrastructure investments. This analysis will emphasize the global outlook. Special attention will be focused on transition modeling. Scenarios and strategies for individual countries could be produced by the participants, based on the data and model analysis. This approach will enable proper accounting of the specific country characteristics and needs. Analysis recently completed in Europe, Japan and the US will not be repeated. Rather, common tools and methodologies will be used to integrate and link these national or regional activities. Considerable effort will be devoted to building scenarios and analysis in Brazil, China, India and key countries where there is a dearth of information.

Examples of questions to be addressed:

- How fast can R&D and deployment programmes reduce the cost of a hydrogen infrastructure and hydrogen fuel cell vehicles?
- How much government funding would be needed in a transition phase, and how can this funding be minimized and used as efficiently as possible?
- What would be the optimal balance between R&D and deployment programmes? To what point must R&D be conducted before deployment?
- How should uncertainty in future hydrogen quality needs in terms of purity and pressure be dealt with in infrastructure development?
- What are the true costs of a hydrogen transmission and distribution system; can existing gas pipelines be used for hydrogen?
- Early decentralized production is either based on gas reforming or electrolysis at the city-gate. In fact, electrolysis uses a hydrogen fuel cell in reverse mode. Could development of such electrolysis cells help to reduce FCV costs, and should they therefore be preferred over gas based supply systems?
- What are the prospects for higher temperature PEM fuel cells, and how would they affect the choice and timing of a hydrogen infrastructure?
- How would FCV niche markets and hydrogen ICEs affect the need for a hydrogen infrastructure, and what would it mean for the infrastructure timing?