

STIMULATING THE HYDROGEN INFRASTRUCTURE

HTAC SUB-COMMITTEE
PROGRESS REPORT

February 17, 2011
Kathleen C. Taylor

Objective

- Assemble information on worldwide hydrogen infrastructure development
- Identify opportunities for the DOE

Scope and Teams (5)

- Infrastructure activities targeted to automotive programs. Lead Joan Odgen with John Hofmeister, Charles Freese, Bob Walker, Michael Mills.
- Current non-automotive hydrogen/fuel-cell infrastructure initiatives. Lead Bob Rose with Harol Koyama, Mark Cardillo, Alan Lloyd.
- International infrastructure developments. Lead Richard Carlin with Geri Richmond, Michael Mills.

Cont.

- Safety codes and standards, regulations, & permitting. Lead Maurice Kaya with Tom Timbario.
- Hydrogen infrastructure for industrial hydrogen. Lead Kathy Taylor with Tom Timbario.

Time line for report

- January 15 Data collected by teams due to Tom Timbario group – Team leads
- February 11 Needs for stimulating the hydrogen in infrastructure identified by teams sent to K. Taylor & T. Timbario – Team leads
- March 15 Feedback from all teams assembled – T. Timbario
- April 15 Draft recommendations due – All

Current non-automotive hydrogen fuel cell initiatives - Bob Rose

- Hydrogen infrastructure for stationary power in S. Africa, Central & Latin America, and SE Asia is for traditional specialty & industrial applications – little for FC mkt. development
- Europe trend to integration of renewable H₂-FC and energy storage systems
- Europe identifies existing hydrogen infrastructure and excess (stranded) industrial hydrogen.
- Enel inaugurated a hydrogen-fueled combined cycle power plant (1.3 metric tons of H₂ per hour.

Current non-automotive hydrogen fuel cell initiatives cont.

- Sahara Wind Project to convert Sahara wind power to H₂ for industrial use
- Commercial Activities include (country detail)
 - Power generation & electric grid support
 - Combined heat and power
 - Back-up & remote power generation
 - Material handling equipment
 - Energy storage

Associations include

- Argentina: [Asociación Argentina del Hidrógeno](#)
- Australia: [Australia Association for Hydrogen Energy](#)
- Brazil: **Development Commerce Transport (DCT) Energia** (Interim Member*)
- Canada: [The Canadian Hydrogen and Fuel Cell Association](#)
- China: **China Association for Hydrogen Energy**
Taiwan Association for Hydrogen Energy
- EU: [European Hydrogen Association](#)
- France: [Association Française de l'Hydrogène](#)
- Germany: [Deutscher Wasserstoff- und Brennstoffzellen-Verband \(DWV\)](#)
- Italy: [Italian Hydrogen and Fuel Cell Association](#)
[Italian Hydrogen Forum](#)
- Japan: [Hydrogen Energy Systems Society of Japan](#)
- Malaysia: **Universiti Teknologi Malaysia** (Interim Member*)
- Mexico: [Sociedad Mexicana del Hidrógeno](#)
- New Zealand: **Massey University Centre for Energy Research** (Interim Member*)
- Poland: [Polish Hydrogen and Fuel Cell Association](#)
- **Sahara Wind**
- Spain: [Asociación Española del Hidrógeno](#)
- United Kingdom: [U.K. Hydrogen and Fuel Cells Association](#)
- United States: [Fuel Cell and Hydrogen Energy Association](#)

International infrastructure developments – Richard Carlin

- IPHE website reports informative summary of demonstration and deployment by country
- European Commission (EC) Strategic Energy Technology Plan identifies FC & H₂ among the technologies to achieve 2020 targets (cut GHG, increase renewable energy, increase energy efficiency)
- EC Hydrogen & Fuel Cell initiative for 2007-2013 RTD of 900m Euro including 50% industrial match
- Hydrogen fueling stations number approx. 200 world wide (58 in US)
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Industrial Hydrogen – K. Taylor

- 2006 industrial hydrogen production in the US was 10,083,000 metric tons, approx. $\frac{1}{4}$ world production
- Hydrogen production facilities include those facilities with primary purpose to produce hydrogen (e.g. reforming, partial oxidation, electrolysis) and hydrogen produced as a by-product in petroleum refining.
- Petroleum refining and petrochemical industries account for more than 90% of the hydrogen used.

Industrial hydrogen cont.

- Pipelines currently appear to be the most economical means of moving hydrogen in large quantities over great distances.
- Hydrogen production is currently concentrated in refinery centers along the Gulf Coast and in the Farm Belt.
- The existing hydrogen transmission system is estimated at 450-800 miles (depending on criteria used) and is mostly along the Gulf Coast to connect producers with well established customers.