2011 ANNUAL REPORT FOR TASK 28 COMING SOON.

CONTACT MARY-ROSE DE VALLADARES AT MVALLADARES@IEAHIA.ORG FOR MORE INFORMATION

PURPOSE

The overall goal of Task 28 is to improve understanding of the infrastructure needed to deliver projected hydrogen demands by sharing latest information, experiences, and lessons learned. Specific objectives are:

- to develop a common state-of-the-art knowledge base on concepts and components for (large-scale) delivery of hydrogen;
- to use modeling and analysis tools to evaluate hydrogen delivery pathways and hydrogen delivery infrastructure rollout scenarios; and
- to identify knowledge gaps with regard to components and concepts for (large-scale) hydrogen delivery and hydrogen delivery infrastructure rollout.

FRAMEWORK SUMMARY

Different options for a hydrogen infrastructure are being considered, tested and developed. Development of a large-scale hydrogen delivery infrastructure will involve considerable investments, and will need focused policy support. To enable the efficient use of limited resources it is important to identify the most promising strategies and options for such an infrastructure. Therefore, it is important that views and insights from study activities and real-life experience are broadly and thoroughly discussed in an international context, so that the available knowledge-base on hydrogen infrastructure components and roll-out strategies can be improved and further extended. This Task was approved by the Executive Committee of the IEA Hydrogen Implementing Agreement in May 2010. The Task currently has 7 participating countries.

- Subtask A Scenarios – H_2 demand projections and rollout scenarios.
- Subtask B Assessment HRS concepts – Review of concepts on functional requirements
- Subtask C Analysis H_2 delivery routes – data, tools and case studies

There is interest in an additional subtask focusing on infrastructure related to hydrogen for storage of energy from intermittent resources.

MEMBERS

COUNTRY	EXPERT NAME	INSTITUTION/COMPANY
Australia	Attilio Pigneri	GreenCollar Climate Solutions
Denmark	Henrik Iskov	Danish Gas Technology Centre (DGC)
France	Phillippe Mulard	TOTAL
France	Remi Batisse	Gaz de France (GDF) Suez
France	Sidonie Ruban / Françoise Barbier	Air Liquide
Germany	Oliver Ehret	NOW
Japan	Hideto Kurokawa	Tokyo Gas
Japan	Sam Miyashita	ENAA
Japan	Takuya Hasegawa	Nissan
Netherlands	Marcel Weeda	Energy Research Centre of the Netherlands (ECN)
USA	Amgad Elgowainy	Argonne National Laboratory
USA	Robert Friedland	Proton Energy Systems

TASK 28

LARGE-SCALE HYDROGEN DELIVERY INFRASTRUCTURE

Dr. Marcel Weeda

Energy Research Centre of the Netherlands

P.O. Box 1, 1755 ZG

Petten, The Netherlands

tel: +31 224 56 44 95

e-mail: weeda@ecn.nl

Operating Agent for The Netherlands

VITAL STATISTICS

Term

May 2010 - May 2013

Members

Australia
Denmark
France
Germany
Japan
Netherlands
USA

Expert Participants

12

Meetings

Preliminary Kick-off Meeting May 2010

December 2, 2010 (with Task 30 subtask C)

Paris, France

ACTIVITIES AND RESULTS IN 2010

PROGRESS AND ACCOMPLISHMENTS

The Task was approved in May 2010. The first Experts Meeting was held in Sacramento, CA in the US. The experts met for three days at the premises of the California Fuel Cell Partnership (CaFCP). Main part of the meeting was devoted to further definition of the Task work plan and country updates on hydrogen projects and programs.

In addition to a visit of the CaFCP facilities the experts visited the development and production facilities of Altergy Sytems. This is a frontrunner company in the field of hydrogen fueled PEMFC based back-up systems and on-site power supply systems. Further, the experts visited AC Transit in Oakland. After the first successful hydrogen bus project, the company is currently implementing a follow-up project with 12 new buses and 2 new filling stations.

Experts of Task 28 at the California Fuel Cell Partnership (Sacramento) and AC Transit (Oakland)

Subtask A – Scenarios

The subtask on 'Scenarios' looks into hydrogen scenarios for transport applications and defines a framework for discussion and analysis within the Task. Selected scenarios will be translated into hydrogen demand and the level of infrastructure needed for transport and distribution of hydrogen (e.g. number and capacity of refueling stations needed in different years). In this analysis, the subtask aims to include the consumer perspective in evaluation of rollout strategies for refueling infrastructure: are there enough customers in limited areas to be able to focus rollout, or is widespread deployment required to build a large enough customer base?

Subtask B – Assessment of HRS concepts

This subtask considers different hydrogen refueling station concepts and evaluates these concepts based on general requirements for large-scale hydrogen refueling stations. Costs are an obvious issue for evaluation (CAPEX and OPEX). Examples of other factors are footprint, scalability (full size station right from the start or modular, i.e., smaller size with the possibility of expansion), possibility to include 'clean and green' hydrogen, and flexibility towards on-board car storage systems.

Subtask C – Analysis of hydrogen delivery pathways

This subtask considers tools for modeling large-scale hydrogen delivery pathways and

evaluates key characteristics of the tools and type of analysis that can be performed. Data on hydrogen infrastructure components, modeling approaches, and key assumptions will be discussed and reviewed, preferably using case studies. Activities will be based on existing work and work in progress of participating task members or other sources available to task members. The subtask aims to deliver an up-to-date database of hydrogen delivery components and concepts for techno-economic assessment activities.

Other interests

Task activities mainly focus on delivery infrastructure for vehicle applications. Due to increasing interest in the use of hydrogen for storage of energy from intermittent renewable resources, there is discussion about enlarging the scope of the Task to include underground storage, transport, and the addition (mixing in) of hydrogen to the existing gas grid.

OUTREACH AND COMMUNICATION

The Task has been presented at a meeting of the IEA HIA Executive Committee with the organization of the Black Sea Economic Cooperation prior to the 63rd ExCo meeting in Istanbul in November 2010. Furthermore, abstracts have been submitted for presentation of the Task at the HFC2011 Conference in Vancouver in May 2011 and at the ASME Conference in Washington, in August 2011.

FUTURE WORK

ACTIVITIES/TARGETS FOR 2011

Activities and targets for 2011 are summarized in the following table:

Subtask	Year1	Subtask lead	Activities
Scenarios: Definition large-scale, views and order of magnitudes	Industry views, scenarios, rollout studies/strategies: Framework for discussion and activities	Australia (GCS)	- Collect Industry views on FCEV deployment to determine frame-work for task activities
Assessment of hydrogen refuelling station (HRS) concepts - Central production based - On-site production based	Identify general requirements / key parameters that need to be met by technologies for application in large-scale infrastructure	Netherlands (ECN)	- Review of existing HRS concepts - Definition of HRS functional/-performance requirements
Analysis of hydrogen delivery pathways - CGH2 by truck - LH2 by truck - CGH2 by pipeline	Determine analysis to be shared and discussed and start evaluation	USA (ANL)	- Develop cost/-performance data bases - IEA data review - Inventory

ACTIVITIES/TARGETS BEYOND 2011

Activities and targets for the full Task are summarized in the following overview:

Subtask	Year1	Year2	Year3
	Map & Describe	Analyse & Compare	Conclude & Report
Scenarios: definition large-scale, views and order of magnitudes	Industry views, scenarios, rollout studies/strategies: Framework for discussion and activities	Quantify need for T&D infrastructure - Amount of stations - Size of stations	Finalise year 1 & 2 activities and draw up final Task report: synthesis subtask results
Assessment of hydrogen refuelling station concepts - Central production based - On-site production based	Identify general requirements / key parameters that need to be met by technologies for application in large-scale infrastructure	Assess concepts against parameters/ requirements e.g.: - Flexibilities - Footprint - Refuelling time	Continue year 2 activities, identify gaps & opportunities and subtask report
Analysis of hydrogen delivery routes - CGH2 by truck - LH2 by truck - CGH2 by pipeline	Determine analysis to be shared and discussed and start evaluation	Evaluate methods, tools, assumptions and compare type of results and insights	Continue year 2 activities, define lessons learned and sub task report