

IEA Hydrogen Implementing Agreement
Annex 18 – Integrated Systems Evaluation
Subtask A - Information Base Development

Final Subtask A Report

Have participated in the preparation of this Final Report the following National representatives¹:

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- Bengt Ridell, Sweden
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¹ in alphabetical family name order of lead subtask participant.

Executive Summary

Annex 18 of the Hydrogen Implementing Agreement of the International Energy Agency deals with Integrated Hydrogen Systems Evaluation and has an overall goal to provide information about hydrogen integration into society around the world. Subtask A of Annex 18 is to provide data and analysis to the hydrogen community regarding the developing use of hydrogen in the form of inventory databases and / or compiled summaries. This report addresses the activities related to subtask A which started on January 1, 2004 and ended December 31, 2006.

Subtask A activities are described hereafter in terms of their objectives and progress.

1. Structure and database scope definition

A consensus was reached with regards to the Structure of the Information Base which includes but is not limited to: hydrogen production technologies, hydrogen transport technologies, hydrogen distribution technologies, hydrogen storage technologies and hydrogen utilization technologies.

The following information bases were deemed as priorities: National Documents, National Organizations, National Projects and technology databases.

2. Information and data collection

At the end of December 2006, the National Documents' information base included two hundred and sixteen (216) documents including one hundred and thirty three (133) searchable English documents from thirteen (13) countries. Some two hundred and fifty two (252) National Organizations from five (5) countries were described. Over thirty two (32) project descriptions from three (3) countries were developed.

A significant contribution was received from HySociety and an internal subtask A assessment lead to the implementation of a major technology information base.

3. Identification of dissemination means

Subtask A is to become a significant library of validated current "Hydrogen" information that could be used by all other IEA groups and that a public website could be developed for such a purpose. Subtask A participants developed an Information Dissemination Plan to meet its objectives.

4. Information and data dissemination

Current information dissemination to non-subtask participants includes a publicly accessible website, presentations made by any subtask A participants. In addition internal dissemination includes an access limited website providing real-time communications between all participants and bi-annual meetings.

5. Meetings

Six (6) Subtask A meetings have been held. Coordination meetings have also been held between Subtask Coordinators and the Operating Agent.

A special meeting was held with members of the Executive Committee of HySociety.

HYDROGEN IMPLEMENTING AGREEMENT

6. Reports

Biannual Subtask A activity reports have been prepared and submitted to the Operating Agent. A first Mid-term report for Subtask A dated August 2005 and a final report describing the status of activities at the end of December 2006 were prepared.

7. Website(s)

Not including the Public website reported above, a general Annex 18 website has been developed to access documents, share information, discuss documents and actively exchange views and collaborate between meetings on a real-time basis. This tool has proven to be a significant means of communications for all Annex 18 Participants. Eight (8) websites have been set up to facilitate “Data and Information” collection, storage and retrieval. These contain 444 Megs of information, had received 3,533 visits and 12,222 pages had been examined. Over 1,602 Megabytes of information have been exchanges between participants.

8. Conclusions and recommendations

Given that the participants in Annex 18 are all involved in hydrogen projects and the high number of visits to the websites it must be concluded that the documents compiled are relevant for active information exchange within the hydrogen issues. It is hoped that this selection of quality documents will serve the interested public as well as professionals working for the progress of the hydrogen economy.

It would benefit the database to have continued support for the next few years, especially if new members join the task. Also given the vast variety of ongoing projects including hydrogen systems it would be of major benefit to the data bank to continue the compilation of documents at least until 2010.

Introduction

Annex 18 deals with Integrated Hydrogen Systems Evaluation and has an overall goal to provide information about hydrogen integration into society around the world. Annex 18 has two (2) specific subtasks with distinct objectives which are:

- Subtask A is to provide data and analysis to the hydrogen community regarding the developing use of hydrogen in the form of inventory databases and / or compiled summaries, and
- Subtask B is to use modeling and analysis tools to evaluate hydrogen demonstration projects, or to guide their design and assessment, and to validate models and assumptions.

This report addresses the activities related to subtask A which started on January 1, 2004 and ended December 31, 2006.

Scope of Subtask A

Subtask A is to:

- support the growing need for information about issues related to the technology, policy, and regulation barriers to implementation of hydrogen energy systems,
- include data gathering, compilation or surveys of programmatic and technical analyses, and
- provide support for coordination efforts of the Executive Committee.

Subtask A activities

A plan including specific tasks was developed to meet Subtask A objectives and scope. Subtask A activities are described hereafter in terms of their objectives and progress. The specific tasks are as follows:

1. Structure and database scope definition
 2. Information and data collection
 3. Identification of dissemination means
 4. Information and data dissemination
 5. Meetings
 6. Reports
 7. Website(s)
 8. Conclusions and recommendations
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1. Structure and database scope definition

The objective of this activity is to provide a structure allowing the organization of data and information in order to facilitate further data retrieval and analysis.

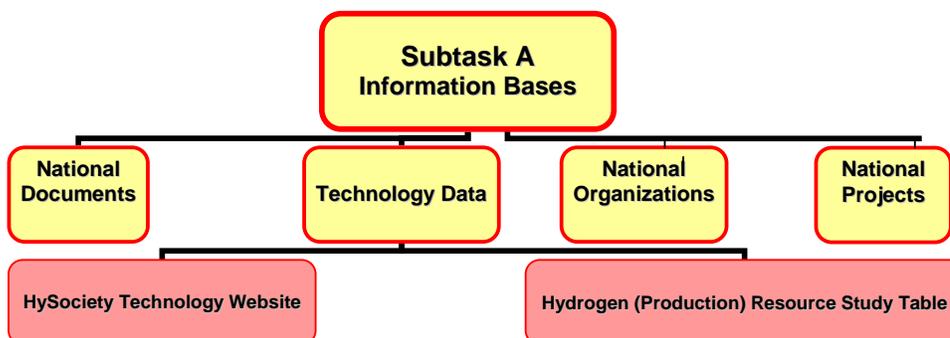
A proposed draft “Database Structure” was developed and presented during the first meeting. Discussions facilitated exchanges of views on the proposed structure and a consensus was developed on the structuring the “Information and Data”. Participants also agreed to an implementation plan to reach the final definition of the Information Structure. This Plan included such listings as that of National Studies and/or Documents.

A consensus was reached with regards to the Structure of the Information Base which includes but is not limited to:

- Hydrogen production technologies
- Hydrogen transport technologies
- Hydrogen distribution technologies
- Hydrogen storage technologies
- Hydrogen utilization technologies

Some National Studies have been identified and each Participant was invited to develop searchable summaries (in English) of such documents based on a proposed template and to post them on the appropriate website for consultation by other Participants. This resulted in additional discussions, participants agreed to develop additional information bases such as:

- hydrogen component manufacturers and developers (organizations database),
- projects,
- websites,
- service providers, and
- modelling tools.



Templates specific to each set of data have been developed and included on each of the information bases so as to expand the overall shared knowledge.

At the end of September 2005, *National Documents* including their Summaries and *National Organizations* have specific websites to post this information.

A Survey posted on the Subtask A website has been selected as a means to determine priorities and receive additional suggestions given that not all Participants had the same needs. In September 2005, Subtask A members have chosen to develop a National Projects database and participating Experts finalized relevant input formats for the following databases:

- National Projects, and
- National Organizations

In addition to the above databases, Subtask A activities included the Coordination of support for the **Special Study on Hydrogen Resources** lead by Ms Cathy Gregoire Padró in support of coordination efforts of the Hydrogen Executive Committee of the IEA. Subtask A Experts were requested to assist in the completion of a table that summarizes process information for hydrogen production technologies including specifically to:

- Ranges of values
- Projections of future technologies

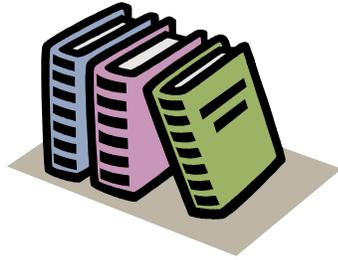
Participants discussed the means to best assist in the development of appropriate information and agreed to take on specific roles (leaders and collaborators) associated with each resource in order to complete this task.

2. Data collection

The objective of this activity is to collect “Information and Data” as defined in Activity 1 above. Each information base is discussed separately hereafter:

i. National Documents and Summaries

Participants agreed to collect information relative to “publicly available documents” developed by both Participating Countries and European organizations. Subtask A Participants used the website to upload their national documents and English summaries were developed to facilitate document searches and retrievals on the website.



This activity received contributions from: Canada, Denmark, Europe, France, Iceland, Italy, Japan, Norway, Spain, Sweden, the United Kingdom and the United States.

At the end of December 2006, this information base included two hundred and sixteen (216) documents including one hundred and thirty three (133) searchable English documents.

ii. National Organizations

A second information base was developed to allow input of National Organizations that included a means to input links to other websites having such information already available.



At a later date, Subtask A Participants would determine if all data pertaining to National Organizations should be listed on a single website.

The listings of National Organizations has also begun and at the end of December 2006, two hundred and fifty two (252) National Organizations were documented. Contributions from Canada, Denmark, Iceland, Spain and the United Kingdom have been inputted.

iii. National Projects



A third information base on National Projects has been developed. To avoid duplication of efforts, this information base includes an External Links section allowing linkages to other databases that are already providing such information.

Here also Subtask A Participants will determine if all National Projects data be concentrated in this information base.

At the end of December 2006, contributions had been received from Canada, Denmark and Iceland.

A special section includes projects that have a world wide scope which currently describes information from one project. A total of thirty two (32) National Projects are described.

A meeting, facilitated by Subtask A Participants from Iceland, Spain and The Netherlands, with representatives of **HySociety** to determine possible collaboration means and cooperation mechanisms led to the sharing of technology information developed as part of HySociety's activity provided acknowledgement of their contribution was indicated. The database developed by HySociety contains significant information including:



- a. Database of European Hydrogen and Fuel Cell Projects
- b. Technology Database for Hydrogen Pathways including:
 - i. Feedstock Preparation
 - ii. Electricity Production
 - iii. Electricity Distribution via HVDC (by FhG-ISI)
 - iv. Hydrogen Production
 - v. Carbon capture and sequestration (by ECN)
 - vi. Hydrogen Compression (by VGB)
 - vii. Hydrogen Liquefaction (by SINTEF)
 - viii. Hydrogen Distribution
 - ix. Hydrogen Storage
 - x. Refuelling of transport vehicles with hydrogen
 - xi. Hydrogen Conversion
 - xii. Analysis of Hydrogen Pathways



With regards to the **Special Study on Hydrogen Resources**, contributions were received from the following Subtask A Participants: Canada, Denmark, France, Italy, Spain, Sweden, the Netherlands and the United States. Comments were also received from the European representative. A 16-page table has been posted on

Subtask A website for consultation by all Task 18 Participants. Following the meeting of the Hydrogen Executive Committee of the HIA in Lyon it has been proposed that this study be incorporated in the next Phase of Annex 18.

3. Identification of dissemination means

The objective of this activity is to propose adequate dissemination means.



As part of the structure and document base scope definition, it was suggested that Subtask A becomes a significant library of validated current “Hydrogen” information that could be used by all other IEA groups and that a public website could be developed for such a purpose. Even if it was clear that most information could eventually be made public it has been suggested that the summaries should have limited circulation to Subtask A participants for a period to be determined so as to provide incentives for collaboration and document

sharing.

Suggestions for additional means to disseminate results of Subtask A activities were discussed and recommendations have been made with regards to all Information Bases developed in Subtask A.



An information dissemination plan was proposed, discussed by Subtask A participants and was approved.

4. Information and data dissemination



The objective of this activity is to implement data or information dissemination.

Current information dissemination includes:

Public website:

- a public website set up in 2004 to facilitate communications while providing a general access to other stakeholders. At the end of December

2006, this **public website** had received 523 visitors since it launch. 1,767

pages had been accessed and 210 megabytes had been offloaded from the website that can be found at:

<http://www.port-h2.com/IEA-Annex-18/>

This public website will be used more intensively to disseminate information relative to Annex 18 activities.

Presentations:

- presentations made by any Subtask A Participants to different publics are posted on the public website.

Access limited website:

- a website currently reserved to Annex 18 Participants to exchange and validate information.

Participants agreed that the “Document Information Base” developed be made public via the Annex-18 website at the end of Phase I (December 31, 2006).

Other information bases still in development would be disseminated to Participants in Annex 18 but would be made publicly available in Phase II.



5. Meetings



Six (6) Subtask A meetings have been held since the beginning of the Task. Coordination meetings have also been held between Subtask Coordinators and the Operating Agent.

A special meeting was held with members of the Executive Committee of HySociety to discuss possible collaboration with this significant European group (reported above).

6. Reports



Biannual Subtask A activity reports have been prepared and submitted to the Operating Agent. A first Mid-term report for Subtask A was prepared in August 2005. The current report is the Final Deliverable for Subtask A and describes the status of activities as at the end of December 2006.

7. Website(s)

Eight (8) websites have been set up to facilitate “Data and Information” collection, storage and retrieval.

Not including the **Public website** reported above, a **general Annex 18 website** has been developed to access documents, share information, discuss documents and actively exchange views and collaborate between meetings on a real-time basis. This Annex 18 password accessible website (including all other Subtask A websites presented hereafter) contains 444 Megs of information, had received 3,533 visits and 12,222 pages had been examined. Over 1,602 Megabytes of information have been exchanges between participants. This tool has proven to be a significant means of communications for all Annex 18 Participants.

A website was developed in October 2004 for the exclusive use of **Subtask A Participants**. At the end of December 2006, this website has off-loaded to 312

Megs of data, had received 1,645 visits and 5,894 pages had been seen.



Subtask A Participants used the **National Documents website** as a library for their national documents and provided summaries of such documents in English. At the end of December 2006, this website had been consulted by 436 participants who visited

1,737 pages. It contains 193 megabytes of information. In total, 174 megabytes of information had been offloaded from the National Documents website by Subtask A participants.

The **HySociety** data base has been uploaded as a the Subtask A **website** for use by Participants. Acknowledgement of this significant contribution has been made on the Subtask A website.

At the end of December 2006, this website had been consulted by 77 Participants who visited 294 pages. It contains 4.7 megabytes of information. In total, 16 megabytes of information had been offloaded from this website by Subtask A participants.

The table developed for the **Hydrogen Resource Special Study** has also been published as a **website**.

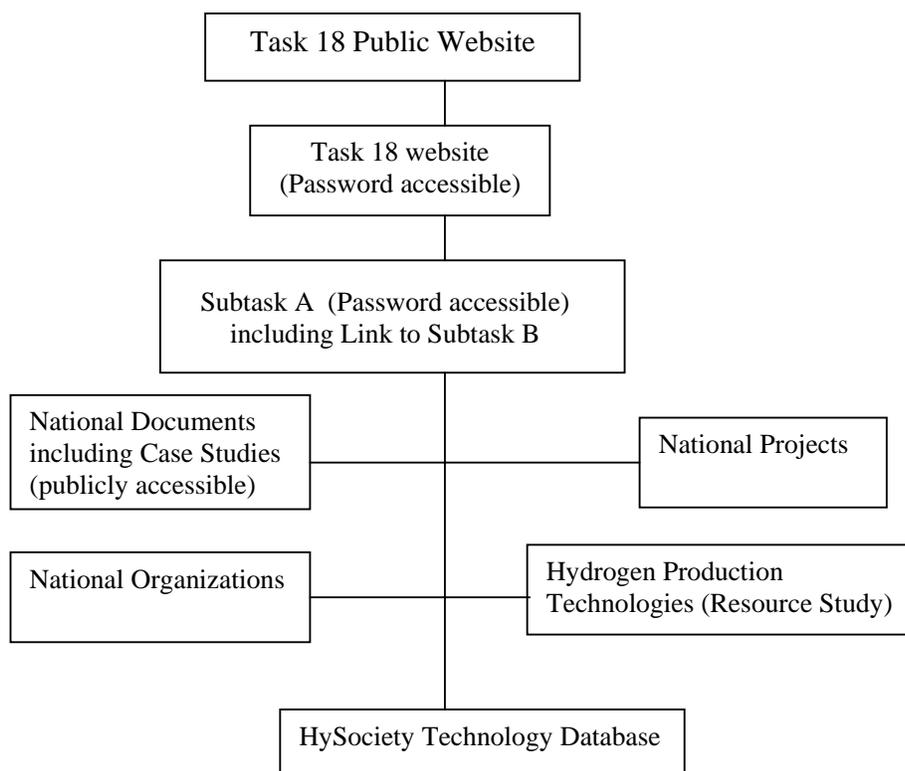
Another website has been set up in October 2005 to share information on “Listings of national component manufacturers and developers” renamed **National Organizations**. It currently contains has received 450 visitors that accessed 1,927 pages representing 19.7 Megs of data.



In March 2006, an Information base regarding **National Projects** was developed, at the end of December 2006, it contains 2.2 Megs of data. 126 visitors and 406 pages have been accessed. 5.8 Megs of data have been shared amongst Subtask A Participants.

At this time, excluding the National Documents website that can be accessed by the general public, these websites are proposed to be used only by Subtask A Participants but it is planned that such bases will eventually be made public.

The overall structure of the websites is as shown hereafter:



8. Conclusions and recommendations

It takes a while for any group to become familiar with a web based portal like the one that has been structured and developed under Subtask A in Annex 18.



It would benefit the database to have continued support for the next few years, especially if new members join the task. Also given the vast variety of ongoing projects including hydrogen systems it

would be of major benefit to the data bank to continue the compilation of documents at least until 2010.

Given that the participants in Annex 18 are all involved in hydrogen projects and the high number of visits to the websites it must be concluded that the documents compiled are relevant for active information exchange within the hydrogen issues. It is hoped that this selection of quality documents will serve the interested public as well as professionals working for the progress of the hydrogen economy.

Acknowledgements:



Mr. Jean Dubé (subtask A coordinator) wishes to express his deepest appreciation to all those who participated in this significant activity for their cooperation and efforts without which it would have been impossible to meet its objectives and to all who have supported this activity, and particularly Natural Resources Canada.