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NHA DOE COST SHARED ACTIVITIES

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Abstract

This paper describes the NHA tasks that have received cost share support from the U.S. Department of Energy Hydrogen Program for years 1999 or 2000. For the purpose of this review, we are including all activities for which the NHA normally receives DOE cost-share support, to include education and outreach tasks (including the new tasks being proposed for this year), our codes and standards work, and the annual meeting. This is in contrast to last year when we only presented our DOE cost-shared Codes and Standards tasks.

Introduction

We will begin by responding to the issue raised at the 1999 DOE Hydrogen Program Peer Review regarding an interest in more examples. We provided more examples this year, and in fact, the Proceedings from the Industry Perspective Workshop held at the end of October were handed out at the Peer Review. We held off on producing these Proceedings so that we could include the results of changes to the Hydrogen Commercialization Plan. The changes were adopted in March at the Annual Membership Meeting. You can add these to the list of publications for FY2000.

Since before the DOE had a hydrogen program, the NHA Mission has been to foster the development of hydrogen technologies and their use in commercial and industrial applications and to promote the role of hydrogen as a major energy carrier of the future

The basic long-term goals are determined by the greatest needs tempered by activities consistent with the role of the NHA as an association. Today these are:

- To Educate the public and policy makers on the benefits of hydrogen
- To Assist in the development of necessary hydrogen codes and standards
- And to Support the development of hydrogen infrastructure which in turn supports the deployment of hydrogen-related energy technologies

Discussion

There are three primary objectives to the tasks the NHA, in conjunction with DOE and other stakeholders, performs. The first is to facilitate timely information exchange between the hydrogen industry and DOE. The NHA strives to provide a forum for issues and present consensus positions to policy-makers, public and the rest of the energy community, as well as at international forums.

The Rationale for this is that the commercial deployment of hydrogen requires a partnership between industry and government. This can only be effective if the public and other potential stakeholders are educated to the promise of hydrogen.

Our second objective is to continue to work toward new hydrogen standards internationally and develop preliminary information prior to proposing new international standards and establish liaison with national and international organizations that are involved in developing hydrogen-related standards.

The rationale for this is simple: For hydrogen to be other than a curiosity, it requires standards to assure the public, financiers, and insurance companies that hydrogen products, equipment, and systems are safe.

Originally our role was to develop codes and standards for hydrogen systems where there were none. The NHA performed the preliminary work because hydrogen project proposals were questioned, and the standards did not yet exist. Now others are working on safety codes and standards and our role is evolving.

And finally, our third objective is to continue to update the Hydrogen Commercialization and Implementation Plans, Measure Progress toward Plan Goals and work to incorporate new hydrogen standards into demonstration and validation activities.

The Rationale for this is as follows: Measuring progress in reaching the commercialization goals will allow the hydrogen community to refocus its efforts on near term goals not yet achieved, while evaluating new standards on DOE field projects will allow for an early assessment of the effectiveness of the standard.

The tasks for which the BHA receives DOE support can be broken into three main areas: Education and Outreach, Codes and Standards, and Annual Meeting. I will go through the efforts we have been performing up to this point, and reserve discussion on the new items being proposed for the discussion on plans for next year.

Under Education and Outreach, the NHA carries out its information dissemination activities.

NHA Information Exchange:

Current year activities include our Quarterly Publication, the *NHA News*, Quarterly or bimonthly (based on available funding) Publication, *H2Digest*, a membership directory, the NHA web page, and a members-only website under development

Information Exchange within the Hydrogen Industry:

To provide a forum for issues, to present consensus hydrogen industry input domestically and furnish a collective U.S. hydrogen industry position at international meetings, attend key energy meeting, including hydrogen-specific and broader energy-related meetings and conferences. Current year activities include the Hydrogen brochure which the reviewers received I their advance publications package, participation in a number of meetings, including this one, participation in activities of the Hydrogen Technical Advisory Panel, and preparations to attend Energex 2000 in July.

Presentation of U.S. Hydrogen Positions and International Information Exchange at Safety, Codes and Standards Forums:

The NHA is tasked to present the U.S. hydrogen positions at international forums and participate in international meetings that are of benefit to the hydrogen community in the areas of hydrogen safety, codes and standards. In addition, the NHA will attend ISO/TC-197 work group meetings, plenary sessions, and other applicable international meetings. In addition to ISO, the NHA is now participating in a new IEC-TC-105 working group on fuel cell standards.

Industry Perspective:

The goal of this activity is to provide DOE and the hydrogen community with guidance on what institutional measures should be taken to insure the safe deployment of hydrogen technologies by government and industry funded projects. The NHA is in the process of revising the goals of the Hydrogen Commercialization Plan and make recommendations to changes for the Hydrogen Implementation Plan based on progress in achieving the goals contained therein. The Proceedings distributed to the review team today summarize our activities in this area over the past eight months.

Hydrogen Safety, Codes and Standards Outreach:

The NHA strives to coordinate efforts and provide information dissemination on domestic hydrogen codes and standards, which allow hydrogen energy systems to be sited and used in the United States in a manner similar to natural gas. The NHA continues its work on facilitating the development of recommended practices and codes and standards critical for the commercial use of hydrogen as an energy carrier. The NHA continues to coordinate codes and standards activities to avoid duplication of effort and enable hydrogen systems to be sited with industry groups and standards organizations such as International Standards Organization, Society of

Automotive Engineers, International Codes Council, IEEE, IEA, the U.S. Fuel Cell Council, Fuel Cell Propulsion Institute, National Fire Protection Association, and others.

Hydrogen Demonstration and Validation:

The NHA will continue efforts to review the codes and standards practices used in current hydrogen demonstrations and to validate the codes and standards being developed through the NHA, ISO and others. This effort includes the information dissemination and public outreach of hydrogen demonstration activities. This information dissemination and public outreach allows the public to become more familiar and comfortable with uses of hydrogen energy. The NHA has begun discussions with the California Fuel Cell Partnership, SunLine Transit, UCRiverside, Air Products, and others with plans to build hydrogen-refueling facilities. The NHA will work with these entities to provide draft standards for use in the refueling projects so that lessons learned can be utilized by the project managers, and real-world issues fed back into the codes and standards development process.

Codes and Standards Technical Tasks:

The Codes and Standards technical work includes consensus building within the hydrogen industry, other stakeholders, and a number of codes and standards development bodies. It involves the development of draft standards for hydrogen energy systems, and the validation of these draft standards through industry. Over the past few years, the NHA developed draft standards for compressed hydrogen tanks, vehicular refueling stations for gaseous hydrogen, and connectors for hydrogen refueling. These drafts were submitted and accepted by ISO-TC-197 as working items. The NHA continues to support these international activities through participation in the working groups and working with industry to validate the draft standards. In addition, last year the NHA began four new working groups. These groups will determine whether the required standards exist for hydrogen, whether other groups are developing the required standards, or whether the NHA should develop a draft standard in the following areas:

C&S for the Use of Electrolysers and Fuel Cells at Customer Sites, Including Homes.

Stuart Energy Systems, Teledyne Brown Engineering and other NHA members, as well as nonmember experts and stakeholders are looking into the creation of a draft standard.

C&S for Safe Self-Service Refueling of Vehicles with H2.

Shell Hydrogen, BP Amoco, Air Products and Chemicals, Ford, and a number of other stakeholders are involved in this activity. The Society of Automotive Engineers is taking the lead on this, and works with the NHA on hydrogen safety issues.

Certification Program for Hydrogen Vehicle Fuel Systems.

Like the item above, the SAE has the lead on this, with support from NHA staff and members.

C&S for Maritime Unique Applications of Hydrogen.

This activity entails the identification of unique applications of hydrogen for maritime uses. The NHA has several members on the Maritime Hydrogen Technology Development Group, led by DCH Technology, which you heard about this morning. The purpose of this NHA Working Group is to interface with the MHTDG and others involved in fuel cells for maritime applications on Safety, Codes and Standards issues.

In addition to these groups, the working group on containers has begun to address the issues of codes and standards for hydrides. A report from each active group will be presented at the NHA Safety, Codes and Standards Workshops.

Annual Meeting:

The theme of this year's annual meeting was *The Universal Fuel*, universal meaning all-inclusive. The meeting addressed market issues through panels focused on hydrogen generation and why building a ground vehicle that uses hydrogen is necessary. It is clear from the discussions that storage and infrastructure remain issues to be overcome and demonstrated as well as the task of reducing fuel cell costs. The meeting addressed many of the activities necessary to successfully commercialize hydrogen including a panel on how best to publicize hydrogen demonstrations and developments through mainstream media. This meeting continues to enjoy support from DOE, NASA, and industry.

This is a listing of the NHA publications since the last Peer Review. Those publications prepared in FY2000 were provided in the review package.

- Quarterly Publication, NHA News: Vol. 3 Nos. 2 and 3 and Vol. 5 Nos. 1
- Quarterly Publication, H_2Digest: Vol. 11 Nos. 4 and 5 and Vol. 12 Nos. 1
- NHA Codes and Standards Workshop Proceedings 16-18 August, 1999
- NHA Implementation Plan Proceedings 26 October, 1999 (Draft)
- U.S. Annual Hydrogen Meeting Proceedings 7-9 April, 1999
- Creating a hydrogen-powered future 1 March, 2000
- 1st Quarterly Report Cooperative Agreement DE-FG03-99EE35108 10 November, 2000
- 2nd Quarterly Report Cooperative Agreement DE-FG03-99EE35108 24 February, 2000
- NREL Final Report "Development of Codes and Standards for the Safe Use of Hydrogen" 28 January, 2000

The *NHANews* issues are available on the NHA website at <www.HydrogenUS.com>.

The Codes and Standards Reports are generally sanitized to remove the contractual language, and are reformatted into a C&S Update report, which is also posted on the NHA website periodically.

If you are interested in additional copies of the hydrogen brochure "Creating a hydrogen-powered future", which the NHA unveiled during the Annual Meeting in March, please contact the NHA at 202-223-5547.

Due to discontinuities in funding, the NHA has not presented at as many conferences as we had hoped. We did however meet the minimum requirement of three presentations. Staff presented at the *2nd Annual lake Tahoe Fuel Cell Conference* in October, and made a presentation on the NHA Codes and standards activities as they relate to infrastructure development at the *F-Cells Infrastructure Conference* in Chicago in December. Both papers are included in published proceedings for those conferences. In addition, Bob Mauro was invited to make a presentation on hydrogen energy at the *Conference on the Future of Energy*, held by the Bureau of Intelligence and Research, U.S. Department of State, on 29 March, 2000.

In addition, Bob Mauro has been invited to participate in a number of HTAP workshops, which have also had reports published from those meetings.

And finally, the NHA is pleased to announce that we have developed a 'members only' section on our website, where we have posted an updated membership directory. We will also be posting NHA committee meeting minutes and copies of quarterly reports to help keep our members better informed between annual meetings. We also plan to make available copies of PowerPoint presentations made by the NHA for easy modification and use by the DOE, HTAP, and members.

Conclusions

The impact of the results of these efforts can be summarized as follows:

In Education and Outreach:

The new Hydrogen brochure was well received. There were many favorable comments when handed out at the 11th annual meeting.

Over 1,000 brochures were distributed to the general public at EarthDay 2000 in April.

The NHA News and H_2Digest keeps the hydrogen community and policy-makers informed of advances and activities in the hydrogen energy arena.

Working closely with HTAP, DOE, and other key stakeholders on the NHA Industry Perspective activities, including revisions to the Hydrogen Implementation Plan has efforts among these organizations, and throughout the hydrogen community dovetailing, which is helping to shape the direction of hydrogen activities.

In Codes and Standards:

Most standards efforts have resulted in proposals accepted by ISO to turn into standards (three standards are currently under development)

These standards will influence California Fuel Cell Partnership, Iceland, California and Nevada refueling station projects

In the Annual Meeting:

The Annual Meeting has greatly increased interest in hydrogen in Congress and among policy-makers. Participation and positive feedback regarding the meetings continues to grow.

Future Work

In addition to the ongoing work described already, the NHA hopes to build upon the liaisons already established to advance the efforts in the development of codes and standards to assure that hydrogen energy systems are safe and accepted by the public.

The NHA proposes coordinating with the national hydrogen associations of the Americas and Pacific Rim to form a Hydrogen Joint Working Group whose goals concern hydrogen economic interests of their respective countries. It is aimed at multinational cooperation and the exchange of information that each member organization can use for their own benefit. It may also have a role in helping countries, that request it, develop a national association around that country's energy needs.

In addition, the NHA hopes to begin an education initiative that supports and expands on the hydrogen curriculum development that Mary Rose Szoka is developing. The NHA would like to devise a series of modern hydrogen experiments that can be performed as part of a high school curriculum, and will make a contribution to the hydrogen activities carried out at the National Laboratories. The success of this effort would increase the visibility of hydrogen technologies on high school students current science curriculum allowing the students the opportunity to understand the role that hydrogen can play in their future. It would also speed the development and transfer of information and acceptance of hydrogen energy. This could begin with a pilot activity at one National Lab, a University and two or three high schools, with results made available on the Internet. The University could perform reviews and analysis, and maintain the Internet site and associated chat rooms. The project could grow based on popularity and funding. This work will be closely coordinated with existing efforts to avoid redundancy and ensure compatibility of the final products.

The NHA is also interested in expanding the hydrogen brochure to include notable success stories. This will include greater participation from the hydrogen community. If there are activities that you would like to see in the next revision, please let us know, and we will try to include them in the revision, funding permitting.

Our objectives for next year are to educate the public and policy makers on the benefits of hydrogen. Our planned activities support this objective.

We plan to conduct the 12th Annual U.S. Hydrogen Meeting with a theme surrounding hydrogen energy systems and success stories.

We plan to increase outreach to the public through wider distribution of new publications and enhancements to the NHA Web Site, as described earlier.

The NHA will continue to measure progress of the hydrogen community in achieving the interim goals of *the NHA Hydrogen Commercialization Plan* and the DOE *Hydrogen Program Plan*. This activity would involve polling the hydrogen community to determine where cost and performance targets are involved, and record the progress toward those targets. The information developed will be presented to the hydrogen community through a workshop and a report. It could serve as a mid-course correction in our efforts to achieve our goals or cause us to begin to modify those goals.

Through the Hydrogen Joint Working Group, we hope to develop regular meetings between hydrogen associations of various countries to share information, experiences and policy positions.
And as stated earlier, we are very interested in working with Mary Rose and the national labs to move hydrogen into the classrooms.

With regard to Safety Codes and Standards, we would like to continue the activities that are ongoing and advance the items in the new working groups toward a draft that can be submitted to ISO or other applicable code or standard body. We plan to continue and expand coordinated efforts with the automotive industry, fuel cell industry, hydrogen safety experts, electrical industry, and International Code Council to assure hydrogen systems may be sited, and acceptance of the new technologies.

We would like to work with the Compressed Gas Association and ANSI to take the first steps toward becoming the Technical Advisory Group in the U.S. for ISO TC 197. We also plan to begin activities on the newly formed IEC TC 105 on fuel cell standards.

Another objective is to support the development of a hydrogen infrastructure that supports the deployment of hydrogen-related energy technologies. Examples include increasing involvement in tracking demonstration projects that may provide success stories for hydrogen, and pave the way for a future hydrogen economy. These activities include the California Fuel Cell Partnership, the Iceland Energy Economy, Fuel Cell Mining Vehicles, Refueling station activities, and others.

And finally, we hope to support the development of a DOE hydrogen initiative, so that Hydrogen can begin to get the recognition it deserves from policy makers and the public.