U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Request for Information (RFI) DE-FOA-0001555: Hydrogen Technology Showcase and Training (HyTeST) Station

DATE: June 22, 2016

SUBJECT: Request for Information (RFI) on a Hydrogen Technology Showcase and Training Station

DESCRIPTION: The Department of Energy's (DOE) Fuel Cell Technologies Office (FCTO) seeks feedback from stakeholders regarding the construction and benefits of a National Hydrogen Technology Showcase and Training station (HyTeST). The station would serve as a tool for research and development, testing, safety training, and outreach for community and commercial early adopters, including station developers, owners, code officials, first responders, operators, investors, and insurers.

BACKGROUND: FCTO is a key component of the DOE's Energy Efficiency and Renewable Energy (EERE) portfolio. EERE seeks to provide clean, affordable, and reliable energy from diverse domestic resources, along with benefits of increased energy security, reduced criteria pollutants, and reduced greenhouse gas emissions. Light-duty vehicles and fueling components are a major emphasis of FCTO's Research, Development and Demonstration (RD&D) portfolio. Since 2004, FCTO's National Fuel Cell Electric Vehicle Learning Demonstration project and subsequent Technology Validation efforts have deployed and collected data on over 220 fuel cell vehicles and more than 30 hydrogen fueling stations. With independent data from over 6 million miles of driving and over 80,000 kg of hydrogen dispensed, FCTO is obtaining important information to help identify key areas for further research and development, and FCTO has identified specific challenges with hydrogen infrastructure and fueling station components.

With fuel cell vehicles currently being sold or leased to consumers in California, and plans announced for the introduction of hydrogen stations in the Northeast, it is important to manage the risk and improve safety practices associated with hydrogen fueling stations. DOE is considering constructing a national HyTeST station to showcase the technologies being deployed in commercial hydrogen refueling stations around the world, and to conduct trainings and outreach to speed public acceptance and commercial adoption. The station will support hydrogen technology deployment activities in California.

The HyTeST station will also directly support DOE's own Hydrogen Fueling Infrastructure Research and Station Technology (H2FIRST) project, which aims to ensure that fuel cell electric vehicle (FCEV) customers have a positive fueling experience similar to conventional gasoline/diesel stations as FCEVs are introduced. H2FIRST leverages capabilities at the national laboratories to address the technology challenges related to hydrogen refueling stations. Led by Sandia National Laboratories and the National Renewable Energy Laboratory, and supported by a broad array of public and private partners, the H2FIRST project is an example of DOE's efforts to bring national lab capabilities and facilities to bear on both immediate and mid-term challenges faced by industry. H2FIRST was established by DOE's FCTO directly in support of H2USA, a public-private partnership co-launched by DOE and industry in 2013.

It is important to note that HyTeST is envisioned to complement DOE's national laboratories' capabilities and to fill a specific need not currently being addressed. The intent is not to duplicate any existing capabilities. For instance, the Pacific Northwest National Laboratory (PNNL) has already developed a robust online and in-person hydrogen safety training program; these existing resources will be leveraged through development of site-specific, hands-on training supported by PNNL.

PURPOSE: The purpose of this RFI is to seek input from stakeholders on a potential model hydrogen station, and in particular what features, trainings, technologies, etc. should be present to maximize use and utility of the station. In this RFI we seek feedback on the proposal for the first phase of HyTeST station, as well as subsequent phases. The input will help DOE prioritize features and activities at the demonstration station, to best serve stakeholders' needs.

The HyTeST station will include infrastructure for compression, storage, and dispensing (CSD) of gaseous hydrogen at 700 bar to achieve standardized refueling protocols (SAE J2601 T40), and it will also be used for research, development, and demonstration of gaseous and liquid hydrogen technologies through collaborative projects to enable reliable, low-cost hydrogen fueling station components and systems. The HyTeST station will be located at Sandia National Laboratories' Livermore Valley Open Campus (LVOC) to enable partnership between the national laboratories and energy innovators. The HyTeST station will complement the existing hydrogen refueling facility at the National Renewable Energy Laboratory (NREL) in Colorado. Partners will be able to showcase their technology as part of training or testing activities as well as through community outreach and education to potential station providers. However, neither DOE, the labs, nor HyTEST may be used to endorse or publicize specific companies or approaches. HyTEST is also not meant to serve as a nationally recognized certification laboratory or to certify components or technologies. Sandia and Lawrence Livermore National Laboratories will work closely with NRELand Pacific Northwest National Laboratory (PNNL) in developing and implementing the scope and activities of HyTeST. DOE is also seeking information from potential partners who can contribute to the station by providing equipment, time, and/or funding. Strong stakeholder interest and commitment is required before DOE invests in the HyTeST station.

This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

DISCLAIMER AND IMPORTANT NOTES: Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

PROPRIETARY INFORMATION: Because information received in response to this RFI may be used to structure future programs and FOAs and/or otherwise be made available to the public, **respondents are strongly advised to NOT include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential.** If, however, a respondent chooses to submit business sensitive, proprietary, or otherwise confidential information, it must be clearly and conspicuously marked as such in the response.

Responses containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

If your response contains confidential, proprietary, or privileged information, you must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

> **Notice of Restriction on Disclosure and Use of Data:**
> Pages [list applicable pages] of this response may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this RFI DE-FOA-0001555. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure" and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

EVALUATION AND ADMINISTRATION BY FEDERAL AND NON-FEDERAL PERSONNEL: Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to DOE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

REQUEST FOR INFORMATION AREA OF INTEREST AND QUESTIONS: FCTO seeks input on its plan to develop HyTeST, an independent, nationally-recognized facility to showcase hydrogen station technologies and conduct training and research on advanced hydrogen infrastructure technology. FCTO envisions that the HyTeST station will be used to provide critical training and informational sessions to a wide audience, educating communities on hydrogen safety and the benefits of clean energy technologies for the environment. HyTeST is also intended to be a platform for future R&D where new technologies can be developed and integration of clean energy technologies can be explored. In order to achieve this vision, your feedback is requested on priorities for technology, training, resources, and other features for the station. FCTO also welcomes comment on relevant issues not identified in the following questions.

FCTO is interested in guidance on this topic area, through responses to the following questions (as applicable):

General

1. Would you be interested in having access to a hydrogen station facility that showcases hydrogen refueling technologies? Why or why not?

2. What is your interpretation of the HyTeST station and what would be of most value?
   - For example, one interpretation could be a subsidized facility where specific activities can be paid for by the user (such as testing a new fueling method or component).

Showcase Options

3. What types of hydrogen refueling station technologies would you be interested in learning about/seeing demonstrated at the proposed HyTeST station? When responding, please prioritize your interest from low, to medium, or high.
   - Options include but are not limited to:
     a. Tube trailer;
     b. Pipeline;
     c. Storage;
     d. Electrolyzer;
     e. Compressors;
     f. Liquid pumps;
     g. Dispensers/hoses/nozzles;
     h. Hydrogen contaminant detectors;
     i. Safety systems and sensors (i.e., leak detection);
     j. Emergency shut-off protocols (including break-away devices);
     k. Multiple refueling protocols (i.e., SAE J2601, MC Method, alternative emerging low-cost protocols);
     l. Communication (i.e., Infrared (IR) and emerging technologies) and non-communication based filling technologies;
     m. Back-to-back refueling capability;
     n. 350 bar refueling (35 MPa) for non-duty application;
     o. 700 bar refueling (70 MPa);
     p. Mobile refueling technologies;
     q. Temperature and pressure relief device (TPRD);
     r. Synergies between compressed natural gas (CNG) and hydrogen refueling stations.

Training

4. How beneficial would you find it to receive training for permitting hydrogen refueling stations? -Please also describe why or why not it would be beneficial.

5. What format of training would you find most beneficial (check all that apply)? Please be sure to indicate how beneficial you would find each type of training (rank from low to medium to high).
   - Options include but are not limited to:
     a. On-site (i.e., at a hydrogen refueling station);
     b. Interaction with experienced Authorities/Authorities Having Jurisdiction (AHJs) (i.e., code officials, fire marshals, etc.);
     c. Video;
     d. Online training;
     e. In-person/hands-on training during the permitting of a hydrogen refueling station.
     f. Other – please describe

6. Would you be interested in hands-on operations and maintenance (O&M) training for operating a hydrogen refueling station?
   - Training topics could include:
     a. Hydrogen sensor calibration;
     b. Compressor maintenance;

c. Storage tank maintenance;
d. Hose/dispenser/nozzle maintenance;
e. Hydrogen system component replacement;
f. Electrolyzer maintenance (for on-site generation);
g. Hydrogen delivery management (for off-site generation);
h. Emergency shut-off protocols;
i. Hydrogen system controls & operation;
j. General hydrogen refueling station O&M training (all of the above).

7. What types of trainings and/or resources would you like to see available at a demonstration hydrogen refueling station? Please be sure to indicate how beneficial you would find each type of training/resource (rank from low to medium to high).
   - Options include but are not limited to:
     a. On-site training with an experienced AHJ;
     b. Station walk-through;
     c. Station orientation;
     d. Safety videos;
     e. Blueprints for the hydrogen refueling station;
     f. Fundamental hydrogen safety training;
     g. Approved permit applications for the hydrogen refueling station;
     h. Example of hydrogen refueling station permit applications;
     i. Overview of quantitative risk assessment and Hydrogen Risk Assessment Models (HyRAM);
     j. Overview of relevant codes and standards;
     k. On-site assistance to answer questions about station design and operation;
     l. Training for station operation safety mechanisms (i.e., emergency shut-off);
     m. Overview of hydrogen refueling safety features;
     n. Online hydrogen safety training;
     o. Hands-on demonstrations of hydrogen emergency response;
     p. Training with prop vehicles;
     q. Hydrogen flame demonstrations;
     r. Interaction with experienced First Responder personnel;
     s. "Train-the-trainer activities;
     t. Fuel cell vehicle test drives and refueling demonstrations;
     u. Ability to observe/participate in the site development/permitting/hydrogen refueling station building process;
     v. Access to a station component reliability database;
     w. Synergies between compressed natural gas (CNG) and hydrogen refueling stations
     x. Other resources or trainings not listed here (please be specific).

8. What analytical/informational tools and/or trainings would you like to see available at a demonstration of hydrogen refueling station technology? Please be sure to indicate how beneficial you would find each option (rank from low to medium to high).
   - Options include but are not limited to:
     a. H2Tools Webpage
     b. The Hydrogen Delivery Scenario Analysis Model (HDSAM);
     c. Hydrogen Refueling Station Analysis Model (HRSAM);
     d. Hydrogen Financial Analysis Scenario Tool (H2FAST);
     e. First Responder Training (online and in-person);

f. Code Official Training (online and in-person);
g. Fundamental hydrogen safety training.
h. Other – please describe.

Other related questions

9. What other hydrogen fuel cell applications are you interested in seeing demonstrated at a showcase of hydrogen refueling station technology? Please be sure to indicate how beneficial you would find each type of application (rank from low to medium to high).
   - Options for consideration include:
     a. Medium-duty vehicles;
     b. Heavy-duty vehicles, buses;
     c. Materials handling equipment/MHE (i.e., forklifts);
     d. Ground support equipment/GSE (i.e., airport baggage tractors).
     e. Other – please describe.

10. Please indicate if you are willing to contribute equipment, supplies and/or a fuel cell vehicle to this demonstration hydrogen refueling station. If so, what would you contribute? Please indicate timeframe during which you could contribute (i.e., for two months, a year, etc.)

11. FCTO envisions the HyTeST station to be a dynamically changing test bed that keeps up with rapidly changing technologies and tools, and therefore annual or biannual training may be pursued.
    a. Would periodic training be of value to you and your organization? Please indicate if you had envisioned utilizing the station facility for demonstrations, training, and outreach more frequently. What frequency is ideal for you (monthly, quarterly, yearly)?
    b. How long do you envision trainings lasting, depending on the topic? (e.g. 1 day or less, 2 days or less)
    c. Would individualized trainings in small groups (e.g. 3-6 people) be more valuable than large group (e.g. 20 people) training? If yes, for what types of training?

12. Does your organization have, or do you know of, highly experienced individuals who may be appropriate in developing training materials in collaboration with the national laboratories? If so, please either provide their contact information or have them contact FCTO directly.

13. What features/opportunities would you like to see to increase usage of the station for training/outreach purposes? Would you or members of your organization be able to cover travel costs to attend the training? What other potential sources of funds could be used (state funding, etc.)?

14. If there is a topic or consideration you'd like to add to this list, please include it in your response.

REQUEST FOR INFORMATION RESPONSE GUIDELINES: Responses to this RFI must be submitted electronically to FY16FCTONeedsandStrategies@ee.doe.gov no later than 5:00pm (EDT) on July 22, 2016. Responses must be provided as a Microsoft Word (.docx) attachment to the email, of no more than 4 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted. Respondents may answer as many or as few questions as they wish.

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.