



Department of Energy
1617 Cole Blvd.
Golden, CO 80401-3393

DE-FOA-0000429
Amendment: 000002

DATE: November 2, 2010
FROM: Stephanie N. Carabajal, Contracting Officer
TO: All Prospective Applicants

SUBJECT: Amendment 00002 to Announcement DE-FOA-0000429,
"Fuel Cell Technologies Early Market Opportunities"

- 1) The purpose of this amendment is to rescind the suspension on the Request for Information (RFI) dated October 22, 2010 and post a modified RFI. Some of the new language indicates that a funding opportunity (FOA) may not ensue as a result of this RFI.



Department of Energy
1617 Cole Blvd.
Golden, CO 80401-3393

DE-FOA-0000429
Amendment: 000001

DATE: October 22, 2010
FROM: Stephanie N. Carabajal, Contracting Officer
TO: All Prospective Applicants

SUBJECT: Amendment 00001 to Announcement DE-FOA-0000429,
"Fuel Cell Technologies Early Market Opportunities"

- 1) The purpose of this amendment is to suspend the current Request for Information (RFI) in order to provide a revised version during the week ending October 30, 2010.



**Request for Information
DE-FOA-0000429
Fuel Cell Technologies Early Market Opportunities**

Date: November 2, 2010

Subject: Request for Information (RFI) for the potential for the deployment of Hydrogen and Fuel Cell Technologies in three distinct strategic early market areas.

Description: The Department of Energy (DOE) is seeking feedback from relevant industry stakeholders to assist in the deployment of hydrogen and fuel cell technologies in three distinct topic areas including “turnkey” project approaches for distributed generation (DG) fuel cells in Federal facilities, “turnkey” project approaches for hydrogen energy storage to support renewable power generation, and the feasibility of commercial deployment of fuel cell powered ground support equipment (GSE) for commercial and government operated airports. This RFI will NOT necessarily result in a funding opportunity announcement (FOA).

Program Manager / Area: Dr. Sunita Satyapal, Program Manager / Fuel Cell Technologies Program, Office of Energy Efficiency and Renewable Energy.
Mr. Peter Devlin, Market Transformation Team Lead / Fuel Cell Technologies Program, Office of Energy Efficiency and Renewable Energy.

Background:

The Fuel Cell Technologies (FCT) Program is a key component of the DOE’s Energy Efficiency and Renewable Energy R&D portfolio which aims to provide clean, safe, secure, affordable, and reliable energy from diverse domestic resources, providing the benefits of increased energy security and reduced criteria pollutants and green house gas emissions. By collaborating with industry, universities, and national laboratories, the FCT Program is working to overcome technological, economic, and institutional obstacles to enable the widespread commercialization of fuel cells and related technologies. In an effort to comply with Executive Order (EO) 13514 (which calls for Federal facilities to lead by example) the FCT program has been working to deploy fuel cells in applications that also promote and enable widespread commercialization. Prime Power DG systems (with the potential to achieve more than 80% overall efficiencies with lower emissions than separate heat and power generation) have become a key area of interest to the FCT Program. The DOE has similar interest in the potential deployment of technologies which enable more renewable power generation through grid or micro-grid level storage. Finally, an additional example of a potential early market fuel cell opportunity is fuel cell powered ground support equipment to reduce emissions and fuel consumption at airports.

Purpose:

The purpose of this RFI is to obtain information pertaining to capabilities in turnkey project implementation, management, cost reduction, and readiness level of applicable hydrogen and fuel cell technologies relevant to the core requirements and relevant costs for each of the three areas of interest described below.

Responses should provide any arguments, observations, or recommendations that respondents consider relevant to the items below:

Areas of Interest

When more than one area of interest is addressed, submit separate response submissions to the e-mail address above.

Area of Interest 1: Turnkey Project Approaches for Distributed Generation (DG) Fuel Cells in Federal Facilities

This RFI seeks responses from relevant stakeholders, including firms with experience in planning, implementing and managing prime power DG system projects – either fuel cell or other DG system projects. Although various firms and third party organizations have installed a number of DG fuel cell systems over the years, installation and operating costs, project complexity, and schedule slippage are still issues that need to be improved. This is particularly true for projects at Federal sites given that Federal entities are not eligible for the investment tax credit that is typically used by commercial entities. The primary purpose of this interest area is to identify and prioritize the key issues with today's approaches to DG fuel cell deployments and to propose and prioritize approaches to address those issues. The focus is on turnkey project execution approaches, rather than on research and development. The FCT Program has been promoting the deployment of fuel cells, including prime power DG systems into National Laboratory facilities and other Federal agencies, in support of Federal initiatives such as EO 13514. As part of this effort, several feasibility study projects are underway at potential sites with the prime power DG system capacity ratings ranging from 300 kW to 2.8 MW. These projects would involve the installation of prime power DG systems at Federal facilities interconnected into the electrical distribution system in a grid parallel configuration. The energy generated by the prime power DG systems would be used on-site to offset grid-supplied electrical energy. In several cases, combined heating, reliable power and cooling will be the preferred configuration of operation.

The FCT Program is soliciting approaches for a comprehensive and coordinated strategy that is designed to provide Federal sites with cost reductions along with reliable prime power DG fuel cell systems, by implementing the optimal third-party private sector partnership structure that will develop, finance and operate the fuel cell installations. Respondents should assume that the Federal sites will have access to a natural gas supply that is sufficient to support the operation of the prime power DG system equipment. In some cases, renewable fuels such as biogas may be available. Relevant equipment installed at the Federal sites will be owned and operated by the third-party private sector organization (or partnership structure) which will be responsible for system costs associated with design, permitting, equipment, materials, and labor (including installation and operation) and maintenance. The capacity and/or energy produced by such prime power DG systems will be sold to the Federal sites (such as set forth in power purchase

agreements (PPA)) to be executed between DOE or other agencies, the Federal sites, and the project developer. A power marketing administration (for example, the Western Area Power Administration) may also be involved in the execution of the PPA for Federal sites.

This RFI requests that respondents provide an assessment of market/financial analysis regarding the proposed project structure, timeline, and any additional information in support of prime power DG system deployment. The RFI solicits information from respondents to potentially begin DG projects using capable prime power DG system project developers and project planning frameworks. Comments on various term and pricing proposals, including the PPA length of terms ranging from 10 to 20 years, are of interest. This RFI also seeks information on the impact of environmental attributes (i.e. carbon credits and Renewable Energy Credits (REC)) on PPA pricing.

As part of a response to this RFI, the FCT Program is interested in comments and insight on:

- Identification and prioritization of the key issues with today's approaches to DG fuel cell deployments for Federal facilities and the identification and prioritization of approaches to address those issues;
- Descriptions of prime power DG system scopes of work, including design, pre-construction environmental resource impact surveys, permitting, start-up and commissioning times, post-construction environmental resource impact surveys, and a typical timeline schedule;
- Descriptions of how project developers obtain private investment capital financing for comprehensive procurement of prime power DG systems and the deployment of these systems at the host sites and opportunities for process improvement;
- An assessment of savings and/or benefits resulting from the aggregation of the host site projects into a "bundled" procurement, including an assessment of the optimal minimum and maximum number of projects (and power ratings); and
- Description of typical operation and maintenance plans and opportunities for improvement.

Area of Interest 2: Turnkey Project Approaches for Hydrogen Energy Storage for Renewable Power Generation

This RFI seeks responses from relevant stakeholders, including firms with experience in planning, investing, owning, and operating prime power renewable generation and storage systems.

The RFI is interested in information on the potential for hydrogen generation and storage to reduce curtailment and increase renewable generation capacity utilization. RFI responders are asked to describe the potential for hydrogen generation to provide a power producer with revenue flexibility including new product opportunities for revenue that are independent of the regulated grid market. This flexibility should ultimately benefit customers of diverse markets and promote the growth of renewable energy assets.

Hydrogen produced by water electrolysis has the potential to be a useful means of storing excess electricity generated using wind, solar, and other intermittent renewable energy. In an integrated system, the produced and stored hydrogen can be used for making a variety of energy and non-energy products. The electrolyser can be operated around a production rate that would be

determined by the demand for various value streams such as transportation fuels, auxiliary power, or chemical feed stocks. The electrolyser could have the ability to adjust its load (ramp up or down) in response to various value streams need to produce both hydrogen and electricity using renewable resources and allowing electricity produced in off-peak periods to be stored as hydrogen. The stored hydrogen could then be used for energy requirements such as peak electric power or for fueling vehicles (e.g. transit buses or other heavy duty vehicles) and a variety of non-energy agricultural and industrial uses such as producing fertilizer.

DOE seeks information on the viability of hydrogen as a storage medium for variable renewable electricity, fuel generation technologies, or non-energy value streams and insights on the challenges of using hydrogen from variable renewable systems to compensate both for short-term mismatches between electricity grid power demand and renewable supply and for providing additional value streams such as vehicle fuel in a multi-purpose, co-production system.

This RFI requests that respondents provide an assessment of market/financial analysis regarding the proposed project concept's structure, timeline, and any additional information in support of this type of integrated hydrogen energy storage system deployment. The RFI solicits information from respondents to potentially begin these types of projects using capable prime project developers and project planning frameworks. Comments on various term and pricing proposals, including, for example, a PPA length of terms or cost-of-capital are of interest.

Respondents are asked to provide information on specific project concepts described above such as:

- Identification and prioritization of the key issues with this concept and the identification and prioritization of approaches to address those issues;
- Descriptions of integrated hydrogen storage system scopes of work, including system scale, design, pre-construction environmental resource impact surveys, permitting, start-up and commissioning times, post-construction environmental resource impact surveys, and a typical timeline schedule;
- The lifecycle cost of an integrated hydrogen energy storage system and business-case calculations such as time-to-payback and net return on investment; capital and operating costs including application of available Federal and/or state policies; and incentives that support the project's implementation;
- Estimates of the resulting product costs (e.g. cents per kilowatt hour or cost per kilogram of hydrogen fuel);
- The type of data that is needed to validate technology applications and configurations (e.g. reliability, safety, costs) to enable an accurate assessment of the state of the art and business case viability; and
- Descriptions of how project developers obtain private investment capital financing for comprehensive procurement of these systems and the deployment of these systems at the host sites and opportunities for process improvement.

Area of Interest 3: Ground Support Equipment (GSE) for Commercial or Government-Owned Airports

This area of interest is focused on airport GSE as applicable to the needs of commercial or government-owned airport facilities. The Battelle Memorial Institute study, “Identification and Characterization of Near-term Direct Hydrogen Proton Exchange Membrane Fuel Cell Markets” indicates that airport GSE has the potential to provide significant lifecycle cost savings over lead-acid battery and combustion engine systems under certain types of operation.¹

The airport GSE market includes various types of specialty vehicles used to service aircraft during ground operations. GSE commonly used in airport operations include baggage tractors (or ground support “tugs”) used to tow baggage trailers between the aircraft and terminal and aircraft pushback tractors that push aircraft back from the terminal to the taxiway or tow aircraft to and from the hangar for maintenance. Battery-powered tugs usually handle baggage and cargo or tow lower-weight aircraft (for small regional airline operations). They use wet cell or sealed gel cell lead-acid batteries. Typical capacity ranges are from 2.5 HP/1.9 kW (36V motor) to 100 HP/75 kW. ICE-powered tugs typically use 4-cylinder or 6-cylinder engines fueled with diesel, gasoline, liquefied petroleum gas (LPG or propane), compressed natural gas (CNG), or Jet A fuel. The capacities of diesel and gasoline engines in airport tugs vary widely ranging from 25 HP/19 kW to 300 HP/224 kW.

Responses to this RFI should clearly describe the potential benefits of the proposed fuel cell powered GSE technology in terms of durability, cost, and performance compared to internal combustion engine and battery-powered systems. DOE seeks information on potential GSE market applications and how they can contribute to the purchase volumes needed to help lower market barriers, achieve the societal and environmental benefits, and accelerate fuel cell market penetration

As part of a response to this RFI, the FCT Program is interested in comments and insight on:

- Key barriers preventing the use of fuel cell powered GSE for airport applications; the near-term commercial feasibility and potential market size of the identified application(s);
- Lifecycle cost; the overall impact that a specific financial assistance project would have on the cost; and the effect of the available \$3,000/kilowatt fuel cell investment tax credit³ (business-case calculations, such as payback and net return on investment, as well as lifecycle cost comparisons to incumbent technologies are of particular interest);
- Issues related to fueling and infrastructure;
- The type of data that is needed to validate technology (e.g. reliability, efficiency, etc.) to enable an accurate assessment of the state of the art;
- Issues related to codes, regulations, and standards that are not currently being addressed and are needed to facilitate the deployment of the identified fuel cell application(s); and
- Other barriers or challenges that must be addressed to increase the commercial viability and market penetration of the identified fuel cell application(s).

¹ K. Mahadevan, Battelle Memorial Institute, “Identification and Characterization of Near-term Direct Hydrogen Proton Exchange Membrane Fuel Cell Markets”; http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/pemfc_econ_2006_report_final_0407.pdf

RFI Guidelines:

Parties interested in submitting a response to this RFI should review the RFI Guidelines in their entirety before developing and submitting a response.

DOE will review and consider all responses in its formulation of program strategies. DOE will not reimburse costs associated with preparing any documents for this RFI and there is no guarantee that a FOA will be issued as a result of this RFI.

Comments in response to this RFI must be provided as an attachment (in Microsoft Word format) to an e-mail message addressed to FCTRFI0000429@go.doe.gov.

Questions regarding the content of the RFI must be submitted through the FedConnect portal. You must register with FedConnect to submit questions and to receive responses to questions. It is recommended that you register as soon after release of the RFI as possible to have the benefit of all responses. More information is available at:

https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf.

DOE will attempt to respond to a question within 3 business days unless a similar question and answer have already been distributed.

Please do not provide any information which may be considered proprietary or confidential.

Comments must be received no later than 11:59 PM EDT on 1/18/2011.

DOE has no obligation to respond to those who submit comments and/or give any feedback on any decision based on the comments received as there is potential for a future FOA relative to this subject. DOE thanks you for your assistance and comments in helping accomplish its mission.