County of Santa Clara
Facilities And Fleet Department

FAF02 061306

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DATE: June 13, 2006

TO: Board of Supervisors

FROM: Larry Jinkins

Larry Jinkins
Director of Facilities and Fleet Department

SUBJECT: Quarterly Report on Fuel Cell Advancement Initiative

RECOMMENDED ACTION

Accept quarterly status report from Facilities and Fleet Department (FAF) on Fuel Cell Advancement Initiative.

FISCAL IMPLICATIONS

There is no fiscal impact associated with acceptance of this report.

CONTRACT HISTORY

Not applicable.

REASONS FOR RECOMMENDATION

In September 2004, the Board of Supervisors approved the Santa Clara County Fuel Cell Advancement Initiative. Staff has been providing quarterly status reports pertaining to this Initiative. The last status report was made to the Finance and Government Operations Committee (FGOC) on February 2, 2006. This report provides the Board with an update on activities since February.

BACKGROUND

This report is provided as an update of the Fuel Cell Advancement Initiative's progress in four different areas; Identifying Stationary Fuel Cell Systems and Vendors, Local Fuel Cell Projects, Stationary Fuel Cell Project Planning, Stationary Fuel Cell Project Financing Alternatives, and Alternatively Fueled Vehicles.

IDENTIFYING STATIONARY FUEL CELL SYSTEMS AND VENDORS

Fuel cell technology is over 130 years old and has been widely used by the military, space programs, and by electric utilities. The federal government has invested in various fuel cell technologies for stationary fuel cell power generation applications since the 1970's. Fuel cell types are typically described by the electrolyte substance that dissociates charged ions. There are five major fuel cell types: Polymer Electrolyte Membrane, Alkaline, Phosphoric Acid, Molten Carbonate, and Solid Oxide. Of the Solid Oxide fuel cells there are two basic designs; Planar and Tubular.

Solid oxide fuel cells are intended mainly for stationary power generation applications. In these systems oxygen ions are transferred through a solid oxide electrolyte material at high temperatures to react with hydrogen on the anode side. Because of the high temperature they do not need expensive catalysts such as platinum, and they are feedstock fuel flexible. Solid oxide fuel cells can be operated on methane, butane, propane, fermentation gas, gasified biomass and even paint fumes. Solid oxide fuel cells can have multiple geometries; Planar – which is a sandwich type where the electrolyte is between electrodes; or Tubular – where

either air or fuel is passed through the inside of a tube and another gas is passed on the outside of the tube. Both types of solid oxide fuel cell power generation systems are available commercially. Solid oxide fuel cell systems work most efficiently with 24/7 facilities.

There are at least 30 U.S. and international companies with both demonstration and commercially available Solid Oxide Fuel Cell power generation systems in the market including among others; Acumetrics, Adaptive Materials Inc., CellTech Power, Chevron Energy, Delphi, FuelCell Energy, General Electric, Honeywell, NDE Energy, Siemens Westinghouse, and Versa Power Systems. Staff research indicates that nine vendors provide Planar Solid Oxide systems; Allied Signal, Ceramatec, Corning, ENrG, Delphi Automotive Systems, General Electric, ION America, ITN Energy Systems, and Ztek.

LOCAL FUEL CELL PROJECTS

Alameda County Correctional Facility (Santa Rita Jail) has a one megawatt (MW) stationary fuel cell system from Fuel Cell Energy and Chevron Energy Solutions. This system combines with a photovoltaic system and provides the entire baseload requirements for the jail facility. The Sierra Nevada Brewing Company, located in Sonoma County, was recently awarded $2.4 million in Self Generation Incentive Program funds for its one MW Fuel Cell Energy system. Staff is planning to visit both sites to obtain useful information for the Santa Clara County Fuel Cell Advancement Initiative.

STATIONARY FUEL CELL PROJECT PLANNING

On February 8, 2005 the Board of Supervisors approved the list of FY 2006 Federal Earmark requests, including the fuel cell earmark. The County's Federal Earmark request did not propose a specific fuel cell technology, and requested $2,500,000 in Federal funding for two fuel cell projects. The final Federally approved Earmark project was listed in the Congressional Record as "Planar Solid Oxide Fuel Cell Project (CA) $1,500,000."

On February 1, 2006, during a meeting in Washington, D.C. for FY 2006 Department of Energy (DOE) Earmark awardees, it was learned that a preliminary 2–3 sentence project description had to be submitted immediately to DOE to continue processing the $1.5 million earmark. The project description was provided by BKSH (the County's Washington D.C.

lobbyist) in consultation with County staff and stated that the project, "...would fund one or more solid oxide fuel cell (SOFC) power generation projects at least one of which would be a planar (SOFC) project at suitable sites on Santa Clara County Property." This description was used for DOE's Summary Fact Sheet and enabled the project to move forward through the DOE approval process. DOE also requested that a full project description with associated project documentation be submitted to DOE by February 28, 2006.

On February 21, 2006 staff conducted informational site tours with interested fuel cell vendors at the Valley Medical Center Campus and the County 911 Communications facilities. A tour of the Vasona Park Youth Science Center new building was also made available. However, the potential electrical demand load from the Vasona site was considered too small for the type of solid oxide fuel cell systems manufactured by the interested vendors. Information gained from both County staff and vendors during the site tours facilitated completion of the required DOE documentation.

On February 28, 2006 the Board of Supervisors approved submitting the project description for the Fuel Cell Demonstration project and conceptually approved use of the Williams Settlement as matching funds. The project description provided to the Board followed the DOE Summary Fact Sheet language of: "This project would fund one or more solid oxide fuel cell (SOFC) power generation projects at least one of which would be a planar SOFC project at suitable sites located on Santa Clara Property."

Following Board approval staff finalized and submitted two project descriptions to DOE. One description was for a Planar Solid Oxide project with an approximate cost of $2.4 million, and the other was for an unspecified type Solid Oxide system with an approximate cost of $1.6 million. Project cost estimates were approximations based upon the informal discussions with vendors. Two possible site alternatives were submitted; the County 911 Communications facility and the Valley Medical Center Campus. In the summary letter the County informed DOE that, due to the reduction in Earmark funding from $2.5 million to $1.5 million and the requirement for the County to potentially match funds of up to $1.5 million, it appeared that the County would only be capable of accomplishing one of the two submitted projects.

In April, staff was informed that DOE had settled on an award of $1,383,376; that the award would have a 50/50 matching fund requirement; and that the project was classified as a "demonstration" project. Since funds were sufficient for only one project, that project would

be a planar solid oxide project in accordance with the Congressional Earmark requirement.

In May, DOE requested more detailed project budget information prior to completion of the DOE Financial Assistance Cooperative Agreement. To obtain this detailed information the County must make a final project site selection and select the fuel cell vendor. The information from the fuel cell vendor bid will be used for providing the additional project budget information requested by DOE.

Selecting a fuel cell vendor and obtaining the additional DOE requested project budget information will be accomplished in two steps. First, a consultant will be selected who will assist in making the final project site selection, and assist in preparing the solicitation bid documents for selecting a fuel cell vendor. Second, a competitive process will be used to select the fuel cell vendor. With County Executive approval, FAF intends to borrow up to $15,000 from Capital Programs Planning funds to provide for the consulting services. These Planning funds will be repaid with Williams Settlement funds as the Settlement funds become available.

Once the fuel cell vendor has been selected and full project costing is available from that selection process, the Statement of Project Objectives (see attached draft) and the Financial Assistance Cooperative Agreement will be finalized. The Financial Assistance Cooperative Agreement will be the project contract between the County and the Federal government, and must be signed by the County and DOE. This is expected to occur in late 2006 / early 2007.

STATIONARY FUEL CELL PROJECT FINANCING ALTERNATIVES

The Board of Supervisors has the opportunity to combine multiple federal, state and local fund sources to finance the Fuel Cell project. The project has successfully received $1.38 million in DOE Federal Earmark funds as described above. In addition, other fund sources are being explored as described below.

Williams Settlement Funds

In 2002, the County participated in litigation that resulted in a $3.5 million settlement, commonly referred to as the Williams Settlement, that was specifically designated for alternative energy generation or energy conservation projects. Since January 2003, Santa

Clara County has received $2 million as a result of participation in this class action litigation against three wholesale electricity suppliers; Reliant Energy, Williams Energy Marketing & Trading, and Duke Power. The County of Santa Clara was one of several litigants receiving settlement payments for overcharges, damages and restitution. The Williams Settlement funds must be used for alternative energy production or energy conservation purposes.The County has used $1.9 million of these funds for energy conservation projects in County–wide facilities. A final payment of $1.5 million will be received in January 2007.

On February 18, 2006 the Board conceptually approved the use of this final $1.5 million payment as matching funds for the Federally earmarked stationary fuel cell project. Staff subsequently submitted a transmittal during the May Budget Workshop for recognition of these funds in the FY 2007 budget for the stationary fuel cell project.

CALTRANS Community Planning Grant

The Fuel Cell Initiative originally proposed to use funds from a CALTRANS Community Planning grant to engage the services of a consultant to assist in the planning process, part of which is described above. Following Board approval, the County submitted a grant application with CALTRANS in October 2004 for the Community Planning grant. In June 2005 the County learned it was not one of the grant recipients. The County rewrote the previous grant submission, and resubmitted a request for $171,700 for the FY 2007 CALTRANS Community planning grant in October 2005. The County anticipates a grant award decision by the end of June.

Homeland Security Funds

Electrical system disruptions and fuel shortages for emergency generators are anticipated in widespread emergencies. One of the objectives of the FY 2006 Homeland Security program is to increase on–site power generation capacity at critical facilities. The planar solid oxide fuel cell system meets these needs by converting natural gas and ethanol to electricity. The ability to operate the Fuel Cell system as an alternative power generation system using ethanol, or other "renewable" feedstock fuels will add operational flexibility. Funds from a Homeland Security grant could partially offset the Fuel Cell Project's reliance upon the Williams Settlement funds, and staff is preparing a request for Homeland Security funding. There is no local matching requirement for FY 2006 Homeland Security funds.

State Self Generation Rebate Program

The Self Generation Incentive Program is a State program that provides incentives to encourage residential and commercial electricity customers to install clean distributed generation systems. Incentives are offered for customers who produce electricity with microturbines, gas turbines, wind turbines, photovoltaics, fuel cells and internal combustion engines. The program is administered by PG&E with payment after project construction is complete.

The incentive payments are linked to the type of feedstock fuel used. If the feedstock fuel is natural gas, then the rebate is $2.50/watt. If the feedstock fuel is from a renewable source then the rebate is $4.50/watt. The maximum system size allowable under the program is five MW, but the rebate is capped at one MW. The minimum system size is 30 kilowatt (kW).

If the County installed a 30 kW system, it would be eligible for a $750,000 rebate if natural gas is used as the fuel feedstock, and a $1,350,000 rebate if a renewable fuel such as ethanol was used as the feedstock. The current conceptual planar solid oxide project is for a 15 kW system. A project cost comparison analysis will be developed comparing the 15 kW system with no self–generation rebate funding to a 30 kW system with rebate funding plus additional electricity generating capacity. If the 30 kW system compares favorably, then a project cash flow analysis will be developed to determine whether the 30 kW system can be funded with available funding while awaiting receipt of the rebate funds.

Vendor Contributions

Another option available to the County to reduce use of Williams Settlement funds is to request that vendors contribute financially to the project.

ALTERNATIVELY FUELED VEHICLES

The County of Santa Clara Fleet Management Department continues to actively promote fuel efficiency and reduced emissions within the Strategic Fleet Plan. The County (including Roads and Airports) has 39 Hybrid Vehicles, 50 Neighborhood Electric Vehicles, 26 Electric Forklifts and Electric Taylor Dunn Carts, and 9 Propane Forklifts. All are light duty for a total of 124 Alternative Fueled vehicles. The Fleet Department has been recognized and awarded

$10,000 by the Bay Area Air Quality Management Board for its purchases of Hybrid Vehicles

Efforts of the Fleet Department to promote a mix of alternatively fueled vehicles are consistent with approved Board Policy 7.11 on Vehicle Procurement – Low Emission Vehicles (adopted 2–10–04). The Fleet Department continues working towards the goal of improving fuel efficiency and thereby reducing fuel costs within the County Fleet. Fuel costs have risen significantly in the past year and are anticipated to continue to be a source of concern for the Fleet Department budget. The Strategic Fleet Plan recognizes the budgetary and environmental impact of maintaining an aging fleet of fuel inefficient vehicles and promotes the replacement of these vehicles when possible.

The County's Strategic Fleet Plan supports compliance with the California Environmental Protection Agency and the California Air Resources Board particulate matter reduction efforts. Specifically, the County's 23 General Fund / Parks diesel vehicles, identified as emitting particulate matter (PM) smaller than 10 microns in size, have been targeted for PM traps. Particulate traps for 15 of the 23 diesel vehicles were installed in early November 2005. Installation and parts were billed directly to BAAQMD under the BAAQMD PM10 retrofit grant program guidelines. The County is requesting funding for installing particulate traps on the remaining 8 vehicles from the Air Quality Control Board's Carl Moyer Memorial Attainment Program. Senate Bill 656 requires the reduction of diesel engine emissions by January 2007.

In July 2005, the County submitted a letter of intent to eight Hydrogen Fuel Cell Vehicle manufacturers requesting acquisition of a fuel cell demonstration vehicle. The Fleet Department is awaiting notification of the status of this request. General Motors has expressed possible interest in providing a fuel cell vehicle to the County in about two years (2008 or later).

CONSEQUENCES OF NEGATIVE ACTION

The Board of Supervisors will not receive updated information on the Fuel Cell Project.

ATTACHMENTS

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- Draft Statement of Project Objectives

Statement of Project Objectives
Santa Clara County Planar Solid Oxide Fuel Cell Demonstration

DE-FC26-06NT42812

A. OBJECTIVES

The primary objective of this project is to demonstrate planar solid oxide fuel cell (PLANAR SOFC) power generation system technology at a to-be-determined (tbd) site in within Santa Clara County, California.

B. SCOPE OF WORK

The Recipient shall form the project team necessary to acquire, site and demonstrate a Planar SOFC power generation system technology. The Recipient shall purchase, install, and maintain a Planar SOFC power generation system with a rated capacity between 3 and 200 kW. The Recipient shall operate the unit to maximize the power generation level from the fuel cell power plant.

C. TASKS

Task 1 – Siting Studies:

The Recipient shall conduct studies on two venues, the County 911 Communications Headquarters and the County Valley Medical Center campus, located within Santa Clara County, California for siting the Planar SOFC power generation system. Evaluations shall be conducted of on-site monitoring, load profiles, grid connection requirements, environmental assessments, site owner coordination, and heat recovery analysis for the two sites. The Recipient shall select one of these sites for demonstration of the Planar SOFC system.

Task 2 – PLANAR SOFC Power Generation System:

Task 2.1 – Evaluation:

The Recipient shall evaluate Planar SOFC power generation systems for consideration of installation and operation at the selected site. Rated capacity shall be between 3 and 200kW. Fuel types may include natural gas or ethanol. The power plant must be substantially manufactured in the United States (i.e., at least 50% of the value of the components must be produced in the United States. The fuel cell stack must be manufactured in the United States. The evaluation shall consider the operating characteristics and performance of the system of interest in relation to the demands of the intended site, in order to select the optimum system within the confines of the project budget.

NOTE: The Recipient shall submit a completed NEPA Questionnaire, specific to the selected site and chosen Planar SOFC power generation system for DOE review and approval. The acquisition and operation of the system is not permissible without a DOE NEPA Authorization specific to the selected site and chosen system. The Recipient is not authorized to proceed with Tasks 2.2, 3 and 4 without the specific written approval of the Contracting Officer.

Task 2.2 – Acquisition:

The Recipient shall acquire the selected Planar SOFC power generation system from the manufacturer or vendor. In addition, the Recipient shall acquire from the manufacturer/vendor or produce an operator-training curriculum, installation methodology, and an operation and maintenance schedule and manual for the selected system.

The Applicant must obtain a signed non-contingent (other than receipt of funding from the Recipient) contract for the selected Planar SOFC power generation system. The Applicant's Planar SOFC power generation system vendor must offer commercial warranties for at least one calendar year of operation as part of the signed contract.

In the event that the Recipient is ultimately unable to acquire a Planar SOFC power generation system, the Cooperative Agreement will be terminated and funding obligated to the Cooperative Agreement will be de-obligated.

Task 3 – Site Preparation:

The Recipient shall prepare detailed site plans and contract information with the selected site owner(s), as required, for the Planar SOFC system demonstration. A demonstration plan shall be prepared, to include objectives, test parameters, validation criteria, and reporting requirements.

Turnkey site integration engineering, construction documents, construction management, and commissioning shall be prepared for the site selected. The Recipient shall make all necessary arrangements for the installation of the chosen system at the selected site.

Task 4 – System Demonstration:

The Recipient shall install the selected Planar SOFC power generation system at the selected site and conduct the field demonstration tests, including maintenance as required, of the selected system for a period of one year.

Task 5 – Project Management:

The Recipient's Project Manager will manage and direct the program to meet all technical, schedule and budget requirements by coordinating activities among team

leaders and with DOE/NETL in order to accomplish effectively the work described herein. The Recipient shall provide the daily management control necessary to monitor technical progress and expenditures of the work, as well as the required documentation and briefing efforts. A project management plan shall be developed and updated consistent with good commercial project management practices. This plan provides sufficient information to document the purpose and scope of the project, the planned approach, resource allocation, and the work breakdown structure (WBS), schedule and milestones. This report describes how all phases of project are coordinated and integrated (i.e., site and system selection; acquisition, site preparation, installation and operation logistics support). This report is not a required deliverable, but shall be complete and available for DOE review within 30 calendar days after award.

The Recipient shall employ a risk management process and/or methodology to identify, assess, monitor and mitigate technical uncertainties/risks, schedule and budgetary risks associated with all aspects of this project. The Recipient shall invite the Contracting Officer's Representative to participate in the program risk reviews and technical risk assessment meetings for this project. . The COR will participate either by phone or by visiting the Recipient's facility. The results and status of the risk management process shall be presented during the semi-annual project reviews with emphasis placed on the high and medium risk items.

In addition the following shall be performed:
a) Conduct review meetings to ensure adequate communication among team leaders.
b) Conduct technical area reviews to identify, discuss and resolve technical issues.
c) Prepare and/or oversee the preparation of the required deliverables.
d) Hold periodic project review meetings with the US-DOE NETL.

D. CRITICAL PATH PROJECT MILESTONES (Milestone Plan/Status)

The following Milestone Plan, mutually agreed upon by the Recipient and DOE, is established as a part of the approved SOPO for the project. This Milestone Plan shall be used as a planning tool to establish the time schedule for accomplishing the planned work. The Milestone Plan will serve as the baseline for tracking performance of the project and identifies critical path project milestones (no less than 2 per calendar year) for the entire project.

During project performance, the Recipient will report the Milestone Status as part of the required quarterly Progress Report as prescribed in the Federal Assistance Reporting Checklist, Section 4.A.7-Progress Report.

Critical Path Project Milestone Description*	Project Duration - Start:								End:				Planned Start Date	Planned End Date	Actual Start Date	Actual End Date	Comments (notes, exp of deviation from basel
	Project Year (PY) 1				PY 2				PY 3								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12					

E. DELIVERABLES

The periodic, topical, and final reports will be submitted in accordance with the Cooperative Agreement, the associated Federal Assistance Reporting Checklist and the instructions accompanying the Checklist. Additional guidance on Checklist Deliverables is as follows:

Progress Reports: (Quarterly, see Federal Assistance Reporting Checklist, 4.A. Management Reporting) In addition to the instructions for the Progress Report provided with the Federal Assistance Reporting Checklist, presentations and trips for the subject and upcoming quarters, respectively, shall be addressed. The Recipient shall provide quarterly financial data (Baseline Cost Plan, Actual Incurred Costs and Variance) by SOPO Task or Subtask, as applicable, in the "Cost Status" section of the report. The suggested tabular format may be modified for this purpose.

Final Technical Report: (see Federal Assistance Reporting Checklist, 4.B Scientific/Technical Reporting) The Recipient shall submit the Final Technical Report in the format described in the Instructions accompanying the Federal Assistance Reporting Checklist. In addition, the "Discussion and Results" section shall address the following for the demonstration unit(s):

a. Mean Time Between Failure (MTBF)
b. Cost Parameters (all costs shall be in US dollars equivalent)
    - Total Fuel Cell Plant Capacity (kW)
    - Total Fuel Cell Plant Cost ($)
    - Fixed Operating Cost
    - Variable Operating Costs (mills/kWh)
    - Heat Rate (Btu/KWh)
    - Local Area Electricity Price (cents/kWh)
c. Capacity Factor (% of Nameplate Rating)
d. Fuel Price ($/M Btu)
e. Thermal Output (Btu/year), if byproduct used
f. Table showing site parameters before installation
    - Total electrical usage for entire site by month (kWh)
    - Peak electrical use for entire site by month (kW)
    - Total site usage of fuel by month (MMBtu)
    - Peak site usage of fuel by month (MMBtu/day)
g. Table showing site parameters during year of operation
    - Total electrical usage for entire site by month (kWh)
    - Peak electrical use for entire site by month (kW)
    - Total site usage of fuel by month (MMBtu)
    - Peak site usage of fuel by month (MMBtu/day)

Fuel cell system total use by month (kWh)
Fuel cell system peak use by month (kW)

h. 8" x 10" Glossy Picture (or electronic picture file (i.e., bmp, tif, pic)) of the fuel cell system.

In addition to the reports and deliverables identified on the Checklist and any other deliverables as listed in the Statement of Project Objectives, the following reports are also required under this award.

Project Summary - Developed yearly for inclusion in the Fossil Energy Fuel Cell Program Annual Report.

Fact Sheet - The Fact Sheet is a short document used to communicate project information, status, accomplishments and issues. A project fact sheet shall be submitted within 45 days of project start and shall be updated semiannually with special-case updates as requested by the DOE COR. Fact Sheets should not exceed two pages and will be completed using a NETL-supplied MS Word template.

F. BRIEFINGS/TECHNICAL PRESENTATIONS

The PI of the project will prepare detailed briefings for presentation at the Morgantown NETL facility at the beginning of the project and the end of the project. In addition, project reviews may be conducted annually at NETL, at the discretion of the DOE COR. These project briefings/reviews may be conducted via WebEx or Net Meeting, at the discretion of the DOE COR.

Presentation materials shall be provided to the DOE COR as needed for internal NETL use or Fossil Energy Headquarters use.