

PEM Fuel Cell Systems Providing Backup Power to Commercial Cellular Towers and an Electric Utility Communications Network

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Project ID: ARRAH2006

A New Era in Critical Backup Power

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Timeline

- Start: August 2009
- End: July 2011
- 30% Complete

Barriers

- Site Selection
- Permitting
- Fueling Infrastructure

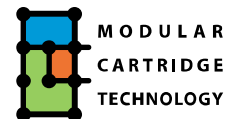
Budget

Total Project Funding

- DOE: \$8,458,431
- Contractor: \$9,644,178

Partners

- AT&T
 - Host Sites / End-user
- PG&E
 - Host Sites / End-user
- Air Products and Chemicals, Inc.
 - Fueling Storage and Supply



- The goal of this project is to install and operate hydrogen fuel cells as critical emergency reserve power for cell sites operated by AT&T and as back-up power equipment for communications sites in use by Pacific Gas & Electric (PG&E), a California utility. Up to 189 sites will be served.
- The goals of the first year were to identify specific sites based on power load and fueling access, and begin deployment.
- This project's relevance to the goals of ARRA:
 - the manufacture and installation of up to 189 fuel cell systems creates and retains direct and indirect jobs at ReliOn and indirect jobs through the service supply chain, and develops growth in new service industries to install and refuel these systems.
- This project's relevance to U.S. DOE goals:
 - by moving beyond limited demonstration sites to wider deployments, the benefits of fuel cells as a back-up solution has higher visibility within the industry, builds a critical mass for advanced refueling infrastructure using compressed hydrogen, and provides broad experience to installers and jurisdictions, reducing barriers to siting.
 - Reduced operational cost of delivered hydrogen and longer run-time are accomplished by implementing bulk refueling in place of packaged gas exchange.

- Identify and select specific sites for fuel cell system installation
- Secure NEPA approval
- Secure approval from fueling supplier for access to all sites
- Manufacture and allocate all fuel cell systems
- Deploy first phase of fuel cells and hydrogen storage systems
- Commission first phase of installed systems
- Deliver initial bulk fuel to first phase of installed systems
- Transition operation to end-user

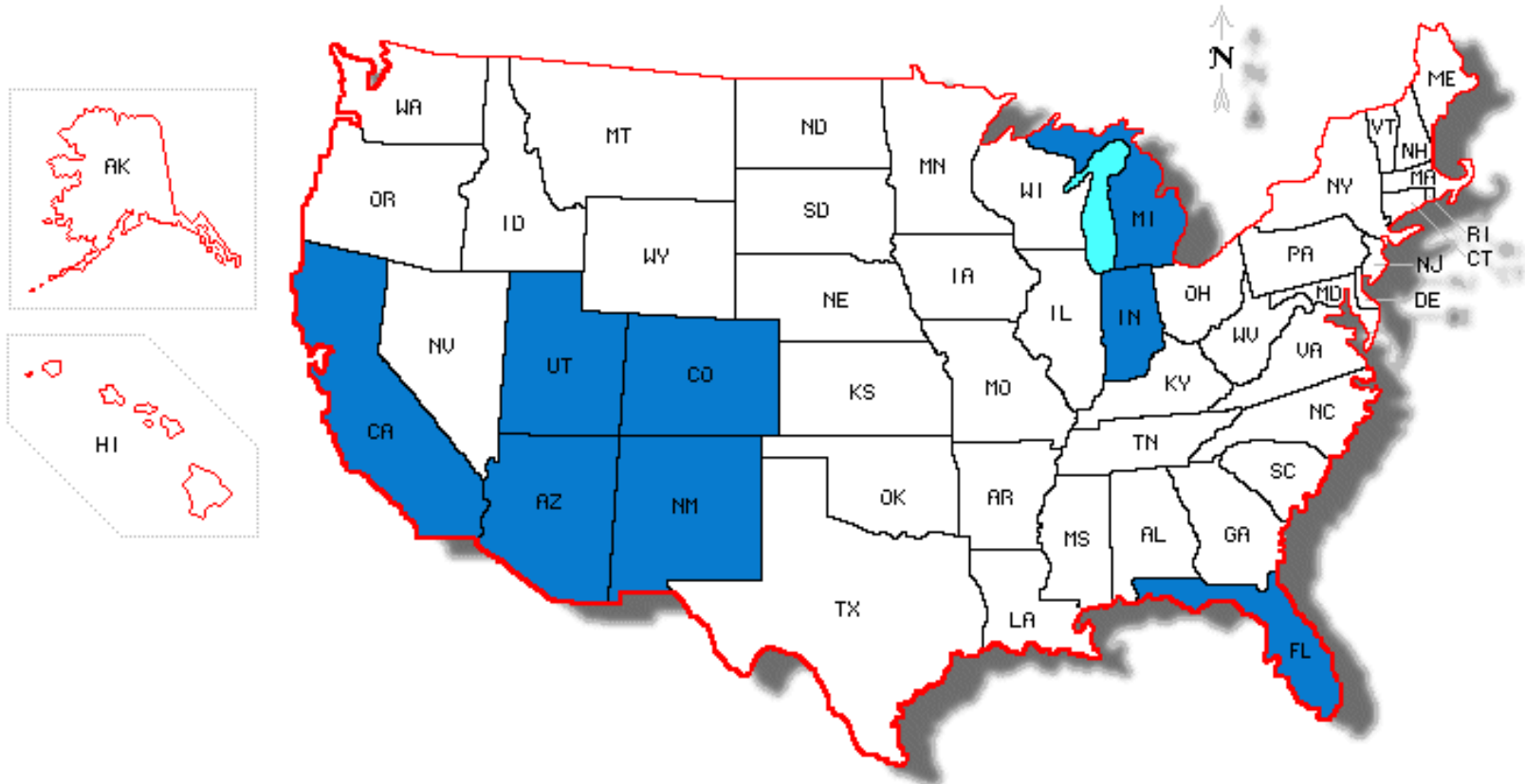
- The project is structured in three phases: Site Selection & Permitting, Equipment Installation, and Data Collection & Reporting.
 - The emphasis is on commercial processes and procedures to validate the readiness of the mainstream stakeholders (end-users, construction vendors, fuel providers, permitting officials) to quickly adopt fuel cell backup systems.
- Phase I: Site Selection & Permitting
 - Site Surveys : 100% complete
 - Identify final sites from a candidate list of 441 sites
 - GO/NO-GO criteria for each site
 - Power requirements
 - Site space availability
 - Site Access for refueling
 - Milestones
 - PG&E surveys – 100% complete
 - AT&T surveys – 100% complete
 - Permitting and Site Acquisition : 25% complete
 - Building/Electrical/Fire permits
 - Site Acquisition and Lease/Zoning Amendments
 - NEPA clearance (100%)
 - GO/NO-GO criteria: all permits and amendments secured
 - Milestones
 - PG&E Permits and Site Acq 9 sites – 90% complete
 - AT&T Permits and Site Acq 180 sites – 20% complete

- Phase II: Equipment Installation
 - Site Construction
 - Fuel Cell System Installation
 - System Commissioning
 - Milestones
 - PG&E sites – 0% complete
 - AT&T sites – 5% complete
- Phase III: Data Collection and Reporting
 - Data Collection
 - Project Management and Reporting
 - Milestones
 - Safety Plan (submitted 12/2009)
 - Quarterly Reports
 - Quarterly Data Collection

- Site surveys completed on 441 sites
 - The applicability of fuel cells in a variety of sites and environments was assessed
 - Access for bulk fuel delivery was assessed at every site. This information was significant in enhancing the fuel company's ability to serve smaller, more restricted sites.
- Permitting completed on 45 sites
 - Coordination with local authorities and landlords was accomplished in multiple regions, educating stakeholders of the benefits and requirements of siting fuel cells. Each subsequent site approval within a region was significantly easier.
- NEPA permitting was completed
 - All installations are retro-fits into existing sites, minimizing any environmental impact.
- Significant progress and success in Phase 1 activities and milestones

Accomplishments – Multi-state

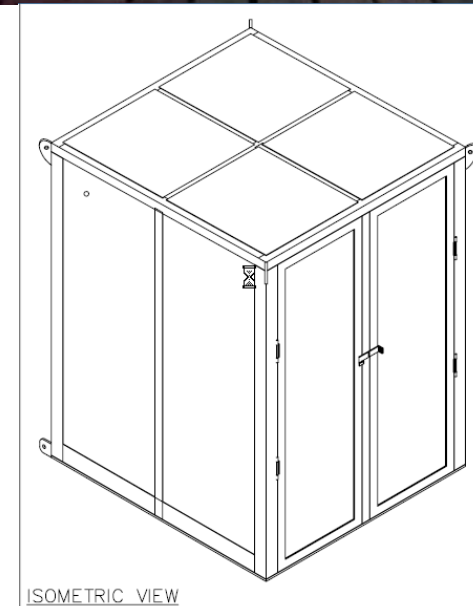
- Sites across 8 states



Accomplishments – Typical Site Installations



- Ancillary accomplishments
 - Initiation of development of enhanced vehicle for hydrogen delivery to broader population of sites
 - Smaller vehicle
 - Lighter weight
 - Better fuel economy
 - Better payload utilization
- Development of hydrogen storage solution
 - (prior to ARRA effort)
 - Commercial, multi-cylinder module
 - U.S.DOT 3AA 3000, 80L cylinder
 - Meets the requirements of 72 hours capacity



- ReliOn
 - DOE Prime Contractor
 - Fuel Cell System Manufacturer
 - Installation Prime Contractor
- AT&T
 - Customer / Host Sites / End-User
 - Up to 180 sites with bulk refueling
 - Extensive involvement in site selection and development
- PG&E
 - Customer / Host Sites / End-User
 - 9 sites with cylinder exchange
- Air Products & Chemicals, Inc.
 - Partner / Supplier
 - Hydrogen Storage / Bulk Fueling Service
 - Extensive involvement with storage development and fueling infrastructure

- FY 2010
 - Complete site permitting
 - Continue to install and commission sites per schedule
 - Report operational data on commissioned sites
- Remainder of program
 - Complete all installations (goal: Q4 2010)
 - Report operational data throughout duration of program
- Risks to this program were front-loaded, primarily on site selection/acquisition
- Risks going forward:
 - Site Acquisition (moderate risk, based on experience)
 - Refueling (moderate risk; limited trucks, weather)
 - Fuel cell installation (minimal risk; weather)
 - Fuel cell operation (minimal risk; commercial systems)
 - Data collection (low risk; wireless modem functionality)

- Relevance
 - The deployment of 189 fuel cell systems in two networks, across 8 states, with a new fueling solution has already begun to transform the market by raising awareness in multiple stakeholders, and has resulted in direct and indirect employment at ReliOn, and indirect employment up and down the supply chain which will continue after the program is completed.
- Approach
 - Focusing on commercial processes and industry standards, the deployment moves beyond traditional “demonstration” programs to reach a critical mass necessary to engage a supply chain and a fueling infrastructure, and touch a broad spectrum of stakeholders.
- Technical Accomplishments & Progress
 - All site surveys are completed. Permitting and site acquisition are well underway, and equipment installation and commissioning sites has begun. New fueling storage and infrastructure solutions have been deployed.
- Collaboration
 - The team brings together a leading fuel cell system manufacturer (ReliOn) with the nation’s largest wireless telecommunications carrier (AT&T), a California utility (PG&E), and a major industrial gas supplier (Air Products), to field commercial systems in real-world installations across a broad range of environments.
 - The critical mass of systems enables the program team to penetrate nation-wide regions with corporate level attention, and catalyze non-DOE-funded activities in fuel storage and delivery.
- Future work
 - Complete all installations in CY 2010 and collect operational data through Q3 2011