

Green Communities



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Organization: NREL

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Project ID: MT003

Overview

Timeline

- Start: 7/2010
- Finish: 10/2011*
- 20% Complete

Budget

- Total Project Funding
 - DOE share: \$2.2M
 - Contractor Share: 50%
(min required cost share)
- Funding received in
FY10: \$2.2M
- Funding in FY11: \$0

Barriers Addressed

- Expanded market opportunities
- Increased deployment of commercial systems
- Increased public awareness

Partners

- To be selected using NREL's established contracts and business services procedures

*Project continuation and direction determined annually by DOE

Objectives - Relevance

1. Develop methods and techniques for identifying and evaluating candidate communities for suitable hydrogen and fuel cell technology projects.
2. Assist communities in deploying and using hydrogen and fuel cell technologies in innovative integration projects with existing energy efficiency, conservation, and renewable energy investments.
3. Develop case studies for replicating successful deployments to other similar communities.
4. Build relationships with communities embracing hydrogen and fuel cell technologies.

Green Communities Methodology - Relevance

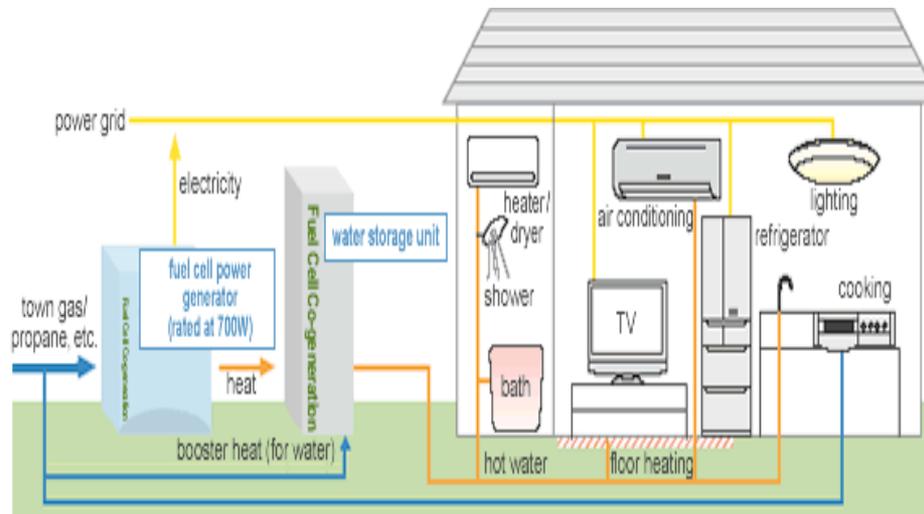
Purpose

Foster the integration of hydrogen and fuel cell technologies into communities to support the goals of energy efficiency, conservation, sustainability, renewable energy and reduced green house gas (GHG) emissions.

Drivers

- Assessment of the technical, environmental, economic and social benefits of integrating H₂ into communities
- A systems level approach to integration & enabling renewable energy use

Example: Deployment of Fuel Cells into Residential Communities



Outcomes

- Short-term goal is deployment & demonstration of H₂ technologies in communities
- Longer term goal is to transform the market & replicate successful deployments to similar communities

FY10 & FY11 Milestones - Approach

Month/Year	Milestone or Go/No-Go Decision	% Complete
Nov - 2010	Milestone: Developed methodology for evaluating and ranking community types.	100%
Dec - 2010	Go/No-Go Decision: Presented community evaluation methodology and analysis results to DOE. Decided to proceed with community project solicitation phase.	100%
Feb - 2011	Milestone: Posted Sources Sought Notice and gathered community responses for potential deployment projects.	100%
Mar - 2011	Milestone: Post Request for Proposals for full project proposals.	80%
May - 2011	Milestone: Complete evaluation of project proposals and select projects for awards.	0%
Jun - 2011	Milestone: Complete subcontract negotiations with selected awardees.	0%

Evaluation of Community Types - Approach

Wide Array of Community Types Evaluated

Institutional

- Military bases
- Colleges & universities
- National labs
- Prisons
- Hospitals
- Airports
- Technology campuses

Residential

- “Smart Design” mixed use communities
- Retirement communities
- End-of-grid housing
- Island residential communities
- Off-grid houses

Tourist Settings

- Island tourist community
- National parks
- Ski resorts

Ranked Community Types Based on Project Goals

Used a Decision-Matrix Approach

Project Ranking:

- 18 ranking criteria with different weightings
- 4 ranking categories:
 - Technical considerations
 - Market potential
 - Project financials
 - Outreach potential

Find projects that are:

- Technically feasible
- Economically feasible
- Market transforming
- Able to support & enable renewable energy

Most Promising Deployment Concepts That Meet Goals

Maximize Impact of Deployment Project

Top Community Types:

- Off-grid communities
- Urban districts
- “Smart Design” mixed-use developments
- Technology firm campuses

Expectation is that the deployment phase of the project will help transform the market for both the particular application and also a wider array of similar applications

Analysis and Partnering – Approach

Recruitment of Top-Ranked Community Types

Targeted Communities:

- Off-grid communities
- Urban districts
- “Smart Design” developments
- Technology firm campuses

Technical Analysis and Modeling:

- Developed solutions matrix of potential system configurations
- Fuel cell types
- Renewable energy integration
- System interconnects

Analyze Potential Deployment Opportunity



Economic Analysis and Modeling:

- Economic analysis using NREL stationary fuel cell “Power Model”
- Project financial analysis
- Assessment of market potential
 - Short-term potential
 - Long-term potential

Maximize Deployment Impact Through Partnering

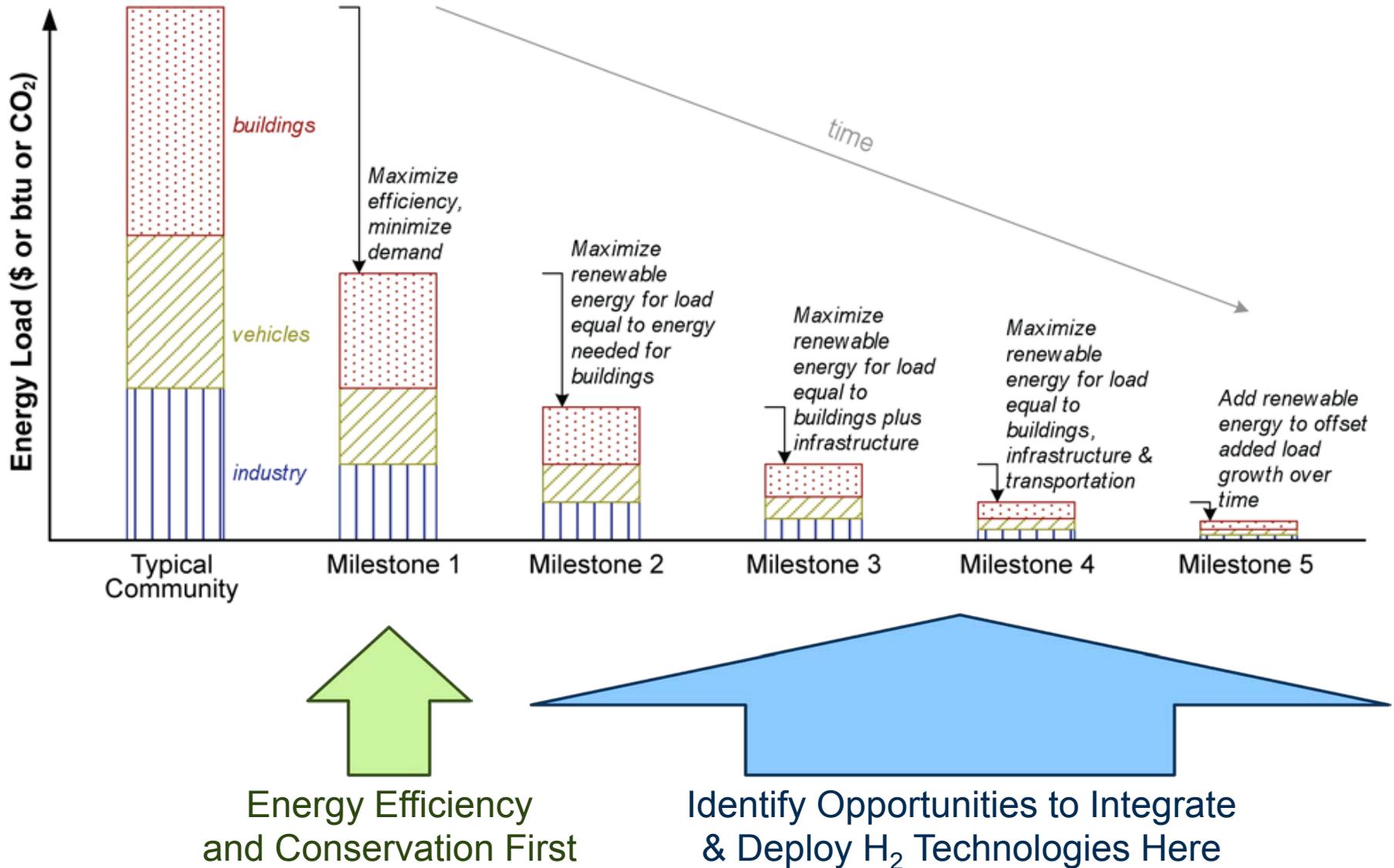
Determine Partnering Opportunities:

- Identify ongoing energy efficiency, conservation, renewable energy and deployment projects
- Target existing projects in top-ranked categories
- Nurture and develop most promising partnerships

Awardee Evaluation Criteria- Approach

1. Determine Baseline Energy Consumption
 - a. Energy audit to determine carbon footprint
 - b. GHG inventory by sector (electrical, thermal, transportation)
2. Analyze Technology Options and Economics
 - a. Efficiency and conservation measures
 - b. Ability to leverage & integrate with existing efficiency and conservation projects and other community investments
 - c. Hydrogen and fuel cell technologies
 - d. Options to integrate with renewable energy sources
3. Define a Deployment Plan and Set Priorities
 - a. Determine acceptable financial criteria
 - b. Set project goals and schedule

Community Opportunities to Integrate H₂ - Approach

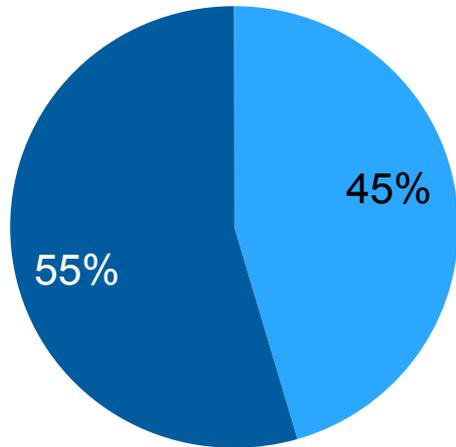


Evaluation Matrix – Technical Accomplishment

1. Developed a decision matrix tool that highlights the most promising community types for deployment projects
2. Used the Pugh Method (aka Pugh Concept Selection method)
3. Ranked a wide variety of community types against a set of ranking criteria developed by DOE and NREL

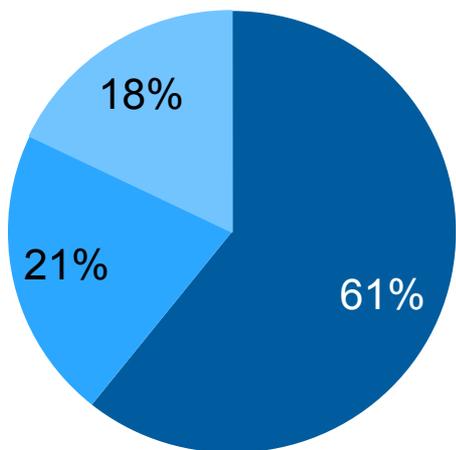
		Concepts	Ski resorts	Island/tourist community	Colleges	New housing development at end of grid	Military base	National Labs	Off-grid houses
		Power level (kW)	1000	1000	1000	1000	1000	1000	5
		Concept description	Ex: some place in Aspen, CO	ex: Remote hotel on an island such as big island		Ex:			ex: mountain high-end homes
IMPORTANCE TO MARKET TRANSFORMATION		CATEGORY	CRITERIA						
5.3	TECHNICAL CONSIDERATIONS	Ease of installation	3	3	9	3	9	9	1
7.0		Accessible for maintenance	3	1	9	1	3	9	1
6.5		Capital utilization	1	9	3	9	9	9	9
8.8		Technology readiness	3	1	3	1	9	3	1
6.8		Possible renew energy/fuel use	1	3	1	3	9	9	3
4.0		MARKET POTENTIAL	Short-term potential to change market	1	3	1	3	3	1
9.8	Long-term potential to change market		3	9	3	9	3	3	9
7.0	Size of potential market		3	1	3	1	9	3	1
5.3	Off-grid/Potential for Grid Isolation		3	9	0	9	3	1	9
5.3	Transport/FCV integration		1	3	9	1	9	9	1
7.0	PROJECT FINANCIALS	Project cost (smaller the better)	3	3	9	1	3	9	1
7.3		Willing demonstration sites	1	3	9	3	9	9	3
7.8		Cost-share potential	1	1	1	1	9	1	1
6.8		Owner/Deployment Site Risk	3	1	1	0	3	3	0
4.5	OUTREACH / LEARNING	Accessible to the general public	3	1	9	1	1	3	1
6.5		Accessible to influential public	9	3	9	1	9	9	1
7.8		Accessible for monitoring & study	3	1	9	1	3	9	1
4.8		Novelty of deployment/new market	9	3	3	3	3	3	3
Technical Score			76	110	163	110	266	215	100
Market Score			75	170	102	159	167	107	159
Financial Score			56	57	143	37	176	156	37
Outreach Score			138	46	183	33	101	156	33
Total Score			346	383	590	339	710	634	329

Sources Sought – Technical Accomplishment



- Community Led Response
- Non-Community Led Response

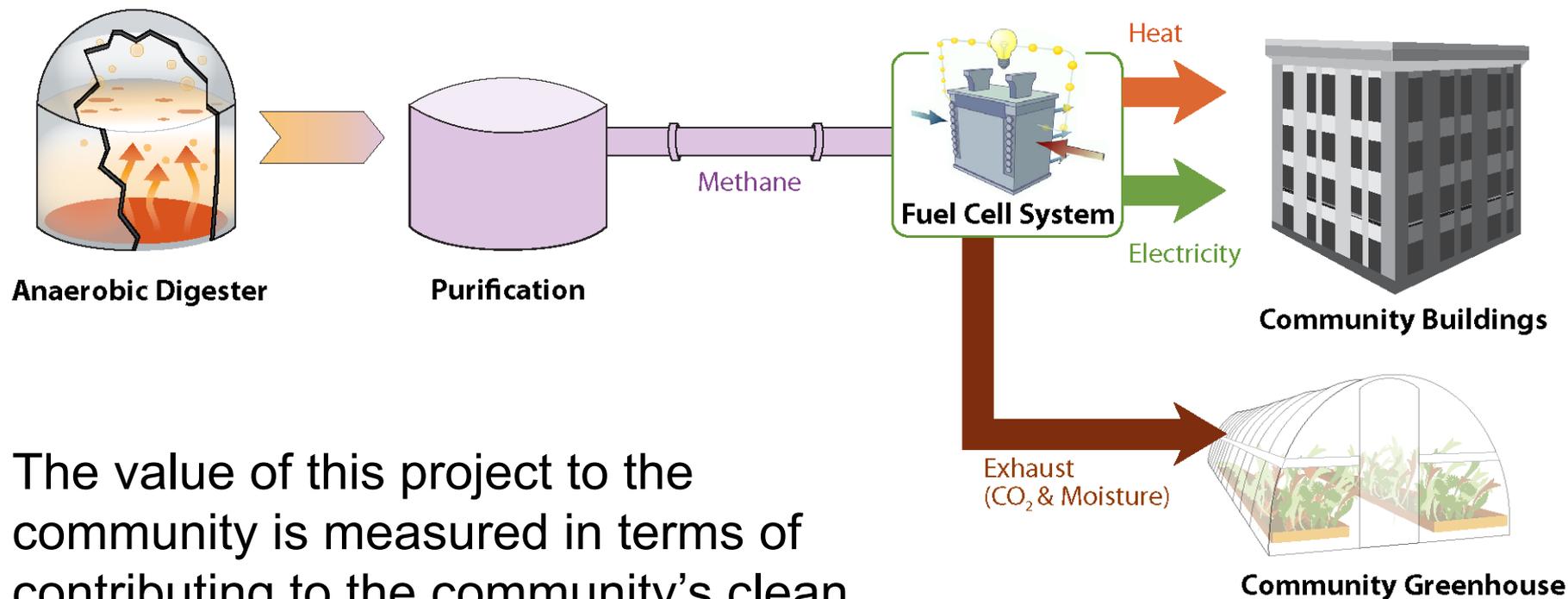
A total of 29 responses received to the Sources Sought Notice from a variety of community and non-community led teams



- Fuel Cell Projects
- Electrolyzer Projects
- H2 Fueling Station Projects

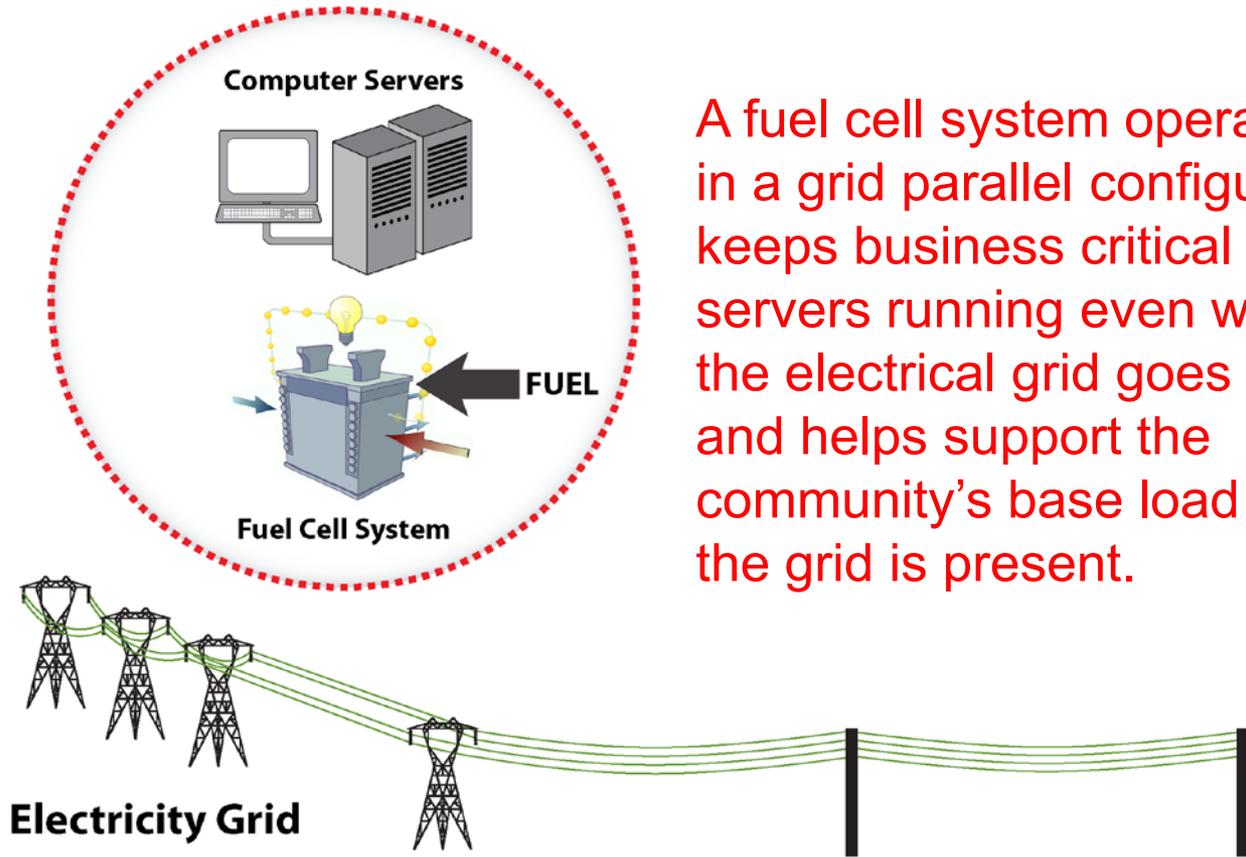
A variety of proposed project types received covering different H₂ and fuel cell technologies, as well as varying degrees of system integration

Identified Off-Grid Opportunity – Technical Accomplishment



The value of this project to the community is measured in terms of contributing to the community's clean energy plan, reduced GHG emissions and increased local food production with a decreased carbon footprint.

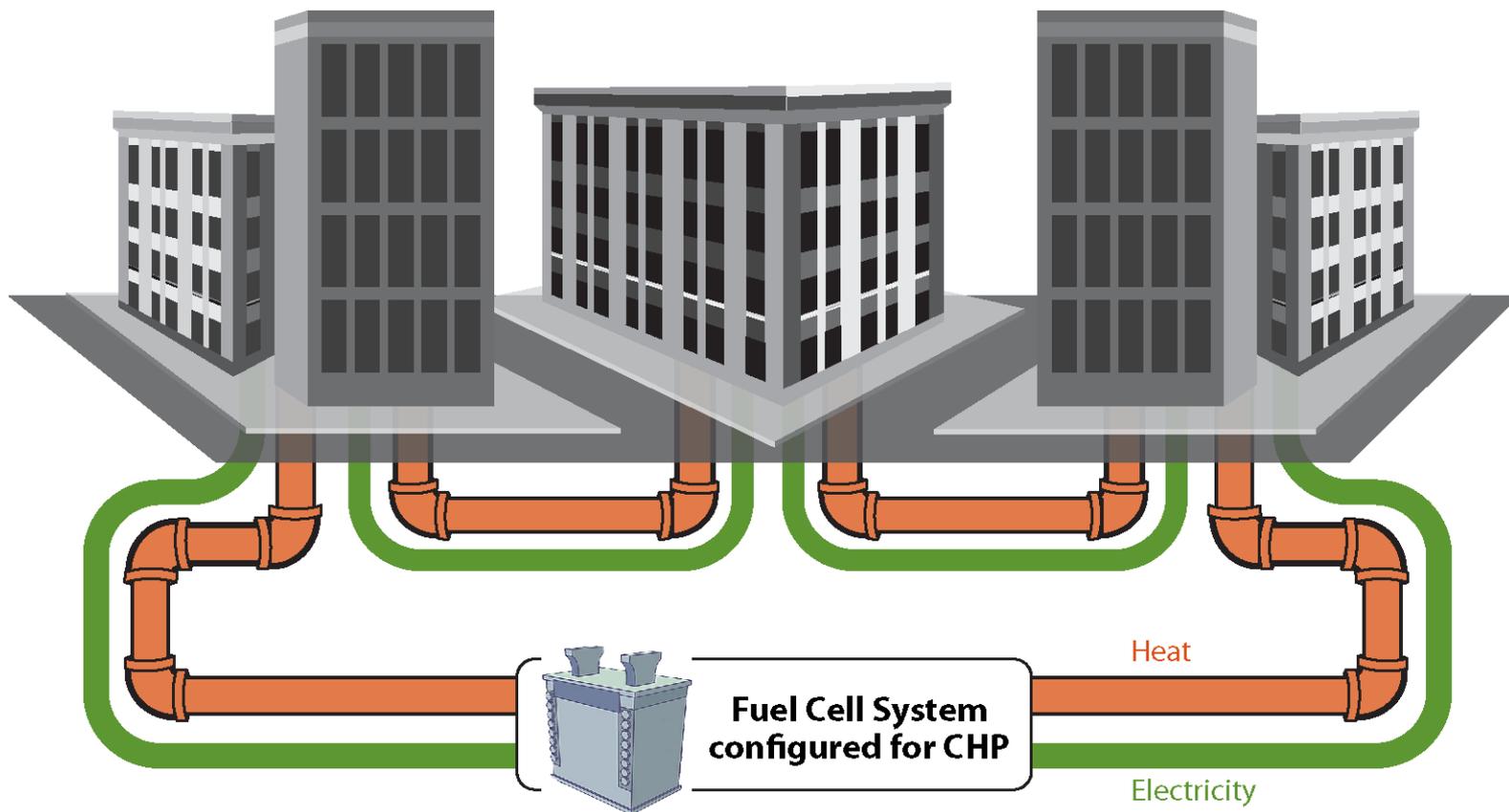
Identified Technology Campus Opportunity – Technical Accomplishment



A fuel cell system operating in a grid parallel configuration keeps business critical servers running even when the electrical grid goes down, and helps support the community's base load when the grid is present.

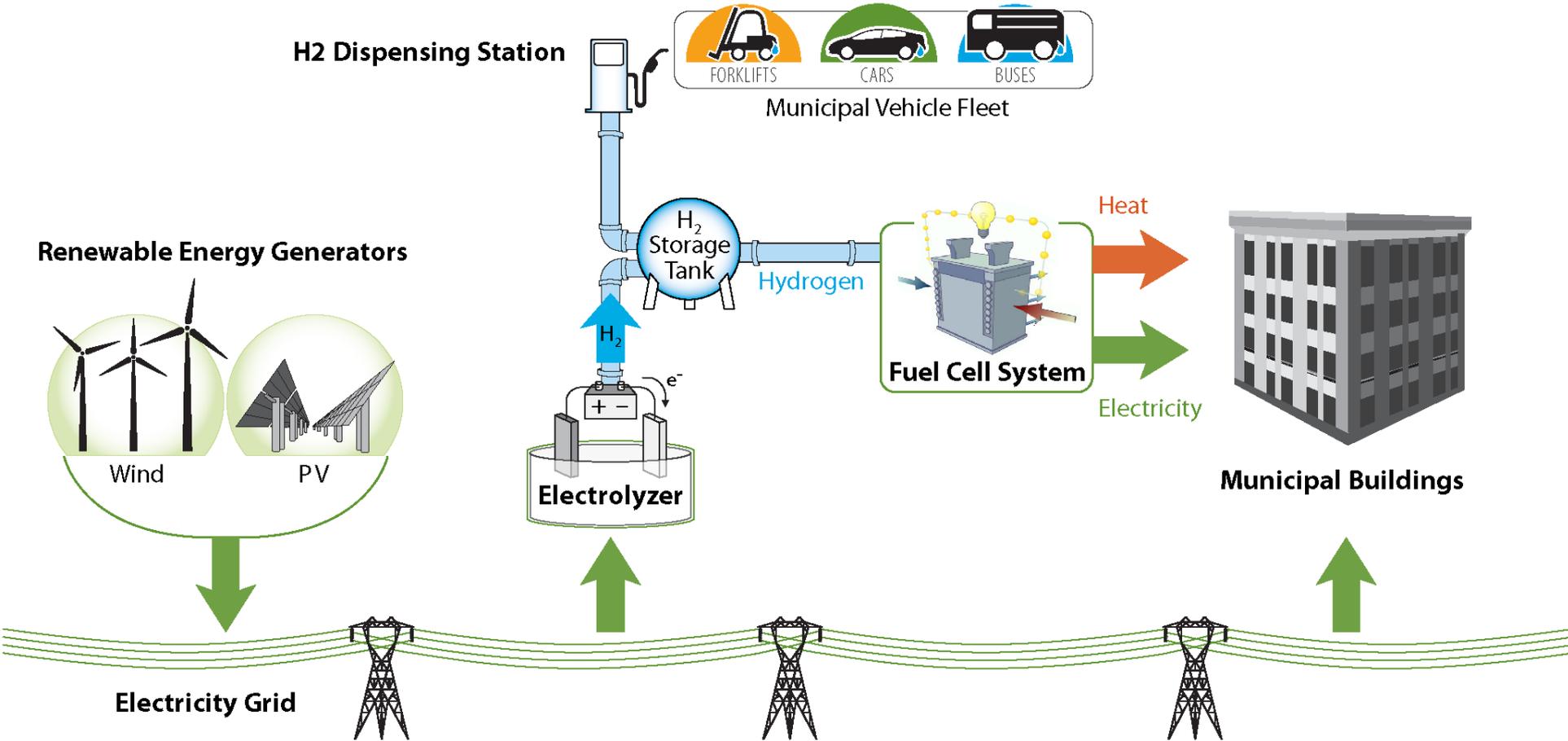
The value of this project to the community is measured in terms of increased power security for the community's business mission, and contributing to a corporate mandate for improved energy efficiency and reduced GHG emissions.

Identified Urban Opportunity – Technical Accomplishment



The value of this project to the community is measured in terms of achieving energy efficiency and GHG emission goals adopted in the community's sustainable energy plan.

Identified Municipal Energy Storage Opportunity – Technical Accomplishment



This project enables the municipality to store excess renewable energy production in the form of H_2 for subsequent use in vehicles and a fuel cell system.

Identifying Collaborators- Collaborations

1. Collaborators will be identified once the project subcontracts are successfully negotiated
2. Collaborators will be selected using NREL's established contract and business services procedures
 1. Sources Sought process
 2. Request for Proposals (RFP) process
 3. Subcontracting process
3. Anticipated collaborator types include:
 1. Communities
 2. H₂ and fuel cell equipment manufacturers
 3. Project engineering firms
 4. Non-profits and for-profits

Proposed Future Work

- Complete Sources Sought process
 - Evaluate responses to Sources Sought Notice (March 2011)
 - Determine invite list for RFP process from responders (March 2011)
- Conduct Request for Proposals (RFP) process
 - Define RFP based on results of Sources Sought process (March 2011)
 - Issue RFP to selected Sources Sought responders (March 2011)
 - Responders complete full proposals (April 2011)
 - Evaluate full proposals and select projects for negotiations (May 2011)
 - Negotiate sub-contracts (June 2011)
 - Award sub-contracts (June 2011)
- Monitor Awarded Subcontracts (June 2011 – End of FY11)

Summary

Green Communities Market Transformation Project

- Project will support the integration of hydrogen and fuel cell technologies into communities that have already invested in energy efficiency and conservation measures
- Developed a methodology to evaluate and rank candidate community types, and investigated a wide variety of potential project types
- Presented evaluations of potential community types and projects to DOE
- Issued a Sources Sought Notice to solicit community responses for innovative deployment projects
- Request for Proposals process will be used to evaluate candidate communities and projects for subcontract awards