



# **State and Local Government Partnership**

**Joel M. Rinebold  
Connecticut Center for  
Advanced Technology, Inc.  
June 11, 2010**

**PROJECT ID#: ED012**

This presentation does not contain any proprietary, confidential, or otherwise restricted information.



# OVERVIEW

## Timeline

- Start – Sept 2008
- Finish – Aug 2010
- 85% Complete\*

## Budget

- Total project funding
  - DOE share - \$197,425
- Funding received since contract
  - \$197,425 (\$101,656 in 2009)

## Barriers

- **Barriers**
  - > A. Lack of Readily Available, Objective, and Technically Accurate Information for Decision Makers for Specific Applications
  - > B. Disconnect Between Hydrogen Information and State and Local Planning Initiatives
  - > C. Lack of Technical Models to Rapidly Assess Costs and Values for Facility Development

## Partners

- Local, State, Federal
- CCAT
- Industry

- Foster Improved Relationships
- Provide Technical Resources/Models
- Improve Exchange of Knowledge
- Coordinate State/Local Planning
- Facilitate Deployment



# Approach – Project Components

The Partnership Building project has five components:

- 1: Identify key stakeholders; expand and strengthen partnerships
- 2: Develop resources to analyze potential sites for hydrogen and fuel cell deployment
- 3: Educate state and local decision makers and other key stakeholders
- 4: Integrate state and local development plans with federal/DOE objectives
- 5: Identify financial and investment opportunities



# Approach and Milestones

Milestones	Progress Notes	% Complete
Identify Key Stakeholders	Developed a database of local and state decision-makers and key stakeholders.	100%
Develop Resources for Hydrogen and Fuel Cell Deployment	Developed a brief report detailing criteria for the deployment of hydrogen and fuel cell technologies for transportation, stationary and portable power applications. Developed a database of potential sites for the deployment of hydrogen and fuel cell technology including: commercial and public buildings and transit, public and private fleet vehicle locations.	100%
Develop Online Information, Models and Tools for User Analysis	Developed an inventory of appropriate models and tools to assess environmental value, energy management, renewable energy, cost and economics; and undertook a comparison of competing technologies. Developed a website and Regional Resource Center with appropriate information, models and tools.	100%
Educate State and Local Decision Makers	Organized nine collaborative meetings with regional planning agencies, presented at local associations, conferences, held a workshop and organized a informational forum for policymakers. Assistance provided to municipalities regarding the development of fuel cell projects, grant applications, and transportation initiatives.	85%
Integrate Local Energy Plans with State Plans	Worked with state Department of Transportation to develop hydrogen fueling and vehicle deployment strategies and local municipalities to integrate energy plans with state plans and energy goals.	85%
Identify Financial and Investment Opportunities	Developed a brief report of incentives, funding and investment opportunities for hydrogen and fuel cell technologies.	85%
Organize and Hold Regional Briefing	Developed a database of DOE contacts and key stakeholders in northeast states for regional briefing. Currently organizing regional briefing/conference and webinar.	60%
Pre and Post Program Survey	Developed survey to assess level of knowledge of local and state decision makers and key stakeholders for the beginning of the program.	50%

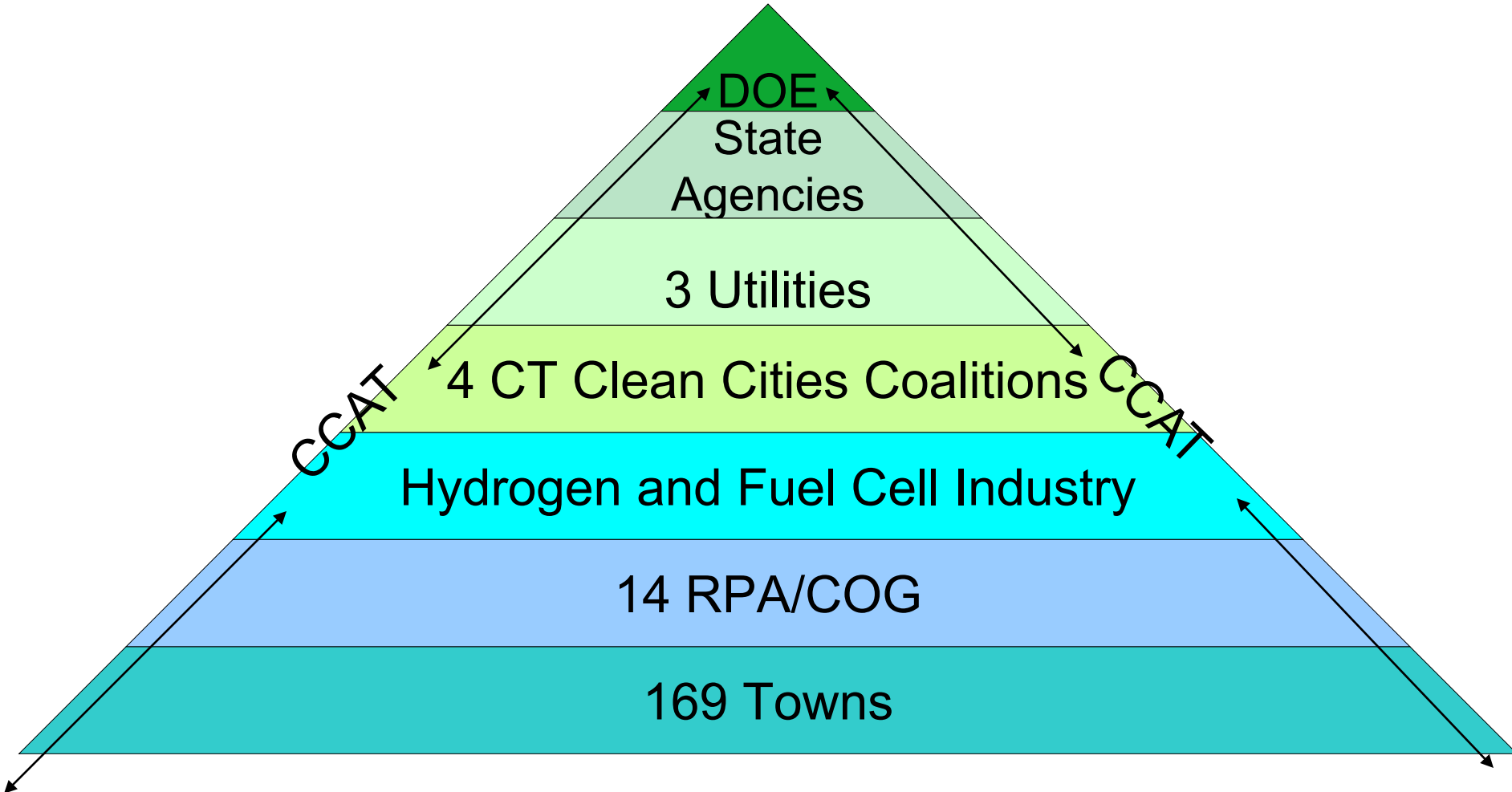


# Approach - Implementation Strategy





# Key Stakeholders





# Previous Accomplishments

- Identified key stakeholders, expanded and strengthened partnerships
- Developed a survey to establish a baseline of stakeholder knowledge
- Developed resources to analyze potential sites for hydrogen and fuel cell deployment (criteria and mapping of potential locations for deployment)
- Began to develop on-line models and tools for a Regional Resource Center



## **Developed resources to analyze potential sites for hydrogen and fuel cell deployment:**

- Developed on-line Regional Resource Center
- Developed Regional Resource Center models
  - Environmental Value (lbs/kWh)
  - Energy Management (kWh/peak/off peak)
  - Renewable Energy (RPS/REC)
  - Technology Comparative Analysis (electric/thermal value)
  - Cost/Economics (ROI)

## **Educated State and Local Decision Makers and Other Key Stakeholders:**

- Presented at nine regional planning agencies/regional councils of government
- Exhibited at the Connecticut Conference of Municipalities Conference
- Presented on a Bi-Monthly State and Regional Initiatives Call
- Developed and held a workshop for municipalities
- Developed and held a legislative briefing/forum
- Presented at Green Energy & Building Expo
- Presented at Connecticut Power & Energy Society

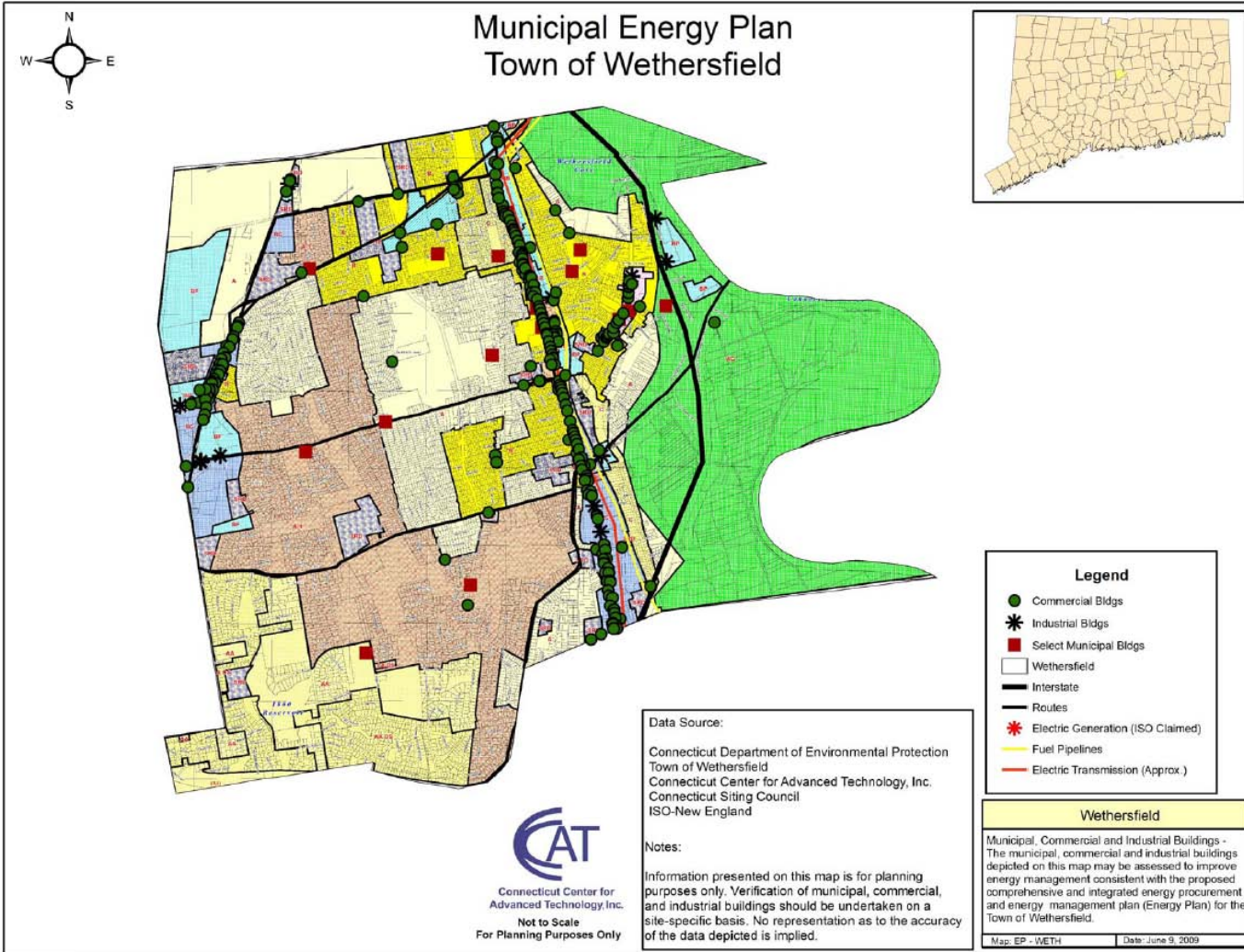
## **Integrated Local Energy Plans with State Transportation, Energy, Climate Action Plans:**

- Provided information to municipal decision makers including hydrogen and fuel cell benefits and project analysis
- Monitor state energy studies/plans for accurate information regarding hydrogen and fuel cells
- Working with the CT Dept. of Transportation to develop a plan for hydrogen fueling infrastructure and vehicles



# Municipal Energy Planning

EXAMPLE ONLY



## **Identify Financial and Investment Opportunities:**

- Integrate results of economic model (Proforma)
- Identify strategies for funding
  - Local
  - State
  - Federal
- Identify opportunities to leverage local, state, and federal funds

## **Results of Outreach Efforts:**

- Town of Weston (UTC 400)
  - Project modeling and interconnection assistance
- Town of Killingly (FCE 300)
  - Project modeling
- University of Bridgeport (FCE 300 or UTC 400)
  - Project modeling and RFP development assistance
- United States Postal Service (FCE 300 or UTC 400)
  - Project modeling and ESCO assistance for distribution centers
- Connecticut Transit (FCE EHS 300)
  - Tiger grant application assistance for vehicles and refueling
- Department of Veteran Affairs (Fuel Cell or other CHP)
  - Project modeling and verification at West Haven VA Hospital



# Economic Modeling

Connecticut Center for Advanced Technology, Inc.

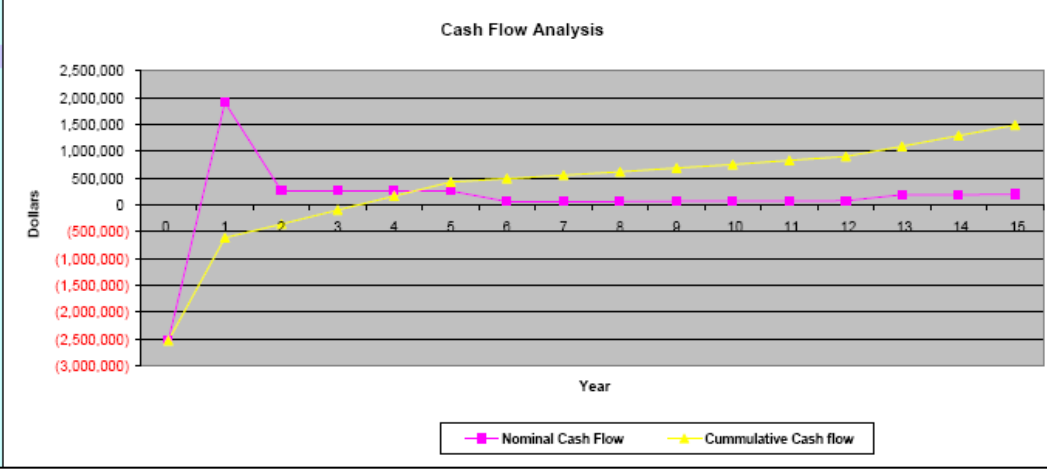
Payback in year 4	
NPV	\$534,274
IRR	15%

FC	Technology
1,033	KWAC Peak Host Demand Capacity
73%	Host approximate Load Factor
5,531,184	kWhs Host Average Energy Demand
0%	Host Expected Return on Equity
2,854,948	btu/hr Average Host Heat Demand
400	KWAC Fuel Cell Installation
95.00%	Capacity Factor
9,475	Average Heat Rate
31,540	mmbtu Heat Input Per Year Required
3,328,800	Fuel Cell Gen output is 60.2% of Host Requirement
785,000	btu/hr Average generated
16.47	Utility Avoided Energy Cost ¢/kWh
3.0%	Utility & Nat Gas & LFG Esc. Rate
3.0%	O&M Esc. Rate
\$12.00	CHP Input Fuel \$/mmbtu
\$17.63	Fuel Oil Cost \$/mmbtu
\$0.00	Propane Cost \$/mmbtu
\$17.23	Boiler Natural Gas and Fuel Oil Cost \$/mmbtu
\$30.00	Recs Market Value De-Esc @2%
2.00	O&M ¢/kWh
80.0%	Natural Gas or Oil Fired Boiler Efficiency
15	- Number of Years in the Analysis
rate 35	Host CL&P Electric Rate
Third Party Rate	0.00

CL&P	<input checked="" type="checkbox"/>
UI	<input type="checkbox"/>
Non Profit	<input type="checkbox"/>

Cost of Capital:			Capital Cost:		
	Percent	Rate	pre-tax	-C	
Debt	100.00%	7.00%	7.00%	\$4,500	perKW
Equity	0.00%	12.00%	0.00%	\$1,826	perKW
Weighted Capital Cost			7.00%		
<b>Finance Term - 12 Years</b>			<b>B/E Analysis</b>		
<b>Depreciation - 5 Years</b>			Total Cost		
			Or		
			Re-stack		
			Subsidies&Tax		
			Host Equity		



## **FY10 (Ending August 31, 2010)**

- Continue education of local and state decision makers
- Organize and hold Regional Briefing
  - Working with Northeast Energy & Commerce Association to develop program
  - Developing webinar for additional outreach
- Re-survey local and state decision makers
  - Provide a brief report of results





# Project Schedule

Activity	4 <sup>th</sup> Qtr 2008	1 <sup>st</sup> Qtr 2009	2 <sup>nd</sup> Qtr 2009	3 <sup>rd</sup> Qtr 2009	4 <sup>th</sup> Qtr 2009	1 <sup>st</sup> Qtr 2010	2 <sup>nd</sup> Qtr 2010	3 <sup>rd</sup> Qtr 2010
Identify key stakeholders; expand and strengthen partnerships								
Develop resources to analyze potential sites for hydrogen and fuel cell deployment								
Educate state and local decision makers and other key stakeholders								
Integrate local energy plans with state transportation, energy, and climate change action plans								
Identify financial and investment opportunities								
Organize and Hold Regional Briefing								
Survey level of knowledge of local and state decision makers and key stakeholders								
Outreach and Reporting								

- Local Partners
  - Mayors, First Selectmen, Public Works Officials
- Organizational Partners
  - CHFCC, CPES, NECA
- State Partners
  - Legislators, State Agencies (DPUC, DEP, DECD, DOT, CSC)
- Federal Partners
  - DOE, DOD
- Regional
  - Regional Planning Organizations/Council of Governments
- Utilities
  - Northeast Utilities, United Illuminating



# Project Website



Connecticut Center for Advanced Technology, Inc.

April 5th, 2010

Search

USER

PASSWORD

[ABOUT CCAT](#)

[SERVICES](#)

[EVENTS](#)

[PUBLICATIONS/NEWS](#)

› [Energy Overview](#)

› [Services](#)

› [Contact Energy](#)

› [Hydrogen Advancement](#)

› [Fuel Cells for Municipalities](#)

› [DOE/CCAT Regional Resource Center](#)

› [Connecticut Hydrogen-Fuel Cell Coalition](#)

› [Energy & Infrastructure Planning Center for Energy Solutions and Applications](#)

› [Renewable Energy](#)

› [Biodiesel Grant Program](#)

› [Energy Events](#)

## Regional Resource Center

The Regional Resource Center (RRC) provides online information, models, and other tools to assist local and state planners to quantify the costs and benefits of hydrogen and fuel cell technology at identified potential sites. The information in the RCC ensures that planners have the information needed to match a potential application with the most appropriate technology. By ensuring appropriate application of the technology, it is expected that the success rate of these early market applications will be high, which will, through case studies and information sharing, promote additional applications and serve to reinforce the message that hydrogen and fuel cell technology is reliable, safe, and cost effective.

## Models & Tools

- [Environmental Model](#)
- [Economic/Cost Model](#)
- [Energy Management Model](#)
- [Distributed Technology Comparison](#)
- [Hydrogen Generation from Renewable Technology](#)

## Presentations

- [Fuel Cells for Municipalities Workshop - September 22, 2009](#)
- [Avalence](#)
- [UConn - Clean Energy](#)
- [Fuel Cell Energy](#)
- [General Motors](#)
- [Infinity](#)
- [Logan Energy](#)
- [Precision](#)
- [Proton](#)
- [UTC Power](#)

## Funding

- [Connecticut Fuel Cell Funding Incentives](#)
- [New England Fuel Cell Funding Incentives](#)

## Links

- [Connecticut Hydrogen Fuel Cell Coalition - Fuel Cell Information Database](#)
- [U.S. Department of Energy - Hydrogen Education](#)
- [U.S. Department of Energy - Safety Page](#)
- [Introduction to Hydrogen Safety for First Responders](#)
- [U.S. Fuel Cell Council](#)
- [National Hydrogen Association](#)



# Project Summary

- **Relevance** – Help to reduce conflict, improve state/regional and municipal relations, and provide community supported solutions to address local and regional energy issues.
- **Approach** – Develop partnerships and technical models to encourage and promote hydrogen and fuel cell technology in early market applications.
- **Progress**
  - Identified key stakeholders.
  - Assessed stakeholder awareness.
  - Developed resources and criteria to analyze sites/deployment for potential market opportunities.
  - Educated key stakeholders through outreach and assistance.
- **Collaborations** – Collaboration with local, state and federal partners.
- **Proposed Future Research** – Organize and hold a regional briefing, perform survey and summarize results, and continue technical assistance and outreach.

Joel M. Rinebold  
Telephone: (860) 291-8832  
Email: JRinebold@ccat.us  
Web: [www.ccat.us](http://www.ccat.us)

Connecticut Center for Advanced  
Technology (CCAT)

**Acknowledgement:**





# Supplemental Slides

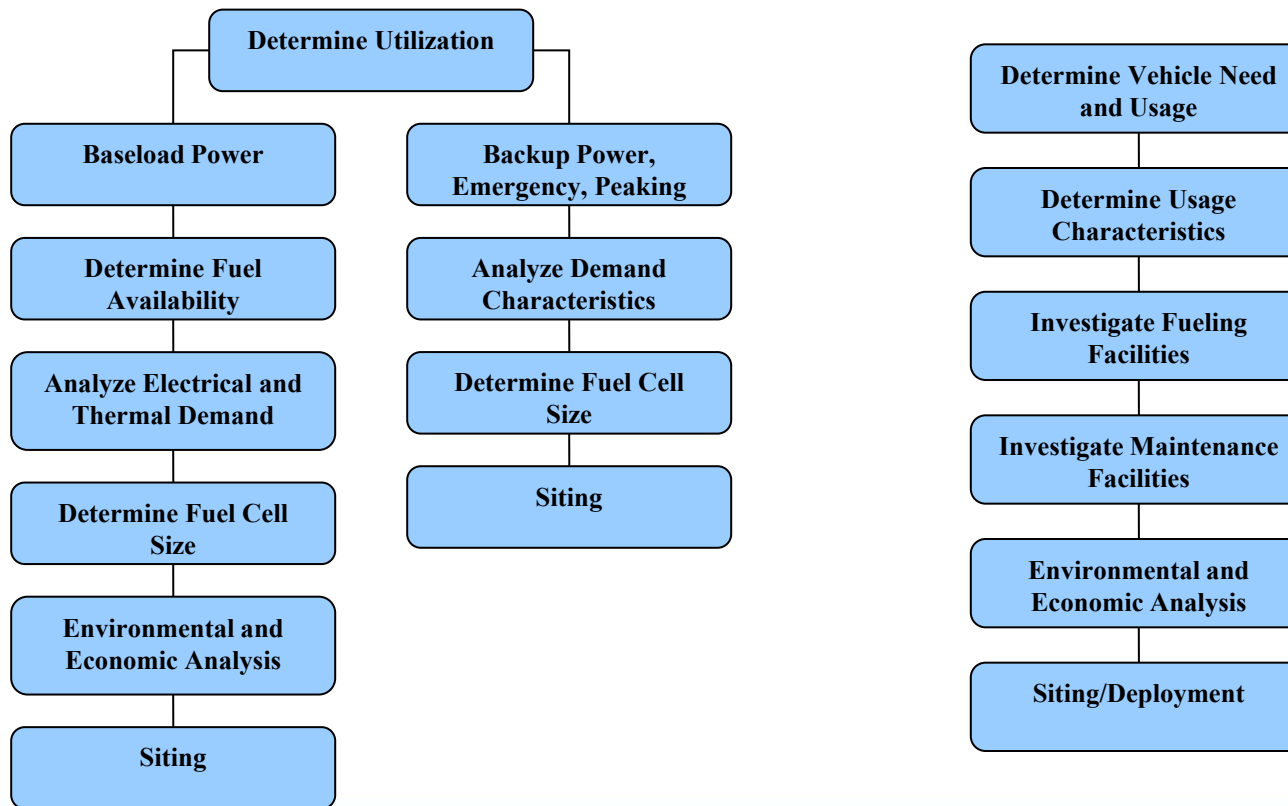
## **Educational and Informational Video**

- CCAT developed two videos which (1) encourage student interest in hydrogen and fuel cell technology and (2) educate end users on applications and benefits.
- Click [here](#) to view the informational video.
- To view on the web visit:  
[http://energy.ccat.us/state\\_and\\_local\\_government\\_partnership\\_building](http://energy.ccat.us/state_and_local_government_partnership_building)



# Previous Work - Project Criteria

## CCAT Developed Criteria for the Assessment of Potential Stationary Power and Transportation Applications

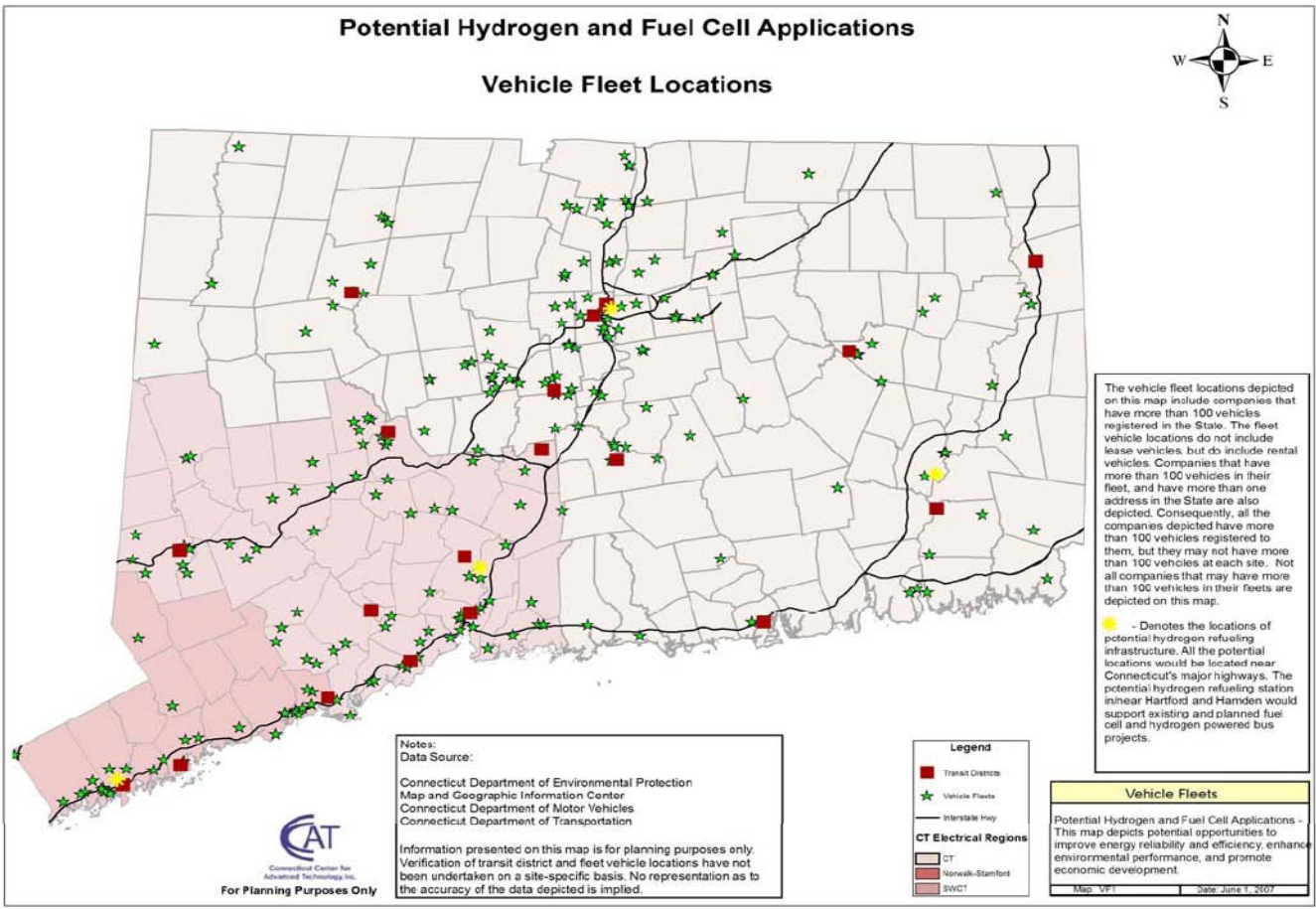






# Previous Work – Applications

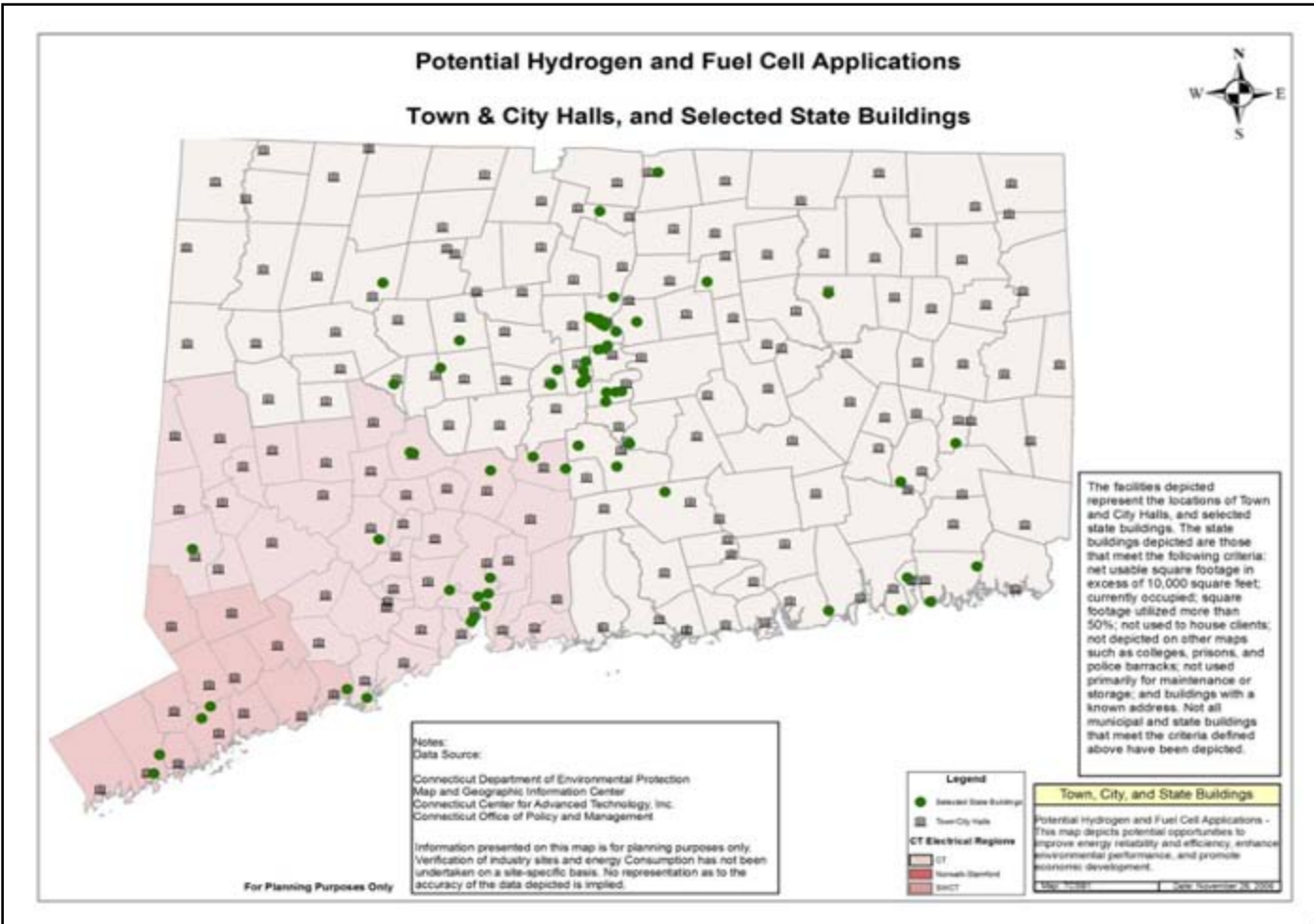
## CCAT Identified Potential Sites for Stationary Power and Transportation Applications





# Previous Work - Applications

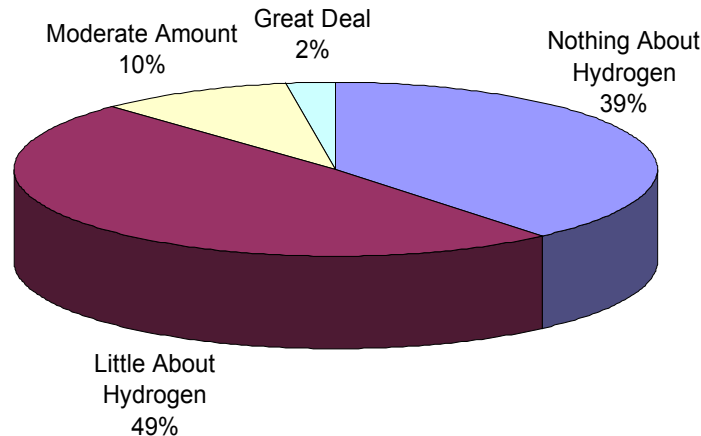
## Town & City Halls, and Selected State Buildings





## CCAT Surveyed the Level of Knowledge of State and Local Decision Makers and Key Stakeholders

**88% of those surveyed knew little to nothing about hydrogen and fuel cell technology.**



**Q2: Hydrogen is an energy storage medium. Which of the following statements best describes your level of knowledge on hydrogen and fuel cell technologies?**