
# Florida's Accelerated Commercialization Strategy for hydrogen Energy Technologies

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# Introduction

The Florida Hydrogen Business Partnership is a collaboration of the world's leading companies and Florida state government. The Partnership was convened in 2004 to develop a private-public strategy for the rapid commercialization of hydrogen energy technologies in Florida. Hydrogen-derived energy will yield many benefits for Floridians: greater energy and economic security through decreased dependence on foreign sources of energy, increased economic diversity and growth, cleaner air resulting from less fossil fuel combustion, and greater reliability for power supplies during emergency situations.

The Florida Accelerated Commercialization Strategy is the first product of the Florida Hydrogen Business Partnership. This Strategy identifies realistic actions and options for business and government to rapidly establish Florida as a leader in hydrogen technology commercialization.

This Strategy is an action plan for business and government in Florida. Many of the actions identified are already underway in Florida. More than 15 mobile and stationary hydrogen technology demonstration projects are in progress or in the development stage. Another 13 are in the planning stage.

**The Florida Hydrogen Business Partnership**

- Air Liquide America, L.P.
- Air Products
- Apollo Energy
- Ballard Power Systems, Inc.
- BP America, Inc.
- ChevronTexaco, Inc.
- Cummins Westport Innovations
- Walt Disney World Company
- DynEco Corporation
- Ener1, Inc.
- FPL Group, Inc.
- Fuel Cell Energy
- Gulf Power Company
- Hydrogenics, Inc.
- Plug Power
- Praxair
- Progress Energy Florida
- Shell Hydrogen
- Siemens Westinghouse Power Corp.
- Tampa Electric Company
- Teledyne Energy Systems, Inc.
- Florida Energy Office
- Florida Dept. of Environmental Protection
- Enterprise Florida
- Florida Office of Tourism, Trade & Economic Development
- Florida Dept. of Financial Services
- Florida Dept. of Education

## Mission:

Establish Florida as a center of hydrogen technology commercialization for the Americas.

## Objectives:

1. Provide recommendations to optimize Florida's business climate for hydrogen technology leadership;
2. Demonstrate the viability of hydrogen technologies;
3. Explore paths to accelerate the demonstration and commercialization of hydrogen technologies;
4. Stimulate growth and investment in the hydrogen technology sector in Florida; and
5. Establish Florida as an early market for commercially viable hydrogen and fuel cell products.

## Milestones

By 2007, North American demand for hydrogen energy systems will be as high as $2.09 billion according to a recent market analysis by PricewaterhouseCoopers[1] for the Canadian Government. The analysis estimated $1.53 billion for stationary systems, $436 million for portable systems and $125 million for mobile systems. By 2010, the analysis projected total North American demand could exceed $9.3 billion ($4.89 billion for stationary systems, $2.9 billion for portable systems and $1.6 billion for mobile systems).

With robust growth forecasted for the hydrogen technology market, the Florida Hydrogen Business Partnership proposes an aggressive set of "stretch goals" as milestones for this strategy document.[2] These milestones will serve as indicators of Florida's success in becoming a center of hydrogen commercialization within the Americas.

Milestones for 2007 include:

- Five hydrogen fueling stations operational in the Orlando Metropolitan Area;
- Installed stationary fuel cell electrical generation capacity to exceed 500 kW;
- Installed hydrogen fuel supply for hydrogen powered vehicles to exceed 940 kg/day[3] capable of powering approximately 40 vehicles (30 medium-duty vehicles requiring 30 kg/day and 10 automobiles requiring 4 kg/day);
- Total private and public investment in new emerging hydrogen technologies to increase cumulatively by $75 million in Florida;
- Florida's university-based hydrogen research budget to triple to $45 million.


Milestones for 2010 include:

- Establish three operational hydrogen-fueled transportation corridors;
- Installed stationary hydrogen generation capacity to exceed 1.5 MW;
- Installed hydrogen fuel supply for hydrogen powered vehicles to exceed 4,700 kg/day capable of powering approximately 200 vehicles (150 medium-duty vehicles requiring 30 kg/day and 50 automobiles requiring 4 kg/day);
- Total public and private investment in new emerging hydrogen technologies in Florida to increase cumulatively by $250 million over 2004 levels.

**Footnotes:**

1 "Fuel Cells: The Opportunity for Canada." PricewaterhouseCoopers. 2002

2 In proposing these collective milestones, FHBP member companies make no specific binding commitments.

3 One kilogram (kg) of hydrogen is equivalent in energy content to one gallon of gasoline.

# Strategies to Accelerate Investment and Commercialization of Hydrogen Technology in Florida

Stimulating investments and accelerating commercialization requires strong partnership between technology producers, technology end users and government. The Florida Hydrogen Business Partnership is pursuing the following elements for a comprehensive strategy to stimulate growth and investment in hydrogen technology:

- An aggressive and diverse portfolio of demonstration projects across multiple technology applications that focus on improving key technology elements;
- Tax and financial incentives that reduce incremental costs of both demonstrating pre-commercial technology and purchasing commercially available technology;
- Public-private partnerships that couple business and government risk capital for research and demonstration projects;
- Government policies that create incentives rather than regulation;
- State and local government procurement of hydrogen technology that creates "market pull" and helps grow economies of scale;
- Targeted and focused hydrogen infrastructure development;
- Uniform and streamlined statewide siting process for hydrogen technology;
- Coordinated and cooperative academic research and development programs linked with companies to enable business partnerships with major universities, with focus on basic research into improved efficiency of hydrogen technologies; and
- Public education and outreach that introduces hydrogen energy technologies and articulates the benefits of early adoption.

Florida businesses, investor-owned utilities, the hydrogen technology industry and Florida government are jointly taking action to accelerate the commercialization of hydrogen technology.

Hydrogen promises a diverse, flexible energy supply because of the multiple production methods that either currently exist or are under development. Florida's goal is to create an inviting, stable environment for companies to develop and demonstrate safe, convenient, economically-feasible and reliable hydrogen-based systems for power generation and transportation. This goal focuses on future advanced renewable technologies while acknowledging the importance and use of current technologies. During this transition, this focus will enable business and government to support a broad portfolio of hydrogen projects and facilitate a

hydrogen market using all technologies, bridging the gap between what is currently available and what will eventually evolve.

Ultimately, the success of hydrogen as a cost-effective, clean energy source will be determined by the marketplace. In the early stages of research, demonstration and commercialization, government will play an instrumental role in providing incentives and helping reduce risks for end-users and technology producers to test the financial and technical performance of these new technologies.

Actions to accelerate investment and commercialization of hydrogen technologies will differ depending on whether technologies are commercially available or pre-commercial.

## Actions for Commercially Available Hydrogen Technologies

Industry and government can help accelerate market penetration by reducing the incremental costs for commercially available technology through the following activities:

- Create Market Pull — Florida businesses and state and local governments can use procurement programs to purchase hydrogen technology, creating "market pull," increasing economies of scale and reducing costs. Florida businesses and governments can purchase hydrogen technologies to fulfill real, existing power needs, just as state government is currently doing with its procurement of hybrid-electric vehicles. For Florida Fiscal Year 2005-2006, state government should develop a new hydrogen technology section within the Energy State Term Contract to streamline state and local government procurement of these technologies in Florida.

- Establish Incentive Tax Policies for Commercially Available Technologies — The Florida Legislature should create hydrogen technology tax incentives for the purchase of commercially available hydrogen technologies while removing disincentives for research, development and investment in productive capital equipment. Tax incentives will help reduce and possibly eliminate the incremental cost for purchases of hydrogen technology in the near term. As hydrogen technologies become more cost-effective and gain greater market penetration, the tax incentives should phase out.

The Florida Hydrogen Business Partnership recommends the following specific tax incentives:

- Provide a sales tax exemption and corporate income tax credits for purchases of:
  - √ Stationary fuel cell or internal combustion engine systems and associated infrastructure fueled with hydrogen fuels for power generation including prime power, supplemental power, and back-up power.
  - √ Marine, on-road and off-road vehicle applications powered by fuel cells or internal combustion engines fueled with hydrogen.
  - √ Hydrogen fueling systems and infrastructure.
  - √ Photovoltaic systems used to electrolytically produce hydrogen from solar power.
- Waive sales taxes on equipment used for hydrogen technology research and development or for manufacturing hydrogen-related technologies within the state;
- Accelerate depreciation on hydrogen-related equipment;
- Provide a 10-year ad valorem tax holiday for the value of hydrogen energy technologies installed in residential, commercial and industrial settings;
- Provide "convenience" incentives for hydrogen fueled vehicles such as full access to High Occupancy Vehicle (HOV) lanes, toll-free use of the Florida Turnpike and other toll bridges and roads, and waive annual vehicle tag registration fees.

- Establish Uniform and Streamlined Statewide Siting Standards for Hydrogen Infrastructure — Florida state government is in the process of establishing uniform siting for hydrogen fuel cell technology and hydrogen infrastructure. Florida's One-Stop Uniform Hydrogen Siting program will create one uniform standard for all 67 counties that will standardize and streamline fire, safety and building codes so that all regulatory jurisdictions are operating within the same standard established by the National Fire Protection Association. At the direction of Commissioner Tom Gallagher of the Florida Department of Financial Services, the Florida State Fire Marshall and local fire marshals from around the state will use this uniform standard to certify hydrogen facilities.

- Create Incentives for Utilities to Invest in Hydrogen Energy Technologies — The Florida Legislature and the Florida Public Service Commission should explore incentive cost recovery mechanisms to support hydrogen-related utility investments. To further accelerate the commercialization

of hydrogen technologies, the Florida Legislature should consider allowing utilities to also recover the Public Service Commission's established rate of return through the Energy Conservation Recovery Clause.

- Adopt uniform interconnection standards for advanced clean energy technologies — The Public Service Commission should evaluate the current State of Florida interconnection standard for 10 kW systems, and lower, against existing national model uniform interconnection standards to determine whether changes are required to assist renewable generation vendors to site "off-the-shelf" equipment without the expense of reconfiguring to meet state standards.

## Actions for Pre-Commercial Hydrogen Technologies

To accelerate the commercialization of new hydrogen technology, Florida businesses, hydrogen technology companies and Florida Government should:

- Continue Pursuing an Aggressive and Diverse Portfolio of Demonstration Projects — A diverse set of projects that test multiple hydrogen technology applications maximizes research and development results and does not place the government in the position of picking early technology "winners and losers."

- Continue targeting key technical objectives in hydrogen technology demonstration projects — Projects should focus on improving key technology elements:
    - Reducing material costs;
    - Increasing material and system durability;
    - Increasing the efficiency of hydrogen productic
    - Increasing hydrogen storage and hydrogen vehicle range;
    - Improving integration with existing power delivery systems; and
    - Minimizing "well to wheel" environmental emissions.

  In addition, demonstration projects should be highly visible and maximize educational benefits.


- Establish Incentive Tax Policies for Pre-Commercial Hydrogen Technologies — The Florida Legislature should establish corporate tax credits to give companies the incentives to site, relocate or expand in-state manufacturing, testing, demonstration, purchase and operation of pre-commercial hydrogen technologies that target key technical research and development objectives.

- Continue Teaming Business and Government "Risk Capital" for Select, High Value Demonstration Projects — Combining business and government risk capital can dramatically improve the success of hydrogen technology demonstration projects. By acting as a true capital partner, partial government funding of projects can reduce the risk and costs of failure to companies, thereby increasing incentives to technology end users and manufacturers to undertake demonstration projects. The Florida Legislature should authorize and appropriate funding for government risk capital grants that match or augment corporate investments for demonstration projects.

  Government risk capital also spurs capital investment in the state of Florida. More than $2 billion is invested each year by industry and the federal government to research and demonstrate hydrogen technology as a new source of clean power for buildings and cars. For example, a $2 million investment made by the State this past year in a hydrogen project will result in an investment of up to $17 million by Ford Motor Company and BP America. The corporate investment is being matched by federal funding from the U.S. Department of Energy.

- Continue to Seek Federal Funding for Projects in Florida — Continue working with the U.S. Department of Energy and Florida's congressional delegation for funding of demonstration projects that achieve Florida and the federal government's objectives on hydrogen technology research and development, demonstration and commercialization.

- Focus and Synchronize Hydrogen Infrastructure Development with Vehicle Deployment — Advanced vehicle and power generation development must be synchronized with infrastructure growth. The lessons of failed efforts at market penetration of electric and natural gas vehicles highlight the need for infrastructure synchronization. Coordinated growth will maximize valuable public and private resources and increase societal benefits. It is critical to focus infrastructure at the site of major projects, and in turn focus projects where they can initially build a critical mass or density of hydrogen infrastructure.

  Market analyses suggest that fleet applications of mobile hydrogen technologies are likely to occur in advance of a broad consumer retail market for hydrogen vehicles. While Florida should focus on fleet deployment in this early phase of product commercialization to maximize economies of scale, state policy should also seek to provide incentives for growth in the retail hydrogen fueling sector.

- Explore Utility Cost Recovery Mechanisms as a Means to Support Testing and Demonstrating Pre-Commercial Hydrogen Energy Technology — The Florida Legislature and the Florida Public Service Commission should provide cost recovery for reasonable hydrogen technology investments. Utilities should continue to use the existing flexibility of Florida's Energy Conservation Cost Recovery laws to fund research and development hydrogen projects.

- Establish a Premiere Hydrogen Research Consortium within the Florida State University System — The Florida Department of Education and Board of Governors of the State University System should establish a comprehensive hydrogen research and development consortium that:
    - Maximizes cooperative and coordinated hydrogen research and development projects in Florida while minimizing duplication and the unproductive competition seen in other states;
    - Aggressively recruits world-class academics to Florida institutions.


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