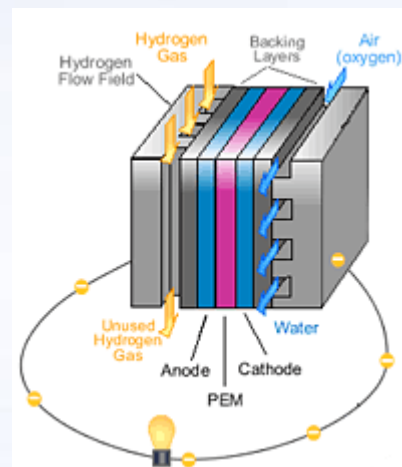




U.S. Department of Energy
Energy Efficiency and Renewable Energy

2007 Annual DOE Hydrogen Program Review *Systems Analysis*

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Office of Hydrogen, Fuel Cells and Infrastructure Technologies



Outline



- Goals and Objectives
- Budget
- Challenges
- Progress
 - ❖ Accomplishments/Status
- International Collaboration
- Future Plans





Goals and Objectives



Systems Analysis: Provide system-level analysis to support transition-strategy development and the 2015 technology readiness decision by evaluating technologies and pathways, guiding the selection of RD&D technology approaches/options, and estimating the potential value of RD&D efforts.

- Develop a Macro-System Model for the analysis of the hydrogen fuel and vehicle infrastructure; provide capability for the analysis of the stationary electrical generation and infrastructure for a full hydrogen economy.
- Identify and evaluate feasible transition scenarios consistent with infrastructure and hydrogen resources.
- Complete environmental studies that are necessary for the 2015 Technology Readiness Decision.
- Update the Well-to-Wheels analysis for technologies and pathways for the Hydrogen Program to include technological advances and changes.
- Provide and coordinate analysis of environmental and techno-economic issues.



Systems Analysis Budget

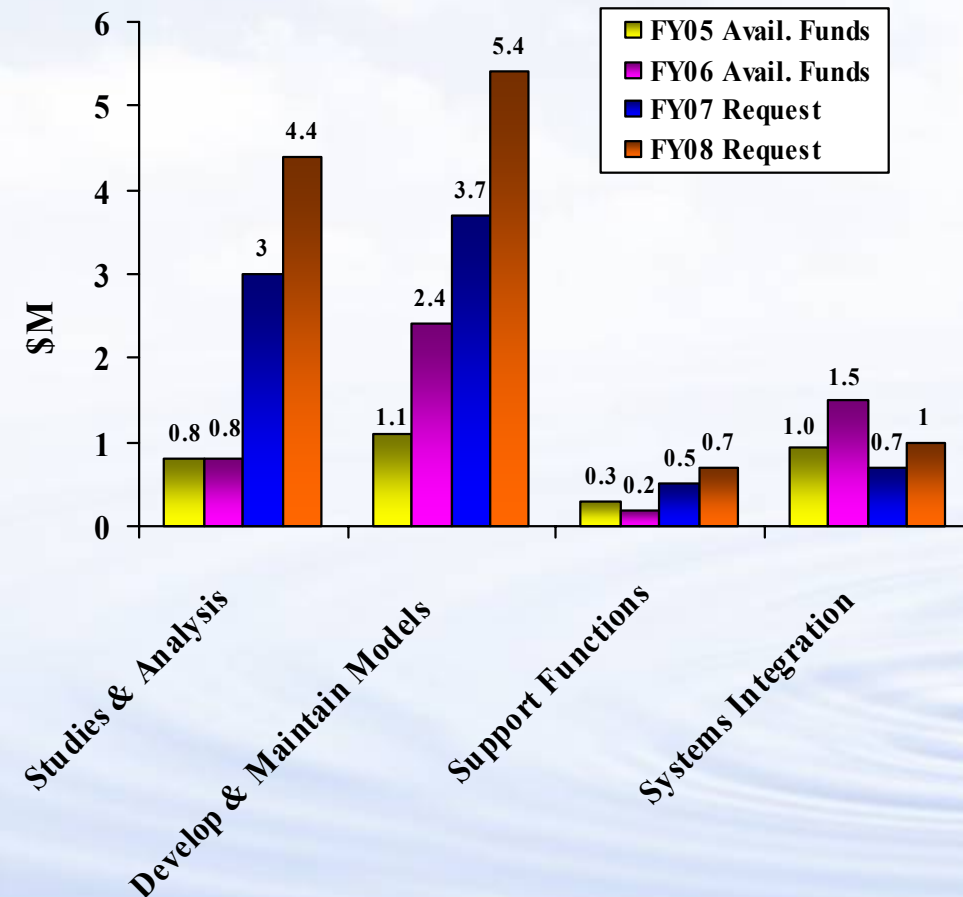


FY 2008 Budget Request = \$11.5M

FY 2007 Budget Request = \$7.90M

FY 2006 Available Funds = \$4.90M

FY 2005 Available Funds = \$3.16M



- Emphasis:**

Conduct cross-cutting life cycle analysis, emissions, environmental and systems integration analysis to identify the impacts of various technology pathways, assess associated cost elements and drivers, and identify key cost and technological gaps.

- Budget Obligations:**

Current contracts	\$ 1.7 M
Planned nat'l lab R&D	\$ 7.8 M
<u>New starts</u>	<u>\$ 2.0 M</u>
Total	\$11.5 M



Systems Analysis Progress



2004

2005

2006

2007

2004

- ✓ Systems Analysis function established

2005

- ✓ Established process for developing Hydrogen cost target
- ✓ Revised Hydrogen Program Hydrogen Cost Target to \$2.00-3.00/gge
- ✓ Identify analytical gaps and “missing pieces”

2006

- ✓ Hydrogen Analysis Resource Center issued
- ✓ Well-to-Wheels analysis process established
- ✓ H2A Production Model issued
- ✓ Systems Analysis Plan issued
- ✓ HyDS model completed

2007

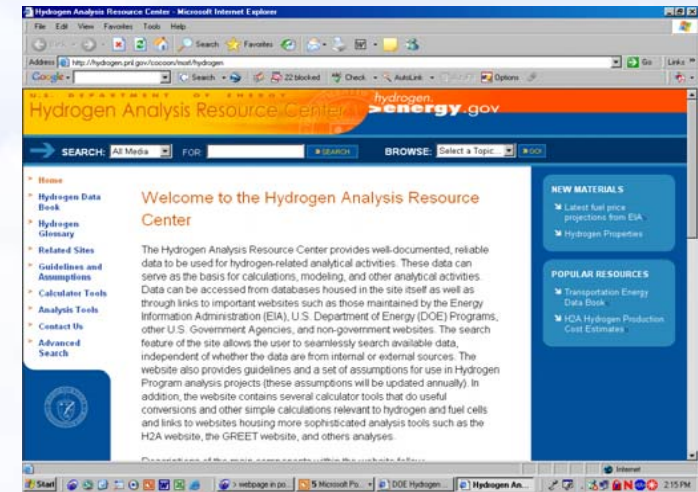
- ✓ Individual Technology analysis
- ✓ WTW analysis completed
- ✓ Macro-System Model test version completed and validated
- ✓ Cross-Cut team established
- ✓ Scenario Analysis for Transition completed
- ✓ Resource and infrastructure analysis started



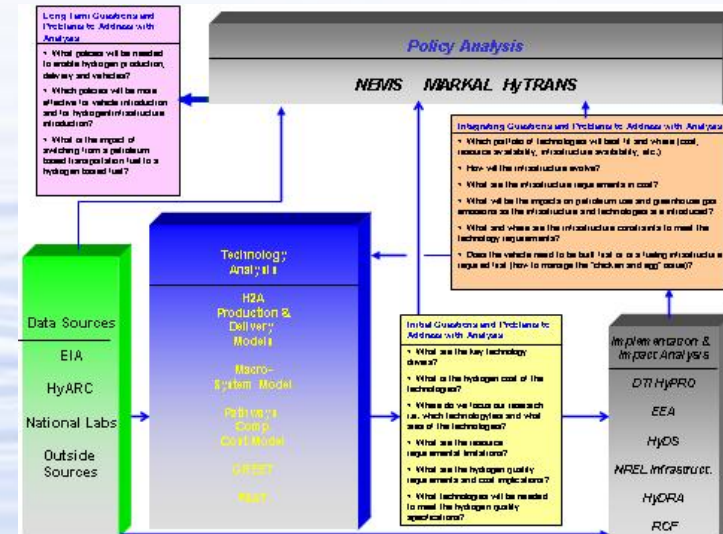
Challenges



- Establish consistent data, assumptions and guidelines for analysis tasks
- Understand behaviors and drivers of the fuel and vehicle markets
- Coordinate and integrate analysis resources and capabilities across analytical domain
- Understand vehicle, fuel and socio-economic policy impacts
- Establish and develop an integrated portfolio of models and tools



<http://hydrogen.energy.gov>





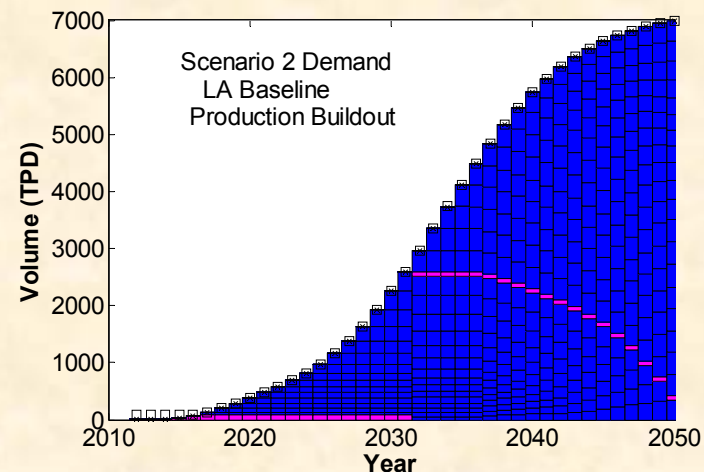
Accomplishments



Modeling and Model Development

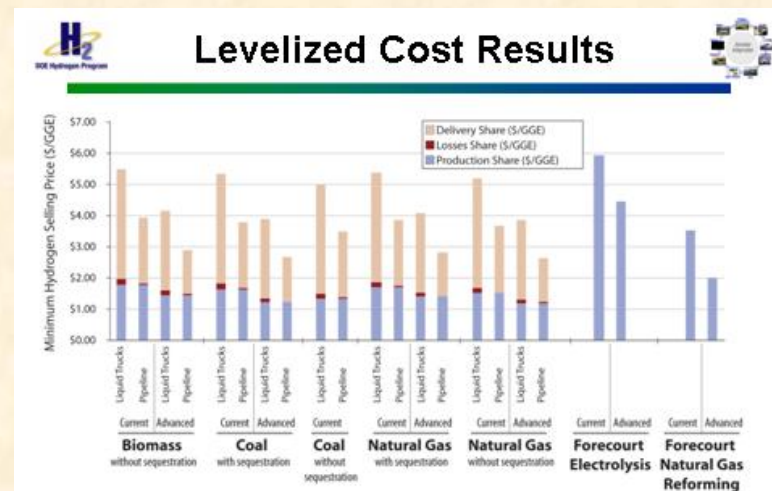
HyPRO Infrastructure Model

- Completed infrastructure build-out evaluation for the Scenario Analysis



Macro-System Model

- Completed first test version of the model.
- Completed peer review of the model.
- Analyzed the impact of system hydrogen losses on pathway petroleum use, greenhouse gas emissions and hydrogen cost



The MSM eases comparisons of levelized cost at the pump



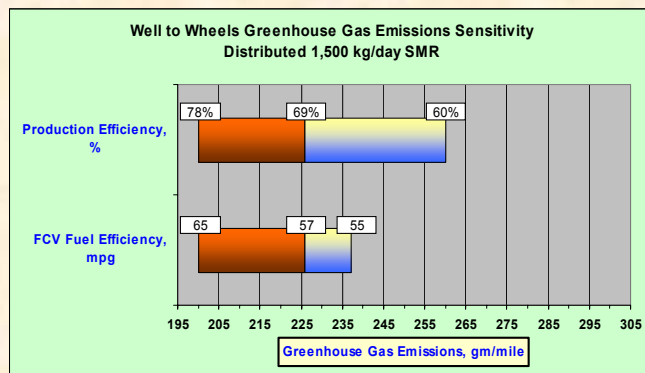
Accomplishments



Program Analysis

Well-to-Wheels Analysis

- Completed sensitivity analysis of production and vehicle impacts on petroleum use and GHG emissions.

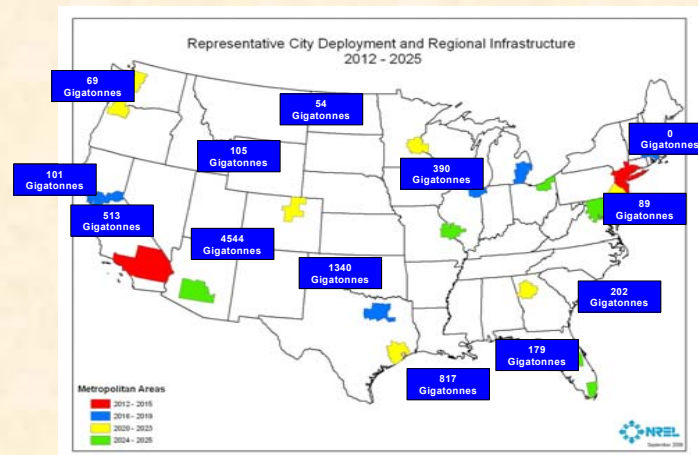


Infrastructure Analysis

- Completed analysis of natural gas infrastructure to determine limitations and supply capacity for major cities during the market transformation.

Resource Analysis

- Completed analysis of potential CO₂ sequestration capacity, cost and locations.

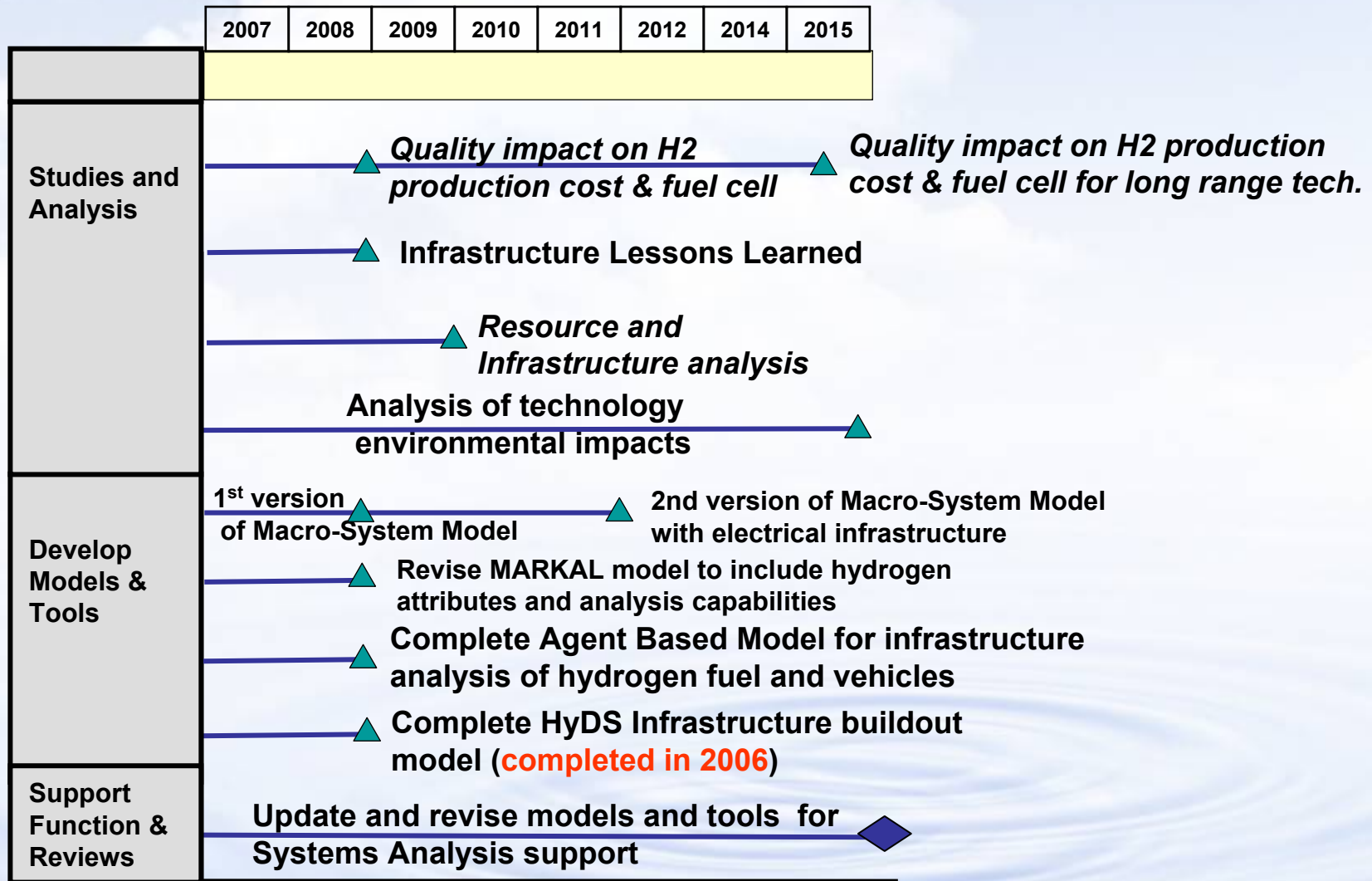


- Completed analysis of hydrogen supply from indigenous resources.
 - Enough hydrogen to fuel 1 M veh./yr.





Future Plans



Source: HFCIT Multi-Year Program Plan

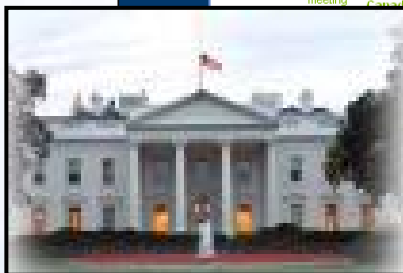
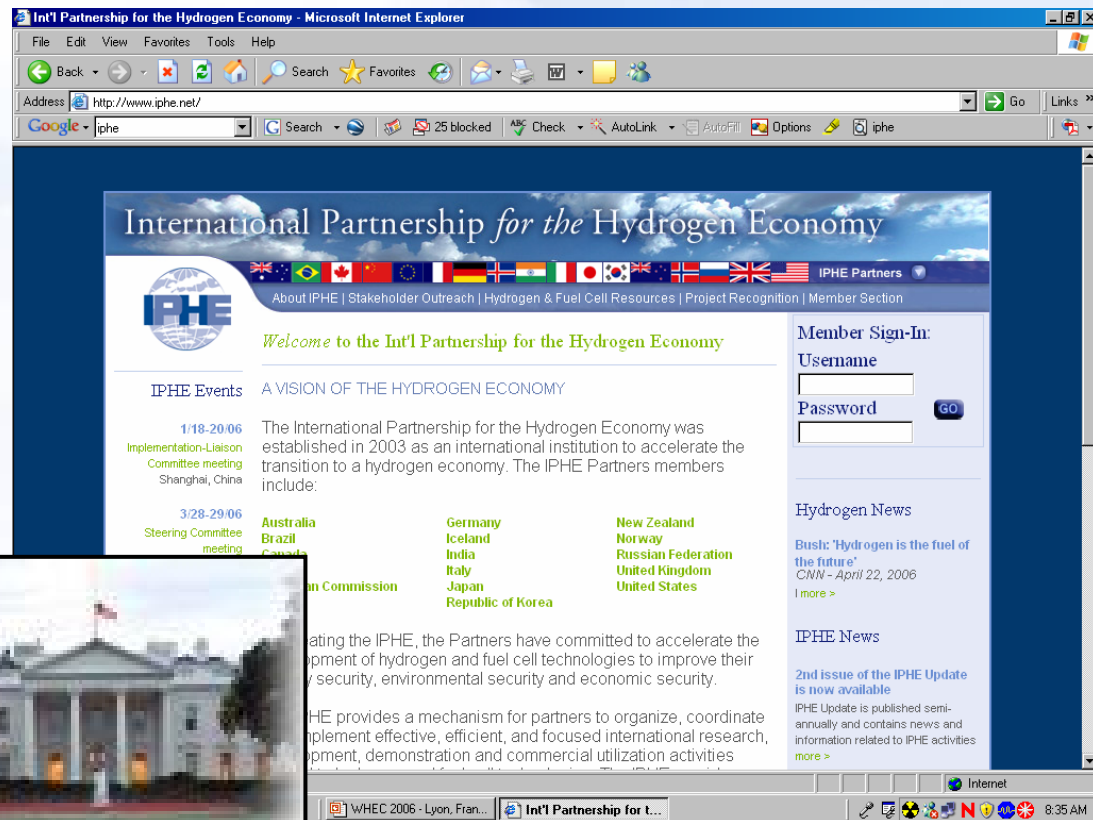


International Collaboration



International Partnership for the Hydrogen Economy

- Joint project to compare and contrast the EU HyWays and US H2A and GREET models



International Energy Agency

- Investigate the global infrastructure requirements for a hydrogen economy



Thank You

For More Information Systems Analysis

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