

# U.S. Hydrogen Program

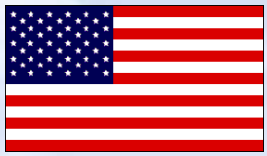
**Steven Chalk**  
Hydrogen Program Manager

January 18-20, 2006

5<sup>th</sup> Implementation—Liaison Committee Meeting  
Shanghai, China

**ENERGY SECURITY for the 21<sup>ST</sup> CENTURY**  
Reliable, Affordable, Environmentally-Sound Energy





# Energy Policy Act of 2005

## Title VIII - Hydrogen

*EPAAct 2005 (Public Law 109-58) “codifies” the President’s Hydrogen Fuel Initiative.  
The national leaders are in agreement that a hydrogen economy can lead to energy and environmental security.*

**Congress reinforces the timeline developed by DOE in support of the President’s Hydrogen Fuel Initiative –**

- By 2015: Enable commitment by industry for fuel cell vehicles and hydrogen infrastructure**
- By 2020: Enable consumers to purchase vehicles and make hydrogen available**

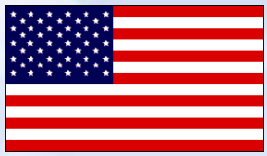
**Congress makes the long-term commitment required for realization of the hydrogen economy by authorizing the Program through 2020**



President Bush signs Energy Policy Act into law on August 8, 2005



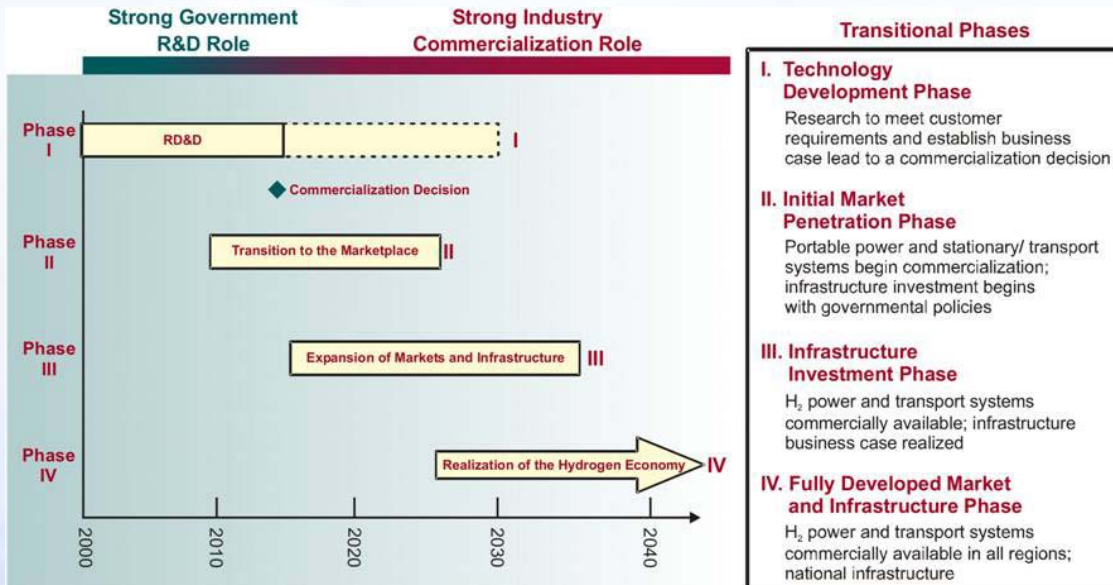
The House Hydrogen & Fuel Cell Caucus Kicked Off on June 28, 2005



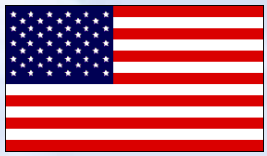
# President's Hydrogen Fuel Initiative Funding

- **President's Funding Commitment: \$1.2B over 5 years (FY04-FY08)**
- **Consistent with Timeline:**

| Year         | Congressional Appropriations |
|--------------|------------------------------|
| FY04         | \$156.5 M                    |
| FY05         | \$221.9 M                    |
| FY06         | \$244.5 M                    |
| <b>TOTAL</b> | <b>\$622.9 M</b>             |



**President George W. Bush  
2003 State of the Union Address  
January 28, 2003**

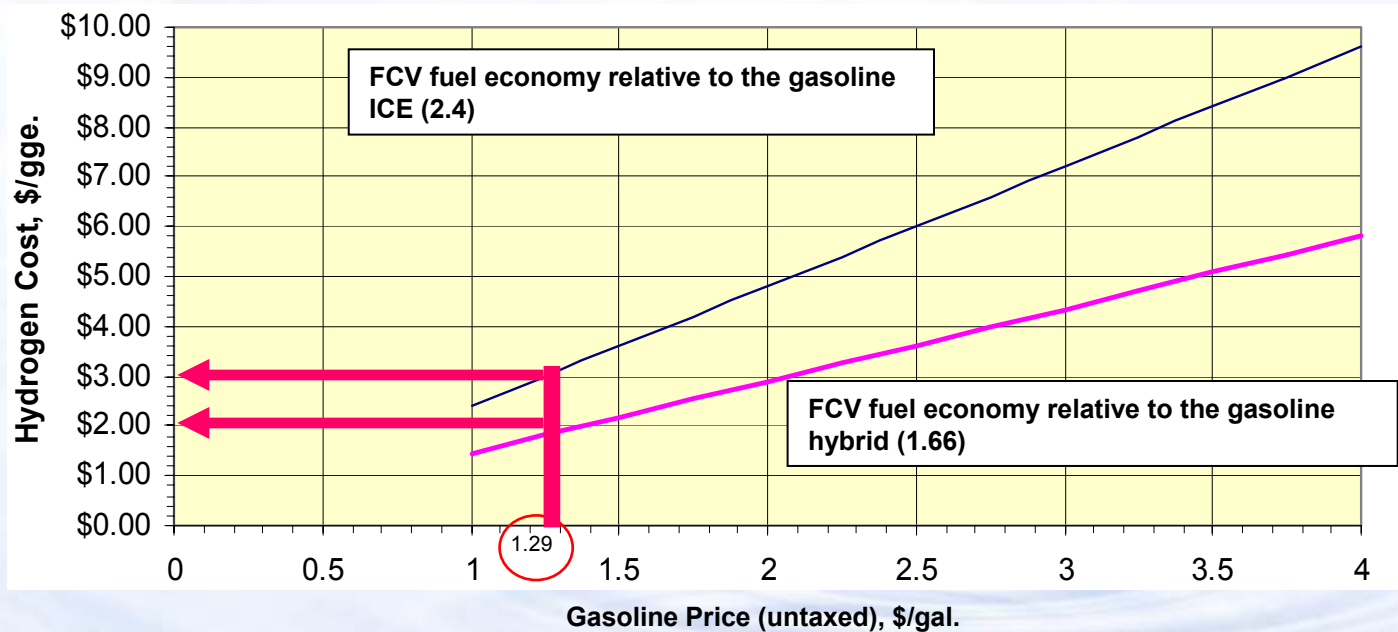


# Hydrogen Cost Target

- **New 2015 research target is \$2-3/gge (delivered, untaxed) at the pump**
- **Competitive with alternative technologies on \$ per mile basis**
- **Independent of the pathway used to produce and deliver hydrogen**

## Model for Hydrogen Cost Goal

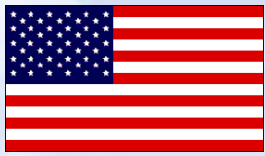
(Equivalent \$/mi. for consumer)



EIA projected gasoline price in 2015 based on HIGH "A" case

Note: The fuel economy ratios from NRC report

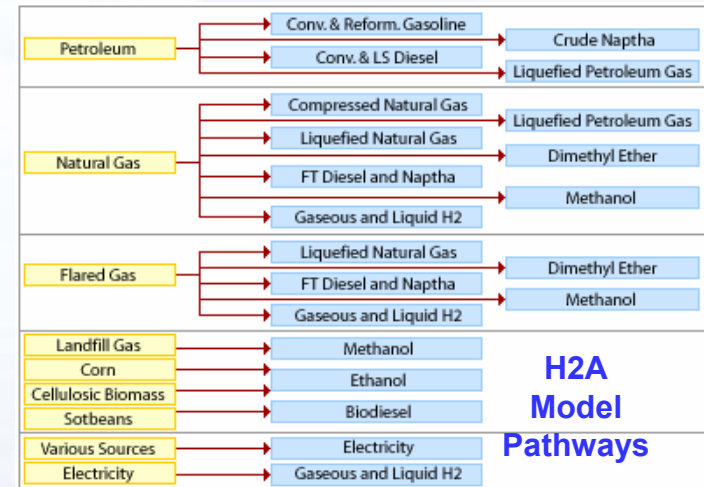
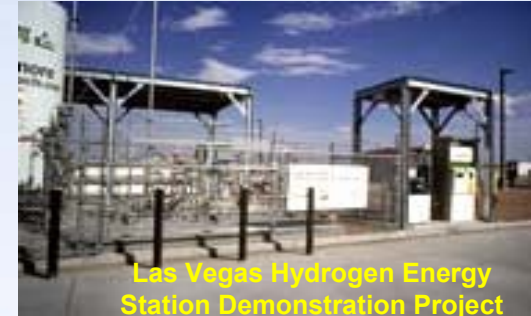




# Summary of Accomplishments

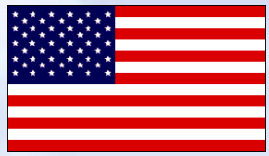
- Las Vegas Energy Station: hydrogen from natural gas demonstrated cost reduction: **\$5 gge to \$3.60 gge**
- 50-kW Automotive Fuel Cell: **\$275/kW (2002) to \$110 /kW (2005)**
- H2A Model: calculates **H<sub>2</sub> cost** for a variety of production pathways
- National Hydrogen Storage Project: Progress through Centers of Excellence
- Learning Demonstration Projects
- Hydrogen 101 Workshops
- Collaboration and progress on first responder training material with fire marshals
- Revised Hydrogen from Coal Program RD&D Plan available for comment

[www.fe.doe.gov/programs/fuels/index.htm](http://www.fe.doe.gov/programs/fuels/index.htm)



General Motors

Photo: Shell Hydrogen



# Key Research Goals for FY 2006

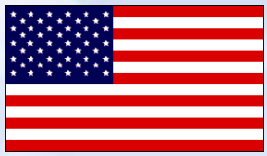
## Systems Integration

- Independent verification of achievement of \$3.00/gge of hydrogen from distributed natural gas
- Independent validation of achievement of \$110/kW for PEM fuel cells at high production volume
- Independent assessment of cryo-compressed technology for on-board storage against 2010 targets
- Go/No-go decision on 6 wt.% (material) on single walled carbon nanotubes

## Other New Initiatives

- Manufacturing Roadmap
- Hydrogen Quality
- Advisory Panel (HTAC)

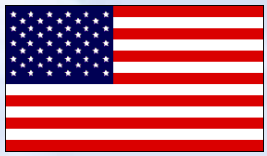




# Update on Transit Bus Program

- FTA National Fuel Cell Bus program (NFCBP)
  - International workshop held in Vancouver
- Competitive Selection of up to 3 Regionally Diverse Non-Profit Organizations
- 50% Cost Share Required
- \$49 Million Available from FY06 – FY09
  - \$11,250,000 – FY 2006
  - \$11,500,000 – FY 2007
  - \$12,750,000 – FY 2008
  - \$13,500,000 – FY 2009





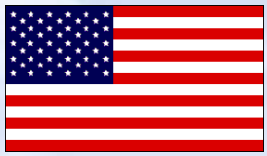
# Update on Transit Bus Program

## NFCBP Objectives and Technical Targets

- Pathway to Commercialization
- Durability – 4 to 6 Years/20,000 to 30,000 hours
- Bus Cost – <5x Comparable Transit Bus
- Reliability – >90% Availability
- Fuel Efficiency – 2x Comparable Transit Bus
- Vehicle Performance – Equal or Better to Comparable Transit Bus
- Emissions – Exceed 2010 EPA Standards
- Enhance Public Acceptance

US effort involves several international participants: Potential partners include Australia, Brazil, Canada, China, Europe, Japan





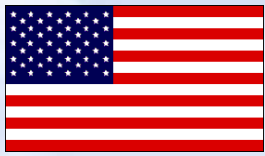
# Update on FutureGen

December 6, 2005- Secretary of Energy announces that DOE and the FutureGen Industrial Alliance signed agreement to build FutureGen



- Alliance officially formed and recognized
- 8 charter members
- Open membership policy with an active recruiting effort
- Alliance has initial capital

- Produces both electricity and H<sub>2</sub> with near zero emissions (including CO<sub>2</sub>)
- Output of 275 MWe, 1 million metric tonnes of CO<sub>2</sub>/year
- Cost: \$950 million [private sector \$250 M and government \$700 M]
- To begin operating in 2012



# 2006 Annual Hydrogen Program

Merit Review and Peer Evaluation Meeting

Arlington, VA



May 16-19, 2006

**H<sub>2</sub>**  
DOE Hydrogen Program

## 2005 Annual Merit Review and Peer Evaluation Report

May 23-26, 2005 Arlington, Virginia

U.S. Department of Energy  
DOE/GO-102005-2187  
September 2005

# 2005

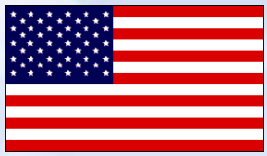
ANNUAL PROGRESS REPORT

## DOE Hydrogen Program

**H<sub>2</sub>**

U.S. DEPARTMENT OF ENERGY

[www.hydrogen.gov](http://www.hydrogen.gov)



# U.S. Implementation-Liaison Committee Program Technology Contacts

## **Steven Chalk**

Hydrogen Program  
U.S. Department of Energy  
Phone: 202-586-3388  
Email: [Steven.Chalk@ee.doe.gov](mailto:Steven.Chalk@ee.doe.gov)

## **Shang Q. Hsiung**

Federal Transit Administration  
U.S. Department of Transportation  
Phone: 202-366-0241  
Email: [shang.hsiung@fta.dot.gov](mailto:shang.hsiung@fta.dot.gov)

## **Robert Wright**

Office of Fossil Energy  
U.S. Department of Energy  
Phone: 301-903-5471  
Email: [robert.wright@hq.doe.gov](mailto:robert.wright@hq.doe.gov)

## **William Chernicoff**

Research and Innovative  
Technology Administration  
U.S. Department of  
Transportation  
Phone: 202 366-4999  
Email: [william.chernicoff@dot.gov](mailto:william.chernicoff@dot.gov)