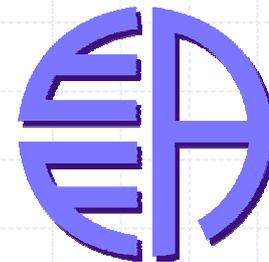


# 2005 DOE Hydrogen Program Review

## Understanding the Hydrogen Economy

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Energy and Environmental Analysis  
May 2005



**Project ID#: EDP3**



# Overview

## Timeline

- Start: Sep 04
- End: Sep 06 (pending FY06 appropriation)
- Status: 30% complete

## Budget

- Total: \$273,867
  - DOE share: 100%
- Funding by Year
  - FY04: \$96,000
  - FY05: \$0
  - FY06: \$177,867 (pending FY06 appropriation)

## Barriers

- Educational Barriers Addressed by this Project
  - A. Lack of Awareness
  - C. Institutional Barriers and Access to Audiences

*(Note: Multi-Year RD&D Plan lists 4 educational barriers; 2 of 4 are addressed by this project)*

## Partners

- Subcontractors
  - Breakthrough Technologies Institute (BTI)
  - H2Nation



# Objectives and Audience

- Objective is to develop hydrogen education materials
- Target audiences
  - Public (energy consumers)
  - Industry leaders
  - Policy makers
- Goal is to reach audiences and help them understand:
  - General concept and value of a hydrogen economy
  - Near term challenges and opportunities for hydrogen and fuel cell technologies
  - Hydrogen safety issues
  - Transition steps and long range challenges required in moving to a hydrogen economy



# Deliverables and Plans for Past Year

- Key deliverables (entire project)
  - Booklet titled, "*Understanding the Hydrogen Economy*"
  - Technology fact sheets
  - Educational presentation
  - Insert for H2Nation magazine
- Plans for past year (through April 2005)
  - Original plan
    - Complete *Understanding the Hydrogen Economy* (first key deliverable)
    - Initiate work on technology fact sheets, educational presentation, and insert for H2Nation (remaining three key deliverables)
  - Modified plan (revised because FY05 funding was not available)
    - Prepare draft of *Understanding the Hydrogen Economy*



# Relevance to Hydrogen Program

- Educational barriers addressed
  - *Understanding the Hydrogen Economy* and related outreach materials help in improving awareness (Barrier A)
  - Distributing insert in H2Nation magazine (circulation of 20,000) helps in gaining access to audiences (Barrier C)
- Milestones addressed
  - Educational materials produced in this project contribute to DOE's library of materials (Milestone #5)



# Approach

- Research DOE and other reliable sources for materials on hydrogen economy and technologies
- Develop booklet titled, "*Understanding the Hydrogen Economy*"
  - Present benefits and challenges of moving to a hydrogen economy
  - Include individual chapters on key components of hydrogen infrastructure
  - Use appealing high quality graphical layout to effectively communicate message
  - Expected size of booklet is 25-30 pages
- Use booklet (*Understanding the Hydrogen Economy*) to create additional outreach materials
  - Technology fact sheets
  - Educational presentation
  - Insert for H2Nation magazine



# Accomplishments this Past Year

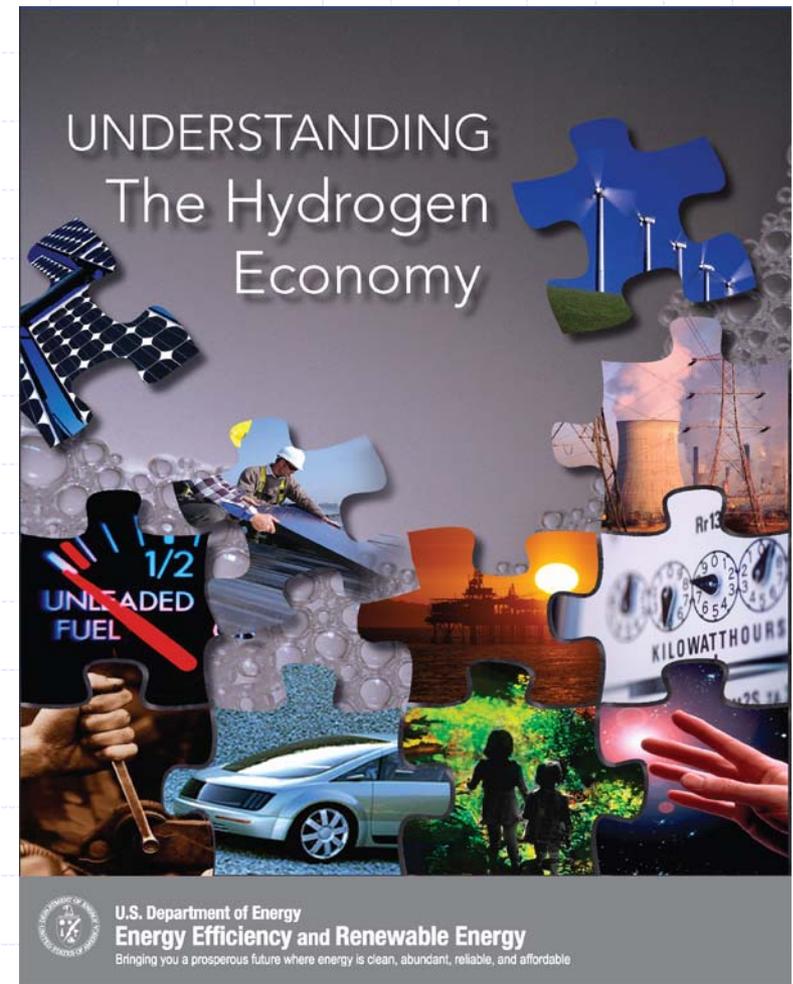
- Held project kickoff meeting (Sep 04)
- Conducted research (Oct-Dec 04)
- Prepared two drafts of *Understanding the Hydrogen Economy (Jan-Apr 05)*
  - 1<sup>st</sup> draft submitted in January
  - Addressed comments on first 1<sup>st</sup> draft and submitted 2<sup>nd</sup> draft in April
  - 2<sup>nd</sup> draft currently being reviewed by DOE
- Prepared preliminary designs for graphical layout (Nov-Jan)
  - Drafts submitted for review to-date are text files with key charts and tables appended
  - Graphical layout, with charts and tables imbedded, will be completed after text is finalized



# Table of Contents for Booklet

- Introduction
- Hydrogen Economy
- Production
- Delivery
- Storage
- Applications
- Safety, Codes, & Standards
- Key Challenges
- Timeline
- Resources
- Glossary

**11 Total Sections**





# 5 Groupings for 11 Sections

- **Benefits and Background**
  - Introduction
  - Hydrogen Economy
- **Technologies**
  - Production
  - Delivery
  - Storage
  - Applications
- **Related Issues**
  - Safety, Codes, and Standards
- **Moving Forward**
  - Key Challenges
  - Timeline
- **Reference**
  - Resources
  - Glossary



# Benefits and Background

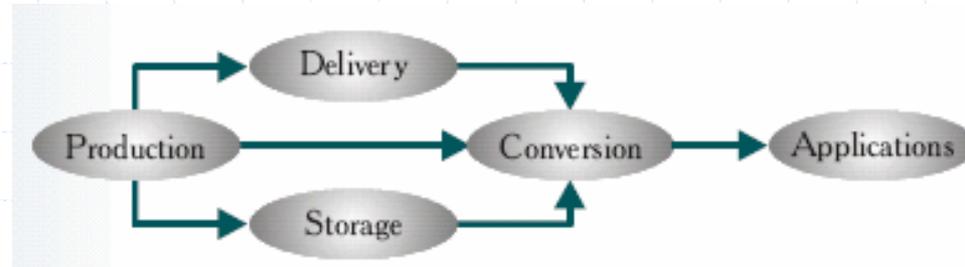
- Introduction section of *Understanding the Hydrogen Economy* presents benefits, which include:
  - Energy security
  - Environmental improvements
  - Economic competitiveness
- Hydrogen Economy section provides discussion of hydrogen as an energy carrier and vision for hydrogen economy



# Technology Sections

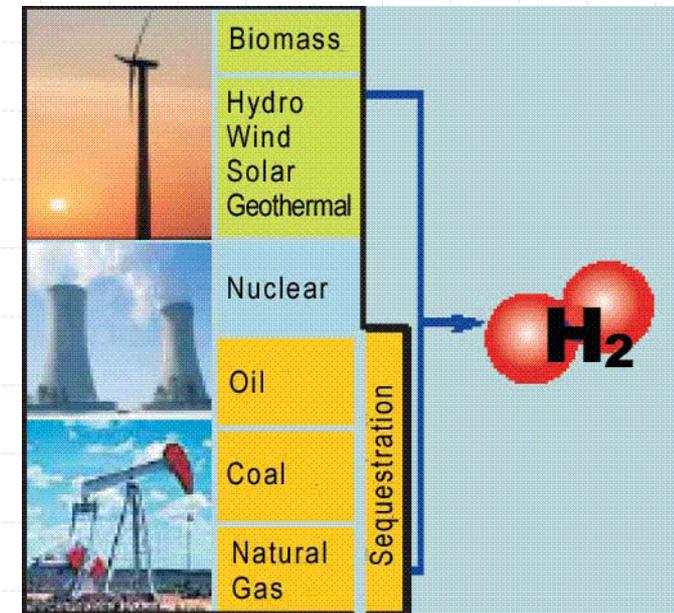
- Four technology sections

- Production
- Delivery
- Storage
- Applications



- Illustration of organization for Production section

- Basics
- Technology discussion
  - Producing Hydrogen from Fossil Fuel
  - Producing Hydrogen from Water
  - Producing Hydrogen from Biomass





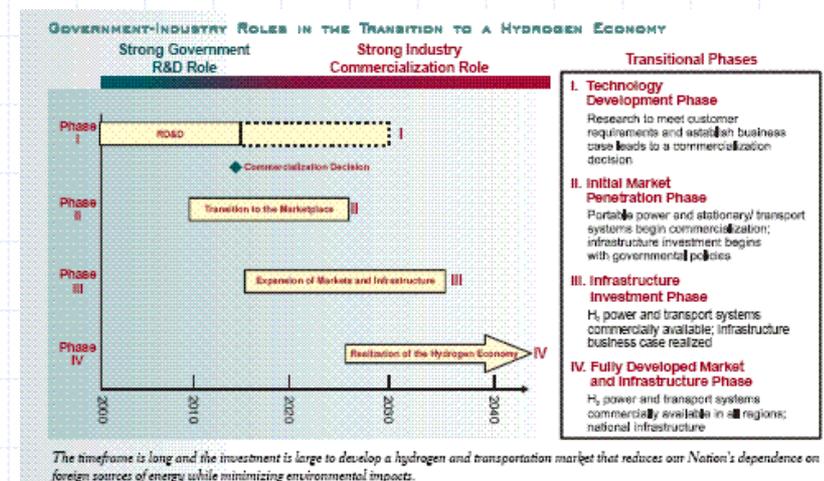
## Related Issues

- A Safety, Codes, and Standards section is included
  - Safety issues for hydrogen are presented and compared to other fuels
  - Need for codes and standards is discussed and benefits are outlined



# Moving Forward

- The Key Challenges section discusses three general barriers
  - Reducing cost of producing and delivering hydrogen
  - Developing storage technologies with sufficient capacity for vehicle use
  - Reducing cost of fuel cells
- The Timeline section presents DOE's schedule for moving toward a hydrogen economy





# Reference Sections

- **Resources** – Two web sites are suggested as good sources for additional information and links:
  - DOE's HFCIT Program ([www.eere.energy.gov/hydrogenandfuelcells](http://www.eere.energy.gov/hydrogenandfuelcells))
  - Fuel Cells 2000 ([www.fuelcells.org](http://www.fuelcells.org))
- **Glossary** – Common terms and phrases encountered when discussing hydrogen economy and related technologies



# Response to Previous Comments

- Project started in September 2004 and was not reviewed last year



# Future Work

- Remainder of FY05 (Jun-Sep)
  - Obtain comments from DOE and designated reviewers on draft booklet (*Understanding the Hydrogen Economy*)
  - Address comments and finalize booklet (both text and graphical layout)
  - Deliver electronic and 5 paper copies to DOE



## Future Work *continued ...*

- FY06 (pending appropriation)
  - Prepare technology fact sheets (topics to be determined based on discussions and guidance from DOE)
  - Develop educational presentation (content to be determined based on discussions and guidance from DOE)
  - Prepare insert and distribute in H2Nation magazine
    - Expected to be a 4 page insert
    - Based primarily on booklet produced in FY05 (*Understanding the Hydrogen Economy*)



# Questions?

For more information, please contact:

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# Publications and Presentations

No publications or public presentations as of April 22, 2005.



# Hydrogen Safety

This project involves the preparation of educational materials. Project personnel will research existing literature sources for this information, and will not be exposed to hydrogen hardware development or laboratory testing. Personnel that contribute to this project are not expected to encounter any significant hydrogen safety hazards.

# Approach for Dealing with Hydrogen Safety Hazard



Not applicable. See previous slide.