

The U.S. DOT Hydrogen Plan



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U.S. DOT and Hydrogen

- Support for the President's Hydrogen Initiative is a top DOT priority
- The U.S. DOT has three principal areas of authority with regard to hydrogen:
 1. Ensuring the safety of hydrogen as a fuel and commodity across all modes of transportation;
 2. Leading the research, development, demonstration and deployment (RDD&D) of medium- and heavy-duty vehicles and their accompanying infrastructure, including buses, trucks, rail, marine, and aviation systems; and
 3. Guiding the RDD&D of a hydrogen infrastructure, including stationary power, and its integration into DOT-regulated systems.

The U.S. DOT Hydrogen Plan

- The U.S. DOT created a Hydrogen Working Group in 2003 to coordinate all hydrogen and fuel cells RDD&D activities within DOT Operating Administrations
- The [U.S. DOT Hydrogen Roadmap](#) (2005) is the guiding document for DOT's hydrogen activities.

The Roadmap delineates four major topic areas:

Road 1: Safety Codes, Standards and Regulations;

Road 2: Infrastructure Development and Deployment;

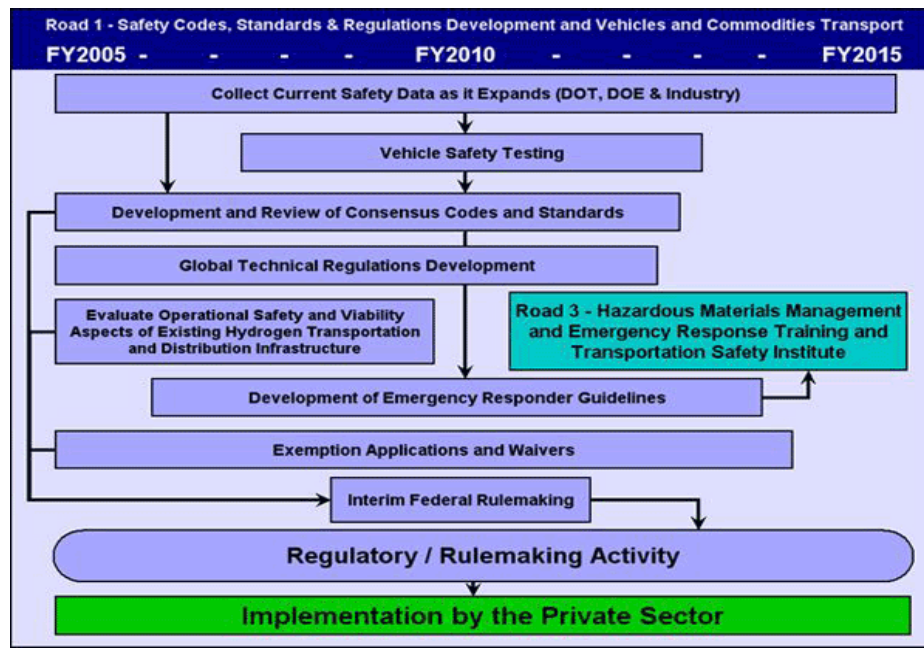
Road 3: Safety Education, Outreach, and Training; and

Road 4: Medium- and Heavy-Duty Vehicle Development, Demonstration and Deployment

The DOT Hydrogen Roadmap

- **Road 1: Safety Codes, Standards and Regulations**

- Funding R&D including testing and data collection on vehicle and infrastructure safety
- Development and review of consensus codes and standards, regulatory development and international regulatory harmonization
- Interim rulemaking and special permit application review
- Supporting implementation by the private sector



The DOT's Broad Safety Regulatory Role

RITA

PHMSA

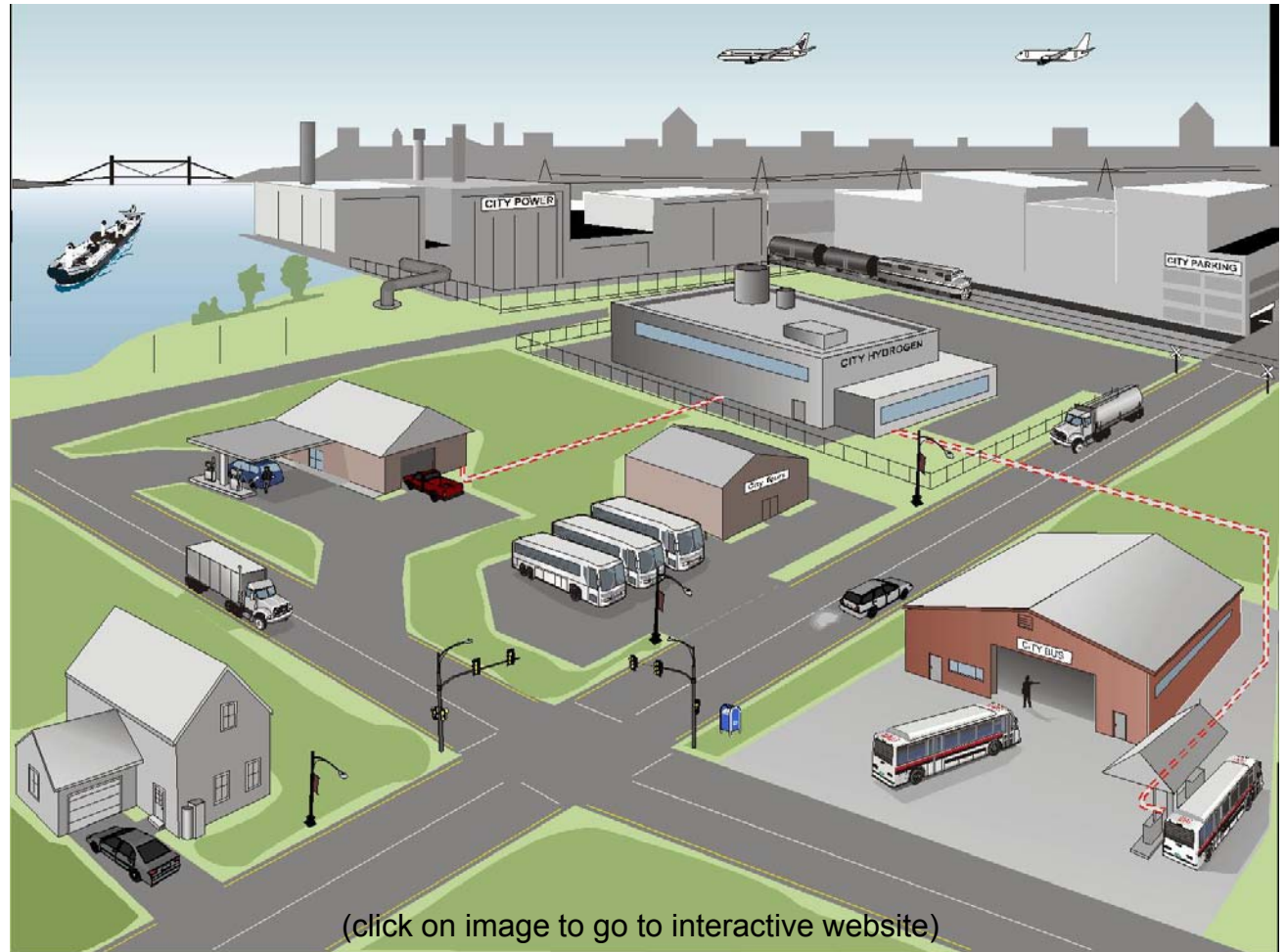
FMCSA

FTA

MARAD

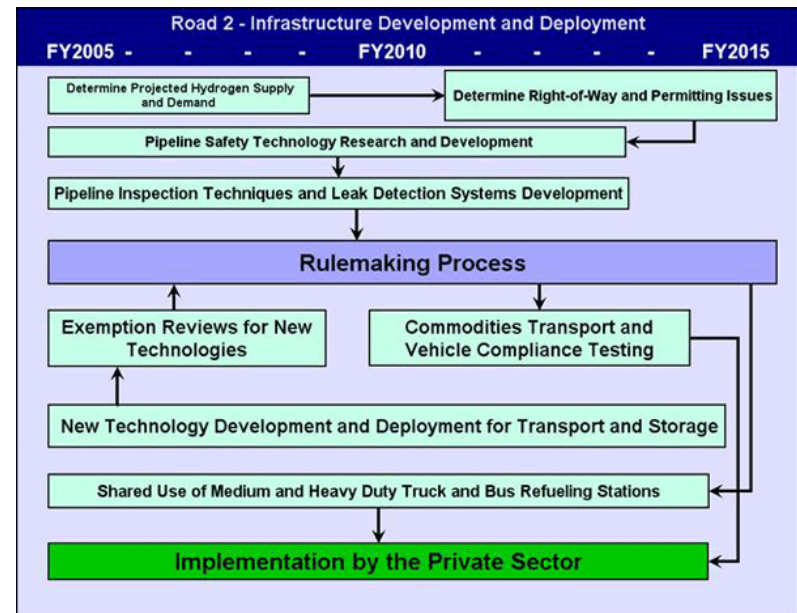
NHTSA

FHWA



The DOT Hydrogen Roadmap

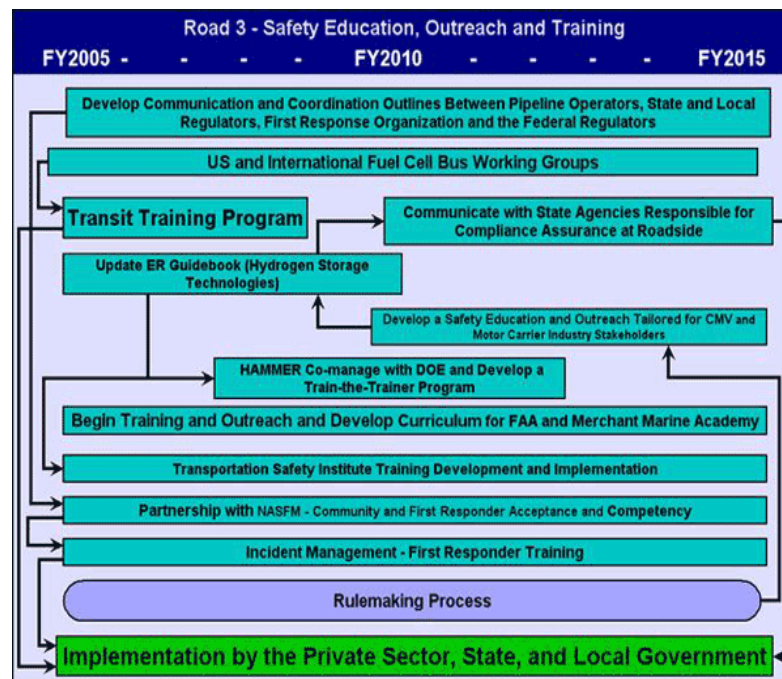
- **Road 2: Infrastructure Development and Deployment**
 - Supporting research and development activities at University Transportation Centers (UTCs)
 - Full Vehicle Performance Testing
 - Determining projected hydrogen supply and demand, and associated burdens on the current and future hydrogen infrastructure
 - Hazardous materials management and emergency response
 - Support the development of:
 - Pipeline inspection practices
 - Leak detection systems
 - High pressure storage vessels
 - Refueling stations



The DOT Hydrogen Roadmap

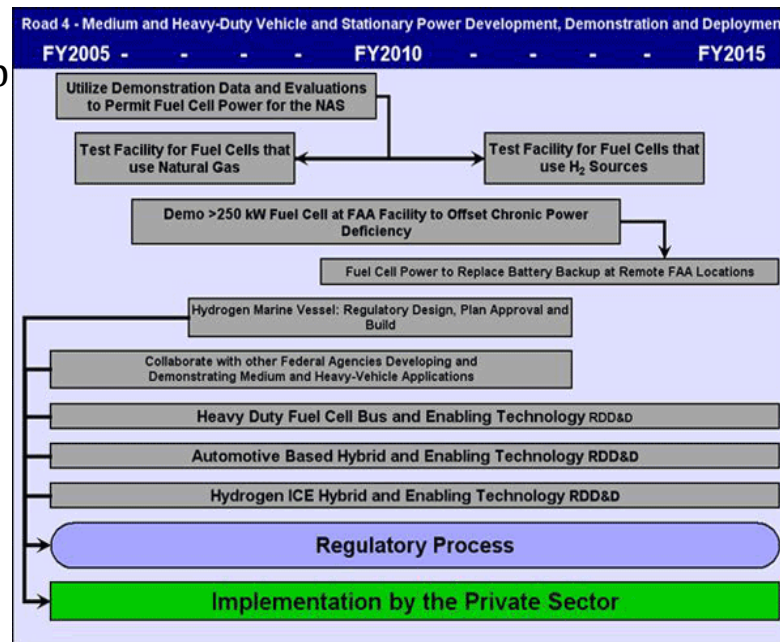
- **Road 3: Safety Education, Outreach and Training**

- Education and Training developed to harmonize local, national and international standards and recommended practices
- Hydrogen Safety Education and Training
 - Hydrogen Fact Sheets, Fuel Cell Bus Training Manual, Emergency Response Guidebook, Hydrogen Executive Leadership Panel
- Hydrogen Outreach
 - Hydrogen Drive 2008
 - Hydrogen Portal



The DOT Hydrogen Roadmap

- **Road 4: Medium and Heavy-Duty Vehicle Development, Demonstration and Deployment**
 - National Fuel Cell Bus Program
 - Hydrogen Fuel Cell Bus Demonstration and Deployment (FTA/NREL)
 - Collaboration, partnerships and knowledge sharing with the public and private sector
 - California Fuel Cell Partnership
 - Life cycle modeling for fuel cell buses and vehicles
 - Technology tracking of light weight material and advanced battery technologies



Interagency Collaboration and Outreach

- The U.S. DOT is uniquely responsible for the safety regulatory process for hydrogen-fueled vehicles and supporting transportation infrastructure
- DOT's ongoing outreach efforts include collaboration with:
 - Department of Defense (DoD)
 - Department of Energy (DOE)
 - National Institute of Standards and Technology (NIST)
 - National Research Council (NRC)
 - Industry Groups and Associations (e.g., NHA)
- Collaboration and outreach has resulted in feedback about successfully achieving DOT's strategic mission for hydrogen transportation infrastructure development

Interagency Recommendations and Findings

- The U.S. DOT's analytical activities should include the following:
 - Coordination with other agencies to fund research, development and deployment activities to support safe hydrogen transportation
 - Track hydrogen-related technologies and monitor their progress
 - Track hydrogen forecasts conducted and supported by other government agencies
 - Participate in assessments and modeling for determining the capability of infrastructure to deliver hydrogen

Source: DoD/LMI Recommendations for DOT Hydrogen Infrastructure Activities, February 2008.

Recommendations for DOT Hydrogen Plan

- “[A]n area of concern relates to safety codes and standards...the DOT part of the program is well behind schedule and woefully underfunded...DOT needs to prepare a long-range hydrogen safety plan and work to get it adequately funded” (Source: Review of the Research Program of the FreedomCAR and Fuel Partnership: Second Report, National Research Council, February 2008.)
- “DOT expenditures on hydrogen infrastructure are small relative to anticipated spending by other government agencies and industry” (Source: DoD/LMI, Recommendations for DOT Hydrogen Infrastructure Activities, February 2008.)
- “[A] major factor in meeting DOT’s obligations will be the assignment of staff members to track the progress of hydrogen-related technologies” (Source: DoD/LMI, Recommendations for DOT Hydrogen Infrastructure Activities, February 2008.)

DOT's Hydrogen Plan – Next Steps

- Road 1: **Safety Codes, Standards and Regulations**
 - Vehicle safety testing (NHTSA) (Assuming vehicle availability)
 - Support international regulatory harmonization (RITA, NHTSA)
 - Continue pipeline integrity evaluation programs (PHMSA)
 - Update regulations for safe operation of hydrogen fuel systems in commercial vehicles (FMCSA)
- Road 2: **Infrastructure Development and Deployment**
 - Implementation of risk management and integrity plans for hydrogen distribution in pipelines (PHMSA)
- Road 3: **Safety Education, Outreach and Training**
 - Distribute train-the-trainer materials for first responders and HAZMAT personnel (PHMSA)
 - Distribute training manuals and materials to transit agencies operating fuel cell buses (FTA)
 - Train students in state-of-the-art hydrogen technologies at U.S. Merchant Marine Fuel Cell Transportation Laboratory (MARAD)

DOT's Hydrogen Plan – Next Steps

- Road 4: Medium- and Heavy-Duty Vehicle Development, Demonstration and Deployment
 - Technology tracking of light weight material and advanced battery technologies (FTA)
 - Continue international communication and coordination for fuel cell powered bus research, development and deployment (FTA)
- System Assessment and Coordination (RITA)
 - Reduce risk in operations of hydrogen-powered vehicles and supporting infrastructure systems
 - Ensure rapid regulatory development and harmonization
 - Develop 'end-to-end' logistics and supply and demand analyses
 - Facilitate removal of barriers to the rapid deployment of hydrogen codes, standards and regulations – a major impediment to hydrogen transportation system implementation

The Path to Energy Independence

U.S. DOT/RITA is committed to alternative fuel vehicle research, including hydrogen, research, development, and commercialization through:

- Developing regulations to help ensure the safe design and operation of alternative fueled vehicles and infrastructure
- Offering opportunities to deploy vehicles where air quality restrictions prohibit conventional technology
- Reducing transportation's impact on the environment through the use of fuel-cell buses and heavy-duty vehicles
- Transitioning to a national and global hydrogen economy