

Lessons From Demonstration Projects

Policy and Regulatory Recommendations for
the Development of Hydrogen Infrastructure

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Agenda

- Overview of current infrastructure demonstration projects
 - Operational
 - Under consideration
- What makes a successful demonstration project?
 - What is the objective of infrastructure demonstration projects, really?
- Successes and obstacles in both development and operation
 - Lessons learnt
 - Our response
- Summary
 - Draw your own conclusions...

Lessons Learnt from Operational Projects



CHIP
•Vancouver
•CH₂ (700 bar)



Benning Road Retail Station

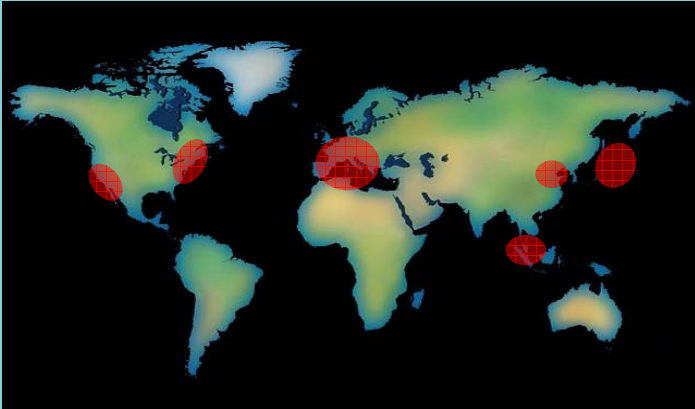
Washington, DC

- Regular Gasoline
- Plus Gasoline
- V-Power Gasoline
- Diesel
- Gaseous Hydrogen
- Liquid Hydrogen

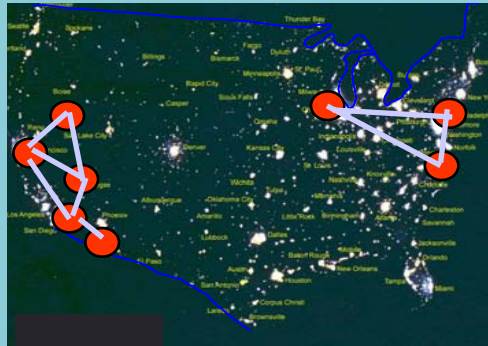
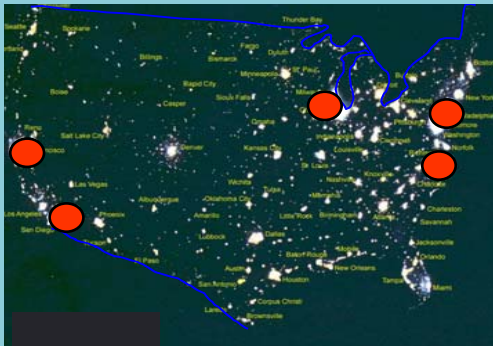
- Open Nov 2004
- “Public” Use



Lessons Applied in Projects under Consideration



- DOE demonstration program
California and Eastern corridor
- Europe JTI
- China
- Singapore



What Makes a Successful Demonstration Project?

New Information and Useful Building Blocks

- Reduce technology risk, market risk, legal risk, etc.
 - What are total costs of supply for the various supply options over time?
 - What are commercialization timelines of hydrogen vehicles?
 - What is the customer value proposition of fuel cells and hydrogen?
 - Where will be the early markets?
- Reduce uncertainty
 - What will be the government support for hydrogen? And how sustainable is this?
 - What is our best business model? And how sustainable is this?
 - What are the barriers to social acceptance? (E.G. HSE, town planning, etc.)
- Create building blocks and move forward
 - Establish codes and standards
 - Create future infrastructure
 - Education
 - Coherent Approach



Successes and Obstacles (1)

- Having several companies at the table helps develop best practices earlier due to variety of input
- Comprehensive HSE case and Risk Assessment development
- Visitor center allows daily outreach to local and global parties – public awareness
- Technology validation in both fuel cell vehicles and infrastructure
- Clarifying the technical issues and targets
- Good relationship with local fire inspector also helps with community
- Combined sites are more efficient to run than stand-alone sites
- Higher volume reduces the need for infrastructure incentives
- Etc.

But the biggest success is that we have learnt how to improve future demonstration projects...

Successes and Obstacles (2)

or... Lessons Learnt

- A coherent approach to incentives and regulations across different countries will reduce “friction” in industry development and has an important influence on either concentrating or fragmenting industry development
- Projects that can be extended or used in the future attract more support.
- A line of sight to normal competitive commercial operation adds credibility
- The vehicle is on the critical path – volume, volume, volume
- Under-utilization of initial infrastructure must be addressed too
- Hydrogen pricing / tax incentives are primarily related to building vehicle volume
- A geographically concentrated effort avoids dilution of effort
- Codes and Standards work must be strongly tied to operational projects
- Insurance and Liability work must be strongly tied to operational projects

Lessons Learnt (3)

- Pricing hydrogen starts the discussion on taxation and permitting of hydrogen as a fuel (regulatory issues). This will start to create long term confidence to invest in this industry
- Public awareness and understanding are essential, especially in the early phases, to have a more efficient infrastructure development and to create the necessary human capital
- Need to learn more about hydrogen distribution from central production, address the issues of supply and distribution logistics
- Confidence to invest is important.
Build confidence in the approaches taken and build confidence in how they will be sustained
- There is an opportunity to develop and apply incentives to reduce CO₂ emissions in the broader policy arena – hydrogen production

Summary

Lighthouse projects, with ...

- Coordination mechanisms & incentives, that build ...
- Supply chain confidence, supported by ...
- Regulations, codes & standards, and ...
- Promotion of public awareness

Substantial public-private partnerships

- Limited number, initially
- 100+ cars
- 4+ combined sites
- 2+ energy companies
- 2+ car OEMs
- 2+ fleet owners
- Semi commercial





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