

# ***Refueling Infrastructure for Alternative Fuel Vehicles: Lessons Learned for Hydrogen***



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# Infrastructure Lessons Learned

## ➤ Fueling Station Location and Customer Selection

Coordination between the OEM and Hydrogen Station Developer is crucial for optimal selection of sites / customers

### ISSUE

- Suboptimal site selection has resulted in low station utilization

### SOLUTIONS

- Clear understanding / agreement of OEM FCV deployment plan is critical
- Easy station access from a highway or major road is important
- Ability to offer 24/7 access is a factor

## ➤ Hydrogen Infrastructure Permitting

Permitting process is fraught with unknowns, obstacles and delays

### ISSUES

- The permitting process through local authorities, especially fire authorities, is new each time and is highly variable due to unfamiliarity with hydrogen specifications and lack of common requirements
- Building departments in general are unclear of requirements
- Equipment may not meet local and state certifications, and certification requirements change from one jurisdiction to another
- NEPA and local environmental processes are lengthy and not widely understood

### SOLUTIONS

- Meet early to understand requirements and kick-off the permitting processes as soon as possible
- Provide education to authorities up-front and bring back when station is running
- A need for permitting standardization
- A need for equipment / station standardization rather than “one-off” designs

# NextEnergy (Detroit) Station

## Infrastructure Lessons Learned



# Infrastructure Lessons Learned

## ➤ Infrastructure Legal Contracts

Legal agreements take longer than expected: customers, suppliers, OEM's

### ISSUES

- Indemnification and liability: BP high risk position (i.e. customers vs. suppliers)
- Site owners exert some level of control over access / supply
- Hydrogen sales - reluctance to pay for fuel

### SOLUTIONS

- ????

## ➤ Hydrogen Purity

Purity issues must be resolved prior to commercialization

### ISSUES

- No one wants to accept the H2 purity risk in demonstration projects
- Equipment suppliers have difficulty in meeting purity guidelines
- Limited number of laboratories that can test to extremely tight purity guidelines which translates into high cost
- No ASTM test standards
- Care must be taken while sampling
- Significant time and financial commitment to test for and assure purity
- Contaminants can come from the open end of the nozzle

### SOLUTIONS

- A need for mutual agreement between OEM's and Hydrogen Station Developers on purity specifications
- A need to finalize development of test standards

# *SMUD Station (in conjunction with Ford)*

## *Infrastructure Lessons Learned*





# Infrastructure Lessons Learned

## ➤ Community Engagement Prior to Station Construction

Engagement of the community is importance and cannot be taken for granted

### ISSUE

- Thorough due diligence of local landscape and early buy in from local officials is critical

### SOLUTION

- Present ideas and solicit community feedback as early as possible

## ➤ Station Equipment Acquisition – Design – Construction - Operation

The 350 bar systems seem to have reached a comfortable level of mature and safe performance but there is more work to do

### ISSUES

- New 700 bar systems need to be proven for long-term use and reliability
- Vehicle communication standardization continues to be an issue – IR vs. RF
- There is confusion between the NFPA specifications which complicates design
- Local site partners bring unique requirements to each project which can complicate and delay progress
- Commercial scale hydrogen stations have large footprints
- Lack of technology to meet Weights and Measures requirements
- BP rigorous processes result in unexpected suppliers' delays
- BP rigorous safety construction processes result in additional efforts to educate third parties
- Low station utilization has not allowed for rigorous testing of demonstration equipment

### SOLUTIONS

- NFPA 2 should help to clarify requirements
- Lessons learned from 350 bar systems should help the transition to 700 bar systems
- A need for a concerted effort to increase station utilization

# ***Burbank - Existing Station / Site***

## ***Infrastructure Lessons Learned***

