Technology Validation: Fuel Cell Bus Evaluations

Overview

**Technology Validation**
- Fuel Cell Bus Evaluations
- International collaboration ongoing

**Budget**
- FY04: $208 K
- FY05: $138 K
- FY06: $212 K

**Technology Validation Barriers**
- Vehicle
- Storage
- Hydrogen fuelling infrastructure
- Fusion and training
- Codes and standards

**Partners**
- Operating Fleets
  - AC Transit
  - Santa Clara VTA
- Fuel Cell Providers
  - Ballard
  - Hydrogenics
  - UTC Power
- H₂ Infrastructure
  - Air Products
  - SunLine
  - NREL

**Objectives**

- Validate FC and hydrogen technologies in transit applications
- Provide feedback for HyFC Program R&D
- Assess "lessons learned" on implementing next generation FC systems into transit operations
- Harmonize data collection efforts with other FC bus demonstrations worldwide

**Approach**

- Evaluations: Work with transit fleets to evaluate FCs in service
- Vehicle specifications, use, and duty-cycle
- Fluid consumptions (fuel, oil, water, etc.), maintenance
- FC system, Hydrogenics 20kW FC
- Hydrogenics 60kW FC

**Overview of Technical Accomplishments/Progress**

- Evaluations: Working with transit fleets to evaluate FCs in service
- Santa Clara VTA – Projected preliminary data report; data collection continues
- International collaboration
  - Coordinating committee for working group
  - Third International FC Workshop; feed back session on "Data sharing sensitivities"

**Operational Highlights**

- Three model year 2004 buses with non-hybrid FC systems by Ballard Power Systems
- Three model year 2005 buses (Cummins IL with DPH)
- FC system, Hydrogenics 20kW FC
- Hydrogenics 60kW FC

**VTA Fueling Station**

- Hydrogenics 20kW FC
- Hydrogenics 60kW FC
- Fuel Cell Hours
- Fuel Cell Bus
- Diesel Bus
- Cumulative Fueling Rate Histogram: VTA Station

**Preliminary Data Results: Santa Clara VTA – San Jose, CA**

<table>
<thead>
<tr>
<th>VTA</th>
<th>Total Miles and FC Hour Accumulation</th>
<th>Fuel Costs</th>
<th>Average Fuel Economy</th>
<th>Cumulative Fueling Rate Histogram: VTA Station</th>
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<tbody>
<tr>
<td>FCB</td>
<td>20,000</td>
<td>6,000</td>
<td>0.84</td>
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<tr>
<td>Diesel</td>
<td>20,000</td>
<td>6,000</td>
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**Future Work**

- Attend Fourth International FC Workshop
- Publish final report on VTA evaluation
- Publish preliminary data report on Hybrid ARIE
- Feed-back results back into HPCT Program R&D
- Continue collection and analysis of technical data on buses and infrastructure for all fleets
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**Summary**

- Preliminary data results show need for hybridization
- Collection of performance and cost data on conventional technology establishes a baseline for tracking progress
- Use of prototype FCs is much less than standard buses
- High cost for maintaining current generation prototype technology