2014 DOE Vehicle Technologies Program Review

Hydrogen Fuel-Cell Electric Hybrid Truck & Zero Emission Delivery Vehicle Deployment

Allison Carr (P.I. & presenter) – Senior Air Quality Planner
Nicholas Williams (P.I.) – Air Quality Coordinator

Houston-Galveston Area Council
June 19, 2014

Project ID: VSS116

This presentation does not contain any proprietary, confidential, or otherwise restricted information.
Overview

Hydrogen Fuel-Cell Electric Hybrid Truck Project

Timeline
- Start date – October 1, 2013
- End date – November 30, 2015

Budget
- Total funding
  - DOE share: $3,400,823
  - Contractor share: $4,253,556
- FY13 Expenditure:
  - $526.77 (travel)
- FY14 Expected Expenditure:
  - Dependent on selected Path Forward

Barriers
1. High cost of Class 8 hydrogen fuel-cell electric hybrid trucks
2. Financing vehicles & coordinating multiple funding sources is very complicated
3. Uncertainty related to deploying hydrogen fueling infrastructure and vehicle technologies in typical fleet use

Partners
- Collaborators
  - Initial project partners – Total Transportation Services, Inc (TTSI), Vision Industries Corporation, Air Products, EDF
- Project Lead
  - Houston-Galveston Area Council
Overview

Zero Emission Delivery Vehicle Deployment

Timeline

- Start date – October 1, 2012
- End date – September 30, 2015

Budget

- Total funding
  - DOE share: $2,430,177
  - Contractor share: $2,760,000
- FY13 Expenditure:
  - $36,571.14
- FY14 Expected Expenditure:
  - Dependent on current Call for Projects
    - DOE share: $1,055,000
    - Contractor share: $1,295,000

Barriers

1. High cost of low volume orders for all-electric medium-/heavy-duty trucks
2. Uncertainty in production capabilities and timeline for all-electric trucks
3. Fleet acceptance of electric drive vehicle by matching trucks to the correct applications and routes

Partners

- Collaborators
  - Center for Transportation and the Environment
  - Initial OEM partner – Smith Electric Vehicles
- Project Lead
  - Houston-Galveston Area Council
# Relevance

**Primary Objective:** Accelerate introduction and penetration of electric transportation technologies into the cargo transportation sector, specifically:

- 20 hydrogen fuel cell – electric hybrid Class 8 trucks
- 30 all-electric delivery vehicles (i.e. box trucks, step vans)

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Project Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cost of vehicles</td>
<td>Provide grant funding to incentivize deployment and testing of medium/heavy-duty zero emission vehicles</td>
</tr>
<tr>
<td>Risk associated with uncertain production capabilities and project financing</td>
<td>Restructure and/or simplify the process for granting ZECT funding through H-GAC</td>
</tr>
<tr>
<td>Challenges to fleet acceptance related to lack of infrastructure and matching vehicles to appropriate routes or applications</td>
<td>Provide funding for required infrastructure &amp; Conduct data collection and analysis on vehicle performance to demonstrate emission reductions</td>
</tr>
</tbody>
</table>
Approach / Strategy

To be successful, the deployed technologies (both all-electric and hydrogen fuel-cell trucks) must be:

- Available
- Cost effective
- Meet performance expectations for operation and emission reductions

Therefore, current and future activities include:

- Finalizing / conducting Call for Projects to identify fleet and OEM partners for projects
- Providing grant funding to selected partners to provide incentive for vehicle deployment and reduce barriers due to incremental costs of advanced technologies
- Begin vehicle monitoring, data collection, and performance / benefits analysis
# Milestones

## Hydrogen Fuel-Cell Electric Hybrid Truck Project

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Agreement Negotiation and Finalization (to be completed through Call for Projects)</td>
<td>8/2014 – 1/2015</td>
</tr>
<tr>
<td>Proposed Revision to Project Scope / Path Forward to DOE</td>
<td>Submitted 2/2014</td>
</tr>
<tr>
<td>Proposed Call for Projects (for fleet partners with all-electric delivery vehicle OEM)</td>
<td>7/2014 – 9/2014</td>
</tr>
</tbody>
</table>

### Possible Path Forward

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Partners &amp; Issue Notice to Proceed</td>
<td>10/2014 – 12/2014</td>
</tr>
<tr>
<td>Delivery of Vehicles</td>
<td>9/2013 – 7/2014</td>
</tr>
<tr>
<td>Vehicle Testing begins</td>
<td>Beginning 11/2015</td>
</tr>
</tbody>
</table>
## Milestones

**Zero Emission Delivery Vehicle Deployment**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Agreement Negotiation and Finalization <em>(to be completed through Call for Projects)</em></td>
<td>6/2014 – 11/2014</td>
</tr>
<tr>
<td>Proposed Revision to Project Scope / Path Forward to DOE</td>
<td>Submitted 12/2013</td>
</tr>
<tr>
<td>Call for Projects <em>(for fleet partners with all-electric delivery vehicle OEM)</em></td>
<td>5/2014 – 7/2014</td>
</tr>
<tr>
<td>Select Partners &amp; Issue Notice to Proceed</td>
<td>8/2014 – 11/2014</td>
</tr>
<tr>
<td>Vehicle Testing begins</td>
<td>Beginning 11/2014</td>
</tr>
<tr>
<td>Full Demonstration of All Vehicles</td>
<td>4/20135– 4/2017</td>
</tr>
</tbody>
</table>
Accomplishments & Progress

Project Outcomes for FY13

• Hydrogen Fuel-Cell Electric Hybrid:
  • Project partners requested restructuring of project budget which was incompatible with cost share funding from state agency
  • H-GAC was unable to agree upon sub-recipient agreements with project partners Vision Industries and TTSI
  • Complete survey to identify suppliers of zero emission Class 8 trucks
  • Next Steps – Identify and agree upon appropriate path forward for procurement and deployment of zero-emission Class 8 trucks.

• Zero Emission Delivery Vehicles:
  • Project partner, Smith Electric Vehicles, indefinitely suspended production of all-electric trucks
  • Next Steps – Complete Call for Projects to select partners for deployment of at least 30 trucks.
Collaboration

• **Contract Lead** – Houston-Galveston Area Council

• **Zero Emission Delivery Truck**
  • Project Administration & Technology Partner – Center for Transportation and the Environment
  • Cost Share Partners(s) – Fleets and OEM partners will be determined through Call for Projects administered by H-GAC
  • *Initial OEM partner was Smith Electric Vehicles.*

• **Hydrogen Fuel-Cell Electric Hybrid Truck Project**
  • Partners TBD
  • *Initial project partners included Vision Industries, Total Transportation Services, Inc (TTSI), AirProducts, and Environmental Defense Fund (EDF)*
Remaining Challenges & Barriers

1) **Addressing Project Delays**
   - Confirming path forward for projects with DOE
   - Identification of new or additional project partners

2) **Reducing risks associated with uncertainty related to production of vehicles**
   - Conducting Call for Projects to identify vehicle demonstration partners (fleets) in partnership with OEMs

3) **Simplifying project reimbursement / payment structure to address financial risks**
Future Work

Next Steps for FY14

- **Hydrogen Fuel-Cell Electric Hybrid:**
  - Identify and agree upon appropriate path forward for procurement and deployment of zero-emission Class 8 trucks, in partnership with DOE
  - Potentially facilitate Call for Projects for hydrogen (and/or all-electric) Class 8 trucks

- **Zero Emission Delivery Vehicles:**
  - Complete Call for Projects to select partners for deployment of at least 30 trucks
  - Complete sub-recipient agreements with project partners and issue Notice to Proceed documentation
  - Support fleet & OEM partners in purchase and procurement of vehicles
  - Oversee delivery and initial testing of vehicles
  - Selected project partners begin deployment and data collection
Summary

*Hydrogen Fuel-Cell Electric Hybrid Truck Project*

- The expense of the hydrogen fuel-cell hybrid trucks requires multiple partners and multiple funding sources (federal, state, private) to cooperate in the deployment of vehicles, as a result:
  - Discussions related to financial risk among partners has resulted in substantial project delays.
  - Original OEM partner, Vision Industries, is unwilling to move forward with the project due to restrictions on state cost share funding.
- H-GAC has proposed moving forward with a simplified project budget and is currently gathering information about options for new and/or additional project partners.
Summary

Zero Emission Delivery Vehicle Deployment

- Uncertainties and financial challenges with vehicle OEM have created delays and continues to present a risk
  - Original OEM partner, Smith Electric Vehicles, has paused production of their all-electric delivery vehicles in the United States
- H-GAC is conducting a Call for Projects to select new project partners (fleets in partnership with selected OEM) for deployment of 30 trucks in the Houston region
  - The selected fleet partners will purchase vehicles from selected OEMs for delivery and deployment on an aggressive timeline
  - Partners will be required to contribute the required cost share
Thank you.

Allison Carr

allison.carr@h-gac.com

Houston-Galveston Area Council