

**Texas Commission on Environmental Quality  
New Technology Research & Development (NTRD) Program  
Monthly Project Status Report**

**Contract Number:** 582-11-11145-3264  
**Grantee:** The University of Texas at Austin (UT-CEM)  
**Report for the Monthly period:** January 2012 **Date Submitted:** February 10, 2012

**Section I. Accomplishments**

*Provide a bulleted list of project accomplishments as well as a description of their importance to the project.*

- Installed hydrogen tube trailer at UT-CEM hydrogen fueling site and received first delivery of hydrogen gas.
- Performed minor modification to off-loading post installation from December 2011 and completed final plumbing to the hydrogen tube trailer. A second trip was needed in January 2012 by Gas Technology Institute (GTI) to perform this work since not all parts were delivered by their vendors in December 2011 as expected on their initial visit.
- Solved compressor issue from December 2011. The solution was not a faulty programmable logic controller (PLC) module as expected, but a poor input connection to the PLC module.
- Pressure tested and leak checked additional hydrogen storage cylinders and plumbing with hydrogen supply from the tube trailer and the use of the compressor.
- Began reformer upgrade design work to increase hydrogen production reliability.
- Began procurement of components for reformer upgrade fabrication.
- Continued preparations for the Proterra bus delivery. Proterra experienced issues with the bus transmission, which are outlined in Section II and delayed delivery. As of February 10, 2012, date of report submittal, Proterra is still working on a solution.

*Indicate which part of the Grant Activities as defined in the grant agreement, the above accomplishments are related to:*

- Task 2.1.1: The PERFORMING PARTY will contract with GTI to prepare hydrogen fueling station and increase hydrogen fuel capacity.
- Task 2.1.2.5: The PERFORMING PARTY and GTI will provide a supply of backup hydrogen for bus refueling.
- Task 2.3: The PERFORMING PARTY will ensure that the Proterra bus, Capital Metro personnel, and support material are prepared for the demonstration.

## **Section II: Problems/Solutions**

*Problem(s) Identified: Report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project*

- a) A trial fill using the hydrogen dispenser at the fueling site was unsuccessful. The dispenser was unresponsive when a fill was initiated and flashed a fault code.
- b) The location of the tube trailer is too close to the dispenser's purge blower per National Fire Protection Association (NFPA) codes.
- c) Proterra's delivery of the bus was delayed in January 2012 due to a malfunctioning transmission. A solution is not clear at this time, and a projected delivery date is unknown.
- d) Delays in bus delivery may push the demonstration schedule back further, and a one-year demonstration may not be possible prior to May 31, 2013.

*Proposed Solution(s): Report any possible solution(s) to the problem(s) that were considered/encountered*

- a) The dispenser provider, Greenfield, suggested a cold start, or hard reset, of the dispenser to clear the fault, which would then allow them to do further diagnosis remotely. UT-CEM personnel performed the cold start as instructed.
- b) GTI removed the purge blower and plumbed compressed air, which was already in use within the dispenser, to the electrical cabinet to create the positive pressure needed to prevent hydrogen from entering the cabinet.
- c) In November 2011, Proterra traced their transmission problems to a communication issue with the transmission's controller area network (CAN) bus line. Proterra believed they had a solution and could deliver the bus in January 2012. The communication solution did not entirely correct the transmission problems and Proterra continued working with their transmission supplier, BorgWarner, in December 2011 and January 2012. They now believe the root cause to be a mechanical problem with the clutch. The solution will require dynamometer testing of the motor and transmission assembly at BorgWarner's facilities, which is expected to take several weeks or longer to diagnose the problem and find a solution. In parallel, Proterra and BorgWarner have been attempting work-around solutions to expedite delivery of the bus pending a final solution from the dynamometer testing. The work-around solutions involved disabling either 2nd or 3rd gear, resulting in somewhat reduced bus performance.
- d) UT-CEM and the Center for Transportation and the Environment (CTE) plan to compress training and pre-service trials upon bus delivery to begin the demonstration as soon as possible. Final reporting schedules after the demonstration will also be compressed if the bus is not delivered soon.

*Action(s) Conducted and Results: Describe the action(s) taken to resolve the problem(s) and its effect*

- a) The cold start did not clear the fault. GTI has arranged for an on-site service call by a Greenfield technician for February 10, 2012.
- b) GTI was unable to test the effectiveness of the compressed air solution since the dispenser is not operational; however, GTI is confident the solution will have a positive result.

- c) As of February 10, 2012, the approach of disabling 3rd or 2nd gear in the transmission has been unsuccessful. Disabling 2nd gear was successful in the first bus Proterra tested, and this bus is still performing well. However, further buses have seen failures early during on-road trials, including the Austin demonstration bus. Proterra and their transmission manufacturer continue to work towards a long-term solution and explore work-around solutions to expedite bus delivery. Proterra will not project a delivery date at this time.
- d) Pending delivery of the bus, a final outcome on the project and demonstration schedule is not known at this time.

### **Section III. Goals and Issues for Succeeding Period:**

*Provide a brief description of the goal(s) you hope to realize in the coming period and identify any notable challenges that can be foreseen*

- Continue fueling station upgrades and preparation with GTI. (Task 2.1)
  - Continue dispenser repair with GTI and Greenfield.
  - Begin reformer upgrade fabrication and testing.
- Complete/continue preparations for bus demonstration. (Task 2.3) (Delivery of the bus to Austin is currently not scheduled.)

Date: 2/10/2012

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*Authorized Project Representative's Signature*

**NOTE:** *Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.*