

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

Contract Number: 582-11-13472-2019

Grantee: Transportation Power, Inc. (TransPower)

Report for the Monthly period: 09/10/11 – 10/07/11 **Date Submitted:** 10/10/11

Section I. Accomplishments

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

- Completed assembly of first two prototype battery modules, each containing 60 batteries with a total energy storage capacity per module of 50 kWh. Collected data on the costs of fabricating the modules, which will help determine best strategies to contain costs for the high-performance electric terminal tractor (HPETT) battery modules.
- Acquired first prototype inverter and successfully ran a Quantum drive motor with the inverter for the first time, in a bench test mode. This is a key accomplishment as it is our first step toward being able to control the drive motor and use it effectively in truck and tractor applications. Figure 1 is a photo of our motor-inverter bench test setup.

Figure 1. Photo of motor-inverter bench test setup.



- Completed the design of our advanced onboard inverter-charger, which is important because this is one of the major components required for electrification of the terminal tractors.

- On October 6, 2011, received from Cargotec the first terminal tractor vehicle to be converted to electric drive on this program, which is important because having the vehicle in our possession will greatly accelerate design and development of the installation of our electric drive system into the vehicle. Figure 2 shows ISE engineers and technicians inspecting the tractor vehicle shortly after its arrival at TransPower’s integration facility.

Figure 2. Kalmar yard tractor being inspected following its arrival at TransPower’s facility.



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

- The first three accomplishments listed above relate to Task 2.1.1, “Final Component Selection and Procurement.” The last task above relates to Task 2.2.1.2, which is to procure two terminal tractors.

Section II: Problems/Solutions

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

- a) Even though the design of our standard battery module was greatly simplified following a design review in August, preliminary data indicate that fabrication of the first two prototype modules was very costly. This has little impact on the progress of the project because the two prototype modules that were built will be used on a vehicle being built under a separate program. Nevertheless, there will be some impact because additional engineering effort will have to be expended to devise ways of further reducing costs.
- b) Obtaining the first inverter from Quantum and getting it to work with the first prototype motor took significantly longer than anticipated. In itself, this will not have a significant impact on the program because the Kalmar tractor took longer to receive than anticipated. However, the delay in receiving the first tractor has held up our ability to determine locations within the vehicle for various components or to begin physically modifying the vehicle.

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

- a) Much of the cost of the battery modules was related to hand-building of the trays in which the batteries were placed. We will explore alternative methods of manufacturing the trays, along with alternative design concepts that don't require as many trays.
- b) To work around the issues created by the delay in receipt of the Kalmar tractor, we focused our efforts for the first 3-4 months of the project on designing and developing components whose designs are relatively independent of vehicle configuration, such as the battery module, electrically-driven accessory subsystem, and the inverter-charger. While less was accomplished during the first four months than originally expected, completion of these tasks has positioned us to make up time now that the vehicle is in our possession. Completion of the first vehicle is still expected to occur within or close to the expected schedule.

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

- a) We have not yet taken action to further reduce the costs of the battery modules, but as indicated previously, we will soon begin exploring alternatives to hand-building large numbers of separate battery trays.
- b) As indicated previously, we have achieved a fair amount of progress designing and building prototypes of subsystems whose designs are independent of the vehicle configuration. An updated plan to accelerate integration of components into the first tractor will be developed during the next reporting period.

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

During the coming period our main goal is to develop a plan for accelerated integration of components into the vehicle, in an effort to make up for time lost due to the delay in receiving the first vehicle. In terms of physical progress toward integration, our goals are to remove the diesel engine and fuel system from the vehicle, along with any other components not required for operation of our electric drive system. We also plan to have a preliminary layout of the major drive system components in the vehicle, including identification of locations for the batteries.

Date: 10/08/2011

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.*