



EV Project: First Responder Training

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Acronyms

| | |
|--------------|---|
| AC | Alternating Current |
| ARRA | American Reinvestment and Recovery Act |
| DC | Direct Current |
| DCFC | Level 2 DC Fast Charger |
| DOE | U.S. Department of Energy |
| EV | Electric Vehicle |
| EVSE | Electric Vehicle Supply Equipment – equipment that provides for the transfer of energy between the electric utility power and the electric vehicle. |
| HRG | Hybrid Response Guide |
| NAFTC | National Alternative Fuel Consortium |
| NFPA | National Fire Protection Association |
| OEM | Original Equipment Manufacturer – refers to automobile manufacturers |
| PHEV | Plug-in Hybrid Electric Vehicle – vehicles utilizing a battery and an internal combustion engine (ICE) powered by either gasoline or diesel. |

1 Introduction

ECOtality, Inc. (NASDAQ: ECTY), headquartered in San Francisco, California, is a leader in clean electric transportation and storage technologies. Its subsidiary, Electric Transportation Engineering Corporation (eTec) dba ECOtality North America (ECOtality), is the leading installer and provider of charging infrastructure for electric vehicles (EVs). ECOtality has been involved in every major electric vehicle (EV) or plug-in electric vehicle (PHEV) initiative to date in North America and is currently working with major automotive manufacturers, utilities, the U.S. Department of Energy (DOE), state and municipal governments, and international research institutes to implement and expand the presence of this technology for a greener future.

ECOtality designed and currently manages the world's largest EV infrastructure demonstration - the EV Project. With a budget of over \$230 million, the EV Project will deploy and study Level 2 alternating current (AC) electric vehicle supply equipment (EVSE) stations for residential use, Level 2 AC EVSE stations for commercial and Level 2 direct current (DC) fast charge (DCFC) stations. This represents thousands of field assets, utilized in concert with the deployment of Nissan LEAF™ vehicles and Chevrolet Volt vehicles.

The EV Project is a public-private partnership administered by the DOE through a federal stimulus grant, made possible by the American Recovery and Reinvestment Act (ARRA) and by the private investment of ECOtality and its partners.

The EV Project is an infrastructure study. The EV Project will deliver to ECOtality, the Government and the general public a wealth of directly-applicable technical and professional experience for jumpstarting regional EV adoption and replicating business models that lead to sustainable, market-based charge infrastructures.

One purpose of the EV Project is to identify potential barriers to the widespread adoption of EVs and the deployment of EVSE to support them. This process identifies topics of national interest in the early deployment of EV charging stations in order to facilitate discussion and resolution. This paper documents the issues associated with and the EV Project's approach to emergency first responders.

The First Responder Training Assistance task was initiated as part of the larger EV Project. The EVs being deployed will present new and unexpected challenges to emergency first responders. In order for first responders to safely and appropriately handle the unfamiliar hazards potentially posed by EVs, it will be necessary to ensure that they are adequately trained and prepared.

Since ECOTality personnel may have contact with local fire department personnel or the local Fire Marshal's office during charger installation inspections or fire code revisions, ECOTality's EV project team determined that they may need to provide first responder information with respect to deployed vehicles. Therefore, early in the EV Project, the project team included a task to identify the best ways to provide the frontline ECOTality Area Managers with information to address local first responder concerns and questions regarding response to an electric vehicle incident or situation.

This document includes a summary of the research methods and resulting discoveries of that task. It concludes with some general observations on the task execution as well as recommendations for future projects in similar phases.

2 Lessons Learned

This section covers the primary steps involved in developing the final summary. In this task, the project team members performed research, evaluated their findings, and then assessed their results against their expectations before making a final recommendation regarding First Responder Training.

2.1 Research

To determine the appropriate action for the First Responder Training Assistance taskforce to take, the taskforce first researched existing materials. The taskforce identified and reviewed the resources currently available to train and prepare first responders for incidents involving advanced electric drive vehicles. Specifically, the taskforce focused on vehicles being deployed as part of the EV Project, such as the Nissan LEAF™ and Chevrolet Volt™.

Additionally, the taskforce gathered issues and concerns from First Responders to aid them in determining if the current materials were meeting their needs.

Finally, EV Original Equipment Manufacturers (OEMs) were contacted to gather vehicle specific information.

2.1.1 Documentation Review

The following existing documents were reviewed by the taskforce:

- *The Emergency Response Guide to Alternative Fuel Vehicles*, prepared by the CAL FIRE-State Fire Marshal, June 2009
- *First Responder Safety Training: Hybrid Electric Vehicles* (ISBN 978-1-933954-24-0), available through the National Alternative Fuel Vehicle Consortium (NAFTC)
- *HEV Emergency Quick Reference Guide* (ISBN 978-1-933954-28-8), NAFTC
- *Hybrid Response Guide (HRG) 2000-2010*, (publication HRG 10-V1) distributed by MGS Tech Corporation
- *First Responder Safety Training: Natural Gas and Electric Vehicle Workshop*, sponsored by Clean Fuels Ohio at the Ohio Fire Academy
- *The Fire Fighter and Emergency Response for Electric Drive and Hybrid Electric Vehicles Final Report*, prepared by The Fire Protection Research Foundation, May 2010
- *GM Impact Preview Program Emergency Responder Information Booklet*, 1995
- *Altima Hybrid First Responder's Guide*, Nissan North America, 2009

The taskforce also contacted DOE's Transportation Electrification Education Grants Project Manager to discuss on-going activities and new developments.

Additionally, taskforce representatives attended a workshop sponsored by the Clean Fuels Ohio, the Division for State Fire Marshals, and Clean Cities, entitled *First Responder Safety Training: Natural Gas & Electric Vehicles*. This workshop included general information about electric drive vehicle technology and emergency response to electric and hybrid vehicles.

Finally, the taskforce reviewed the first responder activities of the National Fire Protection Association (NFPA). In March/April 2010, NFPA announced the launch of a program funded by a \$4.4 million DOE grant that would include the development and implementation of comprehensive emergency response training. Ultimately titled *Emergency Responder Safety Training* and accessible via its website at EVSafetyTraining.org, this program is intended to be a clearinghouse for EV first responder safety-related information.

For example, NFPA posted the *First Responder's Guide for the 2011 Nissan LEAF™* in late December 2010, and a month later, the *2011 Chevrolet Volt™ Emergency Response Guide* and *Chevrolet Volt™ Emergency Responder Quick Reference Guide*. NFPA has also developed promotional materials to direct interested parties to their website. An example of promotional materials is included in Appendix A.

2.1.2 First Responder Issues and Concerns

After reviewing the available resources, the taskforce contacted a sampling of fire departments and State Fire Marshal's offices located with the EV Project local deployment areas, including:

- Seattle Fire Department
- State of Tennessee Fire Marshal
- Tennessee Fire Academy
- Oregon State Fire Marshal's office
- Portland Fire & Rescue
- Oak Ridge Fire Department
- Phoenix Fire Department
- El Mirage Fire Department
- Mesa Fire Department
- Tucson Fire Department.

The taskforce discussed the following topics:

- First responders concerns associated with response to an incident involving an electric vehicle
- Best method(s) of receiving training information
- Current programs/resources used for training on other types of alternative fuel vehicles
- Specific vehicle details considered to be associated with response activities

While these contacts did not produce a significant amount of new information, they did provide a consistent view of the materials and methods currently available.

2.1.3 OEM Contact

After contacting first responders, the taskforce compiled an OEM Information Request form requesting a list of vehicle-specific information. After contacting an EV Project OEM, ECOtality was informed by an OEM representative that they were currently developing first responder guidelines. While they would be happy to review our list of first responder concerns, it was not likely that they would provide ECOtality with any vehicle specific information prior to the OEM releasing its own guidelines to the public. Additionally, the representative indicated that the guidelines currently in development would be similar to the 27-page document provided for their hybrid vehicle.

2.2 Evaluation

After researching the existing materials and processes, the taskforce evaluated how those materials were being used and if they were adequately meeting the needs of the emergency personnel.

Originally, the First Responder Training Assistance task was focused on reviewing available training resources, contacting first responders in several of the initial deployment areas about their concerns with training gaps, and contacting OEMs to obtain vehicle specific information in order to develop detailed materials to meet any outstanding training needs.

As the task developed, it became evident that vehicle specific information would not be provided to ECOtality prior to vehicle deployments. This lack of cooperation delayed implementation of First Responder Training as originally envisioned by the EV Project.

Additionally, the NFPA project was launched and the EV OEMs entered agreements with NFPA to provide vehicle specific. This cooperation between NFPA and the EV OEMs would generate materials that the ECOtality First Responder Training Assistance task effort had identified as needed by emergency personnel. The consolidation of information in this single resource (NFPA's website) is the most cost-effective method of providing the information to all first responders.

2.3 Assessment

The final component of this task was to develop a recommendation for the ECOtality project team regarding First Responder Training needs.

When the NFPA project was launched, ECOtality reevaluated the First Responder Training Assistance task. The task scope was ultimately revised to leverage the work being done by NFPA in cooperation with the EV OEMs.

Rather than creating new training materials to provide to ECOtality Area Managers, ECOtality requested promotional postcards and advertisements from NFPA pointing interested parties (including first responders, law enforcement, emergency medical personnel, etc) to the EVSafetyTraining.org website.

In addition to promoting the NFPA website externally, these materials served to educate ECOtality Area Managers on the website and the information it contains. Area Managers have reviewed the existing materials on the Nissan LEAF™ and the Chevrolet Volt™. As new materials are developed and posted by NFPA, they will be reliably accessible to Area Managers and other interested parties.

ECOtality is also working with NFPA, in cooperation with the NAFTC, to develop safety and response information for vehicle chargers and charging infrastructure.

3 Summary

This section includes key trends, repeatable outcomes, and overall result of the project.

3.1 Key impacts

During the review portion of the task, much of the documentation was initially found to focus on hybrid vehicles, with little specific information on electric vehicles. Standout publications included *Fire Fighter Safety and Emergency Response for Electric Drive and Hybrid Vehicles*, which provided a summary table of currently available electric vehicle-specific literature as well as a review of common elements to emergencies involving electric and hybrid-electric vehicles. Before the NFPA project, literature and training materials specific to electric vehicles seemed to be a gap.

The most substantial impact on the ECOTality First Responder Training Assistance task was the launch and development of NFPA's website, EVSafetyTraining.org. This modified the scope of the task from creating training materials to communicating about existing materials.

3.2 Key lessons

The due diligence that the taskforce performed up front meant that a much more cost effective solution could be utilized. By reviewing existing materials, attending trainings, and communicating with the intended user groups of first responder materials, the team was able to readily assess the viability of the NFPA's materials.

3.3 Recommendations

The taskforce was able to recommend a different, though substantially more cost effective solution by executing thorough research and being flexible about their task scope.