

MARCH 27, 2012—NRE MEETING: NON-ROAD ELECTRIFICATION

AGENDA

7:30 am – 8:00 am: March 27th Continental Breakfast	
8:00 am – 12:00 pm: Non-Road Electrification	
Topic	Speaker/Leader
8:00 – 8:15 Welcome and Introductions	Mark Duvall/Andra Rogers
8:15 – 8:30 Review Minutes and Action Items	Jorge Emmanuel, EPRI
8:30 – 8:45 NEC Article 626 Updates	Greg Nieminski, EPRI
8:45 – 9:15 Right Sizing Incentives	Jesse Shroyer, Smith Electric Vehicles
9:15 – 9:45 EPRI Non-Road Committee Update	Andra Rogers, EPRI
Break	All
10:00 – 10:30 Medium Speed Vehicle Initiative	Yvette DeLaune, Green Fleet Solution
10:30 – 11:00 Mining Opportunities	Mike Butts, Drummond
11:00 – 11:15 TSE Updates	Jeff Kim, ShorePower
11:15 – 11:30 Wrap up: Action Items, Future topics	Jorge Emmanuel/All
11:30 – 12:00 Vehicle to Home (V2H)	Joe Thompson, Nissan
Adjournment	

Grand Hyatt Atlanta
Atlanta, GA

Non-Road Electrification Committee Meeting Minutes (#12-1)

March 27, 2012

Welcome and Introductions

Cedric Daniels, Alabama Power/Southern Company, welcomed the participants and went over safety procedures. Andra Rogers, EPRI, welcomed the participants on behalf of Mark Duvall. She also reviewed the objectives of the IWC. Frank Lambert, NEETRAC, chaired the meeting on behalf of Brian Sisco. He reviewed the agenda and asked participants to introduce themselves (see Attachment for the list of attendees.) He reported that Jesse Shroyer could not make it due to illness.

Review and Approval of Past Minutes and Action Items

The group approved the minutes (#11-04) of the previous meeting (December 13, 2011) in Arizona. Below is the status of the Action Items.

Action Items: December 13, 2011 (Tempe) Meeting

#		ACTION ITEM	
1	Brian Sisco	will work with Cedric Daniels to invite Caterpillar to present on their hybrid heavy equipment.	Completed but Caterpillar unable to attend
2	Brian Sisco	will pursue contacts with John Deere and Smith Electric to invite them to participate in the IWC.	Smith Electric originally scheduled to present at the meeting but unable to attend

NEC Article 626 Updates

Greg Nieminski, EPRI Consultant, reminded the participants that the IWC proposals for Article 626 pertain to allowing electrified parking spaces at truck stops to be used with EVs. The proposal was accepted in principle by NEC Code Making Panel 12 last January. The proposals now go to the individual panel members for comment and the results will be released in late June or early July. The IWC will have until mid October to respond if necessary. The IWC Code Task Force will meet after the NEC report comes out. Mr. Nieminski also reported on the IEC TC 18 Committee working on the ship to shore power standards. The companion standard relating to connectors was published last year. IEC TC 18 referenced the detailed drawings and the complete standard is out for vote until mid April.

EPRI Non-Road Committee Update

Andra Rogers, EPRI, related the history of the EPRI non-road electric transportation program, described the program research areas and plans for 2012. She highlighted the work at the port of Savannah, development of prototype cargo tractors for airports, a mobile forklift calculator on iTunes, and a new project on mining (see Attachments). During discussion, she noted that the mobility of electric rubber tire gantry cranes will be analyzed. The benefits include cost savings, since gantry cranes use 5.2 gallons of diesel per hour. Joel Pointon, SDG&E, suggested that packaging information and tools would be useful when working with airlines. With regards to mining, Ms. Rogers reported that two battery manufacturers are willing to work with EPRI to develop a fast charger for their 128V batteries. She also described a supplemental project on market and environmental assessment modeling. Participants should let Ms. Rogers know if they are interested in funding any of these projects. She noted that work on electric buses continues to be part of the non-road program.

Medium Speed Vehicle Initiative

Yvette DeLaune, Green Fleet Solution, gave a presentation on rethinking electric mobility and introduced Mike Tomberlin of the Tomberlin Automotive Group. She described the growth drivers for electromobility in relation to fleet and infrastructure, noting that 15 billion miles are driven within 7 miles per day and 75% of US roads have speed limits of 45mph or less. She also discussed barriers and opportunities for city cars and medium speed vehicles (MSVs). Ten states already have MSV regulations. The project goals are to conduct evaluations, to produce supporting evidence to enact federal regulations for MSVs and to create educational campaigns to encourage adoption. During discussion, she noted that one

can drive low speed vehicles (LSVs) to a maximum speed of 25mph on 35mph roads, but, crossing a 45mph section is a major barrier. Mr. Tomberlin added that South Africa and Dubai, for example, have simpler regulations for MSV adoption. They will use J1772 for the coupler. Safety of MSVs is a concern. With due diligence, insurance may not be an issue.

Mining Opportunities

Mike Butts, Drummond Company, gave an introduction to electricity and mining (see Attachments). He described typical surface and underground mining methods, including an underground longwall operation. Electric technologies in underground mining include the continuous miner, electric shuttle car, roof bolters, longwall shearer, and conveyers. Electric applications in surface mining include conveyers, draglines, shovels, and haul trucks. He gave examples from mines around the world. During discussion, he explained that electric hydraulic shovels can operate 24/7 and have lights to illuminate the work area. The cost effectiveness of electric technologies is site specific. Some equipment, such as ventilation and pumping, have a high load factor while others, such as draglines, operate in cycles. Since they use large heavy electrical supply cables, reels or mobile equipment are used to manage the cables, which entails operational planning. With coal, some mines use natural gas from the coal bed to generate electricity for the operations. Voltages are defined by the Mine Safety and Health Administration (MSHA). Two major barriers for electrification are the need for a robust grid (stiff system) and the lack of harmonization of international standards for equipment.

TSE Updates

Jeff Kim, Shorepower, gave an update on their truck electrification project (see Attachment). They currently have 15 sites in operation and 50 more across major interstates coming online by the end of the 3rd quarter 2012. Currently, all trucks can plug into shore power with an extension cord and 20-30% of trucks are pre-wired for shore power. All truck manufacturers now provide a shore power option with retrofit costs ranging from \$100 to \$2,000. Mr. Kim listed shore power capable APUs and states with anti-idling laws. He described the Shorepower hardware, payment options, and the Shorepower Truck Electrification Project process. During discussion, he explained that location (occupancy), corridor, amenities (shower facilities, food, etc.) and management support are key to a successful TSE site. For transport refrigeration units, 480V, 3-phase, 30A are used in ports. Mr. Nieminski stated that Article 626 only recommends a specific 30A receptacle configuration as a fine print note in the current code. This issue should be addressed in the next code cycle.

ACTION ITEM: Jorge Emmanuel will include the Shorepower website in the minutes.
(Website: <http://www.shorepower.com/>)

Vehicle to Home (V2H)

Joe Thompson, Nissan, presented Nissan's vision of "LEAF to Home" (see Attachment). Directly connecting the batteries of a parked LEAF to the distribution panel at home via a power control system (PCS) optimizes energy usage, provides back-up power and allows for solar power integration. The PCS is a high power, single-phase, three-wire system with a

maximum power of 6kW. When fully charged, the batteries have a capacity of 24kWh, which is equivalent to two days electrical consumption for the average Japanese home. The PCS is bidirectional: it provides a supply of electricity to all 100V/200V outlets in the house but can also be used to charge the vehicle when needed. The connector complies with the CHAdeMO protocol. The system will be released in 2012. During discussion, Mr. Thompson, noted that there is an automated transfer switch and the system would be in islanding mode during an outage. A demonstration is planned in Farmington Hills, MI, to determine if the system is optimal for the US. LEAF owners will receive an updated software package if they want to install this system. The LEAF has two charge ports, one AC and the other DC. The DC port is used to supply the PCS which becomes the supply into the house.

Wrap up: Action Items, Future topics

Participants requested that EPRI provide an update on activities related to electric buses at the next meeting. The following topics were suggested for future meetings:

- Standardization of the 240V plug for truck stop electrification to be addressed in the next Code cycle.
- More information on electricity and mining.
- Updates on the Balqon electric yard tractor

ACTION ITEM: Andra Rogers will obtain an update on activities related to electric buses.

Announcements

Richard Hodson, SCE, announced that the SAE J2894 Committee is working on a standard related to power quality of electric vehicles spearheaded by Jordan Smith, SCE, and Gery Kissel, GM. Automakers that are interested should contact Gery Kissel.

Next Meetings

The next meetings of the IWC are scheduled for:

- *Meeting 1: June 27-28, 2012; at Exelon's corporate HQ in downtown Chicago*
- *Meeting 2: Week of October 15, 2012, location TBD*

Summary of Action Items

	ACTION ITEM
Jorge Emmanuel	will include the Shorepower website in the minutes. (Website http://www.shorepower.com/)
Andra Rogers	will obtain an update on activities related to electric buses.

Adjournment

With no further business, the meeting was adjourned.

ATTACHMENTS

IWC Attendance List

Last Name	First Name	Company
Anderson	Mike	EFACEC
Asgeirsson	Hawk	DTE Energy
Berezin	Slav	GM Global Technology Engineering
Bohn	Theodore	Argonne National Laboratory
Boroughs	Ralph	Tennessee Valley Authority (TVA)
Burhans	Theodore	Tucson Electric Power Co.
Burke	Bill	National Fire Protection Association
Butts	Michael	Drummond Company, Inc.
Collins	Watson	Northeast Utilities
Coop (via webcast)	Mike	Smart Grid
Coutinho Santos	Mario	EFACEC
Cun	David	Honda R&D North America, Inc.
Daniels	Cedric	Alabama Power Co.
Dwyer (via webcast)	Mike	
Emmanuel	Jorge	E&ER Group
Engle	John	CenterPoint Energy Houston Electric, LLC
Farley	Kathleen	Southern Company Services, Inc.
Fietzek	Cliff	BMW of North America, LLC
Francfort	James	Idaho National Laboratory
Garcia (via webcast)	Josephine	EPRI
Gerber	Seth	Consumers Energy
Guimaraes	Antonio	EFACEC
Hall (via webcast)	Ed	Dominion Resources, Inc.
Halliwell (via webcast)	John	Electric Power Research Institute
Harper	Jason	Argonne National Laboratory
Harris	Diane	Georgia Power Co.
Hawkins	Robert	Ultimate Business Solutions
Hires	Jeff	GS Battery USA, Inc.
Hodson	Richard	Southern California Edison Co.
Hubbard	Tim	Intertek
Humes	Tracee	Eaton Electrical
Kawakubo	Atsushi	Toyota Motor Company
Kesler	Morris	WiTricity Corp.
Kim (via webcast)	Jeff	Shorepower
Kissel	Gery	General Motors Company
Kumita	Kunihiko	Toyota Motor Corporation
Lambert	Frank	Georgia Tech/NEETRAC
MacCurdy	Dwight	Sacramento Municipal Util. Dist.

Last Name	First Name	Company
Maitra	Arindam	Electric Power Research Institute
Markowitz	John	New York Power Authority
Menig	Jeffrey	General Motors Company
Mikat	Dan	Toyota Technical Center-USA
Murach	John	Baltimore Gas & Electric Co.
Narita	Yusuke	Mitsubishi Motors R&D of America
Nichols	Vaughn	Gulf Power Co.
Nieminski	Greg	DBA Greg Nieminski
Northay	Jay	GS Battery (USA) Inc.
Offner	Arnold	Phoenix Contact
Packard	David	ClipperCreek, Inc.
Patterson	David	Mitsubishi Motors
Pointon	Joel	San Diego Gas & Electric Co.
Pucher	Cathy	Grid2Home, Inc.
Rogers	Andra	Electric Power Research Institute
Schlotzhauer	Craig	General Motors of Canada
Scholer	Rich	Chrysler Group, LLC
Shah	Vishant	EnerNex Corporation
Shimizu	Yusuke	Panasonic Corporation
Snyder	Aaron	EnerNex Corporation
Spross	Lance	Oncor Electric Delivery Co.
Srebnik	Kenneth	Nissan North America
Thompson	Joseph	Nissan Technical Center North America
Thompson	Ron	Eaton Corporation
Tillman	Leonard	Balch & Bingham LLP
Tsang	Alec	BC Hydro
Ugajin	Dan	GS Battery USA, Inc.
Ullrich	Daniel	RWE Effizienz GmbH E-Mobility
Uyeki	Robert	Honda R&D North America, Inc.
Wagner	Edward	RCT Systems
Waters (via webcast)	Mike	Progress Energy, Inc.
Weber	Scott	Consumers Energy
Wong	Frank	AeroVironment, Inc.
Yeider	Ted	Paceco Corp.
Zhu	Charles	Delta Products Corp.