

GRANTS/CONTINGENT AWARD REQUEST



To: Grants and Loans Office

Date: 2/27/2013

Project Manager: Rhett deMesa

Phone Number: 916-327-1312

Office: Energy Generation Research Office

Division: Energy Research and Development

MS- 43

Project Title: The Market Impact of Standardized Design in PEV Battery Pack Purchase and Disposal

Type of Request: (check one)

[X] New Agreement: (include items A-F from below) Agreement Number: PON-12-501-6
Program: PIER E / Transportation
Solicitation Name and/or Number: PON-12-501-06 (Solicitation to Address High Purchase Costs and Disposal)
Legal Name of Recipient: Electricore, Inc.
Recipient's Full Mailing Address: 27943 SMYTH DR STE 105
VALENCIA, CA 91355-4036
Recipient's Project Officer: Deborah Jelen Phone Number: 661-607-0230
Agreement Start Date: 6/19/2013 Agreement End Date: 3/31/2015

[ ] Amendment: (Check all that apply) Agreement Number: \_\_\_\_\_
[ ] Term Extension - New End Date: \_\_\_\_\_
[ ] Work Statement Revision (include Item A from below)
[ ] Budget Revision (include Item B from below)
[ ] Change of Scope (include Items A - F as applicable from below)
[ ] Other: \_\_\_\_\_

ITEMS TO ATTACH WITH REQUEST:

- A. Work Statement
B. Budget
C. Recipient Resolution, if applicable. (Resolution may be requested in Special Conditions if not currently available.)
D. Special Conditions, if applicable.
E. CEQA Compliance Form
F. Other Documents as applicable
• Copy of Score Sheets
• Copy of Pre-Award Correspondence
• Copy of All Other Relevant Documents

California Environmental Quality Act (CEQA)

[ ] CEC finds, based on recipient's documentation in compliance with CEQA:
[ ] Project exempt: \_\_\_\_\_ NOE filed: \_\_\_\_\_
[ ] Environmental Document prepared: \_\_\_\_\_ NOD filed: \_\_\_\_\_
[ ] Other: \_\_\_\_\_
[X] CEC has made CEQA finding described in CEC-280, attached

Funding Information:

\*Source #1: PIER-E Amount: \$ 750,000.00 Statute: 11- FY: 12-13 Budget List #: 501.027J
\*Source #2: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ Statute: \_\_\_\_\_ FY: \_\_\_\_\_ Budget List #: \_\_\_\_\_
\*Source #3: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ Statute: \_\_\_\_\_ FY: \_\_\_\_\_ Budget List #: \_\_\_\_\_

If federally funded, specify federal agreement number: \_\_\_\_\_

\* Source Examples include ERPA, PIER-E, PIER-NG, FED, GRDA, ARFVT, OTHER.

Business Meeting Approval: (refer to Business Meeting Schedule)

Proposed Business Meeting Date: 4/30/2013 [ ] Consent [X] Discussion
Business Meeting Participant: Rhett deMesa Time Needed: 5 minutes

Agenda Notice Statement: (state purpose in layperson terms)

Possible approval of a [X] Grant / [ ] Contingent Award to...
ELECTRICORE, INC. Possible approval of this agreement PIR-12-005 with Electricore, Inc. in the amount of \$750,000.00 to survey the plug-in electric vehicle (PEV) marketplace and value-based design options for standardization of battery modules, identify barriers to standardizing battery system designs, estimate life-cycle cost impacts required for standardization, and research methods to implement system standards. This agreement includes \$150,000 in match funding. (PIER electricity funding) Contact: Rhett DeMesa. (5 minutes)

# GRANTS/CONTINGENT AWARD REQUEST



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<b>Project Manager</b>	<b>Date</b>	<b>Office Manager</b>	<b>Date</b>	<b>Deputy Director</b>	<b>Date</b>
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## EXHIBIT A WORK STATEMENT

### TECHNICAL TASK LIST

TASK #	CPR	TASK NAME
1		Administration
2		Market Analysis: Supply vs. Demand
3	X	Barriers Analysis: Industry Reluctance
4		Design Concepts: Standards Design
5		Value Analysis: Financial Benefit
6		Data Collection and Analysis
7		Technology Transfer Activities

### KEY NAME LIST

TASK #	KEY PERSONNEL	KEY SUBCONTRACTORS	KEY PARTNER(S)
1	Deborah Jelen (Electricore, Inc.) Kyle Morris (Electricore, Inc.) Kodie Arnold (Electricore, Inc.) Sara Elton (Electricore, Inc.)		-Ricardo, Inc. -California Center for Sustainable Energy (CCSE) -San Diego Gas & Electric (SDGE) -Bayerische Motoren Werke AG of North America (BMW)
2	Deborah Jelen (Electricore, Inc.) Marc Wiseman (Ricardo, Inc.)	Ricardo, Inc.	CCSE SDGE BMW
3	Marc Wiseman (Ricardo, Inc.) Mike Ferry (CSSE) Deborah Jelen (Electricore, Inc.)	Ricardo, Inc. CCSE	CCSE SDGE BMW
4	Marc Wiseman (Ricardo, Inc.) Peter Dempster (BMW North America) Deborah Jelen (Electricore, Inc.)	Ricardo, Inc. BMW	SDGE BMW
5	Marc Wiseman (Ricardo, Inc.) Mike Ferry (CSSE) Deborah Jelen (Electricore, Inc.)	Ricardo, Inc. CCSE	SDGE BMW

## GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
BEV	Battery Electric Vehicle
BMS	Battery Management System
BMW	Bayerische Motoren Werke AG (BMW North America)
CCSE	California Center for Sustainable Energy
CPM	Commission Project Manager
CPR	Critical Project Review
ERDD	Energy Research and Development Division
ESCO	Energy Services Company
Kwhr	Kilowatt hour
OEM	Original Equipment Manufacturer
PEV	Plug-in Electric Vehicle
PG&E	Pacific Gas & Electric
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric

### Problem Statement:

Plug-in electric vehicles (PEVs) face market barriers due to the high cost of battery packs. New design methods focusing on standardization are needed for commercial PEV battery systems to optimize performance and reduce the costs of purchase and disposal. The California Energy Commission has identified the need for a Techno-Economic Assessment of PEV Battery Pack Standards.

As shown through previous study and demonstration, the opportunity for the greatest life cycle cost savings, reliability, and quality is realized by implementing standardized design.

### Goals of the Agreement:

The quantitative and measurable goals of the proposed project include:

1. Translate stakeholder requirements into battery pack design requirements
2. Estimate the life-cycle cost impacts of the design and process changes required for standardized designs, including the impact on:
  - o Vehicle manufacturing and design
  - o Vehicle competitiveness with other technologies
  - o Battery removal and re-manufacturing costs

3. Examine the holistic impact of standardization on the cost of PEV batteries in dollars per kilowatt hour (\$/kWhr).
4. Collect and describe lessons learned on battery system standardization efforts from Original Equipment Manufacturers (OEMs), utilities, Energy Services Companies (ESCOs), and battery pack manufacturers.
5. Determine the stakeholder requirements for a standardized PEV battery system that will be repurposed into a stationary application after it has completed its useful life in the vehicle.
6. Make recommendations on methods to implement PEV system standards.

### **Objectives of the Agreement:**

The objectives of this Agreement are to:

1. Evaluate how standard system designs compare to the current state non-standard systems in their ability to meet OEM, vehicle customer, remanufacturer, and second use requirements:
  - o Performance
  - o Form factor
  - o Manufacturability and re-manufacturability
  - o Cost
  - o Longevity
2. Quantify the impact on battery system cost in \$/kWh of standardization for each stakeholder in the battery pack value chain.
3. Identify the barriers to a standard battery system design.
4. Quantify the size of the secondary market for battery packs sold to ESCOs.
5. Quantify the added value for a standard system compared to a non-standard system when sold to secondary applications markets.
6. Identify and evaluate potential pathways for implementation of PEV battery pack standards.

## **TASK 1 ADMINISTRATION**

### **Instructions for Submitting Electronic Files and Developing Software**

#### **Electronic File Format**

The Recipient will deliver an electronic copy (CD ROM or memory stick or as otherwise specified by the CCM) of the full text of any Agreement products in a compatible version of Microsoft Word (.doc).

The following describes the accepted formats of electronic data and documents provided to the Energy Commission as products and establishes the computer platforms, operating systems, and software versions that will be required to review and approve all software deliverables.

- Data sets will be in Microsoft (MS) Access or MS Excel file format.
- PC-based text documents will be in MS Word file format.
- Documents intended for public distribution will be in PDF file format, with the native file format provided as well.
- Project management documents will be in MS Project file format.

### **Software Application Development**

If this Scope of Work includes any software application development, including but not limited to databases, websites, models, or modeling tools, the Recipient will use the following standard Application Architecture components in compatible versions:

- Microsoft ASP.NET framework (version 3.5 and up) Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up) Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures Recommend 2008 R2.
- Microsoft SQL Reporting Services Recommend 2008 R2
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the Energy Commission's Information Technology Services Branch.

## **Task 1.1 Attend Kick-off Meeting**

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

### **The Recipient shall:**

- Attend a “Kick-Off” meeting with the Commission Project Manager (CPM), the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the CPM to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the CPM will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Discussion of the terms and conditions of the Agreement
- Discussion of Critical Project Review (Task 1.2)
- Match fund documentation (Task 1.6) No work may be performed until this documentation is in place.
- Permit documentation (Task 1.7)
- Discussion of subcontracts needed to carry out project (Task 1.8)

The technical portion of the meeting shall include, but not be limited to, the following:

- The CPM’s expectations for accomplishing tasks described in the Scope of Work
- An updated Schedule of Products
- Discussion of Progress Reports (Task 1.4)
- Discussion of Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
- Discussion of the Final Report (Task 1.5)

The CPM shall designate the date and location of this meeting.

- Submit an updated Schedule of Products, List of Match Funds, and List of Permits to the CPM.

### **Recipient Products:**

- Updated Schedule of Products

- Updated List of Match Funds
- Updated List of Permits

**Commission Project Manager Product:**

- Kick-Off Meeting Agenda

**Task 1.2 Critical Project Review (CPR) Meetings**

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule, or budget.

CPRs provide the opportunity for frank discussions between the CPM and the Recipient. The CPM may schedule CPRs as necessary, and CPR costs will be borne by the Recipient.

Participants include the CPM and the Recipient, and may include the Commission Grants Officer, the Energy Research and Development Division technical lead, other Energy Commission staff and Management, and any other individuals selected by the CPM to provide support to the Energy Commission.

**The Commission Project Manager shall:**

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location or may be conducted via electronic conferencing (e.g., WebEx), as determined by the Commission Project Manager.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion of both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. If the CPM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more products that were included in the CPR.

**The Recipient shall:**

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work on the project. This report shall be submitted along with any other products identified in this Scope of Work. The Recipient shall submit these documents to the CPM and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

**Commission Project Manager Products:**

- Agenda and a list of expected participants
- Schedule for written determination
- Written determination

**Recipient Product:**

- CPR Report(s)

**Task 1.3 Final Meeting**

The goal of this task is to close out this Agreement.

**The Recipient shall:**

- Meet with Energy Commission staff to present the project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the CPM. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the discretion of the CPM.

The technical portion of the meeting shall involve the presentation of an assessment of the degree to which project and task goals and objectives were achieved, in addition to findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The CPM will determine the appropriate meeting participants.

The administrative portion of the meeting shall involve a discussion with the CPM and the Grants Officer about the following Agreement closeout items:

- Disposition of any equipment purchased with Energy Commission funds
- Energy Commission's request for specific "generated" data (not already provided in Agreement products)
- Need to document Recipient's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions
- Final invoicing and release of retention
- Prepare written documentation of any agreements made between the Recipient and Commission staff during the meeting.
- Prepare a schedule for completing the closeout activities for this Agreement.

**Products:**

- Written documentation of meeting agreements
- Schedule for completing closeout activities

### **Task 1.4 Monthly Progress Reports**

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement on time and within budget.

The objectives of this task are to summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, and to form the basis for determining whether invoices are consistent with work performed.

**The Recipient shall:**

- Prepare a Monthly Progress Report that summarizes all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the CPM within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in the Terms and Conditions of this Agreement.
- In each Monthly Progress Report and invoice, document and verify:
  - Energy Commission funds received by California-Based Entities (CBEs);
  - Energy Commission funds spent in California; and Match fund expenditures
  - Provide synopsis of project progress.

**Product:**

- Monthly Progress Reports

**Task 1.5 Final Report**

The goal of the Final Report is to assess the project's success in achieving its goals and objectives, advancing science and technology, and providing energy-related and other benefits to California.

The objectives of the Final Report are to clearly and completely describe the project's purpose, approach, activities performed, results, and advancements in science and technology; to present a public assessment of the success of the project as measured by the degree to which goals and objectives were achieved; to make insightful observations based on results obtained; to draw conclusions; and to make recommendations for further projects and improvements.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will also prepare a confidential version of the Final Report, the Recipient shall perform the following activities for both the public and confidential versions of the Final Report.

**The Recipient shall:**

- Prepare an Outline of the Final Report.
- Prepare a Final Report following the approved outline and the latest version of the Final Report guidelines which will be provided by the CPM. The CPM shall provide written comments on the Draft Final Report within

- 15 working days of receipt. The Final Report must be completed at least 90 days before the end of the Agreement Term.
- Submit one bound copy of the Final Report with the final invoice.

**Products:**

- Draft Outline of the Final Report
- Final Outline of the Final Report
- Draft Final Report
- Final Report

**Task 1.6 Identify and Obtain Match Funds**

The goal of this task is to ensure that the match funds planned for this Agreement are obtained and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the Energy Commission budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of Energy Commission funds for each task during the term of this Agreement. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

**The Recipient shall:**

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the CPM at least 2 working days prior to the kick-off meeting. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter a list of the match funds that identifies the:
  - Amount of each cash match fund, its source (including a contact name, address and telephone number), and the task(s) to which the match funds will be applied.
  - Amount of each in-kind contribution, a description, documented market or book value, its source (including a contact name, address and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient shall identify its owner and provide a contact name, address, telephone number, and the address where the property is located.

- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured. For match funds provided by a grant a copy of the executed grant shall be submitted in place of a letter of commitment.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a letter including the appropriate information to the CPM if during the course of the Agreement additional match funds are received.
- Provide a letter to the CPM within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR.

**Products:**

- A letter regarding match funds or stating that no match funds are provided
- Copy(ies) of each match fund commitment letter(s) (if applicable)
- Letter(s) for new match funds (if applicable)
- Letter that match funds were reduced (if applicable)

**Task 1.7 Identify and Obtain Required Permits**

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. Although the Energy Commission budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

**The Recipient shall:**

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the CPM at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:

- A list of the permits that identifies the:
  - Type of permit
  - Name, address and telephone number of the permitting jurisdictions or lead agencies
- The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule, and copies of the permits. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide an updated list of permits (including the appropriate information on each permit) and an updated schedule to the CPM.
- As permits are obtained, send a copy of each approved permit to the CPM.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CPM within 5 working days. Either of these events may trigger an additional CPR.

**Products:**

- Letter documenting the permits or stating that no permits are required
- Updated list of permits as they change during the term of the Agreement (if applicable)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable)
- A copy of each approved permit (if applicable)

**Task 1.8 Obtain and Execute Subcontracts**

The goal of this task is to ensure quality products and to procure subcontracts required to carry out the tasks under this Agreement consistent with the terms and conditions of this Agreement and the Recipient's own procurement policies and procedures. This task will also provide the Energy Commission an opportunity to review the subcontracts to ensure that the tasks are consistent with this Agreement, and that the budgeted expenditures are reasonable and consistent with applicable cost principles.

**The Recipient shall:**

- Manage and coordinate subcontractor activities.
- Submit a draft of each subcontract required to conduct the work under this Agreement to the Commission Agreement Manager for review.
- Submit a final copy of the executed subcontract.

- If the Recipient decides to add new subcontractors, it shall notify the Commission Agreement Manager.

**Products:**

- Draft subcontracts
- Final subcontracts

**TECHNICAL TASKS**

**TASK 2 MARKET ANALYSIS: SUPPLY VS. DEMAND**

The goal of this task is to conduct market analysis through primary research, market reports, and selected interviews. The analysis will facilitate the identification of lessons learned from previous and current standardization efforts.

**The Recipient shall:**

- Conduct market analysis to identify lessons learned from previous standardization efforts. Input will be considered from a stakeholder group that consists of vehicle OEMs, utilities, and battery companies. Participants will include but not be limited to the following:
  - Vehicle OEMs: Bavarian Motor Works Group, Chrysler, Cummins, Navistar, Smith, Via, Altec, and Odyne
  - Utilities: San Diego Gas & Electric, Southern California Edison, Pacific Gas & Electric, and Detroit Edison
  - Battery Companies: A123, Altair Nanotechnologies, Dow Kokam, and K2 Energy
- Refine Ricardo Inc.'s truck adoption rate model to predict volumes through 2020.
- Forecast utility need for lithium battery energy storage through 2020.
- Prepare a Market Analysis Report that includes:
  - Current production plans for electric and hybrid vehicles
  - Battery pack information (e.g., voltage, kWh, supplier, cell types, and form factors)
  - Package space constraints for truck battery packs
  - Examples of key OEMs and suppliers
  - Forecast of market growth through 2025
  - Forecast of utility needs through 2025

**Products:**

- Draft Market Analysis Report
- Final Market Analysis Report

**TASK 3 BARRIERS ANALYSIS: INDUSTRY RELUCTANCE**

The goals of this task are to conduct analyses of OEMs and battery suppliers, identify technical and commercial barriers to standard modules and packs, and evaluate alternative technical approaches to integration of modules/ packs.

**The Recipient shall:**

- Conduct analyses of OEMs and battery suppliers.
  - Select OEMs and battery manufacturers for interview, subject to approval of the CPM
  - Conduct [in-person and telephone] Interviews with battery manufacturers and OEMs
- Identify and describe technical and commercial barriers to standard modules and packs, including the following:
  - Cell and module manufacturing infrastructure constraints
  - Package constraints
  - Convergence and divergence of modules and cells
  - Commercial challenges
- Evaluate alternative technical approaches to the integration of modules/packs without standardization.
- Participate in a CPR and prepare a CPR Report per Task 1.2.
- Prepare a Barriers Analysis Report that includes:
  - Review of commercial and technical barriers
  - Potential mitigation approaches with focus on:
    - Acceptance of cell/module standardization
    - Battery company cell size analysis
    - Cell size trends converging/diverging on format
    - Industry movement for standard cells
  - Impact of non-common voltage and watt-hours: standard module
    - Suitability of a range of module voltage and watt-hours for vehicle and utility second life applications.
    - Voltage range
    - Watt-hour range
    - Resistance range
    - State of battery health

**Products:**

- CPR Report
- Draft Barriers Analysis Report
- Final Barriers Analysis Report

**TASK 4 DESIGN CONCEPTS: STANDARDS DESIGN**

The goal of this task is conduct design and analysis for standard modules and to perform a cost/benefit analysis of standardization for OEMs.

**The Recipient shall:**

- Conduct design and analysis for standard modules, taking into consideration the following:
  - Dimensions (length, width, height)
  - Mounting locations
  - Wiring connector locations, connectors, and pin outs
  - Controls and sensors

- Controls and software interface for second life battery management systems (BMS) and BMS definition
- Map current communication protocols to allow the BMS to interface with the smart grid
- Perform a cost/benefit analysis of standardization for OEMs. The analysis will consider:
  - Labor/process improvements
  - Throughput analysis
  - Complexity reduction
  - SGA improvements and capital cost impact
  - Standard shipping crates
- Prepare a Report for Design Concepts that includes:
  - Design options for standard modules for each application
  - Implications for electrical, mechanical, and thermal controls
  - Determination of cost benefits for vehicle OEMs for primary life
  - Evaluate potential pathways for implementing PEV battery pack standards

**Products:**

- Draft Design Options Report
- Final Design Options Report

**TASK 5 VALUE ANALYSIS: FINANCIAL BENEFIT**

The goals of this task are to determine the financial benefit of standard modules and packs in second life, and to estimate life cycle cost impacts from standardizing battery pack parameters, design, and components.

**The Recipient shall:**

- Determine the financial benefit (\$/kWh) of standard modules and packs in second life (repurposing) compared to non-standard modules and packs. Consider the following in determining financial benefit:
  - Suitability for different grid applications
  - Ease of installation: use of modules for second life
  - Standard housings, connectors, and BMS
  - Reliability and risk reduction
  - Maintenance cost savings
- Estimate life-cycle cost impacts from standardizing various battery pack parameters, designs, and components. Consider the following factors in developing the estimate:
  - Manufacturing trade-offs
  - Vehicle designs and competitiveness, including market penetration effects
  - Economic trade-offs of Recycling
- Prepare a Value Analysis Report that discusses the following:
  - Economic benefits of standard modules and packs, as compared to non-standard modules and packs
  - The value of standards to vehicle OEMs and battery companies
  - The potential market size for second life modules through standardization
  - Recommendations for pathways to develop and implement pack standards

**Products:**

- Draft Value Analysis Report
- Final Value Analysis Report

**TASK 6 DATA COLLECTION AND ANALYSIS**

The goals of this task are to collect operational data, analyze the data for economic and environmental impacts, and include the data and analysis in the Final Report.

**The Recipient shall:**

- Develop a data collection test plan based on input from the Energy Commission project manager. The plan will include but not limited to the following subjects:
  - Energy savings and estimated cost savings
  - Greenhouse gas reductions
  - Other non-energy benefits
- Provide data on potential job creation, market potential, economic development, and increased state revenue as a result of expected future expansion.
- Provide an estimate of the project's energy savings and other benefits and potential statewide energy savings once market potential has been realized.
- Compare project performance and expectations provided in the proposal to actual project performance and accomplishments.

**Products:**

- Task Results will be included in the Final Report.

**TASK 7 TECHNOLOGY TRANSFER ACTIVITIES**

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to key decision-makers.

**The Recipient shall:**

- Prepare a Technology Transfer Plan that explains how the knowledge gained in this project will be made available to the public. The level of detail expected is least for research-related projects and highest for demonstration projects. Key elements from this report will be included in the Final Report.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities will be reported in the Monthly Progress Reports.
- Indicate the intended use(s) for and users of the project results.

**Products:**

- Draft Technology Transfer Plan
- Final Technology Transfer Plan



Award Number: Electricore, Inc. (PIR-12-XXX)

Date: 2 / 27 / 2013

**Note:** The Energy Commission Project Managers Manual includes detailed instructions on how to complete this section, with examples of grants that are “Projects” and are not “Projects”. When the Project Manager is completing this section, if questions arise as to the appropriate answers to the questions below, please consult with the Energy Commission attorney assigned to review grants or loans for your division.

1. Is grant/loan considered a “Project” under CEQA?  Yes (skip to question #2)  No (continue with question #1)

Please complete the following: *[Public Resources Code (PRC) 21065 and 14 California Code of Regulations (CCR) 15378]:*

Explain why the grant/loan is **not** considered a “Project”? The grant/loan will not cause a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because grant/loan involves:

The activities under this project include a comprehensive survey of the plug-in electric vehicle (PEV) market and will propose value based design options for standardization of battery systems. Using primary research and techno-economic modeling, the team will provide concrete recommendations for battery system design standardization value analysis justification and identify potential paths to commercial adoption of battery standards. There are no permits or environmental documents required for this analysis project.

2. If grant/loan is considered a “Project” under CEQA: (choose either **IS** or **IS NOT**)

Grant/loan **IS** exempt:

Statutory Exemption: (List PRC and/or CCR section numbers) \_\_\_\_\_

Categorical Exemption: (List CCR section number) \_\_\_\_\_

Common Sense Exemption. (14 CCR 15061(b)(3))

Explain reason why the grant/loan is exempt under the above section:

Please attach draft Notice of Exemption (NOE). Consult with the Energy Commission attorney assigned to your division for instructions on how to complete the NOE.

Grant/loan **IS NOT** exempt. The Project Manager needs to consult with the Energy Commission attorney assigned to your division and the Siting Office regarding a possible initial study.