

Invitation for Proposals

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POWER QUALITY INTEREST GROUP (PQIG)

CEATI PROJECT No. T104700-5154

Impact of Plug-in Hybrid and Electric Vehicles on Utility Distribution Systems

CEATI International Inc. (CEATI) invites the submission of proposals to perform research work on the following topic:

TITLE

Impact of Plug-in Hybrid and Electric Vehicles on Utility Distribution Systems

INTRODUCTION

The continuous drive for energy efficiency introduced major changes in the composition and linearity of electrical loads, in many cases with not insignificant power quality consequences. In recent years an additional trend began to emerge. As concerns about greenhouse gas emissions and continued increases of gasoline prices grew, so have the government promotional policies and consumer acceptance of plug-in hybrids and electric vehicles. It appears that PHEV and EV will soon become a common and growing segment in the overall car market, with consumers expecting to charge up their vehicles either during the day or at night to reduce their gas consumption. This additional load creates two main concerns to electric utilities: firstly, battery chargers are thought to likely be large sources of harmonics and secondly, the new load may cause significant voltage drops, increased system losses and other problems. To accommodate the new loads, utilities will need to proactively identify the potential impact that growing penetration of these types of loads could cause, and develop strategies and set priorities of how to deal with this fast-developing trend.

PROJECT OBJECTIVES

The objective of the project is to survey the current status and future trends of the PHEV and EV battery systems charging technologies - at home, at battery exchange charge parks and at other EV support infrastructure under consideration - and identify potential impacts on the power utility distribution systems together with possible mitigation options.

SCOPE OF THE STUDY

The project will provide critical review and analysis of the potential impacts of the PHEVs and EVs on the distribution grid and recommend priorities for actions or further follow-up by utilities.

The scope of the project research should include, but not limited to, the following areas:

- Electric characteristics of the battery chargers - e.g. current rating, charging duration, harmonic distortion, ability to remotely control “on-peak/off-peak” charging rates etc.
- Power system requirements supplying the chargers - e.g. voltage level, number of phases, conductor configuration, etc.
- Projected growth rate and the trend of car charger usage in North America, including the most likely set-up of battery exchange parks and other such concentrated infrastructure
- The PQ impact of the chargers - e.g. harmonic emissions from various individual types of chargers and their relationship with different charging rates, aggregated impact of multiple charges at a feeder level in a residential sub-division supplied by common

distribution feeder, and other possible PQ impacts. This should include computer modeling of the impact of mass penetration of EVs on the feeder level.

- The load increase impact – e.g. change of the overall power system load profiles, potential overloading of secondary and primary distribution networks, voltage profile and power factor impact, etc.
- Overview of battery chargers related standards and standards development activities

DELIVERABLES

The successful proponent is expected to prepare a ready-to-publish report on the results of the investigation and present the results to funding consortium members. The completed report must be submitted for CEATI approval in editable, electronic format (Microsoft Word). In addition, the platform and version should be specified for any software or programs to be developed.

Progress reports will also be required on either a quarterly or milestone basis - normally these are scheduled to coincide with the completion of the identified tasks.

The successful proponent is also expected to provide the following:

- A ten to fifteen (10-15) slide Power Point Presentation. This should be composed of three main sections:

1. The factors motivating the initiation of the work;
2. A description of the main findings;
3. Summary of the conclusions and recommendations for future research.

- Contents for the Project's Technical Brief. This is a summary of the report (between 1,000 and 1,500 words), which is published separately by CEATI. Proponents are not responsible for the preparation of a ready-to-print Technical Brief, but solely to provide the contents for the following 4 sections: Background, Summary, Conclusions and Recommendations.

1. The Report Background section should be short (approximately 200 words) and should detail the reasons the work was conducted.
2. The Summary section should be approximately 700 words. It must provide a general description of the work program.
3. The Conclusions section should be about 150 words and should provide a general outline of the key results (do not include specifics).
4. The Recommendations section should be about 200 words and should include a description of the potential applications of the results.

Please note that all reporting must be submitted in English. If written English is not the author's strong suit, it is recommended that a technical writer be hired to review the document prior to submission.

BUDGET AND SCHEDULE

The proposal must contain a schedule and a quote of required remuneration for the work in US or Canadian dollars. All prices shall be presumed to be in Canadian dollars (CAD) unless explicitly specified otherwise in the proposal. Proponents' responses to this section must include a full breakdown of the budget and schedule, including an indication of rates and hours and the task allocation for the key personnel by task and must correspond to any phases or milestones outlined above. (Please refer to the Proposal Template for more information).

It is expected that this project can be completed (draft final report submitted for review and approval) within 9-12 months of initiation.

The proposal must include the names and qualifications of the key individuals who will be involved, as well as the name of the accountable manager.

CEATI is not bound to accept any proposal but any selection will take into account technical merit, qualifications, price and schedule. A proposal may be accepted in whole or in part. A commitment to proceed with the first phase of a multi-phase project does not automatically imply that the work of the subsequent phases will be undertaken.

ALTERNATIVE WORKS

Proponents shall generally follow the above description of work, but are encouraged to offer alternative works if these alternatives will meet the objectives and provide a better end product to the utilities sponsoring this work. Alternatives shall be fully described including logistics explaining why the alternate works are being offered and the benefits to be realized by the funding utilities. Where alternatives are proposed, separate budgets shall be calculated for each alternative.

SUBMISSION OF PROPOSALS

The consideration of proposals received will be limited to those who indicate their intent to employ a suitable experienced project team and who possess proper facilities to perform the work. Receipt of this "IFP" does not necessarily constitute a prior determination by CEATI that your organization has the requisite experience and facilities.

The proposal must be properly completed and executed in accordance with the CEATI guidelines available at <http://www.ceati.com/guidelines.php>, and shall be submitted to CEATI as an attachment in Microsoft Word at the following website: <http://prs.ceati.com/proposals/>. Be sure to indicate project number "PQIG 5154" on the submission form. For assistance, please contact us at 514-866-5377 x 225.

CLOSING DATE FOR RECEIPT OF PROPOSALS

Tuesday, March 23rd, 2010, 4:00 pm EST/EDT