



Request for Proposals: Implementing open, smart charging infrastructure

February 2019

Background and objectives

This solicitation seeks a partner to work with the International Zero-Emission Vehicle Alliance (ZEV Alliance) to analyze the potential benefits of smart charging and policy levers to accelerate the growth of this technology. Charging infrastructure that is capable of delivering affordable and convenient charging is becoming increasingly available to support the expanding electric vehicle market. Yet, in many markets, there has been slow progress on standards or technology for a smart charging system that serves consumers and grid operators. An increasingly open and smart charging infrastructure system is paramount to improving the driver experience and enabling seamless integration of electric vehicles into the electric grid. Furthermore, smart charging, where vehicles respond to grid conditions as they change, promises to mitigate challenges posed by an increasingly dynamic grid fueled by more renewables, and to speed the transition to electric vehicles by minimizing costs of grid expansion. This research area would analyze the technological potential of smart charging to meet electric vehicle and grid needs, examine the barriers to implementing smart charging in the near future, and provide policy recommendations for growing and maximizing the benefits of these technologies.

About the International Zero-Emission Vehicle Alliance

The ZEV Alliance is a collaboration of 16 governments, founded in late 2015 to accelerate the global transition to zero-emission vehicles. The member governments are four countries (Germany, Netherlands, Norway, United Kingdom) and 12 subnational jurisdictions (Baden-Württemberg, British Columbia, California, Connecticut, Maryland, Massachusetts, New York, Oregon, Québec, Rhode Island, Vermont, Washington). The collaboration includes the sharing of data, best practices, and lessons learned, and involves coordinating on action plans to help the group collectively achieve its ZEV deployment goals. The Alliance selects three high-priority focus area topics per year for a deeper technical and policy exchange; this project is an integral part of one of the focus areas for 2019. See these links for more information on the ZEV Alliance's [announcement](#) to move to all ZEV sales, [member commitment](#), [publications](#), and [events](#).

Project elements

The primary project elements are (1) engagement with the ZEV Alliance, (2) an original research report as outlined below, and (3) a public webinar based on the results. The engagement with the ZEV Alliance includes monthly project management calls with the ZEV Alliance secretariat (ICCT), an initial teleconference call with interested ZEV Alliance members to discuss the approach and priorities, a preliminary result briefing, and incorporating secretariat and ZEV Alliance member input on the consultant's draft report.

The following provides the expected report scope and suggested outline:

- **Background (3 pages)**
 - Define smart charging concepts, terminology, and definitions (e.g., one-way charging versus two-way charging, time-of-use charging, utility control vs. private control, demand response) and outline potential use cases
 - Review and summarize seminal studies, including smart charging projects in practice, reports on issues smart charging can help to solve (e.g., grid load spikes, upgrade costs, etc.), and analyses of impacts of various smart charging elements
- **Technical barriers (3-4 pages)**
 - Standards:
 - Describe and compare existing initiatives to overcome various charging barriers, such as Open Charge Alliance protocols (OCPP, OSCP, OCPI), ISO 15118, local energy management system-to-charger communications, and identify their goals
 - Different models: Where the “intelligence” will be located (e.g., vehicle, charge point, building/smart meter, grid) and interoperability of these models
 - Data: Discuss the importance and current state of data availability, and the issue of “data silos.” Include the roles of the following stakeholders:
 - Automotive manufacturer (location, vehicle charging rate and capacity)
 - Utility (customer billing, meter data, generation, transmission, distribution)
 - Demand aggregators
 - Charging network provider and EVSE manufacturer (customer info, charger control)
 - Examples and best practices for collaboration and sharing of data
 - Technology and implementation cost: Identify and quantify additional costs for various elements of smart charging, including metering technology (real-time info, dynamic billing, examples and best practices for advanced meters) and communication infrastructure and integration
 - Estimate the cost of utility-scale grid storage as an alternative to smart charging
- **Institutional and customer barriers (3-4 pages)**
 - Business model: Discuss the compatibility between existing utility and charging network business models, both in North America and Europe (rate-based infrastructure and cost recovery vs. customer funded infrastructure)
 - Metering: Compare the viability of existing meter billing vs. charger-based billing vs. vehicle-based billing for measuring charging load profiles
 - Coordination among players: Discuss challenges of coordination between generation, transmission and distribution companies and a fragmented market (many utility companies, varying institutional capacity), with specific examples. Specific challenges to discuss include “ownership” of the customer and value created by smart charging (utility, automakers, network operators, and demand aggregators) and energy tax implications of bidirectional charging
 - Customer: Describe potential for issues for customers, such as ability of the consumer to manage driving range, response to price changes, demands from charging providers under various elements of smart charging. Evaluate customer acceptance of these challenges based on early examples and relevant data.
- **Analyzing the potential of smart charging (5-8 pages)**

- *Electricity patterns*: Seek representative grid loads (daily, seasonal, regional variation); collect information about best-available estimates for increasing availability of renewable electricity generation (e.g., with profiles for wind, solar)
- *Increasing electric vehicle demand*: Evaluate existing trends increasing electric vehicle penetration, and the timing of electric vehicle charging demand while parking at various locations (at home, work, public, DC fast charging) to determine market for smart charging and relation to overall electricity demand.
- *Value of smart charging*: Identify and quantitatively analyze the costs and benefits of smart charging. This includes the cost of new/additional charging equipment in various locations, arbitrage between wholesale electricity generation cost and retail price of electricity (residential, public, DC fast), and the potential for avoided upgrade costs (generation, transmission, distribution). Discuss opportunities for ancillary service provision and geographical and other constraints in these markets. Evaluate the cost savings of electric vehicle smart charging at the individual driver and at scale, and the potential for the value of smart charging to increase over time as the volume and onboard charging capacity of electric vehicles increases. Assess how, with smarter charging practices and policies, higher volumes of electric vehicles can be matched with available new electricity generation, especially renewable electricity.
- *Competition with other charging options*: Describe and assess the potential and limitations of smart charging with regard to competing charging options in terms of customer acceptance, charging costs, contribution to electric vehicle penetration and use, and the related environmental impacts.
 - Assess and compare additional and foregone costs and benefits of smart charging with a scenario where vehicles respond to time-of-use rates using non-networked chargers
- *Case studies*. Provide deeper analysis of smart charging potential within specific markets, selected based on availability of data on electric vehicle charging and electricity grid profiles. One or more market in North America and in Europe would be analyzed to assess the issues based on market and policy context.
- **Outlook and conclusions (2-3 pages)**
 - Highlight electric vehicle-related grid integration and smart charging examples and best practices in practice throughout the world
 - Indicate likely future developments for smart charging and two-way vehicle-to-grid integration
 - Give recommendations on the role for policy among key agencies, stakeholders, public-private partnerships in the following areas:
 - Standards coordination and enforcement
 - Open charging network regulation
 - Reduction of barriers and information silos
 - Creating customer value
 - Discuss opportunities for further work

The consultant report is expected to be approximately 20-25 pages in length (excluding references). This length is suggested to provide a balance between clearly demonstrating the data and methodological rigor, while being readable for range of research and policy experts. The paper is expected to contain approximately 5 figures and 4-6 tables that help quantify and illustrate the key findings. The structure of the report would roughly follow the progression described above, in addition to an executive summary (2 pages). The consultant would share Excel files with the final data and underlying calculations and data assumptions related to the work, and any additional graphic files for the ZEV Alliance to create for the final report layout. A

Powerpoint slide deck containing major conclusions and highlights from the research would also be created and used to brief the ZEV Alliance members. The consultant would host a public webinar around the time of the publication of the report, including a short overview by the report authors, discussion among experts from ZEV Alliance jurisdictions, and questions from the general audience. As the project is completed, we hope the consultant will be proactive in sharing the project results (e.g., in existing conferences, industry and/or government meetings) and also advise the ZEV Alliance members on further knowledge-sharing opportunities.

Project timeline and engagement steps

This project timeline is set by the schedule in Table 1 below. The secretariat (International Council on Clean Transportation) aims to notify the chosen consultant by early March and sign a contract for this work with the consultant by the end of March. There are several critical dates related to this project. A March 12th ZEV Alliance meeting will serve as a project kickoff with ZEV Alliance members to discuss priorities, approaches, and related activities for the focus area; the Secretariat will share results of this meeting with the consultant. The consultant's work would primarily be done from March through September. An informal discussion among the consultant and interested ZEV Alliance members will offer an opportunity to further refine the project scope, tentatively scheduled for April 4. The consultant would provide a briefing on early findings on a June 11th teleconference with ZEV Alliance members, who may provide feedback to incorporate into the report. A preliminary draft report would be submitted to the secretariat by July 5th and a draft final report to the ZEV Alliance members by August 16th.

The secretariat will serve as the project manager to help coordinate the consultant and meet ZEV Alliance member expectations throughout the project. This includes assisting in meeting preparation and collecting and managing ZEV Alliance member input. The engagement also includes short monthly project management check-in calls with the consultant and secretariat from March through November. Following the draft report submission to the ZEV Alliance members by August 16th, the members will have two weeks to review the draft. The consultant would incorporate input, with support from the secretariat, by September 27, at which point the report would be submitted for final publication and design layout steps. The report is expected to be made publicly available in October at the ZEV Alliance page (see publications).

Table 1. Timeline for proposed 2019 ZEV Alliance project

| Project element | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Submit proposal | | | / | | | | | | | | |
| Contract agreement signed | | | / | | | | | | | | |
| Early check-in with interested ZEV Alliance members | | | | / | | | | | | | |
| Research, review, qualitative assessment | | | | | | | | | | | |
| Preliminary presentation teleconference with ZEV Alliance | | | | | | X | | | | | |
| Quantitative analysis, draft report | | | | | | | / | X | | | |
| Incorporate ZEV Alliance report input | | | | | | | | | / | | |
| Publish report on ZEV Alliance website | | | | | | | | | | X | |
| Public webinar | | | | | | | | | | X | |

X = major project milestone; / = interim milestone with the secretariat

Evaluation criteria for proposals

Within the evaluation of the proposals, we expect the following six criteria will be included. We also note the expected length of proposal text to sufficiently explain the proposed work.

- (1) Commitment to complete the scope of work (Maximum 2.5 pages)
 - The consultant would commit to comprehensively completing the expected report, engagement, and presentations. Simply copying the above “Project elements” text within the proposal is sufficient, including any additional supporting actions and their rationale for any of the above scope elements that are excluded.
- (2) Commitment to the project timeline (Maximum 1 page)
 - The consultant would commit to meeting the project timeline as specified above. Copying the “Project timeline” table and text above within the proposal is sufficient.
 - Describe the consultant’s internal process, the use of internal milestones contingency planning to quickly troubleshoot issues, updating and working with the secretariat, and any additional steps to ensure the project timeline is met.
- (3) Prerequisite technical and policy experience (Maximum 1 page)
 - The consultant provides evidence that they have the prerequisite technical and policy experience to complete the proposed work.
 - Share links to exactly four public reports authored by the consultant that are most directly related to this work and summarize (with just 150 words each) how each of these public reports relates to this proposed project.
- (4) Staff management plan (Maximum 1 page)
 - Name the individual staff (up to three key team members, up to 300 words per person), their individual roles in completing the work elements above, and why they are well suited for the work.
 - Also please include curriculum vitae for the principal investigator who will be the primary contact and responsible for executing the project (max. 3 pages, separate document).
- (5) Knowledge sharing and outreach (Maximum 1 page)
 - The consultant would commit to presenting the findings of the work in the webinar and other existing forums with relevant stakeholders.
 - The consultant would also advise the ZEV Alliance members on actions it could take to continue promoting and sharing the findings of the report with relevant stakeholders.
 - Please provide ideas and a process to maximize the knowledge sharing from this project, giving examples of past experiences or communicating related work.

(6) Additional value-add (Maximum 1 page)

- Please name any additional tools, data, case study, or project experience the consultant can offer in the field to advance the overall project objectives in a unique and exceptional way.

(7) Budget

- The maximum bid for the proposed work is \$50,000 (total, including all taxes and fees). Any bids exceeding this amount will be not be eligible. Include preferred payment timing to match the project timeline and milestones (100 words maximum).

We provide these clear guidelines above to emphasize the importance of succinct proposals. We view the ideal proposal to be clearly written and within 6 pages (11- or 12-point font). Proposals over 8 pages will not be accepted. We also ask for two references that can personally attest to the consultant's experience in successfully executing similar projects, ideally on a similar topic. Please submit (1) the proposal in Word of 5-8 pages, (2) the principle investigator's curriculum vitae of up to 3 pages, and (3) contact information for two professional references to secretariat@zevalliance.org by **no later than March 1**. If potential bidders express initial interest in submitting a proposal by February 22, the secretariat will email any potential updates. The secretariat may answer or ask clarification questions but is not obligated to respond to inquiries.