

## DE-FOA-0002528: Request for Information on Integrating Electric Vehicles onto the Electric Grid

DATE: June 15, 2021  
SUBJECT: Request for Information (RFI)

### Description

The Vehicle Technologies Office (VTO), within the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE), and the Advanced Grid Research and Development Division (AGR&D), within DOE's Office of Electricity (OE), seeks public comment on its Request for Information (RFI) number DE-FOA-0002528 regarding Integrating Electric Vehicles onto the Electric Grid. The Energy Act of 2020 directs DOE to examine the research, development, and demonstration opportunities, challenges, and standards needed for integrating electric vehicles onto the electric grid.

### Background

The Energy Act of 2020 (Pub. L. 116-260), signed December 27, 2020, provides Congressional direction for DOE to submit, within one year of enactment, a Vehicles to Grid Integration Assessment Report on the results of a study that examines the research, development, and demonstration opportunities, challenges, and standards needed for integrating electric vehicles onto the electric grid.

### Purpose

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders on issues related to integrating electric vehicles onto the grid. EERE and OE are specifically interested in information directed at the report requirements as listed in Section 137 of the Energy Independence and Security Act of 2007 (EISA) (as added by Section 8004 of the Energy Act of 2020 (see Request for Information elements). **This is solely a request for information and not a Funding Opportunity Announcement (FOA). DOE is not accepting applications.**

### Disclaimer and Important Notes

This RFI is not a FOA; therefore, DOE is not accepting applications at this time. DOE may issue a FOA in the future based on or related to the content and responses to this RFI; however, there

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is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if DOE chooses to issue a FOA regarding the subject matter. If a FOA is issued final details, including the anticipated award size, quantity, and timing of DOE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for applications or abstracts. Your response to this notice will be treated as information only. DOE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. DOE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that DOE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind DOE to any further actions related to this topic.

### **Confidential Business Information**

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination. See 10 CFR 1004.11 for the criteria to be applied in determining whether information is exempt from mandatory disclosure.

### **Evaluation and Administration by Federal and Non-Federal Personnel**

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to DOE providing their response to non-Federal parties. Non-Federal parties given access to responses will be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

### **Request for Information Elements**

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In accordance with Section 137 of the EISA (as added by Section 8004 of the Energy Act of 2020), DOE is requesting information from stakeholders regarding the research, development, and demonstration opportunities, challenges, and standards needed for integrating electric vehicles, including plug-in hybrid electric vehicles, onto the electric grid. Stakeholders are requested to provide research and development results, reports, or other information for past, present, or planned projects that are relevant to the specific items listed below that will be included in the report to Congress. In addition, submissions of insights on critical challenges and barriers that need to be addressed and potential solution pathways are highly encouraged.

DOE is seeking information on the topics below which will each be addressed in the report as required by Section 137. For each category, DOE is interested in comments addressing the spectrum of electric vehicles including light, medium, and heavy duty vehicles in private and fleet use and across vehicle use and dispatch.

**Category 1:** An evaluation of the use of electric vehicles (EV) to maintain the reliability of the electric grid – DOE has interest in:

- 1) The use of electric vehicles for demand response, load shaping, emergency power, and frequency regulation;
  - a. Results from pilots or programs demonstrating the effectiveness of EVs in reducing peak loads or flattening load curves through bi-directional electricity flow,
  - b. Study results on the use of EVs for grid or ancillary services, such as frequency regulation,
  - c. Evaluation techniques and considerations on changes to the reliability and resilience metrics to integrate EV loads, including considerations of adjusted critical load criteria associated with EV adoption.
- 2) The potential for the reuse of spent electric vehicle batteries for stationary grid storage;
  - a. Studies, pilot results, or information on approaches and use cases for the reuse of spent batteries, near-term and long-term viability, and cost effectiveness,
  - b. Information on the ability of EVs to provide backup generation for emergency situations, including policies or standards that might limit implementation.

**Category 2:** The impact of grid integration on electric vehicles, including:

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- 1) The impact of bi-directional electricity flow on battery degradation;
  - a. Results or studies that determine or quantify the capabilities for bidirectional flow with EVs to reduce loads and utilize renewable energy, including information on standards, policy, or technical functionality that is a barrier to implementation.
- 2) The implications of the use of electric vehicles for grid services on original equipment manufacturer warranties;
  - a. Results or studies demonstrating or quantifying the impact of bi-directional electricity flow on battery degradation, approaches for mitigating these effects, and the impact on manufacturer warranties.

**Category 3:** The impacts to the electric grid of increased penetration of electric vehicles:

- 1) The distribution grid infrastructure needed to support an increase in charging capacity;
  - a. Results or forecasts on the local impacts of increasing penetrations of electric vehicles. Include effects on operation and control and forecasts for increased load or the need for infrastructure upgrades to respond to increasing penetrations. Results are sought for light-, medium-, and heavy-duty EV impacts.
- 2) The strategies for integrating electric vehicles onto the distribution grid while limiting infrastructure upgrades;
  - a. Potential strategies or approaches for integrating electric vehicles onto the distribution grid while limiting infrastructure upgrades,
  - b. Results or studies on the specific infrastructure impacts of increased EV charging in underserved communities and any infrastructure requirements or upgrades that might be needed to serve these communities, include information or data on strategies for mitigating upgrades.
- 3) The changes in electricity demand over a 24-hour cycle due to electric vehicle charging behavior;
  - a. Anticipated changes or forecasts in electric load over a 24-hour cycle as a result of residential electric vehicle charging. Include approaches (and results) for mitigating those impacts, such as time-of-use rates whole house or EV only (include adoption rates of programs, capability for submetering and billing) and smart charge management.
- 4) The load increases expected from electrifying the transportation sector

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- a. Magnitude and timeframe for anticipated load increases for the distribution and transmission level from electrification of fleets (local, regional, and long-haul). Report on challenges, technology gaps, policy barriers, and communication standards and protocols needed.
- 5) The potential for customer incentives and other managed charging stations strategies to shift charging off-peak;
  - a. Rate design or other program approaches that will encourage “good” charging behavior by consumers so that negative impacts are mitigated and capacity upgrades are minimized,
  - b. Information on implementing separate billing rates or tariff structures for EV charging. Report on metering of the EV load, including additional metering and billing information technology infrastructure.
- 6) The technology needed to achieve bi-directional power flow on the distribution grid
  - a. Information on the challenges and barriers for achieving bi-directional flow (vehicle to grid) and other integration approaches (such as vehicle to home, vehicle to microgrid). Provide an assessment of their likelihood, anticipated timeframe, and challenges that needs to be addressed to facilitate implementation.
- 7) The implementation of smart charging techniques
  - a. Information on smart charge management systems that have been developed and demonstrated, including the system capabilities and grid services provided; requirements for EVs, charging equipment, and network/system operators; and the ability to mitigate the impact of uncontrolled EV charging on grid operations. Challenges and barriers, or improvements/enhancements needed for widescale adoption are also of interest to DOE.

**Category 4:** Research on the standards needed to integrate electric vehicles with the grid, including communications systems, protocols, and charging stations, in collaboration with the National Institute for Standards and Technology (NIST):

- 1) Technology hurdles or standards work that are needed for the implementation of smart charging techniques. Include an assessment of their potential benefit. Information is also sought on aggregation of these loads, implementation with third-parties and approaches or limitations for animating the market.
- 2) The need for cross-sectoral standards harmonization (e.g. data commonality, minimum level of critical information exchange, etc.) to achieve interconnection and interoperability across technology domains.

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- 3) Standards and protocols needed to advance Vehicle to Everything (V2X) viability and grid resilience.
- 4) Standards for the protection and safety of DC connected systems.

**Category 5:** The cybersecurity challenges and needs associated with electrifying the transportation sector:

- 1) Information on any data sharing and controls access scenarios associated with EV charge control or third-party aggregators/providers. Report on any cyber-security concerns and mitigation strategies.
- 2) Insights on the development of holistic cybersecurity approaches and harmonization across the interfaces of the EV, charging, and grid ecosystems.
- 3) The role of cybersecurity metrics for high-power charging stations and EV smart charge management across networked, grid connected systems such as reliability, resilience, etc.

Please provide any additional comments relevant to the EISA Section 137 (as added to Section 8004 of the Energy Act of 2020) Vehicle to Grid Integration Assessment Report.

### **Request for Information Response Guidelines**

Responses to this RFI must be submitted electronically to [VTO@ee.doe.gov](mailto:VTO@ee.doe.gov) no later than 5:00pm (ET) on July 23, 2021. Include "Vehicle to Grid RFI" in the subject line of the email. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 10 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

Please clearly identify the specific category or question you are providing information for in your submission using the numbering convention provided in the RFI to identify the answer (for example 3.1.a). Respondents may provide information for as many or as few topics as they wish.

DOE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

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Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name;
- Company / institution contact; and
- Contact's address, phone number, and e-mail address.

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