

## Framework for the National Charging Experience Consortium

### Revision Log

<b>Version date</b>	<b>Description of Change</b>	<b>Author</b>
May 11, 2023	Original document	John Smart
May 30, 2023	Added revision log. In Figure 1, changed name of task force in Working Group 3 from Remote Testing Capability Task Force to Testing Methodology Task Force.	John Smart

## Framework for the National Charging Experience Consortium

### Purpose

In light of significant government investment in electric vehicle (EV) charging infrastructure and public interest in a convenient, affordable, reliable, equitable, national charging network, it is critically important that the customer experience with public charging infrastructure in the United States be improved. Therefore, the National Charging Experience Consortium was established to complete a series of discrete tasks to rapidly improve public EV charging reliability and usability through a combination of independent research and pre-competitive stakeholder engagement and information exchange. The effort will be led by the National Laboratories, who are funded by the Joint Office of Energy and Transportation (Joint Office).

The Consortium strives to help the EV industry achieve first-time plug-in success every time a customer uses public charging infrastructure. This goal complements existing goals for public charging station uptime, including the requirement that federally funded chargers exceed 97% average annual uptime. The Consortium focuses on complex charging reliability and usability problems that require multi-stakeholder collaboration to solve and simplify, such as payment and user-interface issues; communication failures between EVs, chargers, and charging networks; and diagnostics limitations.

EV industry stakeholders are invited to engage with the Consortium to exchange information with the national laboratories. Stakeholder engagement in the Consortium is a voluntary, non-binding arrangement outside of funding provided by the Joint Office to the national laboratories and their subcontractors. Stakeholders engaging with the Consortium (i.e., participants) make their own decisions regarding participation and will be responsible for supporting their own efforts based on their opinion of the benefit and value of the Consortium to their organization.

Consortium participants are separate entities and neither this document nor the associated Consortium are intended to create, nor shall they be construed to create, a joint venture, partnership, an employee-employer relationship, or other similar relationship among the participants. No participant shall have the right to obligate or bind any other participant in any manner.

The national laboratories leading the Consortium are Argonne National Laboratory (ANL), Idaho National Laboratory (INL), and National Renewable Energy Laboratory (NREL), with INL as the lead laboratory. Subject-matter experts at ANL, INL, NREL, and their subcontractors conduct research, development, demonstration, and deployment activities to meet the Consortium objectives described in this document. To facilitate this work, the national labs invite industry experts to participate in the Consortium for the purpose of sharing information about current challenges and barriers, data describing the operation of current technology, recommendations on solutions to challenges, and other information pertinent to the labs' work. The labs independently review input received from individual participants, comparing it to their own data, insights, and findings. The labs then independently synthesize findings and author publications to share these findings publicly and with the industry at large. The national labs have used this model of external input for existing Department of Energy programs like Co-Optima, SMART Mobility, and EVs at Scale.

### Vision and Mission

The Consortium's vision is a reliable, frictionless charging experience for all.

Its mission is to bring together EV charging industry members, national laboratories, consumer advocates, and other stakeholders to measure and significantly improve public charging reliability and usability within 24 months (by June 2025).

## Objectives

The Consortium is effective June 1, 2023. The national labs and their subcontractors will endeavor to achieve the following objectives, informed by input from Consortium participants:

1. **Define the charging experience:** define and publish key performance indicators (KPIs) that measure the customer charging experience, set targets for each KPI, measure performance of charging networks in the U.S., and recognize excellence in industry.
2. **Triage charging reliability and usability:** understand the root causes of and identify solutions to quickly address the problems that prevent customers from successfully charging on public chargers, with emphasis on issues related to payment, user interface, and communication between EVs, chargers, and cloud services.
3. **Develop solutions for scaling reliability:** design new diagnostics and testing tools to ensure that every EV can successfully charge on every charger as the market grows.

The national laboratories reserve the right to make final decisions on any products that they produce related to the above to retain scientific integrity and independence.

## Guiding principles

The Consortium is focused on improving charger reliability and usability. Although there are many aspects of the charging experience that impact customer satisfaction (e.g., convenience of charging station location, design features and amenities, etc.), reliability is an absolute prerequisite to a positive charging experience.

Today's poor reliability and usability of public DC fast charging infrastructure pose a threat to the EV industry. Therefore, the national labs and their subcontractors will focus on finding solutions, informed by Consortium participants, to help industry achieve significant, systemic improvement in less than 2 years. The participants of the Consortium will come to the table with their own individual ideas to identify short-term, temporary solutions that can be deployed in a matter of months, in parallel with 1- to 2-year projects to devise permanent, long-term solutions.

Informed by information exchanged by Consortium participants, the national labs and their subcontractors will endeavor to provide solutions for the whole industry by publishing best practices, demonstrating tools, and providing a detailed blueprint for a voluntary recognition program. Industry then can apply best practices and tools, improve, or create standards, and implement solutions that improve the charging experience.

## Scope

The Consortium will focus on exchanging information on the reliability and usability of light-, medium-, and heavy-duty EVs charging on public AC and DC charging infrastructure.

## Organization

The Consortium consists of a Lab Leadership Team, Executive Advisory Board, and three Working Groups, as shown in Figure 1. Two of the Working Groups are broken out into Task Forces.

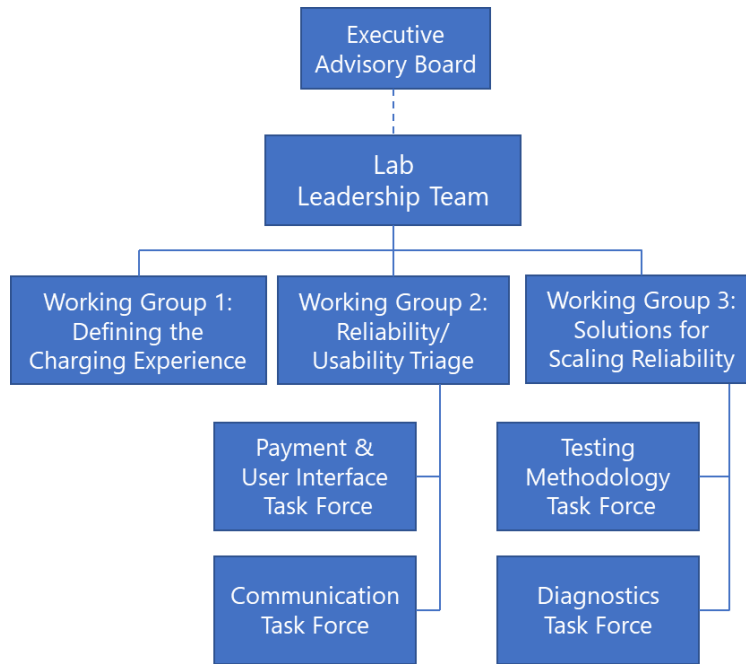


Figure 1. Consortium Organization

The Lab Leadership Team is composed of a Consortium Director from Idaho National Laboratory and a senior adviser from Argonne National Laboratory and from National Renewable Energy Laboratory. The Lab Leadership Team sets the strategic direction of the Consortium, monitors progress, and reviews and approves requests from new organizations to participate in the Consortium.

The executive advisory board (EAB) is composed of representatives from non-national-laboratory participants. Each non-lab participant may assign a senior-level representative to the EAB. The EAB advises the Lab Leadership Team on the strategic direction and impact of the Consortium’s activities and work products. It meets at least semi-annually.

The Consortium has the following three Working Groups:

- Working Group 1: Defining the Charging Experience
- Working Group 2: Reliability/Usability Triage
- Working Group 3: Solutions for Scaling Reliability

Working Groups consist of subject matter experts from national laboratories and non-national-lab participants. Each Working Group is led by a national lab co-chair and a non-national-lab co-chair. They meet at least monthly. Co-chairs report to the Lab Leadership Team monthly.

Task Forces are smaller teams that focus on specific issues or tools. Task Force leaders are selected by Working Group co-chairs and can be from a non-national-lab participant. Task Forces meet as needed and report progress in Working Group meetings.

## Eligible Non-National-Lab Participants

Any organization that meets the following eligibility requirements may participate in the Consortium:

1. Participants make a strong commitment to actively participate in at least one Working Group, attend monthly Working Group meetings, and accept and complete tasks between meetings.
2. Participants have and make available staff with demonstrated subject-matter expertise relevant to the Working Group(s) in which they participate, shown in Table 1.
3. Participants commit to making expected contributions, as described in the next section.

Table 1. Subject matter expertise needed for participation in Working Groups

<b>Working Group 1: Defining the Charging Experience</b>	<b>Working Group 2: Reliability/Usability Triage</b>	<b>Working Group 3: Solutions for Scaling Reliability</b>
<ul style="list-style-type: none"> <li>• Understanding the perspectives, preferences, and behavior of customers of public charging infrastructure</li> <li>• Charging station hosting, operation, and maintenance</li> <li>• Charging network operation</li> <li>• Charging equipment design, manufacturing, operation, maintenance, and repair</li> <li>• EV design, manufacturing, maintenance, and repair</li> <li>• Standards development relevant to charging infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Charging station operation and maintenance</li> <li>• Charging network operation</li> <li>• Charging equipment design, manufacturing, operation, maintenance, and repair</li> <li>• EV design, manufacturing, maintenance, and repair</li> <li>• Payment device design, manufacturing, operation, maintenance, and repair</li> <li>• Payment networks operation</li> <li>• User experience (UX) or customer experience (CX) design, assessment, and improvement</li> <li>• Charging system testing</li> <li>• Standards development relevant to charging infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Charging station operation and maintenance</li> <li>• Charging network operation</li> <li>• Charging equipment design, manufacturing, operation, maintenance, and repair</li> <li>• EV design, manufacturing, maintenance, and repair</li> <li>• Payment device design, manufacturing, operation, maintenance, and repair</li> <li>• Design and management of large-scale data systems</li> <li>• Standards development relevant to charging infrastructure</li> </ul>

Representatives of State agencies with responsibility for policies or programs related to public charging infrastructure reliability and usability may participate as ex-officio members of the Consortium as they deem appropriate.

## Expected Contributions from Participants

Each participant commits to participating in each least one Working Group of the Consortium, engaging the necessary individuals within its organization as active participants, as appropriate, to the best of its ability, and aligned with its areas of expertise and interest.

Each participant is expected to contribute subject-matter expertise. Additionally, participants are expected to contribute the following information to the Working Group(s) in which they participate:

### Working Group 1: Defining the Charging Experience

- Consumer sentiment, consumer behavior, and/or charging performance data to support KPI development and target setting and validation.

### **Working Group 2: Reliability/Usability Triage**

- Charging system performance data describing the operation of devices (e.g., electric vehicle supply equipment and its subsystems, EV subsystems related to charging) and information systems (e.g., communication and payment networks) to identify issues and investigate root causes, and/or
- Data from engineering activities necessary to support collaborative testing to identify issues, investigate root causes, and verify corrective actions, and/or
- Data from engineering activities needed to identify and implement interim and permanent corrective actions.

### **Working Group 3: Solutions for Scaling Reliability**

- Data from engineering activities needed to identify, test, and verify engineering specifications for diagnostics and testing tools.

Each participant is expected to implement findings and solutions produced by the Consortium in a way that not only advances its own interests, but also the EV industry at large.

### **Operating Principles**

1. The Consortium is a voluntary, non-binding arrangement.
2. Participation is open to all eligible participants. Interested participants request to participate in specific Working Group(s). The Lab Leadership Team approves requests by verifying participants meet eligibility requirements.
3. Participants make a strong commitment to actively participate in at least one Working Group.
4. Participants may choose to discontinue their participation at any time. Should any organization choose to leave, it cannot resume participation in the Consortium without the consensus of the Lab Leadership Team.
5. The Lab Leadership Team may remove participants from the Consortium who fail to provide expected contributions.
6. Participants comply with applicable laws and regulations, including U.S. anti-trust and competition laws; further, participants conduct activities in a way that avoids any appearance of anti-competitive behavior, even though no violation of law has occurred.
7. Each participant makes its own decisions regarding its own funding of projects and programs, according to its own internal policies, requirements, and /or guidelines; similarly, each Consortium participant directs and manages its own projects and programs according to its own internal policies, procedures, and requirements.
8. No proprietary or government or company confidential information is intended to be introduced in the Consortium at large. Nevertheless, participants may pursue nondisclosure agreements with other participants for sharing such information.
9. Intellectual property including patentable innovations and copyrightable subject matter created by a participant will be owned by that participant. Jointly developed intellectual property will be jointly owned by the participants that created the intellectual property and will be subject to rights retained or acquired by the U.S. Government. The participants are encouraged to publicly share their intellectual property developed under this Consortium by publishing reports and articles. Participants are strongly encouraged to pursue independent projects to implement

solutions identified in these work products in a way that improves the reliability and usability of public charging infrastructure.

### **Decision Making**

The Lab Leadership Team has decision-making authority over the scope of work and strategic direction of the Consortium. It makes decisions after considering input from Working Group co-chairs and the Executive Advisory Board.

The Executive Advisory Board advises the Lab Leadership Team on the strategic direction and impact of the Consortium's activities and work products.

For decisions regarding Working Group outcomes:

- After information exchange from participants, Working Group co-chairs make the decision. If the Working Group co-chairs fail to make a decision, the Lab Leadership Team makes the decision.
- After information exchange from participants, Task Force leads make the decision.
- Task Force decisions do not need to be approved at the Working Group level, but Task Force leads and Working Group co-chairs work together to ensure that the work of the Task Forces in the same Working Group is coordinated.

### **Work Product Approval**

The work products of the Consortium are written best-practice documents that describe practices, targets, and engineering specifications. In accordance with their respective DOE prime contracts, the national laboratories are responsible for creating these documents, with support from subcontractors and non-national-lab participants, for the benefit of industry. Where appropriate and agreed upon by the Working Group, the national laboratories, and national laboratory subcontractors, as applicable, a non-national-lab participant may lead the development of a Consortium work product.

Authoring organizations make work products accessible free of charge to the general public, subject to the publication approval process of authoring organization. All direct contributors to the publication are listed as co-authors.

Work products created by DOE national laboratory prime contractors and their subcontractors are governed by the terms of their respective prime contracts with DOE and subcontracts thereunder. National laboratory prime contractors and their subcontractors may produce work products based on input from participants, according to the decision-making process defined in the preceding section, subject to the terms of their respective DOE prime contracts, subcontracts, and any non-disclosure agreements executed between them and participants.

If any provision of this framework conflicts with any provision of the respective DOE prime contract of a participating national laboratory prime contractor, the provision of that prime contract shall prevail and control.