



California Energy Commission

Staff Workshop on the Vehicle-to-Grid Equipment List (V2GEL)

Bob Nolty and Kiel Pratt, Vehicle-Grid Integration Unit, Fuels and Transportation Division

March 27, 2023



Agenda

1. Introduction to vehicle-to-grid (V2G) and the V2G Equipment List (V2GEL)
2. Coordination and development history
3. V2GEL demonstrations
4. Public comments and questions



Commitment to Diversity

The CEC adopted a resolution strengthening its commitment to diversity. The CEC continues to encourage disadvantaged and underrepresented businesses and communities to engage in and benefit from our many programs.

CEC staff conducts outreach efforts and activities to:

- Engage with disadvantaged and underrepresented groups throughout the state;
- Notify potential new applicants about the CEC's funding opportunities;
- Assist applicants in understanding how to apply for funding from the CEC's programs;
- Survey participants to measure progress in diversity outreach efforts.



Diversity Survey



Scan the code on a phone or tablet with a QR reader to access the survey.

One-Minute Survey

(<https://forms.office.com/g/5v5PGLVm4B>)

The information supplied will be used for public reporting purposes to display anonymous overall attendance of diverse groups.

Zoom Participants, please use the link in the chat to access the survey or scan the QR code on the left of the screen with a phone or tablet to access the survey.

Survey will be closed at the end of the day.



Introduction to V2G and the V2GEL



What is V2G and why is it important?

V2G stands for **Vehicle-to-Grid**: Export of power from an electric vehicle's batteries to the electric grid

Improve economics
and reliability of grid
operation

Reduce pollution and
greenhouse gas
emissions

Earn revenue as a
participating EV owner



How does an EV owner start participating in V2G?

- Owner selects a V2G charger with:
 - **UL 1741 certification**
 - **Smart inverter functions** (UL 1741 SA or SB)
- Owner submits application to utility
- Utility processes application:
 - Verifies equipment – *as an optional resource, the V2GEL can help with this role*
 - Does a study to verify **safety** and **grid stability**
- Utility extends **permission to operate**
- Owner may then **export power to the grid**



What is the V2G Equipment List?

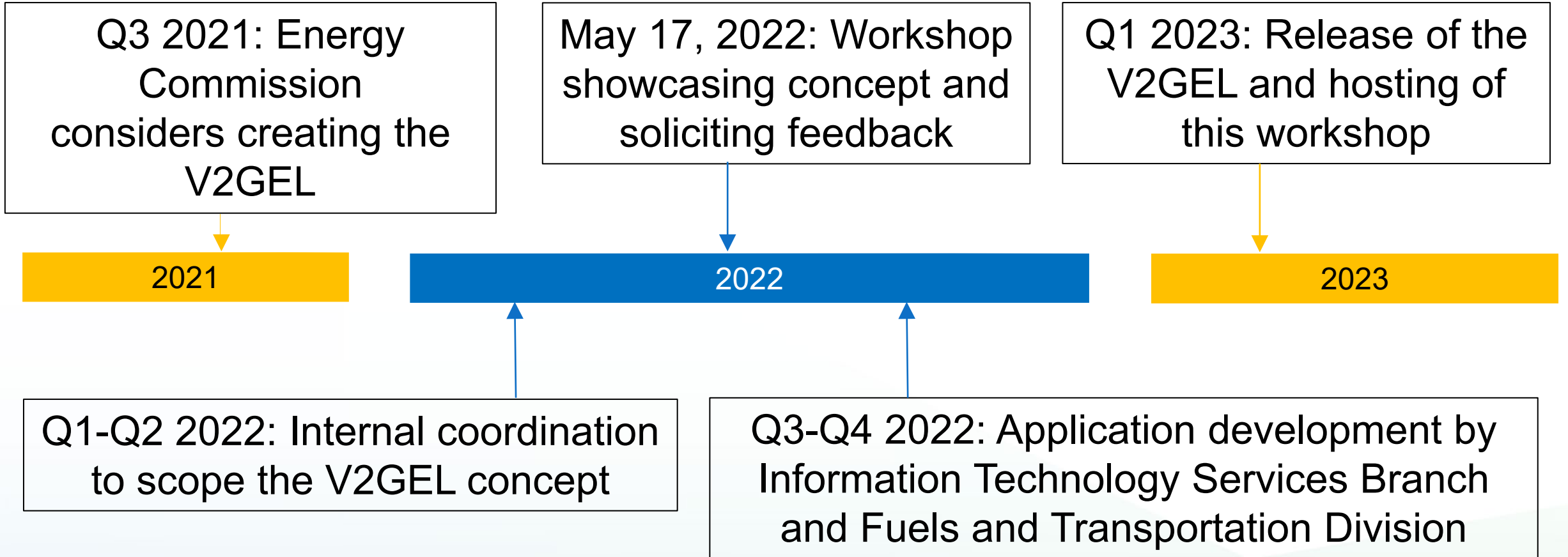
- Strictly a voluntary and informational resource
 - The V2GEL does not impose any interconnection requirements.
 - The Energy Commission created the tool as a courtesy service to utilities and other stakeholders.
 - The Energy Commission is not intending to require equipment to be on the list as a requirement for interconnection.
- Displays information on **UL 1741-certified** V2G equipment models
 - The V2GEL is intended to **streamline utility interconnection**.
 - It may also help electrical contractors identify certified equipment that meets their specifications.



Coordination and Development History



Timeline





The four questions from the May 2022 workshop

Resolution of the four questions we asked stakeholders:

- Which certifications should the V2GEL List track at launch? UL 1741, UL 1741 SA, UL 1741 SB, or a combination thereof?
- To what extent should the V2GEL attempt to accommodate onboard inverters (AC V2G) at launch, versus focusing on offboard inverters (DC V2G)?
- Should the V2GEL track the model numbers of chargers (that is, electric vehicle supply equipment) which contain inverters, or the model numbers of the inverters themselves?
- Should any other parameters besides UL certification be tracked as part of the V2G inverter list? For example, connector type, communication standards, and so on?



Which versions of UL 1741 should be tracked?

Answer: All – UL 1741, Supplement A (SA), and Supplement B (SB)

- Work between utilities and the California Public Utilities Commission is ongoing regarding requiring SB for most new interconnection in California.
- However, there are exceptions for previously-purchased equipment and equipment connected solely to participate in California's Emergency Load Reduction Program (ELRP).
- The V2GEL clearly indicates if equipment was certified to SA and/or SB.
- UL 1741 SC may be tracked once available. Since the V2GEL is designed to mirror Rule 21 requirements, SC will likely be tracked if Rule 21 requires SC.



Should the list include AC V2G (onboard inverters) at launch?

Answer: No, it lists only DC equipment at launch.

- Consensus among commenters was that standards for AC V2G are not mature and we do not yet know what to track.
- Given market status, commenters generally emphasized a near-term focus on DC chargers with inverter in the stationary equipment.
- The V2GEL application is designed with plan to accommodate AC V2G in the future, likely after CPUC enacts regulations.



Should chargers or inverters be listed?

Answer: Chargers (for now), plus any other V2G equipment that gets UL 1741 certification.

- Stationary DC V2G chargers have embedded inverters.
- We will revisit this question when process for interconnecting vehicles with onboard inverters (i.e., AC V2G) exists.
- The V2GEL is designed to help facilitate Rule 21 interconnection, so will likely mirror Rule 21 updates.



What other information should be tracked?

Answer: The V2GEL accommodates *optional* reporting of auxiliary information.

- Compromise between:
 - Providing users any information they may want
 - Additional burden on manufacturers when submitting
 - Additional burden on the Energy Commission to capture, maintain and present information
- Taking Energy Star certification as an example:
 - List will indicate if equipment has Energy Star certification
 - However, Energy Star is not required for listing or interconnection



Communication Protocols

Auxiliary Information	
(This section is optional; the fields below are used for informational purposes and are not required for listing)	
Communication protocols supported, including version	Can Select Multiple
	ISO 15118-20, OCPP 2+,...
	<input type="checkbox"/> ISO 15118-2
	<input checked="" type="checkbox"/> ISO 15118-20
	<input type="checkbox"/> DIN 70121
	<input type="checkbox"/> OCPP 1.6
	<input checked="" type="checkbox"/> OCPP 2+
	<input checked="" type="checkbox"/> OpenADR
	<input type="checkbox"/> Other



Additional Certifications

Additional certifications	Can Select Multiple
[Blurred text]	<p>None selected ▾</p> <ul style="list-style-type: none"><input type="checkbox"/> UL 2202<input type="checkbox"/> UL 2594<input type="checkbox"/> UL 9741<input type="checkbox"/> Energy Star<input type="checkbox"/> Other
[Blurred text]	[Blurred text]



Connectors

Connectors included	Can select multiple J1772 AC, J1772 CCS D... <input checked="" type="checkbox"/> J1772 AC <input checked="" type="checkbox"/> J1772 CCS DC <input type="checkbox"/> MCS <input type="checkbox"/> CHAdeMO <input type="checkbox"/> Other
Notes If any certifications are missing, please explain a... documentation Please provide any other pertin... marketing statements	ing



V2GEL Demonstrations





Browse Walkthrough



Manufacturer Walkthrough



Public Comments and Questions

Instructions

- Requesting three minutes or less per person and one representative per organization

3-Minute Timer

Zoom online

- Click “Raise hand”

Telephone

- Press *9 to raise hand
- Press *6 to (un)mute

When called upon

- Host will open your line
- Unmute, state and spell your name, and state your affiliation if applicable

**For phone participation: Dial (669) 219-2599 or (888) 475-4499
Enter Webinar ID: 842 5003 8230**



Finding information and submitting comments

The V2GEL application: <https://v2gel.energy.ca.gov/>

The **22-EVI-06 docket**, associated with vehicle-grid integration, is used for the list. Feel free to submit public comments about this workshop or the list. Mention “V2GEL” in the comment title.

Submit a comment:

<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=22-EVI-06>

View documents in 22-EVI-06:

<https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=22-EVI-06>

V2GEL information webpage: <https://www.energy.ca.gov/programs-and-topics/programs/vehicle-grid-integration/vehicle-grid-equipment-list>

For future updates, you can sign up to the new subscription topic *V2G Equipment*.



Thank You!

