Charger Reliability and Networking Presentations

- Overview of charger reliability and networking requirements
  - Jeffery Lu, California Energy Commission, Jeffrey.Lu@energy.ca.gov
- Meeting requirements with networked chargers
  - Sam Vercellotti, Terawatt Infrastructure, samv@terawattinfrastructure.com
- Meeting requirements with nonnetworked chargers
  - Matt Zerega, TerraVerde Energy, matt@terraverde.energy

CARB TRIG Meeting

Overview: Charger Reliability Regs & Charger Networking Use Cases

September 2024 | Jeffrey Lu, CEC Staff

Photo: Jan Arendtsz

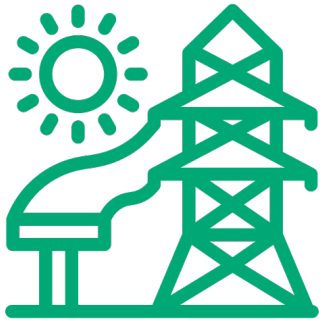
Agenda

1. Guiding principles
2. Upcoming charger reliability regulations
3. Charger networking use cases
4. Questions & discussion

Guiding principles for CEC's EV charging activities

Accessible + Reliable

User-friendly



Grid-friendly

Image credit: Flaticon.com

Upcoming charger reliability regs (1/2)

- Assembly Bill 2061 directs the CEC to develop charger reliability regulations
- Chargers funded with public dollars should perform and are subject to new requirements
- Highlights from current proposal:
  - Public charger **data sharing via API** for address, pricing, status → helps drivers locate chargers
  - Target charger **uptime** and **successful charge** rate of 97% and 90%, respectively*
  - Standardized measurement and reporting using **Open Charge Point Protocol (OCPP)**

** Non-networked chargers are not subject to the 90% successful charge requirement*

Upcoming charger reliability regs (2/2)

Different reporting approaches for networked and non-networked:

- Non-networked chargers will be largely reliant on the charger operator or site host to track and report uptime
- Networked chargers will use specific messages in OCPP logs to ensure reporting is automated and standardized across brands and networks

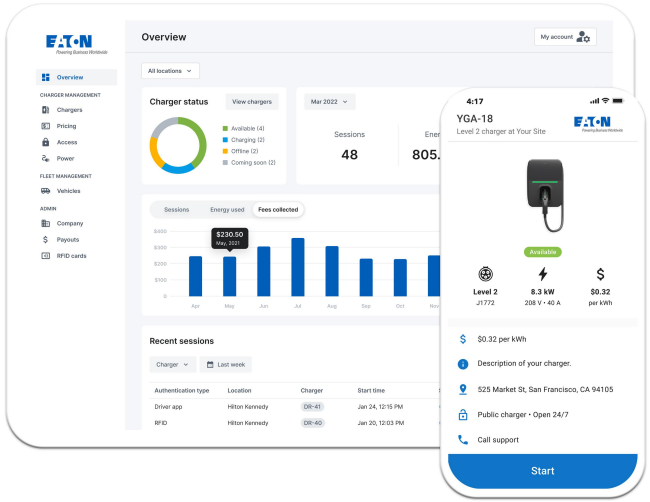
SUMMARY | *The proposed reliability regulations:*

- Set **minimum performance targets** for publicly funded chargers
- **Standardize** reliability monitoring and reporting (OCPP)
- Provide **detailed data** to inform future policies

Charger networking overview

Networked chargers communicate with a central management system, typically using the Internet:

- The appropriate connection type may depend on the site design and location (cellular, Ethernet, WiFi)
- Any OCPP charger is networked if connected to the Internet, but can also act as a non-networked charger if not connected to the Internet



→ Networking can provide several benefits, including **user billing, diagnostics, and site load management.** The following slides provide practical examples of use cases enabled through charger networking.

Image credit: Eaton

Charger networking use case examples (1/3)

Use case 1: Collecting user payment for charging.

→ Networked chargers can enable payment collection without additional payment collection hardware or labor.* Examples:

1. You are an apartment manager and would like to offer paid Level 2 EV charging to residents in the shared lot without changing existing rent collection systems.
2. You manage a grocery store and have installed a 200kW charger to provide paid charging to the various medium- and heavy-duty trucks that make deliveries.
3. You manage a distribution warehouse and have installed 150kW chargers to provide paid charging to the various owner-operator truckers that visit your facility.

Note: Paid, publicly available chargers may be subject to CARB payment method and CDFA price transparency requirements.

Charger networking use case examples (2/3)

Use case 2: Detailed logs, diagnostics, and troubleshooting

→ Networked chargers can save logs for diagnostics^ and automatically send notifications if certain parameter thresholds are exceeded. Examples:

1. You manage a fleet yard with 20 EV trucks and 20 chargers. One of your drivers returns from their route and informs you that the range was much lower than usual. You use the charger OCPP logs to figure out which charger the truck was plugged into the night before, check for error codes* in that charger's log, and notice that the charging power was throttled due to cable overtemperature. You send a tech out to inspect the cable.

2. You own a MD/HD public charging station. Your get a notification on your charger management dashboard that the tilt sensor on a charger was activated, suggesting that it may have been hit. You're send a tech out to investigate and possibly replace the charger before any customers have submitted a problem ticket or called to complain.

^ To aid cross-brand consistency, the federal Joint Office has published a set of minimum required error codes for chargers.

Charger networking use case examples (3/3)

Use case 3: Dynamic load management

→ A central management system can manage multiple networked chargers at a site to optimize charging around grid signals, site electrical constraints, or on-site generation. Examples:

1. To avoid costly demand charges at your fleet yard, you set your management system to ensure that the net load across all chargers never exceeds 100kW at any point throughout the month.

2. You manage a warehouse with rooftop solar and 12 Level 2 chargers. Your management system communicates with both the solar inverter and chargers to schedule charging when there is excess solar generation, which varies day by day.

3. To avoid waiting for grid upgrades, you energize your fleet yard using a “flexible connection” agreement with the utility, meaning that the allowed maximum power draw varies by day, month, or season. Your central management system receives these utility limits and ensures the net load across your chargers never exceeds the limit.

When might charger networking be appropriate?

Networked chargers may be the appropriate choice for your project if you desire any of the below capabilities (non exhaustive list):

Capabilities enabled with networked charging:

- Payment collection for charger use
- Charging session data logging
- Richer diagnostics for troubleshooting
- Automated notifications about potential charger problems
- Coordination with on-site loads or generation
- Dynamic load management in response to electrical constraints

Thanks! Questions?

For questions after today's meeting, please reach out to jeffrey.lu@energy.ca.gov

(Appendix) Non-exhaustive networking cost data

How much does charger networking cost?

→ Often difficult to pull apples-to-apples numbers because different vendors bill for networking in different ways. Some incorporate them into maintenance/field support fees, others bundle it with software fees, and so on. Non-exhaustive data from recent CEC MD/HD projects shown here:

Project 1	$25.00 per port per month
Project 2	$12.50 per port per month
Project 3	$26.00 per port per month
Recent project average	***~$21.17 per port per month***

Terawatt

Our mission.

We power electrified fleets with the most reliable network of charging solutions.

Capital raised

$1B

We’re here for the long haul. That’s why we’ve invested in the best locations, the right team, and infrastructure built to last.

Sites under development

15

Development is underway on a multitude of sites across the U.S., with many more in the pipeline. Of these, 4 are slated to come online in 2024.

EV trucks emit

63%

Less greenhouse gas than diesel trucks, meaningfully reducing your business’s CO2 emissions.

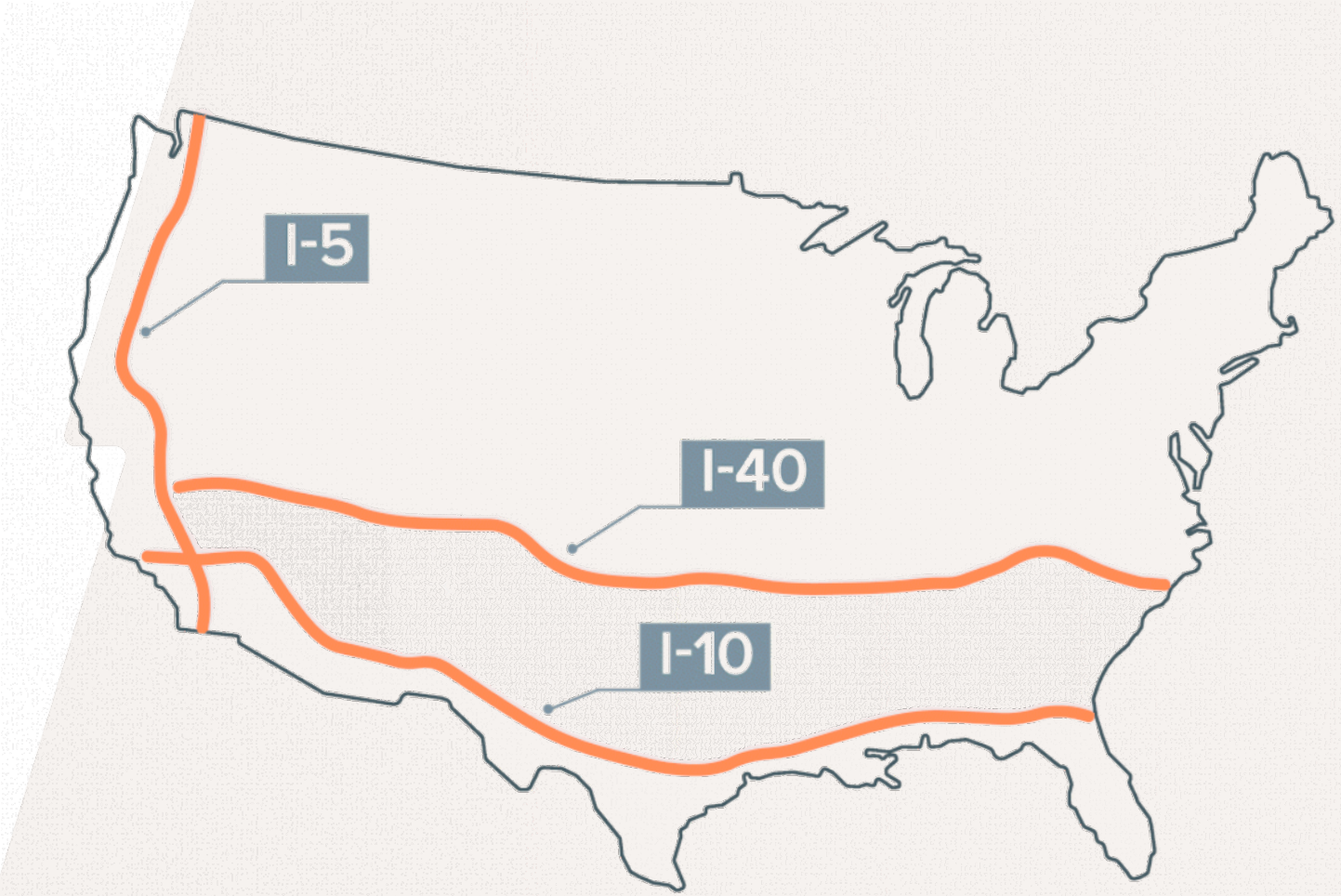
Terawatt is uniquely positioned to be North America's HD EV infrastructure backbone.

Rapidly scaling investments::

- Portfolio of existing sites
- Proprietary, strategic approach

Focus on three corridors:

- I-10: Los Angeles, CA to Jacksonville, FL
- I-5: Otay Mesa, CA to Blaine, WA
- I-40: Barstow, CA to Wilmington, NC



Solutions we offer

1. **Charging Infrastructure**
   On Terawatt-owned land or behind a fleet's fence

2. **Charging Services**
   Software, operations and maintenance

Reliability matters

Industry DCFC charging failure rate

22.7%

(Twice per week for a driver))

Terawatt

0.227%

(Once per year for a driver)

Software & services

1

Software

Charge Management System that includes charging status visibility, fleet charging scheduling, energy management, EVSE reservations, flexible billing, and custom reporting.

2

Operations and maintenance

24/7 call center, predictive & preventive maintenance, spare parts & warranty support, automated performance testing to ensure seamless functionality between vehicle, EVSE, and CMS.


Terawatt
Charging...
Terawatt

Thank you

TerraVerde ENERGY

Reliable Charging

Through Simplicity w/o Connectivity

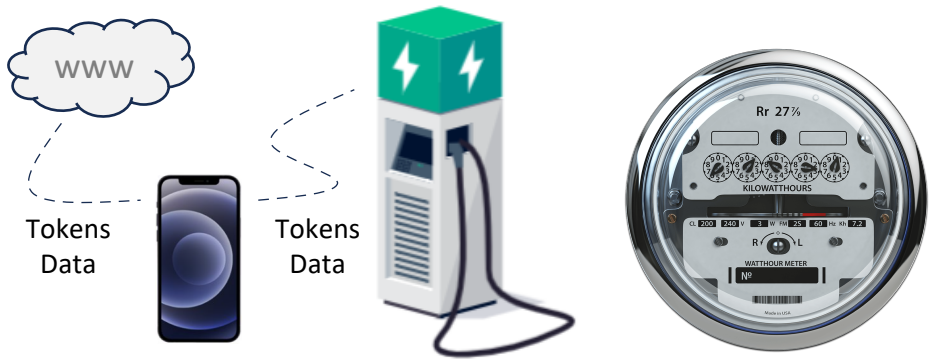
Matt Zerega, Director of Fleet Services

Typical State & Local Government (SLG) fleet scenario

SLG fleets often use parking areas accessible to employee vehicles

Requirements include:

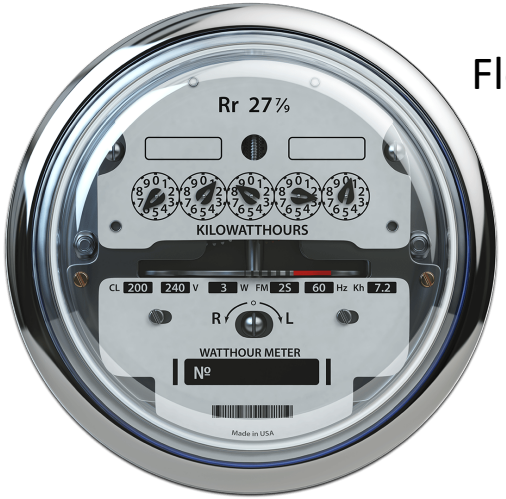
- Employees pay (their cars)
- Fleet consumption records
- Not for public use



Meeting the requirements without a network

Payments

Tokens



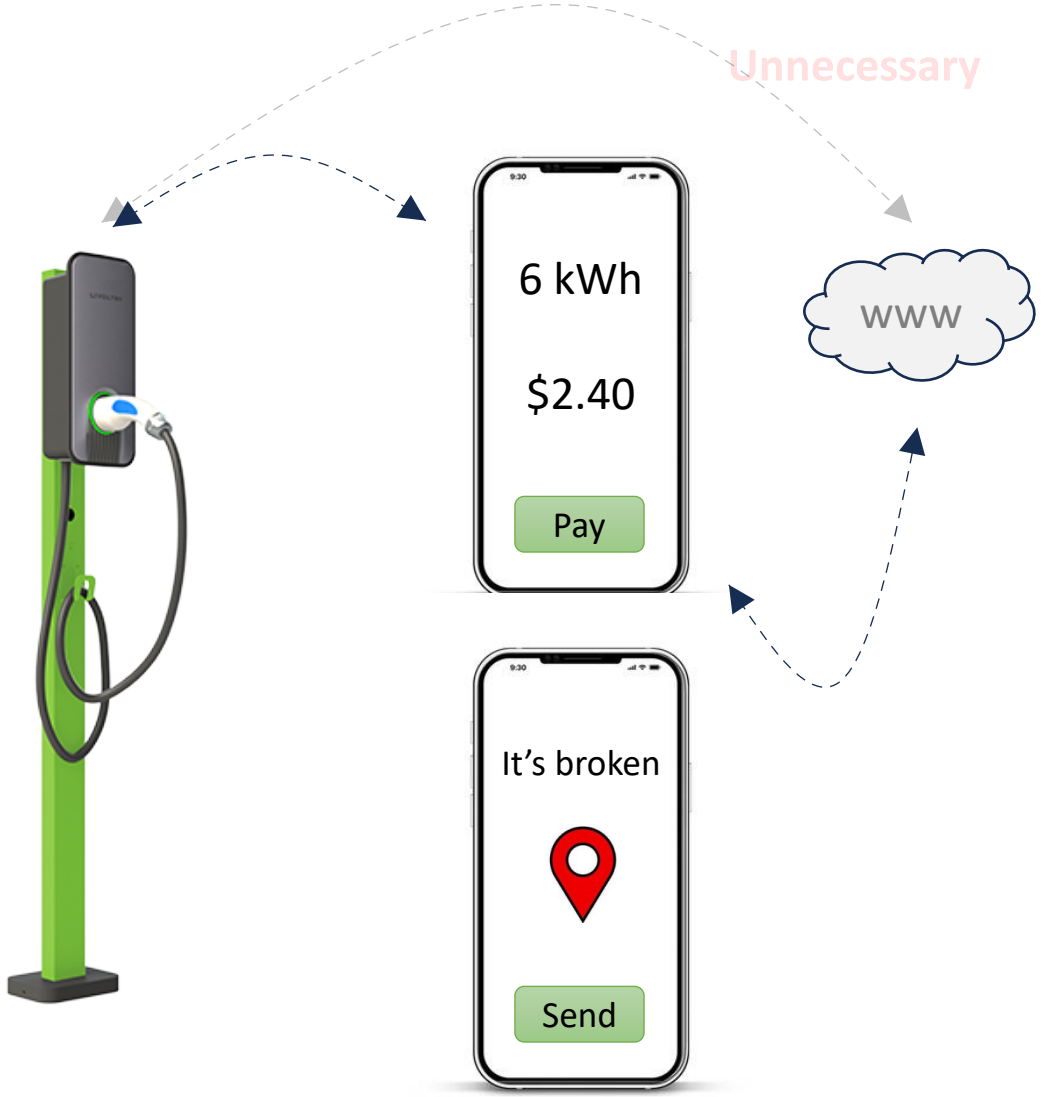
Fleet Usage

Access Control

Problem Reporting

Demand Response Scheduling

For employees who want to charge



Reliable often comes from simple

~~"real time"~~

Requirement	Method
Data	HTML, HTTPS
Payment	Tokens
Uptime reporting	Crowd sourcing

TerraVerde ENERGY

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Director, Fleet Consulting

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