FedFleet 2024

ZEV Charging Data

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www.gsa.gov/FedFleet

ZEV Charging Utopia

FedFleet 2024

Too Much Information, Too Many Decisions

Type of Information
sTOU (static time-of-use)
CPP (critical peak pricing)
TOU-CPP (time-of-use plus critical peak pricing)
VPP (variable peak pricing)
dTOU (dynamic time-of-use)
RTP (real time pricing)
CPR (critical peak rebate)
DLC (direct load control)
Managed Charging Programs
Grid Benefits
Charging Habits
Incremental Load Shift Potential
EV Experience
Charging Habits
Customer Behavior, Culture, and Comfort: Real-life Considerations
Uncoordinated Charging
Increased load demand and change in the shape of load profile.
Load scheduling
Dynamic pricing methodology
Electricity market operation strategy, and time of use (ToU)

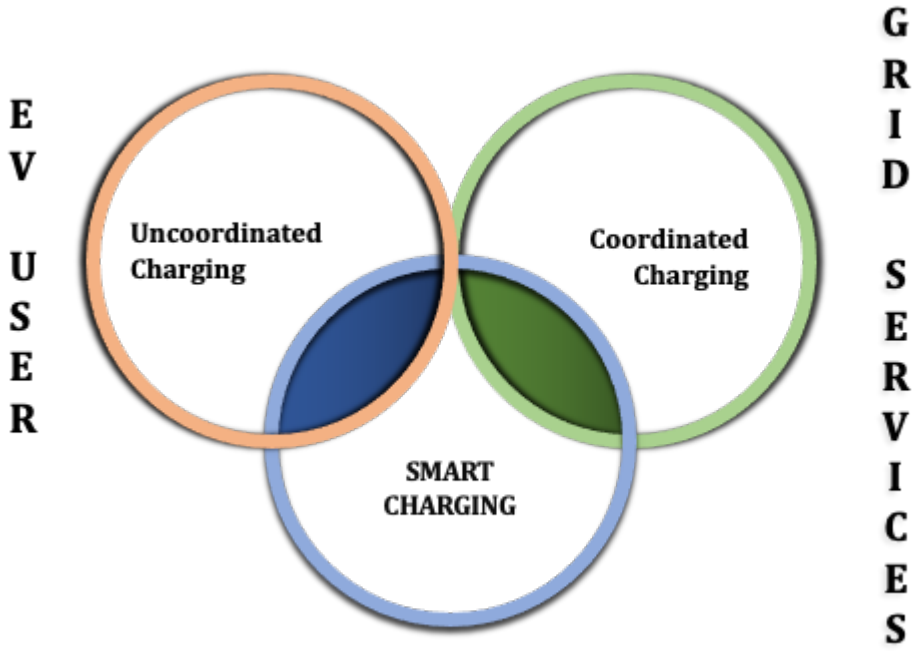
Are EV Chargers Considered Continuous Loads?

Source: https://www.a-m-refrigeration.com/tips-for-deciding-where-to-place-your-grocery-store-refrigerators

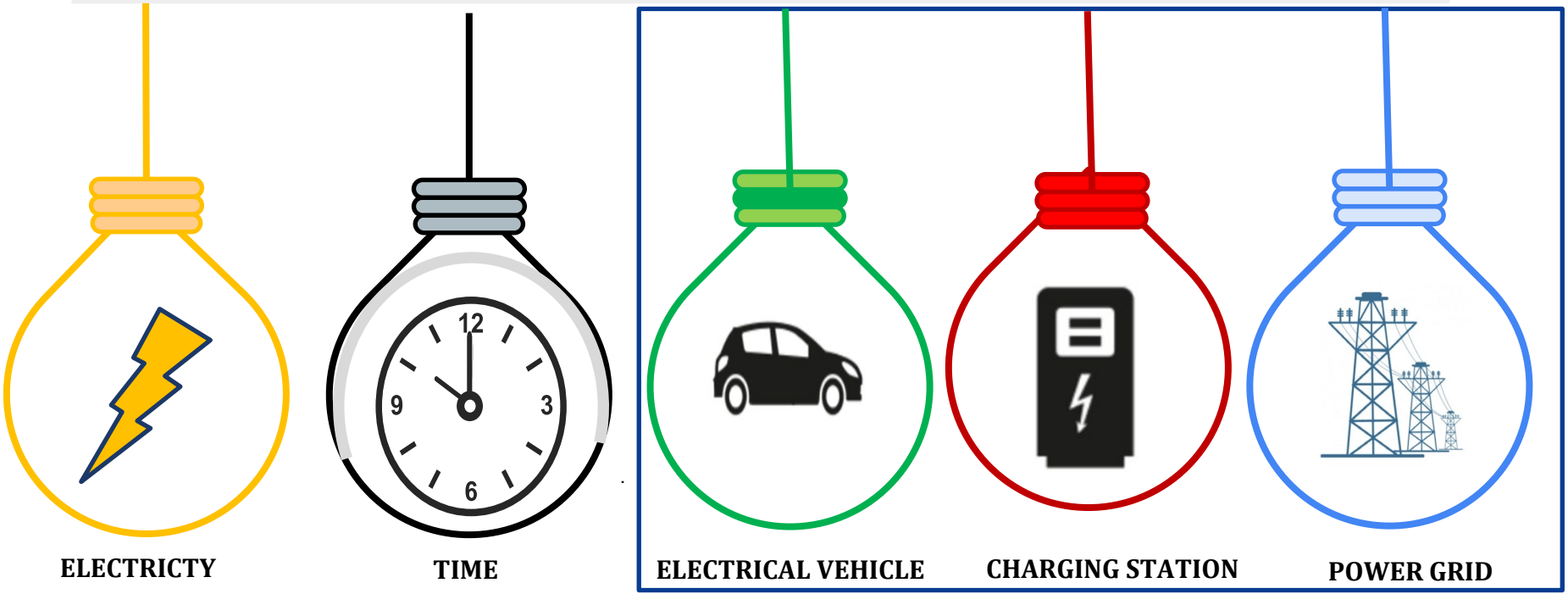
Source: https://www.homedepot.com/c/ab/best-refrigerators-for-your-home/9ba683603be9fa5395fab90c8c73c75

Context of SMART Self-Monitoring, Analysis, and Reporting Technology

Types of Charging



What is EV Smart-Charging ?



Smart Charging Objectives

1. Peak management,
2. Green charging,
3. Acting as a flexibility resource, and
4. Cost optimization.

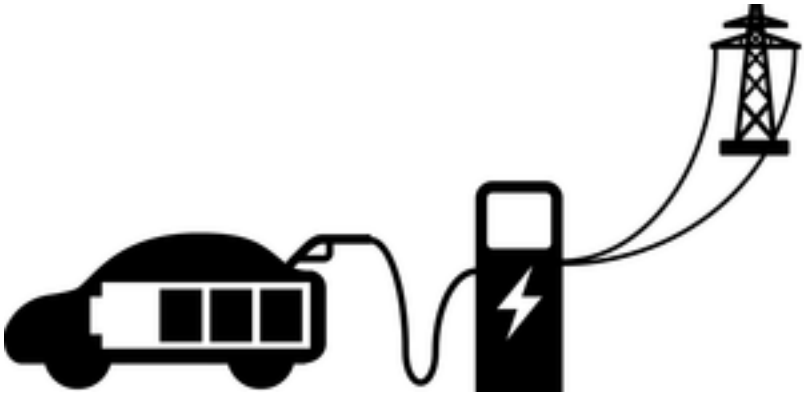


Illustration of two-way connection between grid and EV. The EV can discharge and sell power back to grid during high energy demand. (Source: Wikimedia Commons)

Level of Smartness

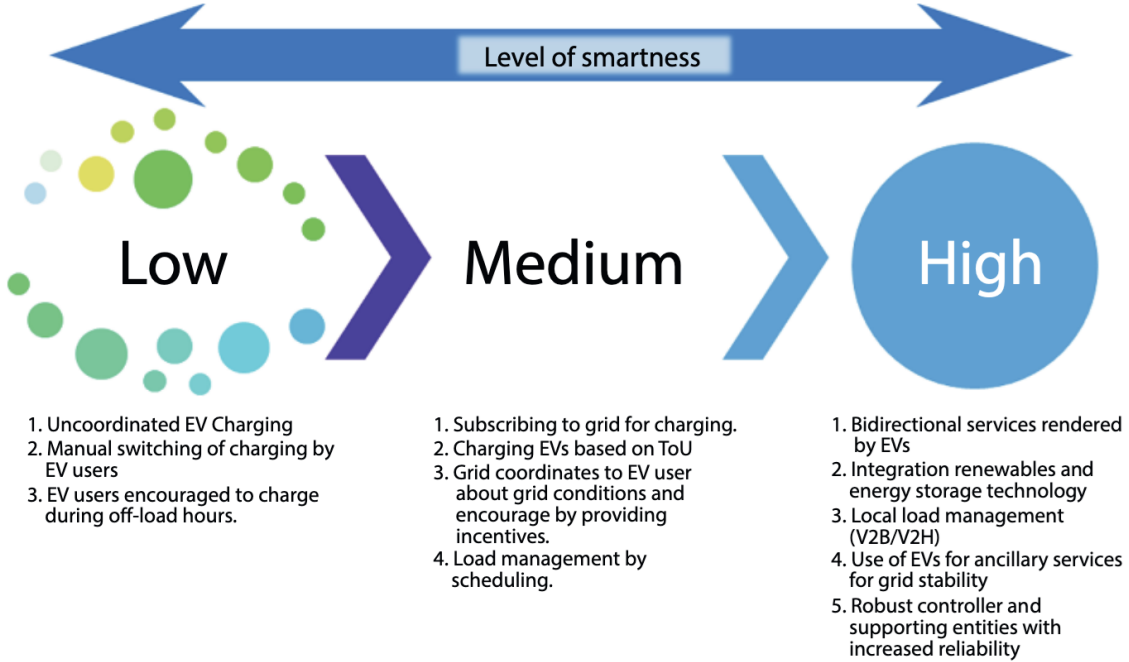


Figure 1.1 Flow diagram to understand and judge the level of smartness based on functionalities.

Source: Smart Charging Solutions for Hybrid and Electric Vehicles, page 9

The first approach:

Add smartness to the target applications accessible to users of the device

Source: https://www.kbb.com/car-advice/ev-battery-drain/ https://www.kbb.com/car-advice/ev-battery-drain/

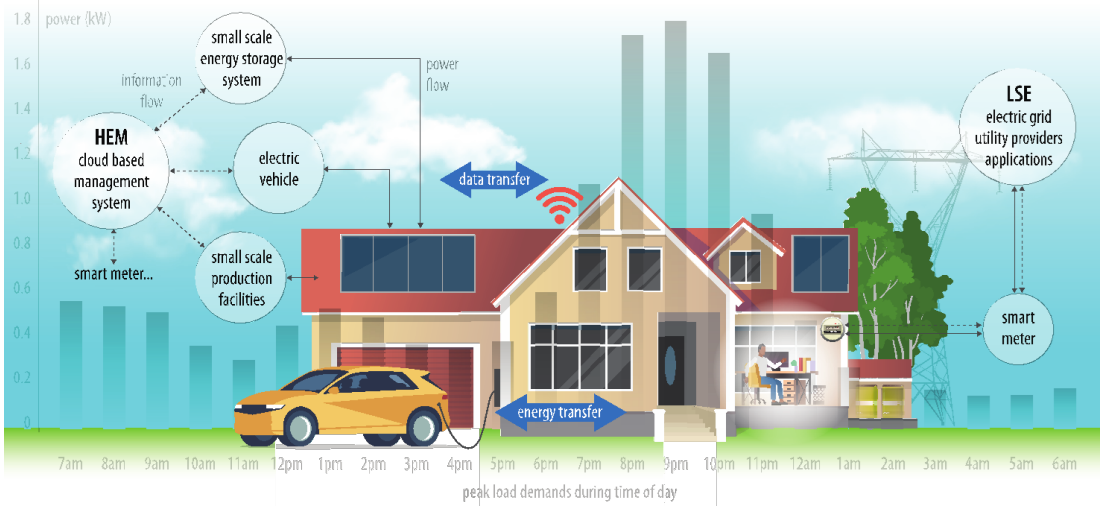
The Second Approach:

Adds functionalities to the device instead of the application that connects the user and the device.

Source: https://www.nrel.gov/transportation/managed-electric-vehicle-charging.html

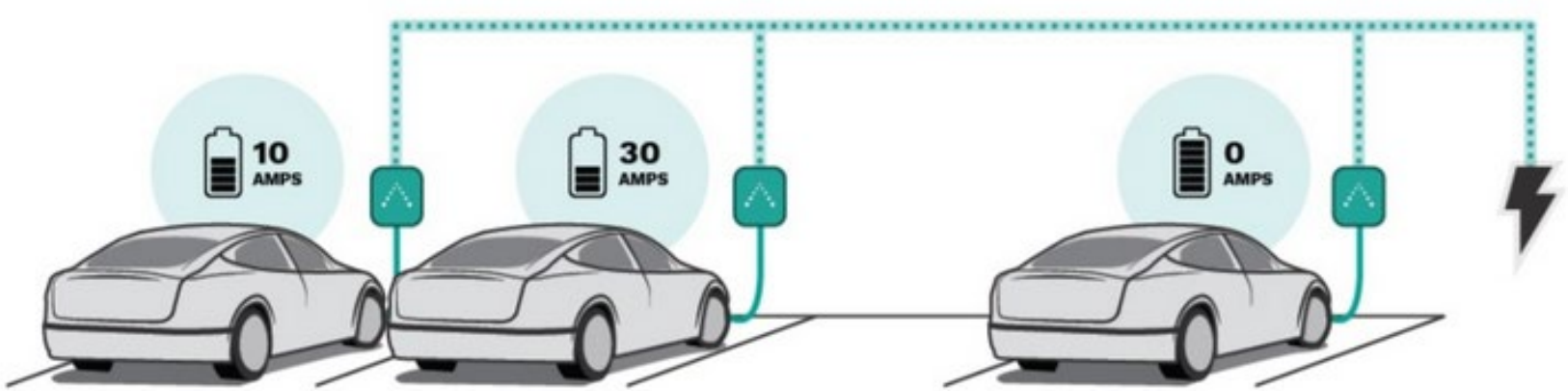
The Third Approach:

Both the target user application and the devices connected are upgraded to develop a smart environment.



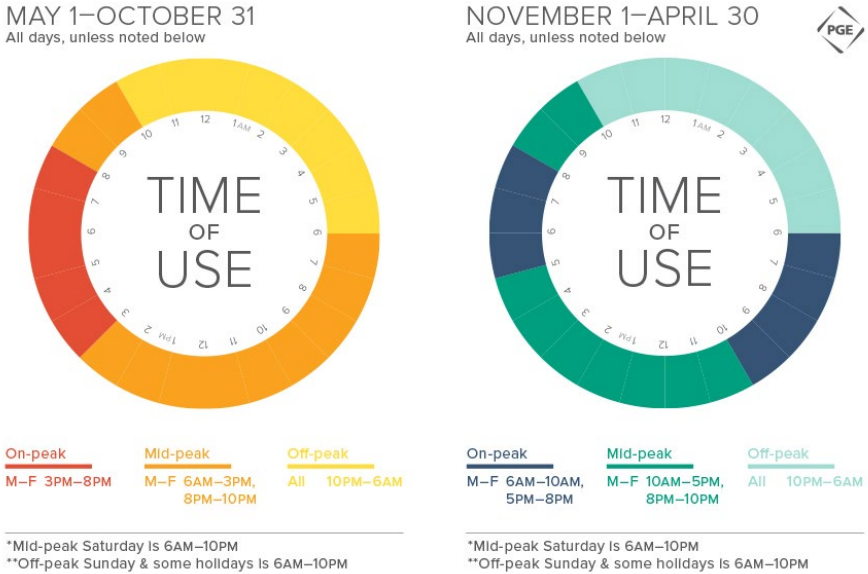
Source: https://www.nrel.gov/ImageGallery

Information Exchanged Conundrum



Source: https://www.wattblock.com/ev-recharge-qld.html

Time shift with Time of Use Rates



Source: https://portlandgeneral.com/about/info/pricing-plans/time-of-use/time-of-use-pricing-home

How much information do you want to know?

- **EV limitations when using AC vs. DC.**
- Where to read the State of Charge.
- EV range available
- Where are the public EVSE
- Opportunity charge time (DC only)

- **Data Reporting Capability**
- EVSE nameplate capacity
- Load management with managed charging
- Payment System, example: WEX card
- RFID card reader capability
- The number and types of communications systems (Wi-Fi, Ethernet, cellular)
- Communication Protocols
- Open Automated Demand Response (OpenADR) standard.

EVSE and ZEV Metering Best Practices

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New FEMP Best Practices on ZEV Charging

EVSE Electricity Use at Federal Buildings:

Best Practices for Federal Facility Measurement and Reporting Electricity Use from Electric Vehicle Supply Equipment
https://www.energy.gov/femp/best-practices-federal-facility-measurement-and-reporting-electricity-electric-vehicle-supply

Fleet Vehicle Charging Electricity Use:

Best Practices for Federal Fleet Measurement and Reporting Electricity Use in Electric Vehicles
https://www.energy.gov/femp/best-practices-federal-fleet-measurement-and-reporting-electricity-use-electric-vehicles

Why track EVSE electricity use at buildings?

- **Compliance with EO 14057**: The Implementing Instructions state *"Agencies must separately track energy used for vehicle charging and overall facility energy consumption."*

- **Benchmarking**: Facilities are required to benchmark building energy performance. Installation of EVSE units can affect a building's electricity use, making separate tracking essential to avoid impacting energy performance ratings.

- **Reporting Requirements**: Agencies are required to report EVSE electricity usage in their Annual Energy Management Data Report and the FAST Fueling Center and EVSE Inventory submission.

Photo by Werner Slocum / NREL

Reporting on EVSE Electricity Use

EVSE Electricity Use at Federal Buildings

FEMP Annual Energy Management Data Report

- Remove GOV and POV EVSE electricity use from facility electricity use in the “Electric Goal” tab
- Report on GOV charging electricity use at on-site grid-connected EVSE units as “Electric Excluded”
- Report on GOV charging electricity use at off-grid EVSE units powered by renewable energy sources as “Renewable Energy Data”

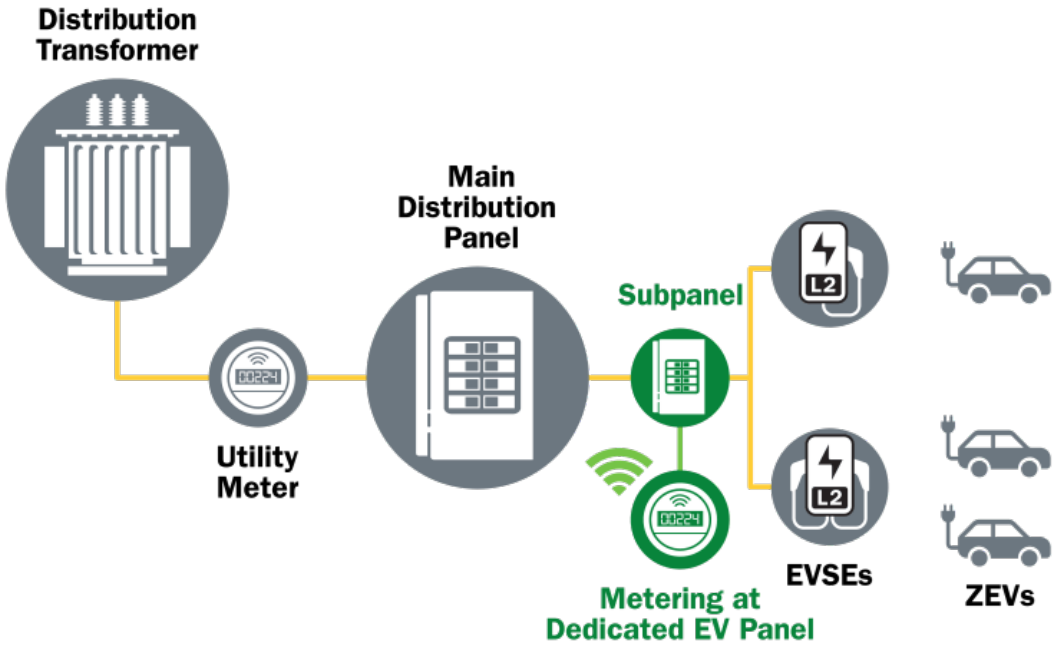
FAST Fueling Center and EVSE Inventory

- Includes field for total energy dispensed by the EVSE, for both GOV and POV charging

Options for Tracking EVSE Electricity Use

Metering at the Panel

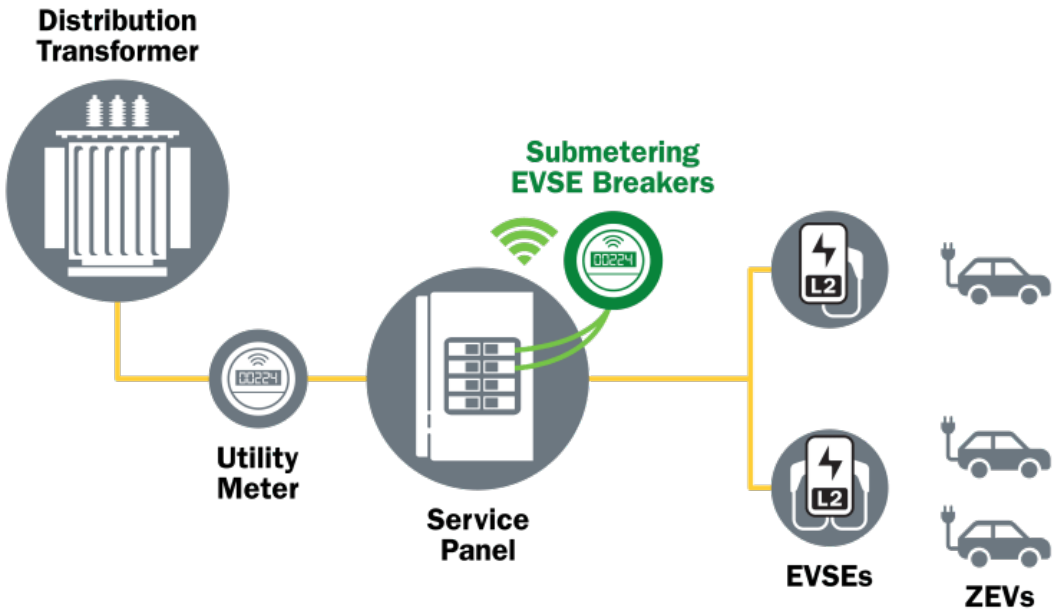
- Consider for larger EVSE installations where there the EVSE circuits have a dedicated panel
- Network meter requires connectivity



Options for Tracking EVSE Electricity Use

Submetering at the Panel

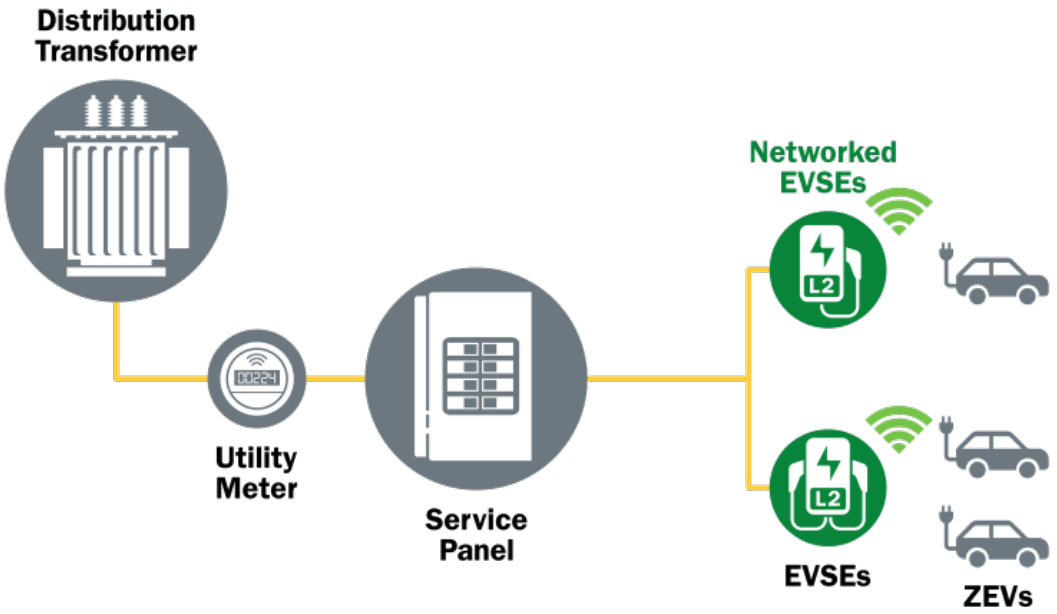
- Consider for smaller installations where the panel is used for more than just EVSE
- Network submeter requires connectivity



Options for Tracking EVSE Electricity Use

Networked EVSE

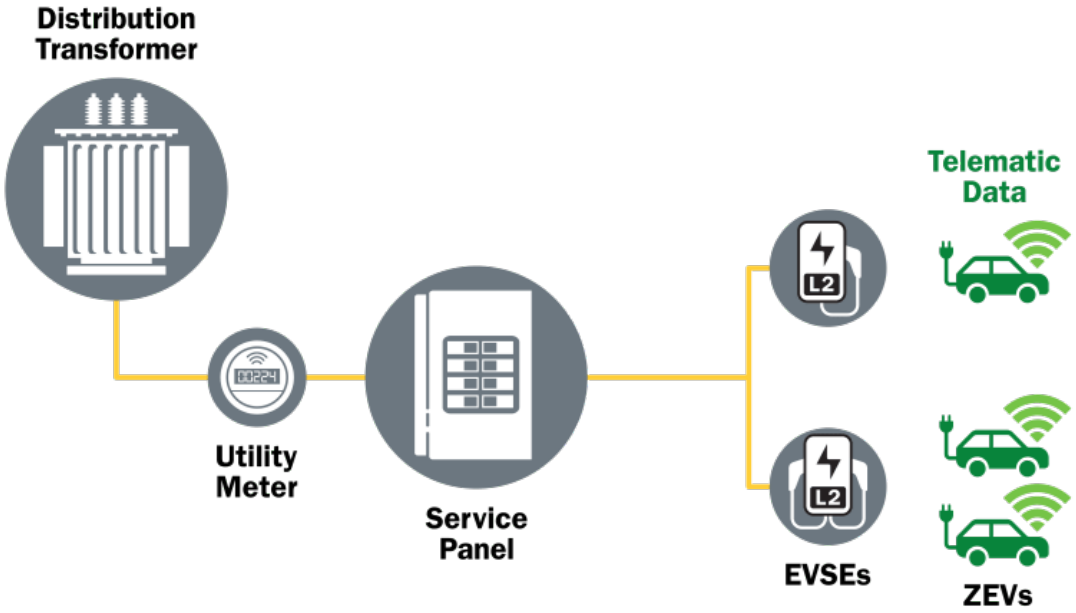
- Ideal for workplace charging with payment collection
- Requires connectivity
- Higher purchase cost and networking fees



Options for Tracking EVSE Electricity Use

Telematics

- Only collects data on vehicles with telematics installed
- Requires agency enrollment in the telematics data plan (monthly fee)



Tracking GOV vs. POV at a Shared EVSE

Photo by Werner Slocum / NREL

FEMP Annual Energy Management Data Report requires separation of GOV vs. POV electricity use.

When selecting a method to track EVSE electricity use at a building, consider how charging events between GOV and POV will be separated if the EVSE is shared.

Options to track at shared EVSEs:

- Networked EVSE tracks session data by user
- Telematics

Best Practices to Track EVSE Electricity Use

EVSE Electricity Use at Federal Buildings

1. Determine early on in your project how to track the EVSE electricity usage at the facility.
2. Select the best method to track the EVSE electricity use for each facility (dedicated panel metering, submetering, networked EVSE, or telematics).
3. Determine the importance of having the ability to automatically upload the EVSE electricity use to your Energy Management Information System and confirm compatibility, if needed.
4. Ensure there is a way to separate electricity used to charge GOV vs. POV.

Reporting on ZEV Charging Electricity Use

Fleet Vehicle Charging Electricity Use

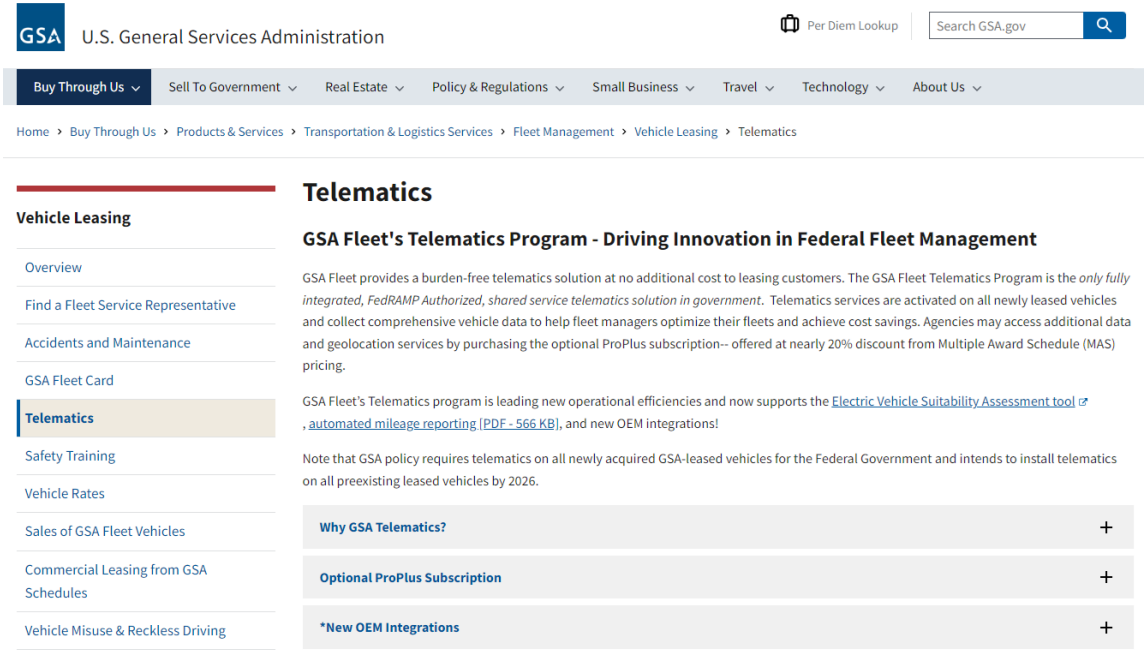
FAST Vehicle-Level Data (VLD), Fueling Data

Fueling data reported for all fleet vehicles, including kilowatt-hours (kWh) added to the ZEV during charging for the previous fiscal year. The following vehicle-level data is required:

- Vehicle identification.
- Date of charging session.
- Location of charging session.
- Type and volume of fuel added to the vehicle (i.e. kWh).
- Fuel cost (if any).

Best Practice: Vehicle Telematics Data

Telematics track charging sessions for a vehicle including the location, charging time, the beginning and ending state of charge, and **total kilowatt-hours added during the session** (e.g. referred to as “Energy Added” in Geotab).



https://www.gsa.gov/buy-through-us/products-services/transportation-logistics-services/fleet-management/vehicle-leasing/telematics

Alternative 1: Networked EVSE

Sum up charging sessions from:

- Agency-owned networked charging events +
- Public charging events +
- Non-networked EVSE charging events

**If the ZEV uses non-networked EVSEs for charging events, Alternative Option 2 or 3 should also be used

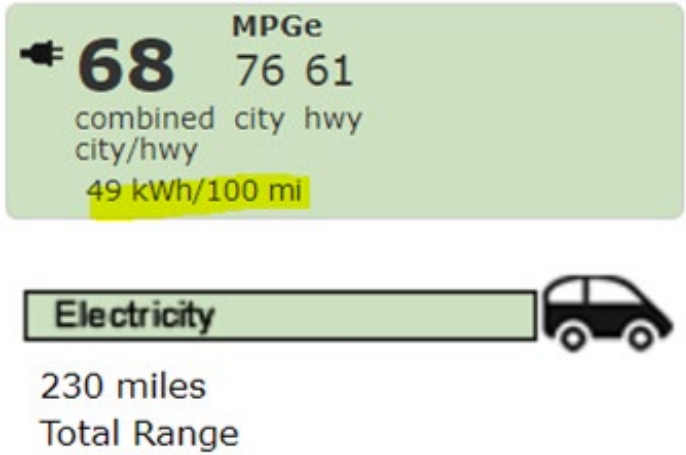
Alternative 2: Charging Session Logs

- To use this option, fleets should create a log for drivers to track necessary data for each charging session, including:
  - Vehicle identification
  - Date of charging event
  - Location of charging event
  - Total kWh added during charging session (found through the vehicle's on-board computer or app), alternatively track the vehicle State of Charge or "miles added" before and after the charging session
  - Cost (if applicable)
- Recommend drivers submit electronic logs directly to FMIS

Alternative 3: Estimate Charging Data

Estimate the electricity use for each fleet vehicles using a calibrated vendor-provided vehicle efficiency factor and the vehicle miles traveled for the FY. For example,

- A 2022 Ford 150 Lightning AWD has an efficiency factor of 49 kWh per 100 miles traveled.
- To calculate the kWh added if the vehicle drove 12,000 miles last fiscal year, use the calculation below:



https://www.fueleconomy.gov/

*12,000 * 49 kWh/100 miles = 5,880 kWh*

Use This Method if the ZEV:

Telematics

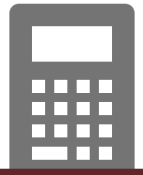
Has a telematic device installed, and the fleet has a method to track public charging session costs

Networked EVSE

Charges on-site at networked EVSEs, and the fleet has a method to log other charging sessions, including costs

Charging Session Logs

Does not have telematics, doesn't charge at a networked EVSE, and the fleet as a method to log and collect charging sessions



Estimate

Does not have telematics, doesn't charge at a networked EVSE, and driver logs are not feasible

Best Practices to Track ZEV Charging

Fleet Vehicle Charging Electricity Use

1. Install telematics devices on fleet vehicles, where feasible.
2. Use public charging stations that accept WEX. Track receipts for public charging sessions where the WEX is not accepted.
3. Develop a process to track charging session data for vehicles that do not have telematics, including:
    a) How to track and sum charging sessions completed on-site at networked EVSEs.
    b) Reporting and logging charging session data at non-networked EVSEs.

Home-to-Work ZEVs

There are options to track the electricity used for charging a ZEV at the employee's home. Charging data needs to be tracked to calculate the reimbursement amount for electricity used to charge the ZEV.

Telematics

Networked EVSE

Networked Receptacle

Driver Logs

Questions?

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