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Use Case Assessment in the Joint Agencies VGI Working Group

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VGI Working Group and Use Case Assessment

Working Group addressed three scoped questions (Aug 2019 to Jun 2020):

- a) What VGI use cases can provide value now, and how can that value be captured?
- b) What policies need to be changed or adopted to allow additional use cases to be deployed in the future?
- c) How does the value of VGI use cases compare to other storage or DER?

Use case assessment framework:

Sector	Residential SFH/MUD, commercial, rideshare, truck & bus fleets
Application	Customer (bill mgmt, backup, RE self-consumption, grid deferral) vs. system services (ancillary, RE integration, etc.)
Type	V1G or V2G
Approach	Direct (managed charging) vs. Indirect (response to time-varying rates)
Resource	EV and EVSE ownership/operation are unified or fragmented

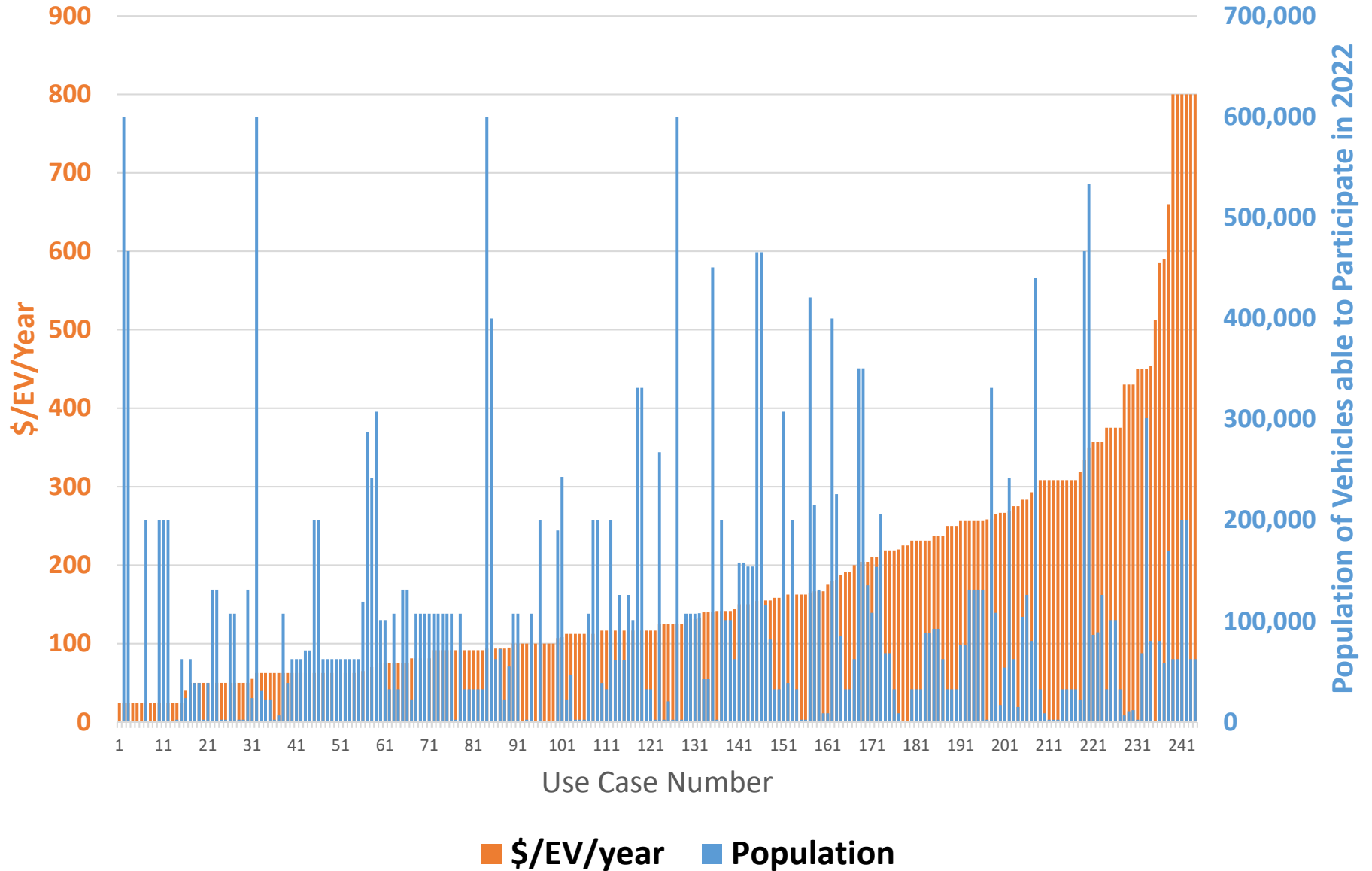
Acronyms

DER – Distributed energy Resource
MUD – Multi-Unit Dwelling

SFH – Single-family home
EVSE – Electric Vehicle Service Equipment



Average Benefit Scores for LDV Use Cases (draft version) \$/EV/year and EV Population That Could Participate by 2022



Medium- and Heavy-Duty Vehicle Types & Policies



	Battery Capacity (kWh)	Charger Power (kw)	Other Technology Notes
Small Truck A	70-100 kWh	10-19 kW	Small Truck A: Class 5 Last Mile Delivery with L2 charging; Daytime deliveries, full charge satisfies duty cycle; needs 100% SOC to start shift between 1 and 6 AM.
Small Truck B	70-100 kWh	25 kW	Small Truck B: Class 5 Last Mile Delivery with low power DCFC; Daytime deliveries, full charge satisfies duty cycle; needs 100% SOC to start shift between 1 and 6 AM.
Long Range Transit Bus A	440 kWh	125 kW	Long Range Bus/Average Mile Route - depot overnight charging; duty cycle 06:00-20:00; 170 miles/day
Long Range Transit Bus B	440 kWh	125 kW	Long Range Bus/Average Mile Route - Enroute charging; duty cycle 06:00-20:00; 170 miles/day
Long Range Transit Bus C	440 kWh	125 kW	Long Range Bus/High Mileage Route - Depot and Enroute charging; duty cycle 04:00 to 01:00 next day; 230 miles/day
Short Range Transit Bus A	330 kWh	125 kW	Short Range Bus/Commuter Route - Overnight Depot Charging; Duty cycle 06:00-09:00 AND 14:00-18:00
Short Range Transit Bus B	330 kWh	125 kW	Short Range Bus/Commuter Route - Afternoon and Overnight Depot Charging; Duty cycle 06:00-09:00 AND 14:00-18:00
Airport Shuttle Bus		50 kW	Airport Shuttle Bus: frequent short trips, in use 5 AM-midnight; overnight charge, may be able to charge at midday
Transit Shuttle Van		L2	less frequent trips to serve transit need; overnight charging
Large Truck A	200-300 kWh	30-50 kW DC	Class 6 Short Haul Delivery - overnight charging, opportunistic daytime charging; duty cycle 03:00 start, return to depot b/w 14:00-19:00
Large Truck B	300 kWh	100 kW DC	Class 8 drayage/delivery - overnight charging only; duty cycle 03:00 start, return to depot b/w 14:00-19:00
Large Truck C	450 kWh	150 kW DC	Class 8 Drayage/Delivery - overnight charging, opportunistic daytime charging; duty cycle 03:00 start, return to depot b/w 14:00-19:00
School Bus A	156 kWh	18 kW L2 or 60 kW with V2G	School Bus Type D (36,200 lbs. GVWR): duty cycle 07:00-0:900 and 014:00-16:00
School Bus B	106-127 kWh	25 kW 3-phase L2	School Bus Type C (22,000 lbs. GVWR): duty cycle 07:00-0:900 and 014:00-16:00
School Bus C	85-127 kWh	25 kW 3-phase L2	School Bus Type B (14,000 lbs. GVWR): duty cycle 07:00-0:900 and 014:00-16:00

Customer bill management use cases

- Highest scored application in terms of benefits for both LDV and MHDV (plus RE self-consumption for MHDV)
- Highly-scored use cases (all V1G; both direct and indirect):
 - Residential SFH & MUD; Residential SFH & MUD Rideshare
 - Commercial Public Commute, Rideshare and Workplace
 - Workplace both unified and fragmented resource scored highly
- Some policy recommendations with “strong agreement”
 - Create an "EV fleet" commercial rate that allows commercial and industrial customers to switch from a monthly demand charge to a more dynamic rate structure
 - Require utilities to broadcast signals to a DER marketplace of qualified vendors (curtailment and load)
 - Enable customers to employ load management technologies to avoid distribution upgrades

Acronyms

LDV – Light-Duty Vehicle

MHDV – Medium- and Heavy-Duty Vehicles



V2G use cases and V2B/V2H backup/resiliency

- Highly-scored use cases:
 - Residential SFH for backup and resiliency
 - Commercial workplace for bill management & backup/resiliency
 - Commercial fleet transit and school buses for bill management and system day-ahead energy
- Some policy recommendations with “strong agreement”
 - V2G systems become eligible for some form of SGIP incentives
 - Coordinated utility and CCA incentives for EVs, solar PV, inverters, battery storage, capacity, and charging infrastructure to support resilience efforts in communities impacted by PSPS events
 - Develop standards and requirements for buildings which will support the use of EV batteries for customer resiliency
 - Pilot funding for EV backup power to customers not on microgrids, including state-wide goals
 - Pilot funding for V1G and V2G for microgrid and V2M solutions, including a state-wide near-term goal; and utilities’ PSPS plans and microgrid frameworks should consider EVs for grid services

Acronyms

SGIP – Self-Generation Incentive Program

PSPS – Public Safety Power Shutoff

CCA – Community Choice Aggregator

V2M – Vehicle-to-Microgrid