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The Role of Bidirectional EVs in Wildfire Resilience

Newer bidirectional EVs are becoming available, this means they are a mobile battery that can be a source of electricity. In a wildfire emergency they can have two roles: Emergency power for homes and mobile emergency power.

Home Emergency Power:

The battery in a typical EV is large enough to hold up a house for several days and much longer if only essential power is used. This is a much better method of meeting the loss of power caused by PSPS than portable generators. This article in DC Reports describes the critical importance of having even a little bit of power during a PSPS. If widespread adoption of bidirectional EVs were encouraged in high risk areas especially for residents with critical requirements for power there could be less uncertainty about when to use PSPS. The attached spreadsheet lists multiple models of vehicles capable of V2H, that is powering a home. At the present time these solutions involve stationary equipment that takes DC from the vehicle and does the needed AC conversion. Currently most of these devices are proprietary so they can only work with vehicles from one manufacturer but the state is pushing regulations to encourage open systems.

Mobile Electrical Power:

Many EV are also capable of what is called V2L, that is they have the ability to generate AC onboard and have built in AC outlets. The capacity of municipal vehicles of all types to serve as sources of power in an emergency would be of great value. Larger vehicles such as school buses and garage trucks inherently have large batteries and would be capable of providing emergency power to a small building. Some vehicles have limited output but even this can power a light or radio, others such as some pickup trucks have significant power capabilities including 240V outlets. The attached spreadsheet shows the power output and V2L capabilities of vehicles currently on the market. It is worth noting that virtually all manufacturers claim that their next models will be bidirectional.

Recommendations:

Given the operating cost and maintenance advantages of EVs fleet purchasers should be specifying EVs for future bids. Further there will be enough bidirectional EVs on the market that buyers, especially ones concerned with vehicles that will be called on to serve in emergencies,

can and should insist on bidirectional capacity. There are still issues around interoperability of charging stations from different manufacturers and the avalanche of bidirectional chargers but these are software issues that will be resolved and buyers can plausibly insist on upgradability to new software standards. Given the life of vehicles and the complexity of implementing full V2G solutions now it is not necessary to wait for complete solutions to begin to acquire bidirectional vehicles. Rather purchase should assume that any EV which is not bidirectional will become a sunk asset within the assets useful life.

Manufacturer	Make	Model	Model Year	Vehicle Type	Availability Status	V2X Capabilities	Max V2X AC Power Output (kW)	Max V2X DC Power Output (kW	Traction Battery Capacity (k	Notes
Ford	Ford	F-150 Lightning	2022-2025	Pickup Truck	Currently Available	V2L, V2H, V2G	9.6 [1]	N/A	131.0 [2]	Pro Power Onboard (2.4kW, 7.2kW, or 9.6kW options for V2L). Ford Charge Station Pro & Intelligent Backup Power system required for V2H/V2G (outputs AC). [3]
General Motors (GM)	Chevrolet	Silverado EV (RST, WT)	2024-2025	Pickup Truck	Currently Available/Rolling Out	V2L, V2H	10.2 (V2L via accessory power bar); 9.6 (V2H via I	N/A	205 [4]	Requires GM Energy PowerShift Charger & V2H Enablement Kit (outputs AC). Some trims/early models may need updates. RST can power home up to 21 days (reduced use). [5]
General Motors (GM)	GMC	Sierra EV (Denali)	2024-2025	Pickup Truck	Currently Available/Rolling Out	V2L, V2H	9.6 (V2H via GM Energy); 7.2 (V2L offboard powe	N/A	244 [6]	Requires GM Energy PowerShift Charger & V2H Enablement Kit (outputs AC). [7]
General Motors (GM)	Chevrolet	Blazer EV	2024-2025	SUV	Currently Available	V2L, V2H	9.6 (V2H via GM Energy) [8]	N/A	102 [9]	2025 MY standard V2H. Requires GM Energy PowerShift Charger & V2H Enablement Kit (outputs AC). 2024 MY may require update. [10]
General Motors (GM)	Chevrolet	Equinox EV	2024-2025	SUV	Currently Available/Rolling Out	V2L, V2H	9.6 (V2H via GM Energy) [11]	N/A	85 [12]	Requires GM Energy PowerShift Charger & V2H Enablement Kit (outputs AC). [13]
General Motors (GM)	Cadillac	LYRIQ	2024-2025	SUV	Currently Available	V2L, V2H	9.6 (V2H via GM Energy); V2L via adapter (power	N/A	102.0 [14]	Requires GM Energy PowerShift Charger & V2H Enablement Kit (outputs AC for V2H). Some 2024 models may require software update. V2L adapter requires 19.2kW onboard charger option for max V2L. [15]
General Motors (GM)	Cadillac	ESCALADE IQ	2025	SUV	Expected Summer 2024/by EOY 2025	V2L, V2H	Up to 19.2 (V2H/V2L via GM Energy or compatible	N/A	205 [16]	V2H capability via GM Energy ecosystem or compatible hardware (outputs AC). [17]
General Motors (GM)	Cadillac	OPTIQ	2025	SUV	Expected by EOY 2025	V2L, V2H	9.6 (V2H via GM Energy, expected) [18]	N/A	85 [19]	Shares platform with Equinox EV. V2H capability expected via GM Energy (outputs AC). [20]
Hyundai Motor Group	Hyundai	Ioniq 5	2022-2025	SUV	Currently Available	V2L, V2G (Pilot)	3.6 (V2L) [21]	Defined by EVSE (V2G pilot) [22]	84 [23]	V2G pilot in Netherlands. V2L standard. [24]
Hyundai Motor Group	Hyundai	Ioniq 6	2023-2025	Passenger Car (Sedan)	Currently Available	V2L	3.6 (V2L) [25]	N/A	77.4 [26]	[27]
Hyundai Motor Group	Hyundai	Ioniq 9	2025	SUV	Expected Spring 2025	V2L (expected)	3.6 (V2L, expected) [28]	N/A	110 [29]	Based on E-GMP platform. V2L capability highly likely. [30]
Hyundai Motor Group	Kia	EV6	2022-2025	SUV	Currently Available	V2L	3.6 (V2L) [31]	N/A	77.4 [32]	[33]
Hyundai Motor Group	Kia	EV9	2024-2025	SUV	Currently Available	V2L, V2H, V2G	3.6 (V2L) [34]	Defined by EVSE (e.g., 12kW wit	99.8 [35]	V2H service launched in select US states with Wallbox Quasar 2. [36]
Hyundai Motor Group	Genesis	GV60	2023-2025	SUV	Currently Available	V2L	3.6 (V2L) [37]	N/A	74.0 [38]	[39]
Lucid Motors	Lucid	Air	2022-2025	Passenger Car (Sedan)	Currently Available	V2L, V2H, V2V	19.2 (V2H via Connected Home Charger); V2L out	N/A	118 [40]	V2H requires Lucid Connected Home Charger (outputs AC). V2V with optional RangeXchange cable. [41]
Mitsubishi	Mitsubishi	Outlander PHEV	2022-2025	SUV (PHEV)	Currently Available	V2L, V2H, V2G	1.5 (V2L from outlets) [42]	Defined by EVSE (V2H/V2G via C	20.0 [43]	Bidirectional via CHAdeMO DC port and compatible bidirectional charger. [44]
Nissan	Nissan	Leaf	2013-2025	Passenger Car (Hatchback)	Currently Available	V2H, V2G	N/A [45]	7.0 (V2H/V2G via CHAdeMO EVS	59.0 [46]	Requires CHAdeMO-compatible bidirectional charger (e.g., Fermata FE-20 for commercial V2G). [47] states no V2L. [48]
Stellantis	RAM	1500 REV	2025	Pickup Truck	Expected by EOY 2025	V2L, V2H, V2G (implied)	TBD [49]	TBD [50]	168.0 [51]	Announced with bidirectional charging capabilities. Can power other devices. Specific V2X output type and power not yet detailed. [52]
Tesla	Tesla	Cybertruck	2024-2025	Pickup Truck	Currently Available	V2L, V2H, V2V	11.5 (V2H continuous); 9.6 (V2L total from outlets)	N/A	123 [53]	Tesla Powershare technology (outputs AC). V2H requires Universal Wall Connector & Powershare Gateway. [54]
Volkswagen	Volkswagen	ID.4 (82kWh battery)	2023-2025	SUV	Currently Available (feature rolling out)	V2H	N/A [55]	10.0 (V2H via external bidirections	77.0 (usable, 82 nominal) [56]	Only models with 82kWh battery (SK supplied). Software update may be needed for 2023 models. Bidirectional charging stops at 20% battery. [57]
Volvo Cars	Volvo	EX90	2024-2025	SUV	Expected by EOY 2025	V2H, V2G (hardware ready)	TBD (Likely AC via integrated system or bidirectior	TBD	111.0 [58]	Hardware-ready for bidirectional charging. Specific V2X system details and power output to be confirmed. [59]
Volvo Cars	Polestar	Polestar 3	2024-2025	SUV	Expected by EOY 2025	V2L, V2H, V2G	11 (V2L, V2H, V2G) [60]	No Data (Announced, power TBD	111.0 [61]	Announced with V2L, V2H (AC), and V2G (AC) capabilities. [62]
Rivian	Rivian	R1T	2022-2025	Pickup Truck	Currently Available	V2L, V2H (planned), V2G (planned)	V2L outlets (power not specified) [63]	24 (planned for V2H/V2G via Rivi	149 [64]	Hardware is V2X capable. V2H/V2G via future software update and Rivian bidirectional charger. [65]
Rivian	Rivian	R1S	2022-2025	SUV	Currently Available	V2L, V2H (planned), V2G (planned)	V2L outlets (power not specified)	24 (planned for V2H/V2G via Rivi	149 [66]	Hardware is V2X capable. V2H/V2G via future software update and Rivian bidirectional charger. (Assumed same as R1T.) [67]
Thomas Built Buses	Thomas Built	Saf-T-Liner C2 Jouley	2021-2025	School Bus	Currently Available	V2G	N/A	Defined by EVSE [68]	246 [69]	Second generation launched with Accelera eAxle and Proterra battery. [70]
Blue Bird Corporation	Blue Bird	Vision Electric School Bus	2021-2025	School Bus	Currently Available	V2G	N/A	Defined by EVSE (e.g., 60kW or 1	196 [71]	Improved battery warranty for V2G use. [72]
Blue Bird Corporation	Blue Bird	All American Electric Bus	2021-2025	School Bus	Currently Available	V2G	N/A	Defined by EVSE [73]	196	[74]
Navistar	IC Bus	Electric CE Series	2021-2025	School Bus	Currently Available	V2G	N/A	Defined by EVSE [75]	315 [76]	V2G ready, can supply power to grid or school. [77]
BYD	BYD	Tyrax A "Achiever" School Bus	2021-2025	School Bus	Currently Available	V2G	N/A	Defined by EVSE (e.g., up to 110	156 [78]	
Evoloctric	Evoloctric	CircuitelEV Isuzu N-Series	2025	Commercial Truck (Conversio	Expected 2025	V2G (readiness)	N/A	TBD (Likely DC via external EVSE	105 [79]	Conversion kit for Class 3-5 Isuzu models. Eligible for MA V2X Demo Program. [80]