

Grid for the Future: Harnessing Zero Emission Vehicles to Enhance Grid Reliability

Kurt Johnson, The Climate Center
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Vision

California becomes a global model for utilizing Bidirectional Zero Emission Vehicles as:

- 1) energy resilience and reliability assets—to keep the lights on at critical community facilities as climate change-fueled extreme weather events threaten the grid
- 2) an energy management tool, storing energy from solar overgeneration and shifting it to evening peak hours when demand is high



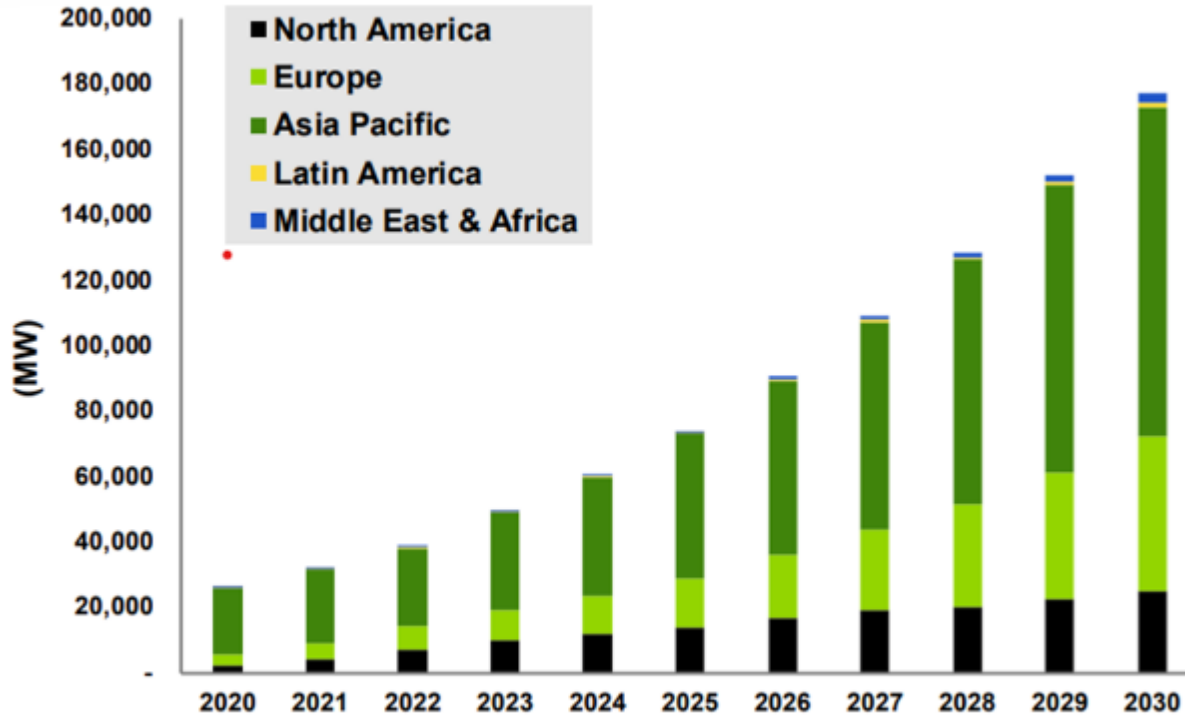
Panelists

Siva Gunda, California Energy Commission

Cliff Rechtschaffen, California Public Utilities Commission

EVs are growing rapidly globally

EV Charging Load Capacity by Region, World Markets: 2020-2030



(Source: Guidehouse Insights)

California is leading the US in EV adoption

2035 year by which all new passenger vehicle sales in CA will be electric

1.3 million+ cumulative sales of EVs

39% share of EVs in the US registered in CA



California is leading on solar adoption

1 million+ rooftop solar installations

11.6 GW of photovoltaics

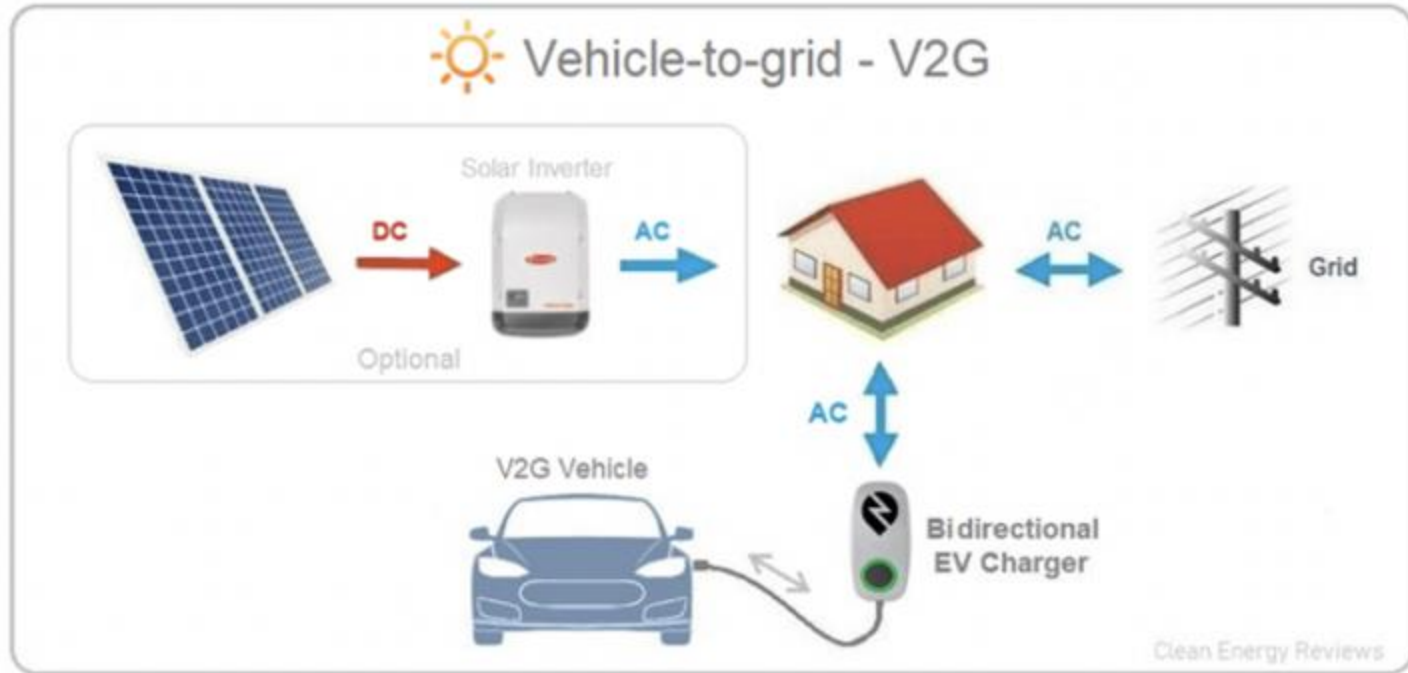
EVs can load shift solar to evening peak periods



8

million

What is Bidirectionality?



Vehicle to Grid (V2G) energy flow diagram using a DC bidirectional charger.

**If 5 million EVs in CA in 2030
were bidirectional, their
stored energy would be
enough energy to power
every home in California for a
day**

California VGI innovation

PG&E Customer | 1/10/2022



PG&E to Offer Nation's First Vehicle-To-Grid Export Rate for Commercial Electric Vehicles

New V2G Export Rate to Accelerate EV Support of Grid During Peak Energy Demand

SoCal school district's fleet of electric buses delivers kids to school, then powers your home










By [Tom Ichniowski](#) | [1/10/2022](#)



California is directing nearly \$4B toward zero emission infrastructure over the next several years, including bidirectional charging

Source: California Energy Commission; includes CEC managed funding from the state general fund and Clean Transportation Program

Currently available bidirectional vehicles include

Vehicle	Model	Connector Type	V2G	V2H	V2L	Available
	Nissan Leaf ZE1	Chademo	YES	YES	No	Now
	Outlander PHEV	Chademo	YES	YES	No	Now
	Hyundai Ioniq 5	CCS	No	No	YES 3.6kW	Now
	KIA EV6	CCS	No	No	YES 3.6kW	Now
	BYD Atto 3	CCS	No	No	YES 3.2kW *	Aug 2022
	BYD Han EV	CCS	No	No	YES 3.2kW *	Oct 2022
	Ford F-150 Lightning	CCS	(TBC)	YES	YES 9.6kW	July 2022
	MG ZS EV (2022)	CCS	No	No	YES 2.2kW	Oct 2022
	VW ID Models	CCS	No (TBC)	No (TBC)	YES (TBC)	Late 2022

**The technology exists.
It's time to scale.**



“Vehicle to grid capacity...is a game changer.” — California Governor Gavin Newsom