
**SENATE COMMITTEE ON ENERGY, UTILITIES AND
COMMUNICATIONS**

Senator Ben Hueso, Chair

2019 - 2020 Regular

Bill No:	SB 676	Hearing Date:	4/24/2019
Author:	Bradford		
Version:	3/27/2019 As Amended		
Urgency:	No	Fiscal:	Yes
Consultant:	Sarah Smith		

SUBJECT: Transportation electrification: electric vehicles: grid integration

DIGEST: This bill requires the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) to establish electric vehicle-grid integration targets for certain community choice aggregators (CCAs), investor-owned utilities (IOUs), local publicly owned electric utilities (POUs), and electric service providers (ESPs).

ANALYSIS:

Existing law:

- 1) Defines transportation electrification as the use of electricity from external sources of electrical power, including the electrical grid, for all or part of vehicles, vessels, trains, boats, or other equipment that are mobile sources of air pollution and greenhouse gas (GHG) and associated programs and charging and propulsion infrastructure to support this use of electricity. (Public Utilities Code §237.5)
- 2) Requires the CPUC to direct IOUs to file applications for investments to accelerate transportation electrification, reduce reliance on petroleum, and meet certain climate goals. Allows the CPUC to approve or amend applications for transportation electrification investments. IOUs are also authorized to recover reasonable costs for approved investments from ratepayers if they are consistent with certain requirements. (Public Utilities Code §740.12(b))
- 3) Requires the CPUC to review data related to current and future transportation electrification adoption and charging infrastructure prior to allowing an IOU to collect new program costs from ratepayers. (Public Utilities Code §740.12(c))
- 4) Requires each POU with an annual electrical demand exceeding 700 gigawatt hours to adopt an integrated resources plan (IRP) that helps ensure that the POU will meet climate goals for the electricity sector. An IRP must be updated at

least once every five years and must address procurement plans for the following:

- a) Energy efficiency and demand response resources,
- b) Energy storage requirements,
- c) Transportation electrification,
- d) A diversified energy resource procurement portfolio, and
- e) Resource adequacy requirements.

This bill:

- 1) Defines “electric vehicle (EV)-grid integration” as any action taken by a grid-connected EV or EV supply equipment to change the time or rate at which the EV charges or discharges, in a manner that optimizes an EV’s interaction with the grid and provides benefits or services to the grid, ratepayers, EV driver, or charger site host. These actions can include, but are not limited to, increasing grid asset utilization, avoiding distribution infrastructure upgrades, integrating renewable energy resources, reducing the cost of electricity supply, or offering reliability services, in a manner that provides ratepayers with a net benefit. These actions do not require the use of specific technology to achieve these benefits.
- 2) Requires the CPUC, by December 31, 2020, to establish targets for EV-grid integration in the service territory of each IOU with at least 200,000 customers; sub-targets for CCAs with at least 200,000 customers in an IOU service territory; and sub-targets for ESPs as the CPUC deems just and reasonable. Targets and sub-targets established the CPUC must be consistent with the following:
 - a) Expenditures on EV-grid integration must be in the best interest of ratepayers, comply with requirements for just and reasonable charges, and support cost savings for ratepayers by reducing the cost of wholesale electricity supply, the need for increased generation, and the need for increased grid infrastructure to meet forecasted demand.
 - b) IOUs, CCAs, ESPs, electric car manufacturers, electric fleet operators, and EV service providers shall work to achieve the EV-grid integration targets and sub-targets established by the CPUC.
 - c) EV-grid integration targets and sub-targets must be at least 10 percent of annual total estimated EV load in that service territory by 2025 and shall be increased annually to achieve at least 25 percent of annual total estimated EV load by 2030.

- 3) Requires the CEC, by December 31, 2020, to establish targets for EV-grid integration in the service territory of each POU with at least 200,000 customers. The CEC's targets must be consistent with the goals the CPUC's targets and sub-targets.
- 4) Requires the CPUC to reference the targets and sub-targets developed under this bill in future transportation electrification proceedings and consider how EV-grid integration can mitigate electric infrastructure upgrade costs.

Background

Transportation electrification and ratepayer investments. The CEC, CPUC, and the State Air Resources Board (ARB) are each administering investments in transportation electrification infrastructure. However, IOU ratepayers are providing the largest source of funding for these infrastructure investments. In 2016, the CPUC directed the IOUs to file applications for programs to accelerate transportation electrification in compliance with SB 350 (De León, Chapter 547, Statutes of 2015). In 2018, the CPUC authorized approximately \$750 million of ratepayer-funded IOU transportation electrification infrastructure programs. The CPUC is reviewing proposals for another \$1 billion in additional investments. A significant amount of IOU investments in transportation electrification are through distribution upgrades that ensure that a facility is ready for EV charger installation and rate design programs that encourage EV owners to charge in a grid-responsive manner.

POUs also make transportation electrification investments, which they identify in their IRPs. CCAs may make transportation electrification investments; however, existing law does not require CCAs to file applications for these investments or report these investments through the IRP process at the CPUC.

EV load can turn ducks into dragons. California produces excess renewable energy during the middle of the day, sometimes referred to as the “belly of the duck.” Vehicle electrification can reduce reliance on petroleum and increase the use of renewable energy through charging aligned with excess renewable production; however, vehicle electrification can also increase demand for electricity generated by natural gas and shift some emissions from the transportation sector to the electricity sector if EV charging occurs at peak demand periods.

In 2018, the Legislature codified the goal of putting five million EVs on the road by 2030 by passing AB 2127 (Ting, Chapter 365, Statutes of 2018). To the extent

that the state accelerates EV deployment to meet this goal, the electricity demand generated by these EVs' charging patterns could significantly change the shape of California's electrical load. A 2018 report by the CEC indicates that EV deployment could increase demand by a gigawatt by 2025. The load pattern generated by accelerated EV deployment could more closely resemble a dragon instead of duck. Depending on the location of EV deployment, this demand increase could disproportionately strain some regions more than others, impacting distribution systems at these locations more severely. Without taking steps to better match EV charging patterns with excess renewable energy availability, EVs' demand increase could increase demand for additional natural gas generation sources and the need for electricity system upgrades to manage the load.

What is vehicle-grid integration? This bill defines EV-grid integration as actions taken by a grid-connected EV or EV supply equipment to change the time or rate at which the EV charges or discharges to optimize the EV's interaction with the grid and provide benefits to the grid, ratepayers, EV drivers, or charger hosts. Existing law does not contain a clear definition of vehicle-grid integration. Currently, a number of activities are currently included in vehicle-grid integration efforts, including time-of-use rates.

While time-of-use rates are not solely focused on addressing load from EVs, rate design can help send price signals that support conscious efforts by consumers to shift load to non-peak hours. As part of their transportation electrification programs, some IOUs are piloting transportation electrification rate designs that are more dynamic than time-of-use rates. For example, San Diego Gas and Electric Company (SDG&E) is piloting an hourly rate design as part of its Power You Drive program aimed at incentivizing charging at times that optimize overall grid and circuit utilization. Demand data from SDG&E indicates that this rate design program may be effectively incentivizing charging outside the IOU's peak demand period.

The use of price signals in vehicle-grid integration is crucial to both encouraging load shifting and load stabilizing charging behavior. Shifting EV load to periods when excess renewables are on the grid may not be sufficient to limit stress on distribution systems arising from increased EV charging. Even if load shifts to charge EVs with renewable energy, a sudden increase in charging will still lead to new peak demands that make consistent energy resource management challenging, especially at the local level. As a result, using hardware that does not have the capability to respond to price signals and take advantage of more dynamic rate designs is likely not sufficient to achieve significant benefits associated with vehicle-grid integration.

In a 2018 staff report on vehicle-grid integration communication protocols, CPUC Energy Division staff acknowledged that hardware alone would not be sufficient to address load issues associated with accelerated EV deployment. The report noted that a more holistic approach involving communication protocols, market facilitation, wholesale and retail rate improvements, load management, demand response programs and other policy changes would be necessary to enable the implementation of vehicle-grid integration in some cases. The CPUC is already in the process of exploring mechanisms for ensure that vehicle-grid integration investments support communication protocols that enable hardware to respond to price signals and grid events.

Target setting effectiveness may depend on EV deployment and investment type.

This bill requires the CPUC and CEC to set vehicle-grid integration targets for certain load-serving entities (LSEs), including IOUs, large CCAs, large POUs, and, potentially, ESPs. Under this bill, the target setting would be based on each applicable LSE's service territory and load. However, target setting may be challenging for vehicle-grid integration strategies, like rate design, that are not based on charger deployment.

It is also likely that EV deployment will be disproportionate throughout the state. As a result, vehicle-grid integration investments may only be beneficial for ratepayers to the extent that they align geographic EV deployment and drivers' charging patterns. Existing law requires the CEC to assess the amount of vehicle charging infrastructure needed to support EV deployment goals and evaluate the extent to which charging infrastructure is proportionately deployed. Information from the CEC indicates that if EV adoption follows trends in new vehicle purchase rates, approximately 90 percent of plug-in EVs will be deployed in counties identified within the four largest metropolitan planning regions of California (Southern California, San Francisco Bay Area, San Diego County, and the greater Sacramento area) by 2025.

This bill requires the CPUC to establish vehicle-grid integration targets for IOUs and CCAs with at least 200,000 customers and requires the CEC to establish similar targets for POUs with at least 200,000 customers. The following is an estimate of the IOUs, CCAs, and POUs that would be required to comply with this target setting:

IOUs	CCAs	POUs
Pacific Gas and Electric Company (PG&E)	Clean Power Alliance	Los Angeles Department of Water and Power (LADWP)
San Diego Gas and Electric Company (SDG&E)	East Bay Community Energy	Sacramento Municipal Utility District (SMUD)
Southern California Edison Company (SCE)	MCE	
	Monterey Bay Community Power	
	Peninsula Clean Power	
	San Jose Clean Energy	
	Silicon Valley Clean Energy	
	Sonoma Clean Power	

Under this bill, any CCAs that does not have at least 200,000 customers would not be required to participate in target setting, regardless of the rate of EV deployment within the CCA’s jurisdiction. For example, Clean Power SF in San Francisco would not have a sub-target for vehicle-grid integration, despite the potential for significant EV deployment in San Francisco and the surrounding Bay Area by 2025.

Need for amendments. As currently drafted, this bill establishes a statutory definition of vehicle-grid integration that focuses on technology and hardware without including rate design. However, a number of utilities are not investing in chargers, and are using rate design to support vehicle-grid integration. Rate design can be a cost-effective mechanism for incentivizing grid-responsive charging behavior and can facilitate more responsive uses of vehicle-grid integration hardware. This bill also requires the CPUC and CEC to establish vehicle-grid integration targets for certain LSEs; however, those LSEs may not cover areas with significant EV deployment, they may not file applications for investments at the CPUC, and targets may be challenging to apply to non-hardware vehicle-grid integration efforts like rate design. *To ensure that vehicle-grid integration efforts continue to include rate design efforts, the author and committee may wish to amend this bill to modify the definition of vehicle-grid integration to include rate design programs. The author and committee may also wish to modify the target setting provisions to do the following:*

- *Require the CPUC and CEC to adopt specific strategies for mitigating the impact of increased EV load in a manner that ensures benefits to ratepayers.*

- *Require applications for transportation electrification investments at the CPUC to quantify how the proposed investments will further those strategies.*
- *Require IOUs to include in the Annual Load Research report information about progress towards furthering the vehicle-grid integration strategies.*
- *Require POUs and CCAs to identify their transportation electrification and vehicle-grid integration investments in their IRPs and quantify how those investments will further the strategies outlined by the CEC and CPUC respectively.*

Prior/Related Legislation

AB 2127 (Ting, Chapter 365, Statutes of 2018) required the CEC to conduct a statewide assessment of vehicle charging infrastructure needed to support the goal of putting five million EVs on the road in California by 2030.

SB 1000 (Lara, Chapter 368, Statutes of 2018) required the CEC to evaluate the extent to which charging infrastructure is proportionately deployed and use funds to more proportionately deploy chargers as needed. The bill also required the CPUC to explore facilitating the development of technologies that promote grid integration and adopting a tariff for heavy-duty EVs that encourages charging during periods of excess grid capacity.

SB 350 (De León, Chapter 547, Statutes of 2015) the Clean Energy and Pollution Reduction Act of 2015, established new clean energy, clean air and GHG reduction goals and established the IRP process through which electrical corporations file procurements, including transportation electrification investments.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: No

SUPPORT:

American Honda Motor Co., Inc.
California League of Conservation Voter
Electric Vehicle Charging Association
eMotorWerks
Enel X
Environmental Defense Fund
EVBox
Natural Resources Defense Council

OPPOSITION:

None received

ARGUMENTS IN SUPPORT: According to the author:

“California has set ambitious goals to electrify its transportation sector, which will dramatically increase the electrical load from our vehicles. But the State’s electrical grid already faces many challenges, in part due to our increased use of intermittent renewable energy. If EV charging is grid integrated, it can mitigate this problem and provide a variety of benefits, including but not limited to, shifting load out of peak demand periods, absorbing excess solar generation during midday, and shedding load as demand rapidly ramps. SB 676 ensures that vehicle-grid integration is a part of the conversation as the State continue to invest billions of dollars in transportation electrification, with significant investments from ratepayers.”

-- END --