Date of Hearing: June 17, 2024

ASSEMBLY COMMITTEE ON TRANSPORTATION
Lori D. Wilson, Chair
SB 59 (Skinner) – As Amended June 10, 2024

SENATE VOTE: 32-0

SUBJECT: Battery electric vehicles: bidirectional capability

SUMMARY: Authorizes the California Air Resources Board (CARB), in consultation with the State Energy Resources Conservation and Development Commission (CEC) and the Public Utilities Commission (PUC) to require any weight class of battery electric vehicle to be bidirectional-capable if there are compelling benefits to the vehicle operator and the electrical grid. Specifically, **this bill**:

1) Authorizes CARB to periodically update definitions provided in Health and Safety Code 44269 to ensure the definitions align with current technology.

2) Authorizes CARB, in consultation with CEC and PUC to require any weight class of battery electric vehicle (BEV) to be bidirectional-capable if they determine there is a sufficiently compelling beneficial use case to the BEV operator and electrical grid.

3) Does not prohibit CARB from crediting a manufacturer of a BEV that voluntarily includes bidirectional capability for that BEV weight class.

EXISTING LAW:

1) Provides, pursuant to the California Climate Crisis Act (AB 1279 (Muratsuchi), Chapter 337, Statutes of 2022) that it is the policy of the state to do both of the following:

    a) Achieve net zero Greenhouse Gas (GHG) emissions as soon as possible but no later than 2045; and,
    b) Ensure that by 2045, GHG emissions are reduced to at least 85% below 1990 levels. (Health and Safety Code (HSC) 38562.2)

2) Defines electric vehicle supply equipment (EVSE) as an electric component assembly or cluster of component assemblies designed specifically to charge batteries within electric vehicles by permitting the transfer of electric energy to a battery or other storage device in an electric vehicle. (HSC 44268)

3) Requires CPUC, December 31, 2020, to establish strategies and quantifiable metrics to maximize the use of feasible and cost-effective electric vehicle grid integration by January 1, 2030. (Public Utilities Code 740.16)

Executive Order (EO)

1) EO N-79-20 orders that the following shall be goals of the state, and directs CARB to develop regulations meeting these goals:

    a) 100% of in-state sales of new passenger cars and trucks will be zero-emission by 2035;
    b) 100% of medium- and heavy-duty vehicles in the state be zero-emission by 2045 for all operations where feasible and by 2035 for drayage trucks; and,
    c) Transition to 100% zero-emission off-road vehicles and equipment by 2035 where feasible.

FISCAL EFFECT: Unknown.

COMMENTS:

California has seen increasing sales of electric vehicles in recent years. In April 2023, the state surpassed 1.5 million zero-emission vehicles (ZEVs) sold, eclipsing the 2025 goal set in EO B-16-12. 21.1% of California new vehicle sales were zero-emission in the first quarter of 2023. The author has introduced this bill because the battery storage capability of electric vehicles offers an opportunity for California's increasing fleet of electric vehicles to "give back" to the grid or homeowners in times of need.

Zero-emission vehicles are a part of California's climate portfolio. California's climate goals require incremental GHG emissions reductions, and carbon neutrality by no later than 2045. Transportation is the single largest source of GHG emissions, and one strategy for reducing emissions from the transportation sector includes an aggressive reduction in the use of fossil fuels. To this end, CARB adopted the Advanced Clean Cars (ACC 2) regulation, requiring an increasing percentage of new car sales to be zero-emission, culminating in 100% by 2035 as required by EO N-79-20. CARB's Advanced Clean Fleet (ACF) regulation addresses medium- and heavy-duty vehicles, requiring 100% of these vehicle classes to be zero-emission by 2045 for all operations where feasible and by 2035 for drayage trucks.

ACC 2 battery requirements. ACC 2 requires vehicle manufacturers to provide ZEV assurance measures, that include battery minimum warranty and durability requirements, increased serviceability, and facilitate charging and battery labeling. For example, by model year 2030, ACC 2 rules require vehicles to maintain at least 80% of electric range for 10 years or 150,000 miles. By model year 2031, individual vehicle battery packs are warranted to maintain 75% of their energy for eight years or 100,000 miles.

Bidirectional charging. A typical battery electric vehicle refuels by receiving electricity from a power source. Bidirectional capable electric vehicles can both receive energy (charge) from EVSE and provide energy to an external load (discharge). Bidirectional vehicles could provide backup power to specific loads, sometimes as part of a microgrid, though vehicle to building or vehicle to home (V2B or V2H) charging, or provide power to the grid through vehicle to grid (V2G) charging. An electric vehicle battery is typically 60 kilowatt-hours (kWh), compared to the average daily home energy usage of 30 kWh, which means a V2H situation could theoretically power a home for two days. Most of today's vehicle chargers, or EVSE, are not capable of bidirectional operations. A bidirectional EVSE must contain an internal converter to handle the electric conversion from direct current (DC) of the vehicle to alternating current (AC),

which is what the grid runs on. In other words, bidirectional charging requires compatible vehicles and compatible chargers.

Battery storage could address grid uncertainty. Over the last few years, California has experienced events such as wildfires and extreme heat that highlight our energy system's vulnerabilities. These have resulted in public safety power shutoffs where California's utilities can shut off power to electric lines to prevent causing a fire to ignite. The state has called for flex alerts asking consumers to voluntarily conserve electricity when there is a predicted shortage of electricity. The increasing number of battery electric vehicles projected in the future has led to consideration of utilizing the storage capability of BEVs to feed power back to multiple sources during times of electricity uncertainty.

School buses have been cited as an optimal use case for bidirectional charging. They can be charged overnight when energy demand is low and feed energy back to the school or the grid when the bus is parked during the day. Working with San Diego Gas & Electric (SDG&E) and Nuvve, a technology company, California's Cajon Valley Union School District deployed a V2G project that allows eight electric school buses to send power back to the grid when needed on hot summer days.

V2G Integration. Recently, the California Independent System Operator (Cal ISO), CEC, CARB, and CPUC jointly created the Vehicle Grid Integration (VGI) Working Group tasked with addressing the following question: (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 demand energy response? What emerged was 320 different VGI use cases across a wide range of sectors (residential, commercial, rideshare, and fleets), applications, and types of charging for both light-duty vehicles and medium- and heavy-duty vehicles. However, the value perceived by Working Group participants for these use cases varied widely. The final report also admitted to limitations in fully assessing barriers to VGI, including customer interest and acceptance.

The working group developed a set of 92 individual recommendations for policy actions that California state agencies, utilities, and community choice aggregators, and CAISO could undertake to advance VGI in the short-term (2020-22), medium-term (2023-2025), and long-term (2026-2030). None of the recommendations include mandating bidirectional-capability BEVs.

Adding bidirectional capability to a vehicle increases vehicle cost. CARB ACC 2 rules require electric vehicle manufacturers to warrant minimum battery performance requirements, and to satisfy these requirements they will need to install larger batteries. Batteries are the most expensive component of electric vehicles, therefore price increase could be substantial. Other hardware upgrades may also be required, such as additional circuit breakers and upgraded communications semiconductors.

Bidirectionality may not be for everyone. It is unlikely that all electric vehicle owners will want to take advantage of bidirectionality. In addition to owning an electric vehicle, electric vehicle owners would also need to make electrical upgrades to their home to take advantage of energy stored in their vehicle. Such upgrades may be costly. Moreover, using a vehicle to charge their home could also strand a family and leave them without a vehicle during a time where there are

also electricity shortages. This option would most likely only benefit families with more than one electric vehicle or a second vehicle that is not electric.

Medium- and heavy-duty vehicles may be less ideal for energy storage and bidirectional capability. The bigger battery size of larger vehicles would seem to provide an appealing use case for bidirectional charging. However, medium and heavy duty trucks, unlike school buses and cars, may not spend long periods of time idle during any particular day, or part of the year. This could make battery electric trucks poor candidates for demand response, as they will either be charging or on the road with little expected downtime during peak electricity demand hours.

According to the author, "EV batteries are an asset that can power more than just transportation. Equipping EVs with the capability of bidirectional charging will allow those EVs to power homes or other facilities when electricity demand is at its peak and prices are high. With bidirectional charging, EVs have the potential to help power the grid and help slash energy bills for EV owners. EVs that can deploy their batteries to charge more than just the vehicle will give California the opportunity to harness EVs as mini-power plants on wheels. SB 59 furthers California as a leader in achieving grid stability with clean power sources."

According to supporters of this bill, "Existing California policy already calls for all sales of new, light duty passenger vehicles and school buses to be zero-emission vehicles by 2035. SB 59 takes the next step in EV policy towards a future in which current, once-in-a generation investments in electric vehicles could also help build a more resilient and reliable electrical grid."

Double referral: This bill is double referred to the Assembly Utilities and Energy.

Previous legislation: SB 233 (Skinner) had the same language as this bill in addition to requiring CEC, in consultation with CARB, CPUC and a stakeholder group and submit a report to the Governor and Legislature examining the challenges and opportunities of bidirectional charging. The bill was gutted and amended on the Assembly floor.

SB 676 (Bradford), Chapter 484, Statutes of 2019 requires CPUC to establish electric vehicle-grid integration strategies for certain load-serving entities. This bill also requires local publicly owned electric utilities to consider electric vehicle-grid integration strategies in their integrated resources plans and requires Community Choice Aggregators to report specified information to the CPUC regarding electric vehicle-grid integration activities.

REGISTERED SUPPORT / OPPOSITION:

Support

The Climate Center (co-sponsor)
Union of Concerned Scientists (co-sponsor)
Sustainable Rossmoor
The Democrats of Rossmoor

Opposition

None on file

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