



California Regulation Landscape for BEV after 2020 Rolling Blackouts

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Who is Nuvve ?

- Our founders invented the concept of V2G at the University of Delaware in 1996
- Nuvve Corp. has been in operation for 10 years, HQ in San Diego
- V2G Projects and Operations in multiple countries
- Longest V2G operation: 4 years of operation in Denmark



📌 V2G Operations

- Corporate investors
 - EDF Renewable Energy 
 - Toyota Tsusho 
- Joint Venture  **dreev**
edf GROUP

Awards:



ENERGY®
STORAGE
NORTH AMERICA



NUVVE

How does V2G/VGI create value?

1. Revenues from Energy Markets (Ancillary, Spot, Demand Resp. etc.) *These markets require qualifications and aggregation for access.*
2. Savings from optimizing energy flow to buildings and EVs. *Savings depend on local site setup and metering*



California background and context

- 2014: VGI Roadmap established
- 2015: SB 350 State law including \$ for EV infrastructure
- 2017: Small generation rules revision includes EVs
- 2017: EV sub-metering pilot begins
- 2018: New rulemaking on EV rates and infrastructure
- 2018: New build solar mandate
- 2019: SB 676: State law requiring VGI for all new transportation electrification. Establish strategies by Dec 31, 2020
- 2019: Microgrid rulemaking includes EVs
- 2020: Extreme weather rulemaking

V2G in focus starting in 2017

- Small generation rule revision:
 - DC V2G (stationary inverter) is analogous to battery storage for interconnection purposes
 - Existing rules and procedures are sufficient as currently written
 - AC V2G (mobile inverter) subgroup established
 - Gap analysis of existing technical standards
 - UL and SAE collaborating on standards updates
 - Group will reconvene when updates are complete
 - Pilots being allowed while updates continue
- Microgrid rulemaking considers V2G
- Energy commission funds development of V2G school buses
- Millions in funding for V2G demonstrations
- VGI Working Group explores short term policy actions for all possible use cases

Related crises: Wildfire PSPS

- Dry, hot, windy weather: Wildfire risk from July-November
 - In windy conditions where trees are near electrical infrastructure, utility lines can actually start fires
 - Example: PG&E's bankruptcy is partly due to liability for 2019 wildfires caused by poorly maintained power lines
- TEMPORARY SOLUTION: Public Safety Power Shutoffs (PSPS)
 - Utilities identify sections of their transmission and distribution grids at risk and shut off power to those lines to prevent potential fires
 - PSPS can affect hundreds of thousands of customers and last several days
- Microgrid rulemaking adds RESILIENCY as a focus

Related Crises: Heatwave blackouts

- Historic heat waves in Western US: Energy demand exceeds supply
 - August 14-19 temperatures 10-20 degrees above average
 - 50.5 GW peak load (Today forecast: 37 GW)
 - Conventional generation was less efficient: planned and unplanned outages
 - Solar resources under-performed due to unusual cloud cover
 - Demand was under-scheduled by market participants
 - Transmission constraints limited interstate power transfers
 - Demand response prices spiked to market cap
 - “Flex Alerts”: California System Operator (CAISO) requests voluntary demand response from every customer
- TEMPORARY SOLUTION: Rolling blackouts to prevent system crash
 - 1-hour long power cuts to decrease demand, alternating circuits

Power shutoffs and EVs (and V2G)

- PSPS: Potential for EVs as backup power
 - Microgrids
 - Islanding individual houses and emergency shelters
 - EVs need advance warning to charge prior to shutoff
- Rolling blackouts: EVs as potentially significant demand response resource
 - Better if EVs can help prevent the blackout ever happening
 - Demand response, metering, price signals

Building on existing efforts

- Urgency of climate change growing with these incidents
- PSPS, rolling blackouts, climate targets, and EV goals require reconsideration of EVs as part of the energy ecosystem
 - Short-term: Getting through next summer with the lights on
 - Long-term: Making 6 million EVs part of the solution in 2030
- Acceleration and expansion of existing/planned efforts
 - Grant funding expanded and extended
 - Markets access
 - Rulemakings added and include adjusted scopes
- Consideration of previous policy proposals that had not been prioritized
- CAISO exploring role of EVs at system level

Need action before Summer 2021

- Microgrid rulemaking is too complex for a short-term fix
 - Diesel generators as default plans
 - How do microgrids and the EVs inside them help the grid when it goes down?
 - Pilot for V2G backup using smart meter disconnect for summer
- Address SB 676 VGI strategies using previous VGI working group results
 - Automated Load Management
 - Distribution upgrade deferral
 - Optimizing with other resources (solar, batteries, loads)
 - Rate design with real-time dynamic rates
 - Credit for V2G export
 - Working toward wholesale market participation
- Post-Incident study found Demand Response resources not fully utilized
 - Resulted in Extreme Weather Rulemaking

Extreme Weather Rulemaking

- Proposed short-term programs:
 - Emergency load reduction Program
 - Measure load reduction without baselines
 - Compensate for export (current Demand response does not)
 - Add new Demand Response capacity auctions specifically for the summer
 - Compensate demand response capacity programs at real-time market prices
 - Expand EV participation in existing Demand Response programs
 - Other market adjustments
- EVs already incentivized to delay charging by TOU
 - V2G is relevant here
- Nuvve and others would prefer these mechanisms be permanent

Thank You



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