# NUVVE

#### 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
- Corporate investors
  - EDF Renewable Energy Steps
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- Joint Venture

Awards:





**V2G** Operations

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#### How does V2G/VGI create value?

- 1. <u>Revenues</u> from Energy Markets (Ancillary, Spot, Demand Resp. etc.) *These markets require qualifications and aggregation for access.*
- 2. <u>Savings</u> 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

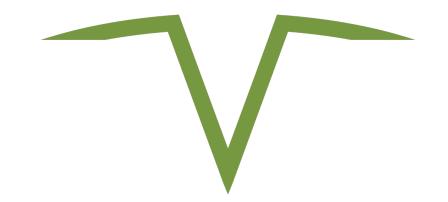
- Microgrid rulemaking is too complex for a short-term fix
  - Diesel generators as default plans
  - How do microgrids and the EVs inside them help the grid when it goes down?
  - Pilot for V2G backup using smart meter disconnect for summer
- Address SB 676 VGI strategies using previous VGI working 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







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