



VGI Working Group PUC Question (c): “Big Picture” Response

May 7, 2020

Vehicle-Grid Integration Council Introduction

ABOUT VGIC:

Vehicle-Grid Integration Council (VGIC) is a national 501(c)(6) membership-based advocacy group committed to advancing the role of electric vehicles and vehicle-grid integration through policy development, education, outreach, and research.

VGIC MISSION:

Support the transition to decarbonized transportation and electric sectors by ensuring the value from EV deployments and flexible EV charging and discharging is recognized and compensated in support of achieving a more reliable, affordable, and efficient electric grid.



Why Vehicle-Grid Integration (VGI) Now?

Five public policy goals:

1. Decarbonize transportation sector
2. Support decarbonizing power sector
3. Increase affordability
4. Improve grid resiliency
5. Foster economic activity

“What is it about VGI that has you focus your time and attention on it? What makes you think it is worth the time, attention, and money (including public funds) that could go into it?”

1. Decarbonize transportation sector by accelerating EV adoption

- Transportation represents ~40% of statewide emissions¹
- California aims to reach 1.5 million EVs by 2025 and 5 million EVs by 2030²
- VGI can help meet these goals by addressing barriers to faster EV adoption

Barriers to faster EV adoption	How VGI addresses this
EV Total Cost of Ownership (TCO) remains too high	Reduces TCO via lower charging costs & new customer revenue streams
Value proposition (versus ICE) not compelling enough for some customers	Unlocks new value propositions beyond mobility (e.g. providing home backup power – especially relevant during COVID-19)
Margin on sales not large enough for some OEMs to prioritize	Unlocks new revenue streams for OEMs; improves business case for EVs
Lack of TE infrastructure	Can help “right-size” TE infrastructure investments & unlock revenue streams for EVSPs

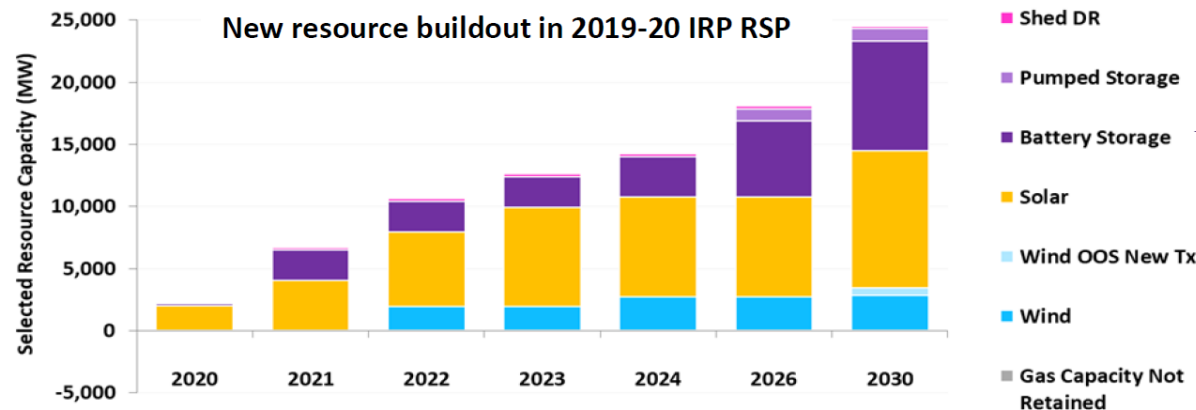
2. Support decarbonization of power sector by providing essential grid services as renewable energy penetration increases

- California aims to achieve a 100% carbon-free grid by 2045¹
- VGI can provide essential grid reliability services as renewable energy penetration increases

Essential reliability services that will be needed	Service that batteries (incl. VGI-enabled EVs) can provide
Resource Adequacy (system, flex, local)	✓
Operating Reserves (e.g. spin, non-spin)	✓
Frequency Regulation	✓
Frequency Response	✓

- 2019-2020 IRP modeling shows need for >8,900 MW of new storage by 2030 to meet GHG targets

The cumulative buildout of new resources in the new RSP is shown below:



Battery Storage Portfolio:

- Distributed BTM batteries
- Large-scale FTM batteries
- VGI-enabled EVs

3. Increase affordability by reducing electricity bills for all customers

- VGI can directly help limit overall electricity system cost increases by
 - Providing lower-cost alternatives to traditional supply-side resources, AND/OR
 - Offering a tool to help mitigate cost impacts of rising EV and RE adoption
 - (more details in appendix slide)
- VGI can also help to reduce electricity bills, even for non-EV owners
 - VGI plays a role in accelerating EV adoption, thereby increasing kWh sales
 - Helps place downward pressure on overall electric rates by increasing total sales relative to revenue requirement
 - See VGIC “Ratepayer Impact Benefits” writeup submitted as part of Subgroup B workshop materials
 - <https://onedrive.live.com/?authkey=%21AJWXlotkZHagf28&id=5891771FBA4AFF14%211430&cid=5891771FBA4AFF14>

UCT/PCT
Perspective

RIM
Perspective

4. Improve grid resiliency and security (including during PSPS events)

- Prospect of more frequent Public Safety Power Shutoffs (PSPS) creates a need for:
 - Microgrids to support vulnerable communities
 - On-site backup power for customers during a PSPS event
- VGI, specifically bi-directional EV+EVSE, can support both needs by:
 - Leveraging EVs as multi-use assets for more cost-effective microgrids
 - Providing a new benefit stream for customers seeking backup power during a PSPS
- VGI also reduces emissions caused by diesel backup generators in use customers and/or microgrids

CPUC Wildfire Map¹



5. Foster economic activity through innovation, competition, and market transformation

Partial View of VGI Ecosystem



BTCPower

DAIMLER



enel x

EVBOX

evconnect
Charge Forward

FCA
FIAT CHRYSLER AUTOMOBILES

FERMATA
ENERGY

fleetcarma.



greenlots
A Member of the Shell Group



LUCID



NUVE

olivine

OSSIACO

powerflex
EDF renewables

SIEMENS

SUMITOMO
ELECTRIC

THE MOBILITY HOUSE



wallbox



PROTERRA

Comparison to Other DERs Hypothesis – *Draft for Discussion*

Policy Objective	DER Type		
	VGI	Rooftop PV	BTM Battery
Decarbonize transportation sector	Yes	No	No
Decarbonize power sector	Supporting role	Yes	Supporting role
Increase affordability	All customers	Primarily participants	Primarily participants
Improve grid resiliency	Yes (duration limited)	Yes (availability limited)	Yes (duration limited)
Foster economic activity	Yes (nascent market)	Yes (mature market)	Yes (maturing market)

3. (con't) Increase affordability: VGI can directly help limit overall electricity system cost increases

Key drivers of electricity system costs	Potential changes that could increase system costs (and future customer bills)	Mitigation through VGI
New generation capacity needed to meet system peak	Increasing load (incl. EVs) exacerbates system peak	Managed charging/discharging to shift load from peak hours
New generation capacity needed to meet flexibility needs	Increasing RE exacerbates needs for ancillary services	Managed charging/discharging to provide ancillary services
Distribution system upgrades needed to meet local peak	Increasing load (incl. EVs) in a load pocket exacerbates local peak	Managed charging/discharging to limit throughput on distribution feeder
Energy commodity costs to meet generation need	Increasing RE exacerbates curtailment; pipeline constraints + ramping needs lead to high summer peak fuel costs	Real-time energy arbitrage to shift demand from high to low priced hours