



April 19, 2024

## **Comments of the Vehicle-Grid Integration Council on April 1, 2024, V2G and ESS Tariff Discussions**

### **Introduction**

The Vehicle-Grid Integration Council (VGIC)<sup>1</sup> is a 501(c)(6) nonprofit trade association focused on accelerating the role of smart EV charging and discharging (i.e., vehicle-grid integration or “VGI”) through policy development, education, outreach, and research. One widely referenced definition of VGI is by the California Energy Commission:

“Vehicle-grid integration (VGI) refers to technologies, policies, and strategies for electric vehicle (EV) charging which alter the time, power level, or location of the charging (or discharging) in a manner that benefits the grid while still meeting drivers’ mobility needs.”<sup>2</sup>

Scaling VGI should become an essential part of transportation electrification in Michigan and will help accomplish the following key policy goals:

- **Benefit drivers and fleet owners** by reducing the total cost of ownership.
- **Decarbonize the transportation sector** by accelerating EV adoption.
- **Support decarbonization of the power sector** by providing necessary grid services as renewable energy and distributed energy resource penetration increases.
- **Increase affordability** by reducing electricity bills for all customers.
- **Improve grid resiliency** and security during extreme weather events.

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<sup>1</sup> VGIC member companies and supporters include American Honda Motor Co., Inc., BorgWarner, Fermata Energy, Ford Motor Company, General Motors, Nissan Group of North America, Bidirectional Energy, Customized Energy Solutions, dcbel, Eaton Corporation, Emporia Corp., EnergyHub, EV.Energy, FreeWire Technologies, Inc., GridWiz, Kaluza, Landis + Gyr, Leapfrog Power, Inc., Nuvve Holding Corporation, Peak Power, PowerFlex, Qcells, Stellantis N.V., Sumitomo Electric, The Mobility House, Toyota Motor North America, Inc., WeaveGrid, Hoosier Energy, Peninsula Clean Energy, and Sacramento Municipal Utility District. The views expressed in these Comments are those of VGIC, and do not necessarily reflect the views of all individual VGIC member companies or supporters. (<https://www.vgicouncil.org/>)

<sup>2</sup> See California Energy Commission Vehicle-Grid Integration Program available at [https://www.energy.ca.gov/programs-and-topics/programs/vehicle-grid-integration-program#:~:text=Vehicle%2Dgrid%20integration%20\(VGI\),still%20meeting%20drivers'%20mobility%20needs.](https://www.energy.ca.gov/programs-and-topics/programs/vehicle-grid-integration-program#:~:text=Vehicle%2Dgrid%20integration%20(VGI),still%20meeting%20drivers'%20mobility%20needs.)



- **Foster economic activity** through innovation, competition, and market transformation.

With the proper regulatory support and coordination, these goals can be achieved, and EV drivers and fleets in Michigan can play a supportive role in the acceleration of both transportation electrification and grid decarbonization. **Our vision for VGI encompasses the following key elements:**

- **Ensure customer mobility needs are satisfied.** Drivers and fleets can participate in a wide variety of VGI services without compromising their mobility needs.
- **Managed charging will benefit EV drivers and fleet operators:** Drivers and fleets will be given the ability to align charging with the times of day when electricity prices are low, reducing operating costs compared to unmanaged charging. Lowering the total cost of EV ownership will accelerate overall EV adoption by drivers and fleet managers, helping meet important decarbonization goals.
- **EVs provide emissions-free emergency power during blackouts:** During extreme weather blackouts or other power outages, EVs can utilize bidirectional charging capabilities to send energy to a home, building, or microgrid, serving as a generator and providing safe backup power for households and communities.
- **Charging infrastructure dollars go further:** Smarter management of EV charging and discharging can help manage the cost of deploying EV charging infrastructure, which encourages wider access to EV charging.
- **VGI enables EVs to provide valuable services to the grid and generate revenue:** V2G (vehicle-to-grid, or bidirectional charging) will enable electric vehicles to both receive and feed power back to the grid, supporting advanced grid services such as frequency control, demand response, peak shaving, and more. Unidirectional V1G managed charging can also provide grid services by modulating the rate of charge at a smaller scale relative to V2G. A number of utilities have implemented programs that provide compensation for these valuable grid services.

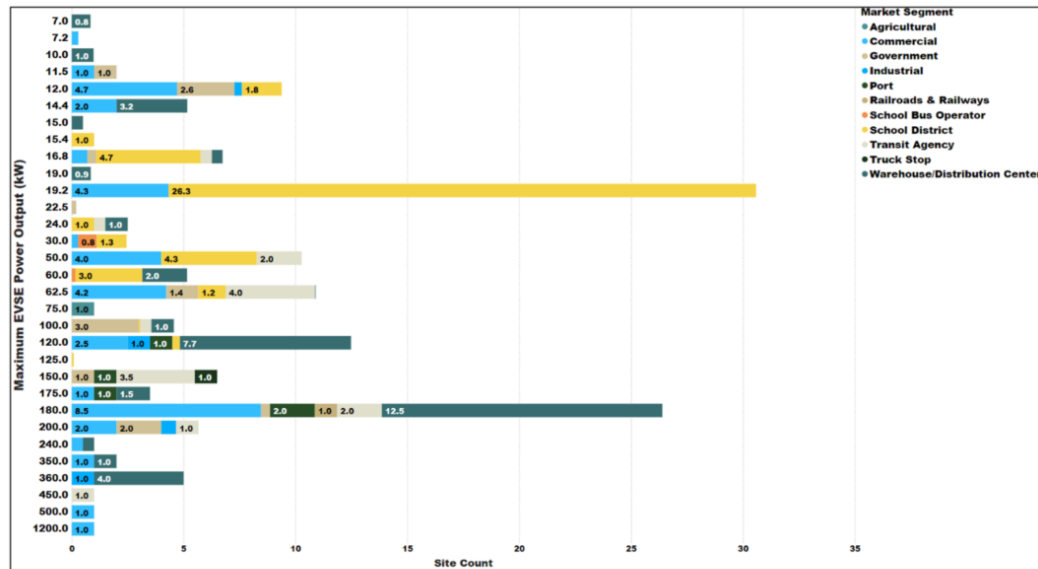
VGIC is pleased to engage with the Commission, staff, and other stakeholders to consider potential V2G and ESS compensation mechanisms. We offer the information below as context to support the development of Michigan's V2G market.

### **VGIC Recommends Considering an Array of V2G Compensation Pathways**

The VGI market, specifically the V2G market, is relatively nascent. To transition the VGI market from early V2G demonstrations and pilots to large-scale deployments that can meaningfully support the grid and provide grid edge energy storage capacity at scale, V2G customers may benefit from access to a *menu* of export compensation options. EV customers have a diverse set of needs and serve a variety of use cases characterized by various duty cycles, dwell times, vehicle battery sizes, charger configurations, and site load characteristics. For example, the nation’s largest medium/heavy-duty make-ready program shows a varied assortment of site host segments and charger power output:

### EVSE Power Output Levels by Market Segment

D.18-05-040  
D.18-01-024  
A.17-01-021



Note, figures reflect active, committed sites with signed CRT Program Agreements. Partial site counts represent sites with multiple types of charging equipment.

Figure 1. Southern California Edison, Transportation Electrification Program Advisory Council, March 8th, 2024, pg. 12 (Charge Ready Transport).<sup>3</sup>

Promoting grid-friendly behavior, including V2G exports, from an exceptionally diverse subset of utility customers presents a unique challenge. In 2019-2020, about 100 representatives from utilities, state and federal agencies, ISO/RTO, automakers, charging manufacturers, charge point operators, transit agencies, research institutions, industry associations, environmental nonprofits, consumer groups, ratepayer advocates, and standards development organizations

<sup>3</sup> Southern California Edison, Transportation Electrification Program Advisory Council, March 8th, 2024, pg. 12 (Charge Ready Transport).

convened to **define, sort, assess value, and rank 2,500 potential “VGI use cases.”**<sup>4</sup> Figure 2 below illustrates the various “dimensions” of the use case assessment:

TABLE 2. Dimensions of the Use Case Assessment Framework and Use-Case-Definition Options

SECTOR	APPLICATION	TYPE	APPROACH	RESOURCE ALIGNMENT
Residential-Single-Family Home	Customer-Bill Management	V1G	Indirect (passive)	Unified and Aligned
Residential-Single-Family Home, Rideshare	Customer-Upgrade Deferral	V2G	Direct (active)	Fragmented and Aligned
Residential-Multi-Unit Dwelling	Customer-Backup, Resiliency			Fragmented and Misaligned
Residential-Multi-Unit Dwelling Rideshare	Customer-Renewable Self-Consumption			
Commercial-Workplace	System-Grid Upgrade Deferral			
Commercial-Public, Destination	System-Backup, Resiliency			
Commercial-Public, Destination Rideshare	System-Voltage Support			
Commercial-Public, Commute	System-Day-Ahead Energy			
Commercial-Public, Commute Rideshare	System-Real-Time Energy			
Commercial-Fleet, Transit Bus	System-Renewable Integration			
Commercial-Fleet, School Bus	System-GHG Reduction			
Commercial-Fleet, Small Truck (class 3-5)	System-RA, System Capacity			
Commercial-Fleet, Large Truck (class 6-8)	System-RA, Flex Capacity			
	System-RA, Local Capacity			
	System-Frequency Regulation Up/Down			
	System-Spinning Reserve			
	System-Non-Spinning Reserve			

Given the *considerable* diversity of relevant use cases, it may be most beneficial for customers to be given the choice to participate in the option that best fits their specific needs and internal cost-benefit calculations. With this in mind, the examples of V2G compensation mechanisms listed herein include both utility export rate designs and non-rate utility programs, as well as approaches that do not fall into either of these two categories. For some customers, demand response strategies and relatively infrequent event-based programs may be better suited to their needs, goals, and technologies. Other customers may be attracted to a 24/7, year-round optimization approach. Yet other customers may seek to dual participate in both utility export rates and non-rate utility programs, where permitted, to maximize cost-effectiveness. In this way, there appears to be no *one-size-fits-all* approach to unlocking V2G capability to support the grid. Just as planners seek fuel diversity in the bulk power generation profile, policymakers may seek V2G strategy diversification. This is especially critical within the context of the relatively nascent V2G market, where there is a need to prompt initial customer response from a wide array of new vehicle classes and use cases, customer segments, charger sizes and types, site hosts, relevant agents and actors, and price sensitivities.

Furthermore, by offering a portfolio of participation options, the Commission and utilities can experiment with more innovative rate design approaches, like real-time-equivalent pricing, while still maintaining the key rate design principles of gradualism, simplicity, understandability,

<sup>4</sup> See Final Report of the VGI Working Group. <https://gridworks.org/2020/09/final-report-of-the-california-joint-agencies-vehicle-grid-integration-vgi-working-group/>

public acceptability, and feasibility of application through offering more widely used export compensation mechanisms.

Whatever solution(s) the Commission ultimately decides to employ for V2G export compensation should clearly signal to consumers that there is value in participating in V2G compared to the additional costs to install and enable the technology.

VGIC shares several examples of V2G compensation models below that have been implemented, approved, or proposed throughout the U.S. In some cases, customers may seek to participate in more than one of the compensation mechanisms below. This is feasible and appropriate only where policymakers have adopted or directed the implementation of design elements that avoid double counting and double compensation. For example, customers in Massachusetts may dually participate in examples 1a and 3, while customers in California may dually participate in examples 1c and 2b.

## **Examples of V2G Compensation Mechanisms**

### 1. V2G in Demand Response Programs

#### a. Connected Solutions (Offered by Various Utilities in the Northeast)

During the *MPSC EV Technical Conference – Day 2* hosted on January 25, 2024, Fermata Energy detailed its facilitation of a customer participating in Rhode Island Energy’s Connected Solutions program that earned over \$12,500 with one vehicle over three summers by enabling V2G capability during events lasting 2-3 hours each.<sup>5</sup> In Massachusetts, National Grid also offers Connected Solutions, including a Daily Dispatch option with 30-60 events lasting 2-3 hours each under a \$200/kW-summer incentive.<sup>6</sup>

#### b. Demand Side Grid Support: Market-Aware Behind-the-Meter Battery Storage Pilot (Proposed by the California Energy Commission)

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<sup>5</sup> *Interconnection Opportunities and Obstacles for V2H and V2G*. Steve Letendre, Fermata Energy. January 25, 2024. Slide 4. <https://www.michigan.gov/mpsc/-/media/Project/Websites/mpsc/workgroups/technical-conference/EV-Technical-Conference-Presentation-Day-2.pdf?rev=5d8df7e45d4d4093add720e2bb8fa9e5&hash=FFC86A3557D5EFFEF7A6D4BAF79666B5>

<sup>6</sup> *Connected Solutions*. National Grid, Massachusetts Business Site. <https://www.nationalgridus.com/MA-Business/Energy-Saving-Programs/ConnectedSolutions>

The California Energy Commission established the Demand Side Grid Support Program to compensate customers for upfront capacity commitments and per-unit reductions in net energy load during extreme events.<sup>7</sup> Market-Aware Behind-the-Meter Storage Pilot, one of three incentive options in the program, pays aggregators based on the demonstrated capacity of their storage aggregation, with different levels of incentives available of varying durations, as detailed below:

**Table 2: Monthly BTM Storage Capacity Prices by Month (\$/kW)**

Month	4-Hour	3-Hour	2-Hour
May	\$9.00	\$8.10	\$6.75
June	\$9.30	\$8.37	\$6.98
July	\$16.80	\$15.12	\$12.60
August	\$18.00	\$16.20	\$13.50
September	\$19.20	\$17.28	\$14.40
October	\$10.50	\$9.45	\$7.88
<b>Annual Total</b>	<b>\$82.80</b>	<b>\$74.52</b>	<b>\$62.10</b>

Source: CEC staff analysis

Aggregators are expected to dispatch when the wholesale market price reaches \$200/MWh, and under related price triggers. This participation option was first made available to stationary energy storage, but the proposed program revisions expand eligibility to V2G customers, pending final approval by the California Energy Commission.

c. Emergency Load Reduction Program

The three major California investor-owned utilities have established an EV/VGI Aggregation pathway within the Emergency Load Reduction Program, a voluntary demand response program intended to bolster grid reliability during emergencies.<sup>8</sup> Under this pathway, V2G customers are compensated \$2/kWh for load reduction and/or exports during 3-hour event windows, with a minimum dispatch of 30 hours per year. Under a separate pathway known as Group B, V2G customers that are enrolled with third-party demand response providers (i.e., for wholesale market participation) may receive \$2/kWh for exports during grid emergencies, as these exports would not otherwise be

<sup>7</sup> Demand Side Grid Support (DSGS) Program Guidelines, Third Edition. Proposed Draft Program Guidelines. March 2024. Page 23.

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=254890&DocumentContentId=90560>

<sup>8</sup> See, for example, San Diego Gas & Electric’s Emergency Load Reduction Program Terms & Conditions.

[https://elrp.sdge.com/\\_files/sdge/elrp/SDGE-ELRP-Group-A-Terms-and-Conditions.pdf](https://elrp.sdge.com/_files/sdge/elrp/SDGE-ELRP-Group-A-Terms-and-Conditions.pdf).

recognized and compensated, although there is no annual minimum dispatch for these customers.

2. V2G in Export Tariffs

a. Avoided Cost Calculator-Based Static V2G Export Rate (Proposed by Southern California Edison)

Capitalizing on decades of experience investigating and experimenting with V2G, Southern California Edison recently filed its Vehicle to Grid Resource Proposal, an export credit design open to both residential and non-residential customers on Time-of-Use rates.<sup>9</sup> The proposed static time-of-use export rate, shown below, is based on values from California’s Avoided Cost Calculator, which precisely identifies avoided generation energy, generation capacity, ancillary services procurement, losses, transmission, distribution, and other avoided costs. Note that the values below represent the *export credit* for each time-of-use period (i.e., the TOU rate under which all consumption is billed is not shown below).

Day of Week / Time of Day Segmentation	Seasonal Segmentation	
	Summer (June – Sept)	Winter (Oct – May)
Weekday – Off-Peak (12 am – 6 pm, 9 pm – 12 am)	\$ 0.05 / kWh	\$ 0.04 / kWh
Weekday – On-Peak (6 pm – 9 pm)	\$ 0.58 / kWh	\$ 0.06 / kWh
Weekend – Off-Peak (12 am – 6 pm, 9 pm – 12 am)	\$ 0.05 / kWh	\$ 0.04 / kWh
Weekend – On-Peak (6 pm – 9 pm)	\$ 0.51 / kWh	\$ 0.06 / kWh

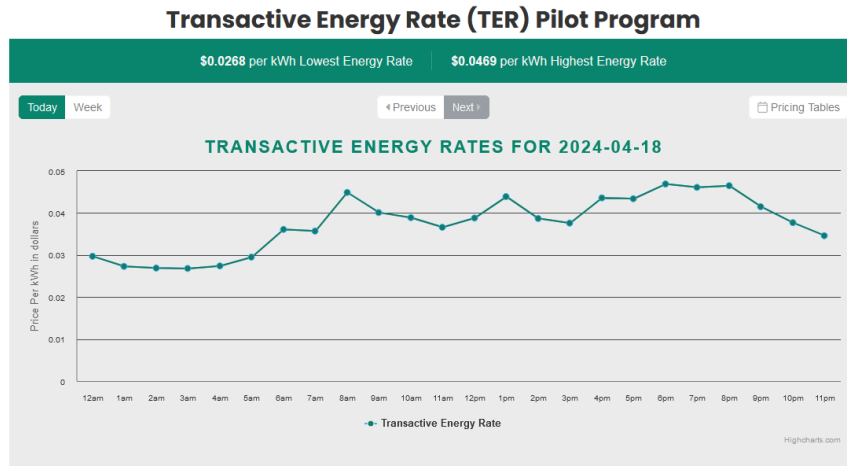
b. Real-Time-Equivalent Pricing (Piloted by New Hampshire Electric Cooperative; Offered by Pacific Gas & Electric and Southern California Edison Beginning in June 2024)

New Hampshire Electric Cooperative offers a Transactive Energy Rate to compensate devices, including V2G resources, for load shift and/or battery

<sup>9</sup> Southern California Edison. Phase 2 of 2025 General Rate Case Rate Design Proposals. Exhibit 04. Pages 120-138. [https://edisonintl.sharepoint.com/:f/t/Public/regpublic/Ei5\\_2\\_TFEhdOo16OosdAmOMB6C5T74brbM2IYweBi1lcVw](https://edisonintl.sharepoint.com/:f/t/Public/regpublic/Ei5_2_TFEhdOo16OosdAmOMB6C5T74brbM2IYweBi1lcVw)



discharge.<sup>10</sup> The Transactive Energy Rate is based on marginal avoided energy, capacity, and transmission costs and is communicated on a day-ahead basis to customers through the utility’s website as shown below and to capable devices through OpenADR.<sup>11</sup>



Meanwhile, in California, Pacific Gas and Electric and Southern California Edison will begin offering a similar day-ahead hourly real-time marginal-cost-based pricing approach based on the “CalFUSE” framework developed by the California Public Utilities Commission staff to V2G customers.<sup>12</sup> These “CalFUSE” rate pilots employ the use of a load subscription for customers based on historical usage, such that only deviations from that subscription load are subject to the dynamic price, while the subscription load is subject to the otherwise-applicable tariff (e.g., the static time-of-use rate). This results in “symmetric, bidirectional prices” that apply equally to load reduction and V2G exports.

<sup>10</sup> New Hampshire Electric Co-Op. Transactive Energy Rate (TER) Pilot Program. <https://www.nhec.com/energy-management/transactive-energy-rate-program/>

<sup>11</sup> New Hampshire Electric Co-Op. Terms & Conditions. Section X-7. <https://www.nhec.com/new-terms-conditions/>

<sup>12</sup> See, Decision to Expand System Reliability Pilots of Pacific Gas and Electric and Southern California Edison. January 25, 2024. <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M524/K176/524176497.PDF> and Resolution E-5192. Pacific Gas and Electric Company Advice Letter 6259-E requests approval of four vehicle-grid integration pilots pursuant to Decision 20-12-029. <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M474/K369/474369017.PDF>



c. Value of Distributed Energy Resources “Value Stack” Tariff (Offered by Various Utilities in New York)

The New York Public Service Commission established the Value of Distributed Energy Resources (VDER) or “Value Stack” Tariff to compensate DERs for the following components: energy value, capacity value, environmental value, demand reduction value, and locational system relief value.<sup>13</sup> While some utilities have long deemed V2G customers eligible for VDER value stack compensation, effective January 1, 2024, all utilities now deem V2G eligible for VDER value stack compensation.<sup>14</sup>

3. V2G in Clean Peak Standard

Massachusetts’ Clean Peak Energy Standard provides an opportunity to monetize the clean peaking attributes of EVs and EV chargers through the generation and sale of Clean Peak Energy Credits.<sup>15</sup> V2G customers can participate in the program as Qualified Energy Storage Systems, provided that the vehicle is charged during periods of typically high renewable energy production or otherwise demonstrate storage of primarily renewable energy. Customers can even take advantage of distribution circuit multipliers that increase the credit value for customers located on congested circuits.<sup>16</sup>

4. V2G in New “Virtual Power Plant” Offerings

a. Direct Automaker-Utility V2G Offering (Announced by Duke Energy)

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<sup>13</sup> Order Regarding Value Stack Compensation. NY Public Service Commission. April 18, 2019. <https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/NY-Sun/Updated-Value-Stack-Order-2019-04-18.pdf>

<sup>14</sup> Order Approving Midpoint Review Whitepaper’s Recommendations with Modifications. NY Public Service Commission. November 16, 2023. Pages 64-67. <https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b6057D98B-0000-C912-9B64-A2D769C4790D%7d>

<sup>15</sup> Massachusetts 225 CMR 21.00: Clean Peak Energy Portfolio Standard. August 7, 2020.

<https://www.mass.gov/doc/225-cmr-21-clean-peak-energy-portfolio-standard-cps/download>

<sup>16</sup> Massachusetts Clean Peak Energy Portfolio Standard: Clean Peak Distribution Circuit Multiplier Guideline. December 5, 2023. <https://www.mass.gov/doc/cps-distribution-circuit-multiplier-guideline/download>



Duke Energy has announced a V2G initiative for residential customers with Ford F-150 Lightning vehicles in North Carolina.<sup>17</sup>

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<sup>17</sup> *Illuminating possibility: Duke Energy and Ford Motor Company plan to use F-150 Lightning electric trucks to help power the grid.* Duke Energy. August 16, 2022. <https://news.duke-energy.com/releases/illuminating-possibility-duke-energy-and-ford-motor-company-plan-to-use-f-150-lightning-electric-trucks-to-help-power-the-grid>



**Conclusion**

VGIC offers itself as a resource to support the Commission, staff, and other relevant stakeholders in consideration of V2G compensation mechanisms. We look forward to continuing to collaborate in Michigan on this important initiative.

Respectfully submitted,

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