

Docket No.: A.21-12-006 / A.21-12-008

Exhibit No.: _____

Date: December 30, 2022

Witness: Ed Burgess

**OPENING TESTIMONY OF ED BURGESS
ON BEHALF OF THE VEHICLE-GRID INTEGRATION COUNCIL**

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1 **I. INTRODUCTION**

2 **Q. Please state your name, title, and business address.**

3 A. My name is Ed Burgess. I am a Senior Director at Strategen Consulting and the Senior
4 Policy Director for the Vehicle-Grid Integration Council (“VGIC”). My business address
5 is 10265 Rockingham Drive, Suite #100-4061, Sacramento, California 95827.

6 **Q. On whose behalf are you testifying?**

7 A. I am testifying on behalf of the Vehicle Grid-Integration Council.

8 **Q. What is VGIC?**

9 A. VGIC is a 501(c)6 membership-based trade association committed to advancing the role
10 of electric vehicles (“EV”) and vehicle-grid integration (“VGI”) through policy
11 development, education, outreach, and research. VGIC supports the transition to a
12 decarbonized transportation and electric sector by ensuring the value from EV
13 deployments and flexible EV charging and discharging to customers and the grid is
14 recognized and compensated to achieve a more reliable, affordable, and efficient electric
15 grid.

16 **Q. Who are VGIC’s current members?**

17 A. VGIC’s members represent a broad range of transportation electrification industry leaders
18 including American Honda Motor Co., Inc., Enel X North America, Inc., Ford Motor
19 Company, General Motors, Nissan Group of North America, Nuvve Holding
20 Corporation, Stellantis N.V., Toyota Motor North America, Customized Energy
21 Solutions, dcbel, ENGIE NA, Fermata Energy, FlexCharging, FLO EV Charging,

1 FreeWire Technologies, Inc., IoTecha, Kaluza, Kitu Systems, Sunrun, Switch EV Ltd.,
2 The Mobility House, Veloce Energy, Inc., Wallbox USA Inc., WeaveGrid, and
3 Sacramento Municipal Utility District.¹

4 **Q. Please summarize your professional background and qualifications.**

5 A. I am a leader within Strategen's consulting practice where one of my primary
6 responsibilities is managing the VGIC, which is one of Strategen's primary clients. In
7 addition to VGIC, I oversee much of the firm's practice for governmental clients, non-
8 governmental organizations, and trade associations. Strategen's team is globally
9 recognized for its expertise in the electric power sector on issues relating to resource
10 planning, renewable energy, energy storage, electric vehicles, utility rate design and
11 program design, and utility business models and strategy. During my time at Strategen, I
12 have managed or supported projects for numerous client engagements related to these
13 issues. Before joining Strategen in 2015, I worked as an independent consultant in
14 Arizona for several years and regularly appeared before the Arizona Corporation
15 Commission. I also worked for Arizona State University where I helped launch their
16 Utility of the Future initiative as well as the Energy Policy Innovation Council. I have a
17 Professional Science Master's degree in Solar Energy Engineering and
18 Commercialization from Arizona State University as well as a Master of Science in
19 Sustainability, also from Arizona State. I also have a Bachelor of Arts degree in
20 Chemistry from Princeton University.

¹ The opinions expressed in this testimony reflect those of VGIC, and do not necessarily reflect the views of all of the individual VGIC member companies.

1 **Q. Have you ever testified before the California Public Utilities Commission, or any**
2 **other state regulatory body?**

3 A. Yes. I testified before the California Public Utilities Commission in Application (“A.”)
4 19-08-002 and A.20-08-002 both of which pertain to PacifiCorp’s 2020 and 2021 Energy
5 Cost Adjustment Clause, as well as Rulemaking (“R.”) 20-11-003 on Emergency
6 Reliability, A.21-10-010 related to Pacific Gas and Electric Company’s (“PG&E”)
7 Electric Vehicle Charge 2 proposal, and A.20-10-011 related to PG&E’s Commercial EV
8 Rate. I have also provided expert testimony before the Massachusetts Department of
9 Public Utilities, the South Carolina Public Service Commission, the Indiana Utility
10 Regulatory Commission, the Nevada Public Utilities Commission, the Oregon Public
11 Utilities Commission, and the Washington Utilities and Transportation Commission.

12 **Q. What is the purpose of your testimony?**

13 A. The purpose of my testimony is to respond to San Diego Gas & Electric Company’s
14 (“SDG&E”) proposal for Dynamic Pricing Pilots, including a two-stage Real-Time
15 Pricing (“RTP”) Pilot and a two-stage Export Compensation Pilot, as filed in
16 consolidated proceedings A.21-12-006 and A.21-12-008. Specifically, I will analyze
17 SDG&E’s proposed Dynamic Pricing Pilots in the context of supporting the goals
18 outlined in A.21-12-006 et al. and address certain deficiencies in SDG&E’s proposal in
19 complying with Decision (“D.”) 20-12-023 and Energy Division (“ED”) staff
20 recommendations issued on June 15, 2022. In doing so, I propose alternative eligibility
21 criteria for participating in the Dynamic Pricing Pilots and offer additional
22 recommendations for enhancing the proposed pilot designs.

1 **II. BACKGROUND ON CURRENT AND NEAR FUTURE POTENTIAL FOR**
2 **ELECTRIC VEHICLES TO SUPPORT THE GRID THROUGH LOAD**
3 **MANAGEMENT AND VEHICLE-TO-GRID EXPORTS.**

4 **Q. SDG&E states that offering export compensation to EV customers “has the**
5 **potential to increase grid reliability by sending appropriate price signals that**
6 **incentivize grid exports during periods of peak demand.”² Does VGIC agree?**

7 A. Yes. VGIC agrees that implementing export compensation for EV customers represents a
8 significant opportunity to advance the VGI industry and deliver much-needed grid
9 reliability benefits. There is no doubt that EVs on the road today, plus those that will be
10 deployed through 2024, have the technical capability to meaningfully increase grid
11 reliability through unidirectional managed charging (“V1G”), vehicle-to-building
12 discharging (“V2B”), and vehicle-to-grid exporting (“V2G”) activities. EVs can provide
13 net peak load reductions by exporting to the grid using V2G capabilities as well as
14 through non-exporting V1G and V2B activities. However, market incentives to
15 encourage this grid supporting behavior have been slow to develop relative to the
16 technical capabilities of today’s EVs, chargers, and smart controls.

17 **Q. Is VGIC confident that EVs can contribute meaningfully to grid reliability?**

18 A. Yes. VGIC is confident that meaningful EV contributions can become a reality during the
19 2024-2028 timeframe being considered in SDG&E’s proposal. If the proposed Dynamic
20 Pricing Pilots are adopted (with the recommended modifications and enhancements
21 described in my testimony), no fundamental technical barriers will prevent EVs from

² SDG&E. *Prepared Supplemental Direct Testimony of Kristie C. Raagas (Chapter 2) on Behalf of SDG&E.* August 15, 2022. Page KCR-3.

1 contributing to grid reliability. EVs have already been used to provide emergency power
2 to the grid during extreme heat events in California. For example, VGIC member Nuvve
3 Holding Corporation (“Nuvve”) enrolled several electric school buses (“ESB”) in
4 SDG&E’s Emergency Load Reduction Program (“ELRP”), which successfully exported
5 power from the ESBs to the grid during the summer 2022 extreme heat events, thereby
6 helping to avoid a major power outage.³ However, unlike power plants with a singular
7 function, the primary role of EVs is to support customers’ transportation needs, not grid
8 reliability needs. To be successful, Dynamic Pricing Pilots must be designed to put the
9 customers’ perspective first and foremost. That said, VGIC believes that both customer
10 transportation needs, and grid reliability needs, can be served by taking advantage of the
11 approximately 90% hours of the day when vehicles typically are parked and sitting idle.
12 Additionally, since this is a novel type of grid resource, any incremental participation
13 (even if small initially) will be beneficial and is worth pursuing as part of a
14 comprehensive approach to supporting the grid. The immense potential that VGI offers as
15 a grid resource is undeniable, as Governor Newsom said at a September 16, 2022, press
16 event for the signing of several important pieces of climate legislation: “The vehicle-to-
17 grid capacity is a game changer. You’ll be writing a lot more and talking a lot more about

³ See Nuvve Holding Corp. *SDG&E and Cajon Valley Union School District Flip the Switch on Region’s First Vehicle-to-Grid Project Featuring Local Electric School Buses Capable of Sending Power to the Grid*. July 26, 2022. <https://nuvve.com/sdge-and-cajon-valley-union-school-district-flip-the-switch-on-regions-first-vehicle-to-grid-project-featuring-local-electric-school-buses-capable-of-sending-power-to-the-grid/>; and Nuvve Holding Corp. *San Diego County’s Ramona Unified School District, Blue Bird and Nuvve Unveil 8 New V2G-Enabled and Qualified Electric School Buses*. October 11, 2022. <https://nuvve.com/ramona-unified-school-district-blue-bird-nuvve-unveil-new-v2g-electric-school-buses/>

1 this – the opportunity for vehicles to be battery storage and then export their off-peak
2 charge back onto the grid during the peak to absorb more load. This is the future.”⁴

3 **Q. Is there a significant amount of EV/EV supply equipment (“EVSE”) deployed in**
4 **SDG&E service territory today that can respond to dynamic price signals using**
5 **V1G technologies?**

6 A. Yes. Aggregators of EVs and EVSE in California have already demonstrated their ability
7 to modify charging schedules, including through SDG&E’s long-standing VGI Rate
8 implemented as part of Power Your Drive beginning in 2017.⁵ Networked EVSE have the
9 technical capability to manage charging in response to dynamic pricing. Similarly, many
10 EVs – particularly those deployed in recent years – already have built-in telematics
11 capabilities that automotive original equipment manufacturers (“auto OEMs”) or third-
12 party aggregators can leverage to adjust charging schedules if properly incentivized. This
13 is being done today in California, including in Pacific Gas & Electric’s evPulse program.⁶
14 At the end of 2021 there were approximately 828,000 EVs registered in California,⁷ and
15 another 250,000 have been sold through Q3 of 2022.⁸ If California EV sales continue at a
16 similar pace through Q4 2024, there will likely be over 1.5 million EVs in California
17 before SDG&E’s proposed Q4 2024 pilot launch date. San Diego County is home to

⁴ "Governor Newsom Signs World-Leading Climate Action Legislation." YouTube, uploaded by California Governor Gavin Newsom, September 16, 2022, https://youtu.be/aG_WDEWnnd0. At 47:30.

⁵ SDG&E. *Power Your Drive Research Report*. April 2021.

<https://www.sdge.com/sites/default/files/regulatory/SDG%26E%20FINAL%20Power%20Your%20Drive%20Research%20Report%20April%202021.pdf>. Page 4.

⁶ evPulse (2022). <https://join.pge.ev-pulse.com/>. Retrieved December 22, 2022.

⁷ California Energy Commission (2022). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 29, 2022. Retrieved December 22, 2022 from <https://www.energy.ca.gov/zevstats>

⁸ Veloz (2022). 2011-2022 Annual EV Sales in California. October 2022 Data Update. https://www.veloz.org/wp-content/uploads/2022/10/Q3-2022_Annual-EV-Sales-in-California_Final.png

1 70,000 EVs, representing 8.5% of California’s EVs.⁹ If this 8.5% share remains
2 consistent as new vehicles are added, SDG&E can expect over 127,000 EVs located
3 within its service territory by Q4 2024. Assuming an average charging load of 5 kW per
4 vehicle,¹⁰ this represents a total technical potential of 635 MW in flexible load that could
5 theoretically be managed to provide reliability benefits via V1G. The practical potential
6 is only a small fraction of this since not all those vehicles will be charging at a given
7 time, and not all EV owners will choose to participate in V1G activities. However, VGIC
8 estimates that even under a more limited participation rate of 5%, approximately 32 MW
9 of net peak load reduction from V1G might be achievable as early as Q4 2024.

10 **Q. Is there a significant amount of EV/EVSE equipment deployed today that can**
11 **already provide V2B or V2G capabilities?**

12 A. Yes, although it is less widespread than V1G capabilities, a meaningful portion of EVs
13 deployed today have bidirectional capabilities that allow them to discharge to the grid,
14 effectively doubling their ability to support the grid (relative to V1G alone). Today's most
15 significant sources of vehicle-to-everything (“V2X”) potential are the Nissan LEAF,
16 electric school buses, and the Ford F-150 Lightning.¹¹ At the end of 2021, about 2,800
17 Nissan LEAF vehicles in San Diego County were model year (“MY”) 2013 or later,

⁹ California Energy Commission (2022). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 29, 2022. Retrieved December 22, 2022 from <https://www.energy.ca.gov/zevstats>

¹⁰ VGIC recognizes that a significant share of EV-owners that use Level 2 (or greater) chargers that would likely exceed 5 kW per vehicle. However, many EV-owners (particularly owners of plug-in hybrid electric vehicles with smaller ranges) also primarily rely on Level 1 charging. VGIC believes that 5 kW is a reasonable estimate based on an assumed 50/50 split between Level 1 and Level 2 charging. This would be consistent with studies of home charging behavior, for example Tal, G., Lee, J., & Nicholas, M. A. (2018). Observed Charging Rates in California. UC Davis: Plug-In Hybrid & Electric Vehicle Research Center. Retrieved from <https://escholarship.org/uc/item/2038613r>.

¹¹ The term V2X encompasses both V2B (non-grid-exporting) and V2G (grid-exporting) use cases.

1 equipped with V2X bidirectional charging capabilities.¹² Meanwhile, 13,300 Ford F-150
2 Lightnings have been sold in the US through November 2022.¹³ Assuming California
3 sales represent approximately half of these vehicles, and San Diego County represents
4 8.5% of those sales, VGIC believes roughly 600 V2X-capable Ford F-150s may already
5 be in SDG&E's service territory.¹⁴ Assuming the Nissan LEAF discharges at 20 kW¹⁵
6 using off-board V2X EVSE, and the Ford F-150 Lightning discharges at 10 kW¹⁶ using
7 off-board V2X EVSE, this equates to 62 MW in total technical potential for incremental
8 V2X contributions to net peak load.¹⁷ As with V1G, not all vehicles are likely to
9 participate at once. However, VGIC estimates a conservative 5% participation rate would
10 equate to approximately a 6.2 MW of potential net peak contribution from V2X
11 capabilities alone from today's *existing* San Diego County EV fleet.

12 Additionally, as referenced above, SDG&E is already home to two electric school bus
13 deployments totaling 840 kW of operational V2G export capability, which were deployed
14 within the first four months of ELRP being available to EV/VGI Aggregations.¹⁸

¹² California Energy Commission (2022). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 29, 2022. Retrieved December 22, 2022 from <https://www.energy.ca.gov/zevstats>

¹³ Business Wire. *Sales of Ford Electric Vehicles Climb at Twice the Rate of EV Segment; F-150 Lightning, E-Transit No. 1 Electric Truck and Van; Retail Orders for '23MY Vehicles up 104%, drive by Strong Demand For Super Duty, Maverick*. December 2, 2022. <https://www.businesswire.com/news/home/20221202005219/en/>. November 2022 Sales Release.

¹⁴ Historically, California has represented about half of all EV sales nationwide. See, for example: Veloz (2022). *Electric Vehicle Market Report*. Data last updated October 28, 2022. Retrieved December 23, 2022 from <https://www.veloz.org/ev-market-report/>.

¹⁵ Fermata Energy. October 6, 2022. *Fermata Energy's Newest V2X Bidirectional Charger – the FE-20 – Available Q1 2023*. <https://fermataenergy.com/article/fermata-energys-newest-v2x-bidirectional-charger->

¹⁶ California Energy Commission. July 28, 2022. *CEC VGI Workshop: Ford*. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=244217>. Page 5.

¹⁷ [2,800 LEAFs X 20 kW = 56,000 kW; 600 F-150s X 10 kW = 6,000 kW]

¹⁸ See Nuvve Holding Corp. *SDG&E and Cajon Valley Union School District Flip the Switch on Region's First Vehicle-to-Grid Project Featuring Local Electric School Buses Capable of Sending Power to the Grid*. July 26, 2022. <https://nuvve.com/sdge-and-cajon-valley-union-school-district-flip-the-switch-on-regions-first-vehicle-to-grid->

1 According to Nuvve, several additional ESB V2G installations are under various stages
 2 of development in SDG&E’s service territory and represent well over 1 MW of V2G
 3 capacity expected to be online by Q3 2023.

4 In addition to the 63 MW of technical V2X capability in SDG&E’s service territory
 5 identified above, sales of V2X-capable vehicles are expected to increase as new V2X-
 6 capable EVs and EVSE models become available for purchase in 2023 and 2024
 7 including the Chevrolet Silverado EV and GMC Sierra EV.¹⁹ The table below
 8 summarizes VGIC’s estimate of the bidirectional-capable vehicles and charging
 9 equipment in San Diego County for both existing and forthcoming vehicle models.

10 *Table 1. Bidirectional-capable vehicles in San Diego County, currently-available bidirectional*
 11 *EVSE, and forthcoming bidirectional products:*

Product	Amount Deployed / Expected Launch Date	Notes
Blue Bird Vision and All American RE Bus Models	16 as of the end of Q2 2022. ²⁰	-155 kWh battery capacity. In use today. ²¹ -14 participating in ELRP. ²²

[project-featuring-local-electric-school-busescapable-of-sending-power-to-the-grid/](#) ; and Nuvve Holding Corp. *San Diego County’s Ramona Unified School District, Blue Bird and Nuvve Unveil 8 New V2G-Enabled and Qualified Electric School Buses*. October 11, 2022. <https://nuvve.com/ramona-unified-school-district-blue-bird-nuvve-unveil-new-v2g-electric-school-buses/>

¹⁹ GM Energy (2022). *Ultium Products: Ultium Home*. <https://gmenergy.gm.com/ultium-products> ; GMC (2022). *Introducing the First Ever Sierra EV Denali Edition 1: Plug and Play*. <https://www.gmc.com/future-vehicles/sierra-ev-denali>

²⁰ California Energy Commission (2022). *California Energy Commission Zero Emission Vehicle and Infrastructure Statistics*. Data last updated April 29, 2022. Retrieved December 22, 2022 from <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/medium-and-heavy>

²¹ See Nuvve Holding Corp. *SDG&E and Cajon Valley Union School District Flip the Switch on Region’s First Vehicle-to-Grid Project Featuring Local Electric School Buses Capable of Sending Power to the Grid*. July 26, 2022. <https://nuvve.com/sdge-and-cajon-valley-union-school-district-flip-the-switch-on-regions-first-vehicle-to-grid-project-featuring-local-electric-school-busescapable-of-sending-power-to-the-grid/> ; and Nuvve Holding Corp. *San Diego County’s Ramona Unified School District, Blue Bird and Nuvve Unveil 8 New V2G-Enabled and Qualified Electric School Buses*. October 11, 2022. <https://nuvve.com/ramona-unified-school-district-blue-bird-nuvve-unveil-new-v2g-electric-school-buses/>

²² *Ibid.*

Ford F-150 Lightning Electric	Approximately 600 ²³	-98 kWh or 131 kWh battery capacity in use today. ²⁴ -Offers V2X-DC capability using 10 kW bidirectional charger. ²⁵
Nissan LEAF	2,800 as of the end of 2021. ²⁶	-MY 2013 or later are V2X-capable. ²⁷ -MY 2013-2015 have a 24 kWh battery, MY 2016 has a 30 kWh battery, and MY 2017-present has a 40 kWh battery and offers a 62 kWh LEAF Plus. ²⁸ -Bidirectional mode requires V2X-DC EVSE. This is in use today. ²⁹
Thomas Built Buses Saf-T-Liner C2 Jouley	Available for purchase.	-Up to 226 kWh of battery capacity. ³⁰
Fermata FE-15	Available for purchase.	-Offers V2X-DC capability, 15 kW. ³¹
Nuvve PowerPort	Available for purchase.	-Offers V2X-AC capability, 19.2 kW, although barriers to mass-scale V2X-AC persist. ³²

²³ Approximately 13,300 Ford F-150 Lightnings have been sold in the US through November 2022. Assuming California sales represent half of these vehicles, and San Diego County represents 8.5% of those sales, VGIC believes roughly 600 V2X-capable Ford F-150s are already in SDG&E's service territory.

²⁴ Connor Hoffman. Car and Driver. *Ford Confirms 2022 F-150 Lightning EV Battery Specs*. December 17, 2021.

<https://www.caranddriver.com/news/a38552140/2022-ford-f-150-lightning-battery-specs-revealed/>

²⁵ Ford Motor Company (2021). 2022 Ford F-150 Lightning: Ford Intelligent Backup Power. Retrieved September 1, 2021 from <https://www.ford.com/trucks/f150/f150-lightning/2022/>

²⁶ California Energy Commission (2022). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 29, 2022. Retrieved December 22, 2022 from <https://www.energy.ca.gov/zevstats>

²⁷ Electrek. *The Nissan LEAF is getting its first-ever V2G charger for selling energy back to the grid*. September 7, 2022. <https://electrek.co/2022/09/07/the-nissan-leaf-getting-first-ever-v2g-charger/>

²⁸ 2013 Nissan LEAF Press Kit: Overview <https://canada.nissannews.com/en-CA/releases/ca-2013-nissan-leaf-press-kit>. 2016 Nissan LEAF 30 kWh. <https://www.caranddriver.com/reviews/a15101006/2016-nissan-leaf-30kwh-instrumented-test-review/>. 2022 Nissan LEAF Range, Charging & Battery.

<https://www.nissanusa.com/vehicles/electric-cars/leaf/features/range-charging-battery.html>

²⁹ See, for example, Shay Hlavaty. *New Partnership Combines Electric Carsharing with Vehicle-to-Grid Technology*. The Alliance Center. March 11, 2021. <https://www.fermataenergy.com/news-press/new-partnership-combines-electric-carsharing-with-vehicle-to-grid-technology-alliance-center-colorado-carshare-fermata-energy>

³⁰ Thomas Built Buses / Daimler Trucks North America LLC (2021). The Safe-T-Liner C2 Jouley Electric School Bus. Retrieved September 1, 2021 from <https://thomasbuiltbuses.com/school-buses/saf-t-liner-c2-jouley/>

³¹ Fermata Energy. *Proven Results and Cost Savings with V2G Technology*. October 14, 2020. <https://www.fermataenergy.com/news-press/proven-results-and-cost-savings-with-v2g-technology>

³² Nuvve Corporation (2020). Nuvve PowerPort Specifications Sheet. Retrieved September 1, 2021 from: <https://nuvve.com/wp-content/uploads/2020/05/nuvve-powerport-spec-sheet-us-ul-energystar-certified-v5.0-may-2020.pdf>

Nuvve DC Heavy Duty Charging Station	Available for purchase, and currently operating in SDG&E territory.	-Offers V2X-DC capability, 60 kW and 125 kW. ³³
Proterra PC-060-PI, PC-090-PI, PC-120-PI, PC-150-PI, PC-180-PI	Available for purchase.	-Offers V2X capability ranging from 60 kW to 180 kW. ³⁴
Rhombus RES-D2, RES-D3, RES-DCVC60, RES-DCVC125	Available for purchase.	-Offers V2X-DC ranging from 60 up to 250 kW. ³⁵
BYD Type A	Unknown.	-To offer V2X capability. ³⁶
Chevrolet Silverado EV	Expected 2023 launch.	-To offer bidirectional charging. ³⁷
GMC Sierra EV	Expected 2024 launch.	-To offer bidirectional charging. ³⁸
Autel MaxiCharger DCV2X	Expected Q2 2023 launch.	-To offer V2X-DC capability, 12 kW. ³⁹
dcbel r16	Unknown.	-To offer V2X-DC and V2X-AC capabilities, 7.6 kW. ⁴⁰
Fermata FE-20	Expected Q1 2023 launch.	-To offer V2X-DC capability, 20 kW. ⁴¹

³³ Nuvve Corporation (2020). Nuvve DC Heavy Duty Charging Station Specifications Sheet. Retrieved September 1, 2021 from: <https://nuvve.com/wp-content/uploads/2020/04/nuvve-dc-heavy-duty-spec-sheet-1.0.pdf>. See also Nuvve Holding Corp. *SDG&E and Cajon Valley Union School District Flip the Switch on Region's First Vehicle-to-Grid Project Featuring Local Electric School Buses Capable of Sending Power to the Grid*. July 26, 2022. <https://nuvve.com/sdge-and-cajon-valley-union-school-district-flip-the-switch-on-regions-first-vehicle-to-grid-project-featuring-local-electric-school-buses-capable-of-sending-power-to-the-grid/>; and Nuvve Holding Corp. *San Diego County's Ramona Unified School District, Blue Bird and Nuvve Unveil 8 New V2G-Enabled and Qualified Electric School Buses*. October 11, 2022. <https://nuvve.com/ramona-unified-school-district-blue-bird-nuvve-unveil-new-v2g-electric-school-buses/>

³⁴ Proterra (2022). Proterra Industrial Charging System. Retrieved December 23, 2022. <https://www.proterra.com/products/charging-infrastructure/>

³⁵ Rhombus Energy Solutions. V2G Charging, Control, and Management 50-500 kW: Bidirectional. Retrieved September 1, 2021 from: <https://rhombusenergysolutions.com/products>

³⁶ BYD. *BYD Introduces Innovative and Safe Type A Battery Electric School Bus with V2G Technology*. January 26, 2022. <https://en.byd.com/news/byd-introduces-innovative-and-safe-type-a-battery-electric-school-bus-with-v2g-technology/>

³⁷ GM Energy (2022). *Ultium Products: Ultium Home*. <https://gmenergy.gm.com/ultium-products>

³⁸ GMC (2022). *Introducing the First Ever Sierra EV Denali Edition 1: Plug and Play*. <https://www.gmc.com/future-vehicles/sierra-ev-denali>

³⁹ Joanna Hamblin. EnergyTech. *Charging Ahead with V2G: Pilots, Challenges and Opportunities*. November 28, 2022. <https://www.energytech.com/emobility/article/21255375/charging-ahead-with-v2g-pilots-challenges-and-opportunities>

⁴⁰ dcbel. dcbel r16 Specifications Sheet. Retrieved September 1, 2021 from: <https://www.dcbel.energy/wp-content/uploads/ossiaco-data-sheet-2021.pdf>

⁴¹ Fermata Energy. October 6, 2022. *Fermata Energy's Newest V2X Bidirectional Charger – the FE-20 – Available Q1 2023*. <https://fermataenergy.com/article/fermata-energys-newest-v2x-bidirectional-charger->

Lucid Motors – Charging	Unknown.	-To offer 19.2 kW bidirectional charging. ⁴²
Wallbox Quasar 2	Unknown.	-To offer V2X-DC capability, 11.5 kW. ⁴³

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Additionally, the following automakers have shared plans to offer V2X capabilities in the future: Genesis,⁴⁴ Hyundai,⁴⁵ Lucid,⁴⁶ Kia,⁴⁷ Polestar,⁴⁸ Rivian,⁴⁹ Sono,⁵⁰ Volkswagen,⁵¹ and Volvo.⁵²

III. VGIC IS GENERALLY SUPPORTIVE OF THE PROPOSED DYNAMIC PRICING PILOTS BUT BELIEVES THEY COULD BE IMPROVED UPON.

Q. Generally speaking, does SDG&E’s proposal have the potential to unlock the latent V1G and V2G capabilities noted above?

⁴² Lucid Motors. *Charging*. <https://www.lucidmotors.com/charging>

⁴³ Wallbox. Quasar DC Charger: Electrical Specifications. Retrieved September 1, 2021 from: https://wallbox.com/en_us/quasar-dc-charger

⁴⁴ Bengt Halvorson. Green Car Reports. *Electric car platform for Hyundai, Kia, Genesis: Bi-directional charging, robotaxi ready*. https://www.greencarreports.com/news/1130487_ev-platform-hyundai-kia-genesis-bi-directional-charging-robotaxi-ready

⁴⁵ Chris Randall. Electrive. *Hyundai to include V2G capabilities for their EVs*. April 12, 2022. <https://www.electrive.com/2022/04/12/hyundai-to-include-v2g-capabilities-for-their-evs/>

⁴⁶ Nick Flaherty. Emobility Engineering. Accessed December 22, 2022. <https://www.emobility-engineering.com/vehicle-to-grid-charging/>

⁴⁷ Bengt Halvorson. Green Car Reports. *Electric car platform for Hyundai, Kia, Genesis: Bi-directional charging, robotaxi ready*. https://www.greencarreports.com/news/1130487_ev-platform-hyundai-kia-genesis-bi-directional-charging-robotaxi-ready

⁴⁸ Roberto Baldwin. TechCrunch. *Polestar CEO sees value in EVs, even when they’re parked*. August 21, 2022. <https://techcrunch.com/2022/08/21/polestar-ceo-sees-value-in-evs-even-when-theyre-parked/>

⁴⁹ Charles Morris. Charged. *Rivian working on 800-volt architecture, bidirectional charging, in-house drive units and battery cells*. <https://chargedevs.com/newswire/rivian-working-on-800-volt-architecture-bidirectional-charging-in-house-drive-units-and-battery-cells/>

⁵⁰ Vartan Badalian. GreenBiz. *Is bidirectional charging becoming more accessible?* November 8, 2022. <https://www.electrive.com/2022/04/12/hyundai-to-include-v2g-capabilities-for-their-evs/>

⁵¹ Charles Morris. *VW to enable bidirectional charging on all EVs on its MEB platform starting next year*. Charged Electric Vehicles Magazine. April 8, 2021. <https://chargedevs.com/newswire/vw-to-enable-bidirectional-charging-on-all-evs-on-its-meb-platform-starting-next-year/>. “The Volkswagen Group says it could produce as many as 300,000 bidirectional charging-enabled vehicles next year, including models from VW, Audi, Skoda, and Seat-Cupra.

⁵² Yusuf Latief. Smart Energy. *Volvo’s first bi-directional EV brings the customer to the grid*. October 8, 2022. <https://www.smart-energy.com/industry-sectors/electric-vehicles/volvos-first-bi-directional-ev-brings-the-customer-to-the-grid/>

1 A. Yes. VGIC generally supports dynamic pricing options for EV customers. Dynamic
2 pricing options – if designed appropriately – and other VGI strategies can help contribute
3 to the following policy objectives:

- 4 • advance the state’s transportation electrification goals by reducing the total cost of
5 EV ownership,
- 6 • deliver increased value to utility customers, including both EV and non-EV
7 owners,
- 8 • support customer and community resiliency, including during Public Safety
9 Power Shutoffs (“PSPS”) and other resilience events,
- 10 • support grid reliability, including during extreme heat events or other times of
11 high stress on the grid,
- 12 • provide flexible grid services needed to support a decarbonized power grid
13 relying on variable sources of renewable generation, and
- 14 • foster a growing market for VGI services.

15 VGIC appreciates SDG&E’s effort to develop a dynamic rate option available to
16 residential EV customers and commends the company for its innovative Export
17 Compensation Pilot rate for commercial EV customers. VGIC believes the proposal is a
18 constructive step towards encouraging more EV customers to utilize dynamic rate options
19 and be adequately compensated for VGI services.

20 **Q. Does SDG&E’s proposal fully comply with the direction of D.20-12-023 and ED**
21 **staff recommendations filed on June 15, 2022?**

22 A. No. The proposal has the potential to advance VGI by incorporating dynamic rate options
23 and promoting the use of V2X bidirectional charging systems; however, the Dynamic
24 Pricing Pilots should be modified to bring them in closer alignment with the

1 Commission’s prior directives on this issue. More specifically, Ordering Paragraph
2 (“OP”) 9 of D.20-12-023, which directs SDG&E to “file an optional dynamic rate
3 application” to “encourage commercial EV charging.”⁵³ This directive was expanded
4 upon through ED staff’s June 15th recommendations, which directed SDG&E to
5 implement two pilots that “should be open to all customers, except for streetlight
6 customers.”⁵⁴ ED staff recommended SDG&E offer an optional dynamic import rate and
7 an optional dynamic export rate, and further specified that both rate options “would be
8 available to customers on all commercial TOU rates, except the rates specific to street
9 lighting, and all residential TOU rates, including EV-TOU rates.” However, as detailed in
10 SDG&E’s supplemental direct testimony of Jeff DeTuri, RTP Pilot Stage 1 and Export
11 Compensation Pilot Stage 1 would exclude certain customers.⁵⁵ The Dynamic Pricing
12 Pilots Stage 1 would fail to offer a dynamic *charging* rate option for commercial EV
13 customers as required by D.20-12-023 and suggested by ED staff’s recommendations.
14 Additionally, customers on several residential EV TOU rates will not be eligible to
15 participate in RTP Pilot Stage 1, despite explicit ED staff recommendations to make these
16 rates available to EV TOU customers, including both residential and commercial. Lastly,
17 all residential EV customers will be ineligible to participate in Export Compensation Pilot
18 Stage 1, further conflicting with ED staff recommendations to apply broad eligibility to
19 both the import and export pilot.

⁵³ D.20-12-023. OP 9.

⁵⁴ ALJ Ruling Issued June 15, 2022. Attachment A – Energy Division Recommendations. Page 4.

⁵⁵ Prepared Supplemental Direct Testimony of Jeff DeTuri. August 15, 2022. JDT-5.

1 **IV. SDG&E’S PROPOSAL FOR RTP PILOT – ANALYSIS AND**
2 **RECOMMENDATIONS.**

3 **A. Overview of SDG&E’s proposal**

4 **Q. Please summarize SDG&E’s overall proposed approach to implementing an RTP**
5 **pilot.**

6 A. SDG&E proposes a two-stage optional RTP Pilot. The RTP Pilot Stage 1 rate design will
7 consist of three rate design components: (a) the CAISO DAM commodity energy prices;
8 (b) Critical Peak Pricing commodity capacity adder; and (c) total base commodity rate.
9 The RTP Pilot will be available to bundled customers on the following seven rate
10 schedules:

- 11 • TOU-DR1
- 12 • EV-TOU-5
- 13 • TOU-A
- 14 • AL-TOU
- 15 • A6-TOU
- 16 • PA-T-1
- 17 • TOU-PA

18 Stage 1 will begin in Q4 2023 and run through Q3 2026. SDG&E aims to target 1,391
19 residential and 70 non-residential customers for Stage 1, with the maximum customer
20 enrollment limit set at 13,908 residential and 700 non-residential. SG&E estimates
21 approximately \$4.93 million in costs to implement Stage 1, primarily used to support a
22 billing system update. SDG&E also proposes offering a \$300 incentive to the first 1,000

1 residential customers participating in the pilot in exchange for their enrollment and
2 completion of surveys.

3 RTP Pilot Stage 2 will be open to all customers, except for street lighting customers, and
4 will begin in Q4 2026 and run through Q3 2028. SDG&E estimates RTP Pilot Stage 2
5 will cost \$5.9 million to implement and targets to enroll 1,471 customers with a
6 maximum limit of 14,608 customers.

7 ***B. Eligibility for SDG&E’s proposed Stage 1 RTP Pilot 1 should be***
8 ***expanded to include residential customers beyond those on the existing EV-***
9 ***TOU-5 rate.***

10 **Q. Does the RTP pilot include an option for residential EV customers?**

11 A. Yes. Customers on EV-TOU-5 would be eligible to enroll in Stage 1 of the RTP pilot, as
12 noted in the supplemental direct testimony of William G. Saxe.⁵⁶

13 **Q. Are there residential EV charging rates that would not be eligible for Stage 1 RTP**
14 **Pilot?**

15 A. Yes. Customers on EV-TOU and EV-TOU-2 would not be eligible to participate in the
16 RTP pilot.⁵⁷ EV-TOU-5 and EV-TOU-2 are both “whole-home” TOU rates, meaning that
17 the time-differentiated prices apply to all load behind the utility meter, including EV and
18 non-EV load. In contrast, EV-TOU rate enrollment requires that customers install a
19 separate utility meter (i.e., a EV-TOU is “separately-metered” EV rate). EV-TOU TOU
20 rates are equal to EV-TOU-2 rates but apply only to separately-metered EV load, whereas

⁵⁶ WS-4.

⁵⁷ WS-4.

1 EV-TOU-2 rates apply to all load behind the utility meter, including EV and non-EV load
2 (i.e., the “whole-home” load).

3 **Q. Are separately-metered configurations common in residential settings?**

4 A. No. EV-TOU has seen very limited participation.⁵⁸ This is likely due to the requirement
5 that customers install a separate meter, which is costly and burdensome for most
6 residential customers.

7 **Q. Do you think residential EV customers are as likely to want expose their whole
8 home load to RTP price signals as they would be to exposing just their EV load?**

9 A. I don’t believe so. The basis for pursuing dynamic pricing and managed charging
10 strategies is the unique flexibility that at-home EV charging offers relative to other
11 household loads. EV charging load reflects an exceptionally elastic type of load (i.e.,
12 customers have the ability to shift charging patterns to lower cost periods), given that
13 vehicles typically sit parked in residential settings for longer than a Level 2 charger takes
14 to deliver a full charge. Furthermore, optimizing EV charging in response to price signals
15 – but within constraints of the customer’s desired state of charge – is likely a more
16 convenient proposition for customers than many other load modifying technologies
17 available to residential customers today. For example, smart thermostat or water heater
18 programs can reduce load during high-cost periods but could lead to a more noticeable
19 impact on customer comfort that causes customers to opt out or override the control
20 period. In contrast, managing EV charging load to reduce charging during system or local
21 peaks, can be possible while still delivering a customer’s desired state of charge at the

⁵⁸ Joint IOU EV Load Research and Charging Infrastructure Cost Report. 10th Report Filed on March 31, 2022. Page 84.

1 end of the charging session. If done automatically an EV service provider (“EVSP”)
2 integrating with SDG&E’s proposed API pricing tool, the customer can be minimally
3 impacted by the behind-the-scenes charge optimization.

4 **Q. Is the newly-adopted submetering protocol likely to increase enrollment in**
5 **residential EV TOU rates, including separately-metered EV TOU rates?**

6 A. Yes. D.22-08-024 directs utilities to implement a submetering protocol, allowing
7 residential customers, including those interested in participating in EV-TOU, to use their
8 EVSE as a submeter for billing purposes.⁵⁹ On December 5, 2022, SDG&E submitted
9 their implementation plan, which details that SDG&E will revise its tariffs, including
10 both residential and commercial rates, to permit customers to participate using an EVSE
11 submeter, rather than needing to install a separate meter (in the case of EV-TOU) or
12 expose their whole home to the TOU rates (in the case of EV-TOU-2 and EV-TOU-5).⁶⁰

13 **Q. Given these recent developments, how does VGIC propose that SDG&E unlock**
14 **additional participation in RTP Stage 1 beyond what the Company originally**
15 **proposed?**

16 A. VGIC recommends that any residential customer utilizing an EVSE submeter (pursuant
17 to the protocol adopted in D. 22-08-024) or enrolled in a separately metered EV-TOU
18 rate (e.g., EV-TOU-2, EV-TOU) be eligible to participate in RTP Stage 1, rather than
19 limiting eligibility to just EV-TOU-5. Customers utilizing submetering to enroll in these
20 rates by definition will own networked chargers which generally have the capability to be
21 managed by a third-party to respond to dynamic price signals. This configuration

⁵⁹ Commission Decision 22-08-024.

⁶⁰ SDG&E. Advice Letter 4114-E. *Establishment of the Plug-In EV Submetering Protocol Implementation Plan Pursuant to D.22-08-024*. December 5, 2022. https://tariff.sdge.com/tm2/pdf/submittals/ELEC_4114-E.pdf

1 therefore represents an excellent use case for which to make RTP pricing options
2 available.

3 **C. Eligibility for SDG&E’s proposed Stage 1 RTP Pilot 1 should be**
4 **expanded to include commercial EV customers enrolled in the EV-HP rate.**

5 **Q. Is RTP Stage 1 available to customers on SDG&E’s commercial EV rate (EV-HP)?**

6 A. No. The RTP Stage 1 does not appear to be open to customers on SDG&E’s EV-HP rate
7 option.

8 **Q. Do you think RTP Stage 1 should be made available to commercial EV rate (EV-
9 HP) customers?**

10 A. Yes, I think customers enrolled in EV-HP should be eligible to participate in the RTP
11 pilot. I believe this would be more consistent with D.20-12-023. I appreciate SDG&E’s
12 efforts to establish leadership in the VGI market by proposing a V2G export rate for
13 commercial EV customers and agrees that this is needed, as discussed below in Section
14 V. However, I also believe that SDG&E has overlooked a simple way to offer a more
15 complete suite of VGI offerings by including EV-HP customers.

16 **Q. Does the RTP Pilot Stage 1, as proposed by SDG&E, fully comply with D.20-12-023**
17 **(i.e., the EV-HP Decision)?**

18 A. No. My understanding of D.20-12-023, and specifically OP 9, was to create an optional
19 dynamic rate available to all commercial customers. This is similar to how PG&E’s
20 recently approved Day-Ahead Hourly Real-Time Pricing (“DAHRTP”) rate option will
21 operate for commercial customers beginning in Q4 2023.⁶¹ Instead, SDG&E proposal

⁶¹ See Docket No. A. 20-10-011. D.21-11-017.

1 excludes EV-HP customers as explained above. If the Company’s proposal were
2 modified to include EV-HP customers, then I believe it would more fully comply with
3 D.20-12-023. Absent this change, commercial EV customers may not be encouraged to
4 manage load year-round through an RTP signal until Q4 2026, when RTP Pilot Stage 2
5 will launch. This risks missing an important near-term opportunity for EV customers to
6 manage their electricity bills while supporting the grid.

7 **Q. Does SDG&E already have experience offering a dynamic charging option for**
8 **commercial customers?**

9 A. Yes, SDG&E offers its VGI Rate to commercial customers participating in SDG&E’s
10 Power Your Drive (“PYD”) program.⁶² SDG&E’s VGI Rate offered through PYD is
11 similar to the RTP Pilot Stage 1, as it includes a dynamic energy component based on
12 CAISO DAM prices, as well as a Critical Peak Pricing (“CPP”) adder during times of
13 grid stress.

14 **Q. Could commercial customers not participating in SDG&E’s PYD benefit from a**
15 **dynamic charging rate in the timeframe proposed for RTP Pilot Stage 1?**

16 A. Yes. SDG&E’s VGI rate is limited to customers receiving make-ready incentives, which
17 will disappear in Q4 2026 or when the \$56 million in authorized funding is fully
18 subscribed, whichever comes first.⁶³ However, VGIC believes commercial customers not
19 participating in PYD would also benefit from having access to a dynamic charging rate
20 during the timeframe of RTP Pilot Stage 1 (i.e., 2024-2026), as several fleets will be

⁶² SDG&E. Schedule VGI. California PUC Sheet No. 35630-E. https://tariff.sdge.com/tm2/pdf/tariffs/ELEC_ELEC-SCHEDS_VGI.pdf

⁶³ See Decision 21-04-014 Authorizing SDG&E’s PYD Extension EV Charging Program. April 19, 2021. Page 2. See also Decision 22-11-040 on Transportation Policy and Investment. November 17, 2022. Page 78.

1 electrifying without make-ready incentives or with make-ready programs other than
2 PYD.

3 **Q. Did SDG&E provide reasoning behind its proposal to exclude EV-HP from RTP**
4 **Pilot Stage, or offer a dynamic export rate (and not import rate) for EV-HP**
5 **customers?**

6 A. SDG&E states that the RTP pilot will be limited to seven rate schedules for ease of
7 implementation and to reduce the costs of the pilots. However, SDG&E considers only
8 the costs and therefore overlooks the potential benefits from expanding eligibility to
9 include EV-HP customers. Several EV-HP customer segments, including school buses
10 and other fleets with predictable duty cycles and long dwell times that overlap with
11 system peaks, are valuable use cases for dynamic pricing.

12 **V. SDG&E'S PROPOSAL FOR EXPORT COMPENSATION PILOT – ANALYSIS**
13 **AND RECOMMENDATIONS**

14 **A. Overview of SDG&E's proposal**

15 **Q. Please summarize SDG&E's overall proposed approach to implementing an Export**
16 **Compensation Pilot.**

17 A. SDG&E proposes to implement a two-stage Export Compensation Pilot. Stage 1 will
18 offer a dynamic export price signal consisting of two components: a CAISO DAM
19 energy price and a CPP Event Day capacity adder based on marginal costs only. SDG&E
20 proposes to target 10 customers taking service under EV-HP for participation in the
21 Export Compensation Pilot Stage 1, and proposes a maximum enrollment of 35,000 EV-

1 HP customer accounts. The proposed Stage 1 implementation timeline is identical to the
2 RTP Pilot Stage 1, and SDG&E estimates it will cost approximately \$1.8 million.

3 SDG&E does not detail plans or terms for Stage 2 of the Export Compensation Pilot, but
4 notes that it aims to open Stage 2 of both Dynamic Pricing Pilots to all customers, except
5 for street lighting customers.

6 ***B. Eligibility for SDG&E’s proposed Export Compensation Pilot Stage 1***
7 ***should be expanded to allow participation from residential EV customers. This***
8 ***would be consistent with Energy Division staff’s June 15 Recommendations.***

9 **Q. Is a V2G export rate appropriate and necessary to advance the transportation**
10 **electrification (“TE”) market while supporting the evolving grid at this time?**

11 A. Yes. Establishing an export rate for V2G is necessary to compensate EV customer not
12 only for the value of providing energy to the grid, but for the additional use of their EV’s
13 battery for a purpose other than its primary use (i.e., transportation). V2G can also
14 provide many grid benefits, including energy and ancillary services, as well as serving as
15 a reliability resource during peak net load hours. Compensation for providing these
16 services is essential to unlocking the full potential that EVs can provide as grid resources.
17 Offering a new revenue stream for EV owners can reduce the overall cost of vehicle
18 ownership, and in turn help to accelerate EV adoption across segments that can access
19 this compensation.

20 **Q. Does the V2G rate proposed by SDG&E fully comply with the ED staff**
21 **recommendations?**

22 A. No. As mentioned above, the Administrative Law Judge (“ALJ”) issued a Ruling in this
23 proceeding on June 15, 2022 which included several recommendations from ED staff.

1 Specifically, the ED staff recommended that *both* the RTP import rate and export rate
2 “would be available to customers on ... all residential TOU rates, including EV-TOU
3 rates.”⁶⁴ However, under SDG&E’s proposal, the Export Compensation Pilot Stage 1
4 would only be available to commercial customers enrolled in EV-HP.

5 **Q. Should the dynamic and V2G rates be available for residential customers, as well as**
6 **commercial customers?**

7 A. Yes, given current and expected product availability, as noted above in Section II, there
8 are likely more light-duty V2X-capable vehicles owned by residential customers today
9 than by commercial customers eligible for EV-HP. As such, it would be
10 counterproductive to the Export Compensation Pilot’s success if the larger residential
11 customer segment were excluded from the outset. Furthermore, excluding residential
12 customers would be inconsistent with SDG&E’s recent efforts to promote the
13 deployment of V2X equipment among residential customers. Specifically, SDG&E
14 recently requested V2X incentives for residential customers, which I describe in more
15 detail in Section V-D below.

16 C. **SDG&E should include an upfront incentive to support pilot**
17 **participation and early-stage development of the V2X market**

18 **Q. Do V2X bidirectional charging systems cost more than unidirectional charging**
19 **systems?**

⁶⁴ ALJ Ruling Issued June 15, 2022. Attachment A – Energy Division Recommendations

1 A. Yes. On average, a unidirectional Level 2 charging systems costs \$1,300.⁶⁵ In contrast,
2 bidirectional Level 2 charging systems can cost around \$5,000.⁶⁶ Today, commercially
3 available and certified V2X equipment is based on a direct current (“DC”) platform,
4 which results in significant cost differences between a Level 2 charger (either
5 unidirectional or bidirectional) and a bidirectional DC charger. Meanwhile, an average
6 unidirectional DC Fast Charger (“DCFC”) unit cost ranges from about \$25,000 to
7 \$45,000, while total project costs range from about \$100,000 to \$125,000.⁶⁷ While public
8 information on the costs of bidirectional DCFC is limited, based on recent discussions I
9 have had with industry participants I believe a 30% cost premium for bidirectional
10 capabilities is a reasonable estimate. SDG&E may have a better understanding of these
11 costs from its V2G school bus pilots, including their Priority Review Pilot with Cajon
12 Valley Unified School District.

13 **Q. Do California’s primary funding opportunities for EV chargers provide adders or**
14 **incremental incentives to account for the incremental costs of V2X systems relative**
15 **to V1G systems?**

16 A. No. None of the primary EV infrastructure funding programs in California, including
17 SDG&E’s PYD programs, CEC CALeVIP, and CEC EnergiIZE offer incremental
18 incentives for higher cost V2X systems.

⁶⁵ Sebastian Blanco. J.D. Power. *What Does an EV Home Charger Cost?* August 16, 2022.

<https://www.jdpower.com/cars/shopping-guides/what-does-an-ev-home-charger-cost>

⁶⁶ See, for example: Fred Lambert. Electrek. *Ford F-150 Lightning Electric Pickup needs a \$3,900 home device to use it as backup power.* May 2, 2022. <https://electrek.co/2022/05/02/ford-f-150-lightning-electric-pickup-needs-a-4000-home-device-use-backup-power/>; dcbel (2022). *r16*. <https://www.dcbel.energy/r16/>

⁶⁷ CEC (2022). *CALeVIP DC Fast Chargers, Average Rebate, Unit Cost, and Total Project Cost per Charger.* Accessed December 23, 202. <https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/california-electric-vehicle/calevip-dc>

1 **Q. Have incentives that were previously made available for energy storage systems**
2 **been applicable to V2X systems?**

3 A. No. Incentives through programs such as the Self-Generation Incentive Program
4 (“SGIP”) have been limited to stationary energy storage systems and therefore V2X
5 systems were ineligible to participate.

6 **Q. Do other V2X pilots being offered in California provide funding to customers to**
7 **offset the higher upfront costs of deploying V2X systems?**

8 A. In a few limited cases. Examples of this include PG&E’s V2X Pilots⁶⁸ and PG&E’s
9 DAHRTP Export Compensation Rate Pilot.⁶⁹

10 **Q. How are these technology incentives structured?**

11 A. Generally, these include an upfront incentive. PG&E’s V2X Pilots offers upfront
12 incentives of up to \$4,500.⁷⁰ PG&E’s DAHRTP Export Compensation Rate Pilot offers
13 an incentive of up to \$6,560, with 70% of the incentive paid to customers upon
14 enrollment and installation and the remaining 30% paid after the first year.⁷¹

15 **Q. Has SDG&E considered offering upfront incentives to offset the costs of V2X**
16 **equipment in other proceedings?**

17 A. Yes. An upfront incentive was proposed in SDG&E’s recent request for a residential
18 V2X rebate in their Low-Carbon Fuel Standard (“LCFS”) Holdback Implementation

⁶⁸ PG&E (2022). *Vehicle to Everything pilot programs: Incentives and Eligibility for Vehicle to Everything Pilot Programs*. https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/vgi/v2x-pilots.page

⁶⁹ CPUC Decision 22-10-024 Adopting Settlement on Export Compensation for Certain PG&E Customers. October 20, 2022. Page 6.

⁷⁰ PG&E (2022). *Vehicle to Everything pilot programs: Incentives and Eligibility for Vehicle to Everything Pilot Programs*. https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/vgi/v2x-pilots.page

⁷¹ CPUC Decision 22-10-024 Adopting Settlement on Export Compensation for Certain PG&E Customers. October 20, 2022. Page 6.

1 Plan. SDG&E proposed a three-year, \$5.8 million program launching in Q2 2023 to
2 provide roughly 2,000 rebates at \$2,000 each.⁷² The stated goal of this program is to
3 “demonstrate the value V2X/bidirectional [light-duty] EVs possess for customers
4 experiencing an interruption in electrical service.”⁷³ As proposed, the V2X Equipment
5 Rebate Program would provide rebates to residential customers installing V2X
6 bidirectional chargers.

7 **Q. Is SDG&E’s proposed LCFS-funded V2X Equipment Rebate Program a sufficient**
8 **mechanism to offset incremental costs for Dynamic Pricing Pilot participants who**
9 **wish to provide export capabilities?**

10 A. No. While SDG&E’s proposed LCFS-funded V2X Equipment Rebate Program is a step
11 in the right direction, it is insufficient for two reasons. First, it does not apply to
12 commercial customers, whereas the proposed Export Compensation Pilot Stage 1 would
13 be open only to commercial customers enrolled in EV-HP. Second, the proposed LCFS-
14 Funded V2X Equipment Rebate Program incentive is intended to target specific
15 resilience use cases, rather than provide more broad-based support for grid reliability and
16 flexible load. Therefore, the LCFS-funded incentive is designed to target a different
17 subset of customers, as detailed in Advice Letter 4127-E, Section III, and may also
18 impose different technical requirements than what is relevant to customers installing V2X
19 systems intended to participate in the Export Compensation Pilot.

20 **Q. Do you think that SDG&E should offer a similar equipment rebate for Dynamic**
21 **Pricing Pilot customers who wish to provide V2X bidirectional charging capability?**

⁷² SDG&E Advice Letter 4127-E. *SDG&E’s Second Low Carbon Fuel Standard (LCFS) Holdback Implementation Plan in Compliance with Decision 20-12-027*. https://tariff.sdge.com/tm2/pdf/submittals/ELEC_4127-E.pdf. Page A-2

⁷³ *Id* at A-5.

1 A. Yes. Such a rebate could be structured similarly to what SDG&E has proposed through
2 its LCFS Holdback Implementation Plan; however, it would be made available to all
3 Dynamic Pricing Pilot customers using eligible V2X bidirectional charging equipment
4 and offer a \$/kw incentive for bidirectional chargers.

5 **Q. Why do you think such an incentive is appropriate?**

6 A. As a high-level policy consideration, there is significant potential for V2X to serve as
7 grid reliability resource and help California to meet its net load peak during the critical 6-
8 8pm hours during the summer. Leveraging even a small fraction of California's EV
9 owners for V2X capabilities in the coming years could amount to a GW-scale resource.
10 However, unlocking this potential requires overcoming three key barriers: 1) a
11 streamlined interconnection process, 2) a compensation mechanism for discharging from
12 the vehicle, and 3) the installation of V2X-capable charging equipment. The first of these
13 has largely been addressed through D.20-09-035 and the Rule 21 Interconnection
14 proceeding (R. 17-07-007). The second of these will largely be addressed if SDG&E's
15 proposal in this proceeding (with VGIC's recommended modifications) is adopted.
16 However, the third item listed above still poses a crucial barrier if customers are unable
17 or unwilling to install bidirectional chargers due to their higher incremental cost. A
18 simple upfront incentive program can help reduce or eliminate this barrier during the
19 critical period of time over the next few years when many new EVSEs are being
20 installed. Like many technology incentive programs, this need not be a permanent
21 solution, but may be a necessary bridge to help jumpstart the V2X market while it is still
22 in its infancy.

1 **D. SDG&E’s dynamic pricing pilots should consider dynamic transmission**
2 **and distribution values in both import rates and export compensation,**
3 **consistent with recent Commission decisions.**

4 **Q. Should transmission and distribution values be explored in the future as an**
5 **additional component for export compensation?**

6 A. Yes. VGIC believes a distribution component or distribution adder for both RTP Pilot
7 and Export Compensation Pilot should be explored in the future. This would compensate
8 customers for any additional locational value provided from managing load and
9 providing exports, such as the alleviation of load on congested circuits. However, VGIC
10 also recognizes that this adds a layer of complexity that may not be resolved in the near
11 term. As such, VGIC recommends that SDG&E’s proposed pilots and VGIC’s above
12 recommendations and enhancements be considered and approved in the current phase of
13 this proceeding. Meanwhile, the distribution component should be explored in a future
14 phase of this proceeding, or in another proceeding.

15 **Q. Is there precedent for a dynamic pricing import or export rate that includes a**
16 **distribution component?**

17 Yes. Resolution E-5192 directed PG&E to incorporate a distribution component into its
18 V2X pilots and PG&E recently proposed a methodology to do this.⁷⁴ Additionally, per
19 D.21-12-015, PG&E is partnering with Valley Clean Energy (“VCE”) on a Dynamic Rate
20 Pilot for Agricultural Pumping, which could offer a model to support the development of

⁷⁴ PG&E AL 6694-E. *Rate Structured for Vehicle Grid Integration Pilots*. September 2, 2022.
https://www.pge.com/tariffs/assets/pdf/advicelatter/ELEC_6694-E.pdf

1 distribution component for a dynamic export rate.⁷⁵ Lastly, PG&E’s DAH RTP
2 settlement, which was approved in D.22-10-024, also agreed to consider a distribution
3 component in a future phase of the pilot once more information is available, (for example
4 from the above-mentioned V2X Pilots and VCE partnership). Lastly, VGIC notes that
5 SDG&E’s PYD VGI Rate includes a distribution circuit adder.⁷⁶

6 **VI. CONCLUSION.**

7 **Q. Does this conclude your testimony?**

8 A. Yes.

⁷⁵ D.21-12-015 Phase 2 Decision Directing Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company to Take Actions to Prepare for Potential Extreme Weather in the Summers of 2022 and 2023, issued December 6, 2021 in Rulemaking 20-11-003. Ordering Paragraphs 50 through 58.

⁷⁶ SDG&E. Schedule VGI. California PUC Sheet No. 35630-E. https://tariff.sdge.com/tm2/pdf/tariffs/ELEC_ELEC-SCHEDS_VGI.pdf

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Appendix A:

Declaration of Ed Burgess in Support of Opening Testimony on Behalf of the Vehicle-Grid
Integration Council

**DECLARATION OF ED BURGESS IN SUPPORT OF OPENING TESTIMONY ON
BEHALF OF THE VEHICLE GRID INTEGRATION COUNCIL**

I, Ed Burgess, am the Senior Policy Director for the Vehicle-Grid Integration Council (VGIC). Having worked for VGIC since its founding in 2020, I am currently managing policy and regulatory affairs for VGIC and its 25 members. My business address is 10265 Rockingham Drive, Suite #100-4061, Sacramento, CA 95827. I declare under penalty of perjury that the foregoing facts in this document are true and correct.

Executed on December 30, 2022 at Sacramento, California.

A handwritten signature in black ink, appearing to read "Edward A. Burgess". The signature is cursive and fluid, with a long horizontal stroke at the end.

Ed Burgess