NARUC Summer Policy Summit

Committee on Energy Resources and the Environment

This session will begin at 11:15 a.m.

COLORADO
Department of Regulatory Agencies
Public Utilities Commission

Impact of EVs and V2G on the Grid? A Colorado Regulator Perspective

NARUC Summer Policy Summit
July 17, 2023

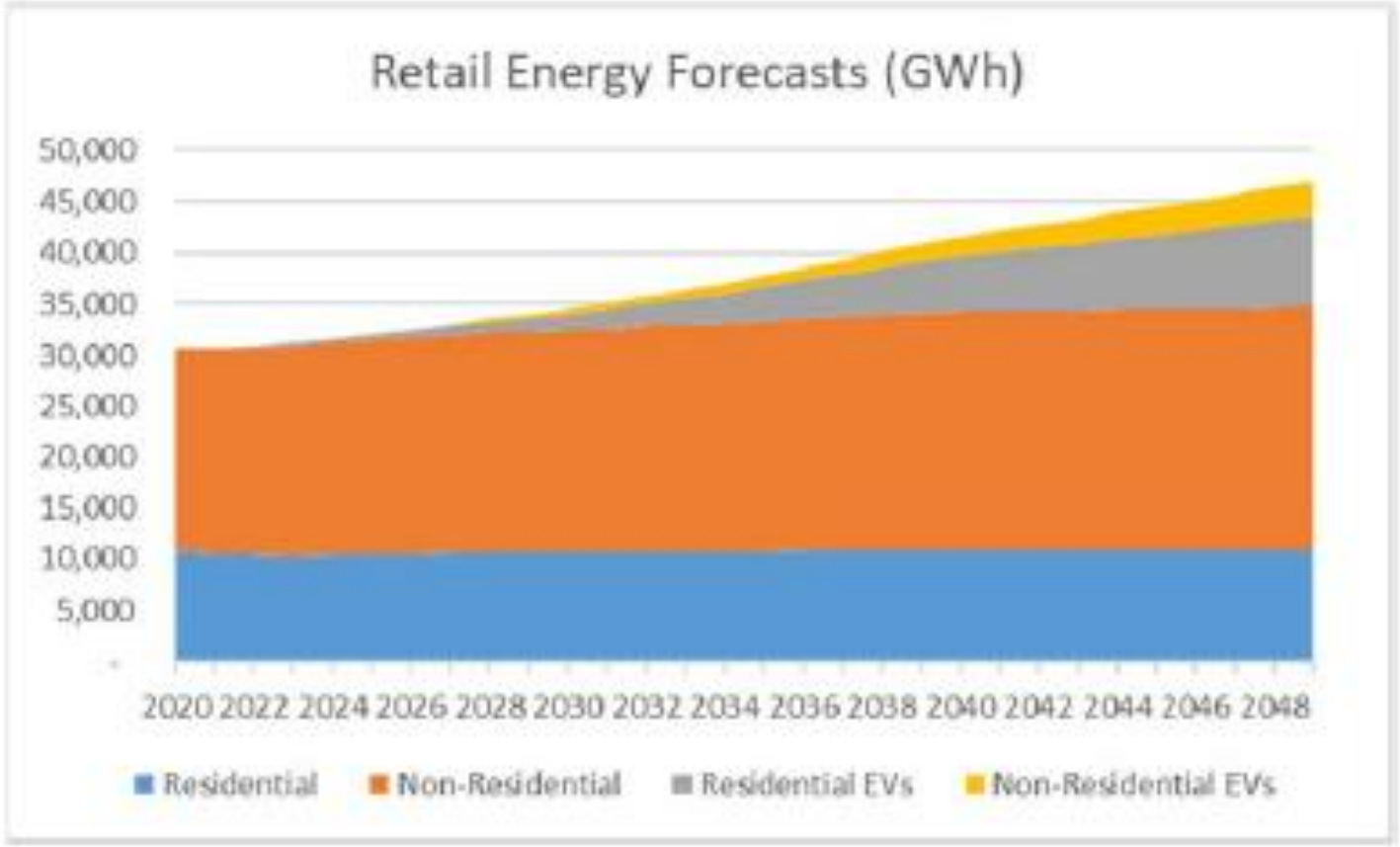
Eric Blank, Chairman
Colorado Public Utilities Commission

Potential 2030 Impact of EVs in Colorado?

EVs on the Road (2030)	940,000	Vehicles
Average Battery Size	60	Kwh
Total Storage Capability	56,400	MWh
4-Hour Duration Capacity	14,100	MW
Xcel Energy BAA Peak Demand	9,000	MW
Cost of Utility-Scale Storage	$250	per KWh
Value of Battery Storage?	$14	Billion
PSCo 2022 Electric Rate Base	$11	Billion

→The potential $ and MW peak demand impact of EVs on the CO electric system is enormous

Impact on Energy and Demand Forecasts?



PSCo ERP, Proceeding No. 21A-0141E, HE 101, Technical Appendix, at p. 46.

→ EVs are the single biggest uncertainty in the energy forecast and may increase energy needs in CO by 25-35% by the early 2030s w/ a potential doubling or tripling by 2045?

Impact on Distribution Planning / Investment?

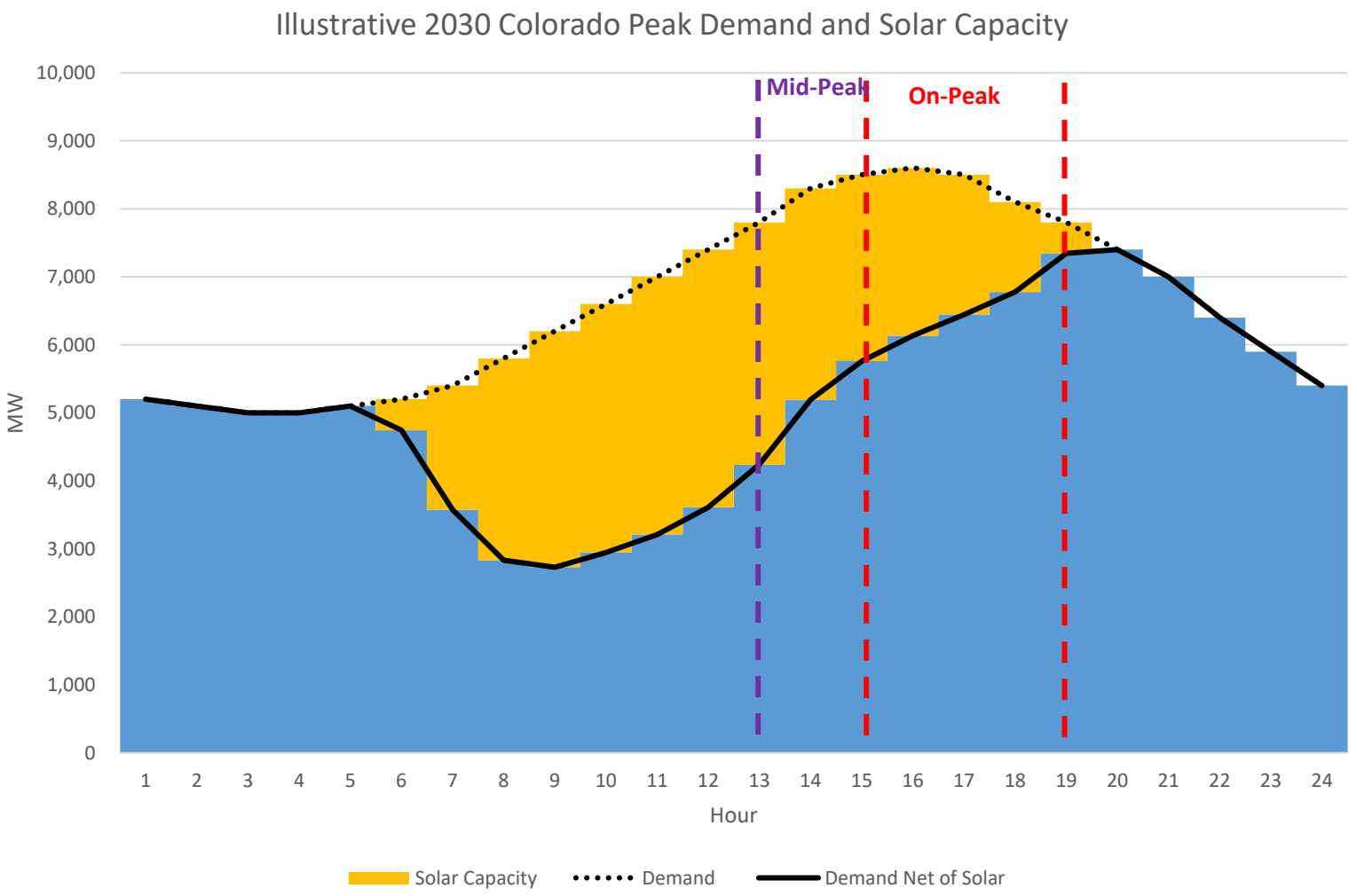
Capital Additions Net of Retirement ($s)

	Total
Steam Production	($225,966,210)
Hydro Production	$75,327,253
Other Production	$302,419,385
Transmission	$685,273,066
Distribution	$1,053,301,806
Electric General and Intangible	$223,788,003
Common General and Intangible	$383,945,841
Total	$2,557,718,908

PSCo Rate Case, Proceeding No. 22AL-0350E, HE 101, at p. 28.

→ Distribution already accounts for over 40% of Xcel CO's total capital investment (DERs, aging equipment, new growth), with the potential for a restructuring of planning, investment, and cost recovery to accommodate EVs and V2G.

Impact on Rate Design?



→ Need to better align customer incentives w/ the needs of the grid to dynamically shape customer behavior.

Key Takeaway

→ Over the coming years, EVs and V2G may be the single biggest change to CO energy systems driving peak demand and energy growth and complicating load forecasting and resource planning. Issues surrounding distribution system planning, investment, and cost recovery as well as more dynamic approaches to rate design will also play a critical role requiring new programs and approaches so that EVs and V2G are a substantial benefit, not a cost. I very much look forward to hearing and learning from the panel!

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A Microgrid on Wheels- Can V2H and V2G Applications Transform the Home and the Grid?

- **Evan Belser, Managing Counsel and Policy Strategist, Ford Motor Company**
- Zach Woogen, Senior Policy Manager, Vehicle-Grid Integration Council (VGIC)
- Stephanie Gossman, Director of Electric Transportation, Georgia Power Company

A Microgrid on Wheels- Can V2H and V2G Applications Transform the Home and the Grid?

National Association of Regulatory Utility Commissioners
2023 Summer Policy Summit
Austin, Texas
July 17, 2023

Evan Belser
Policy Strategist and Managing Counsel
Ford Motor Company

600,000 EV Production Run Rate

150,000

F-150 Lightning

North America

150,000

E-Transit

North America & Europe

270,000

Mustang Mach-E

North America, Europe, China & Oceania

30,000

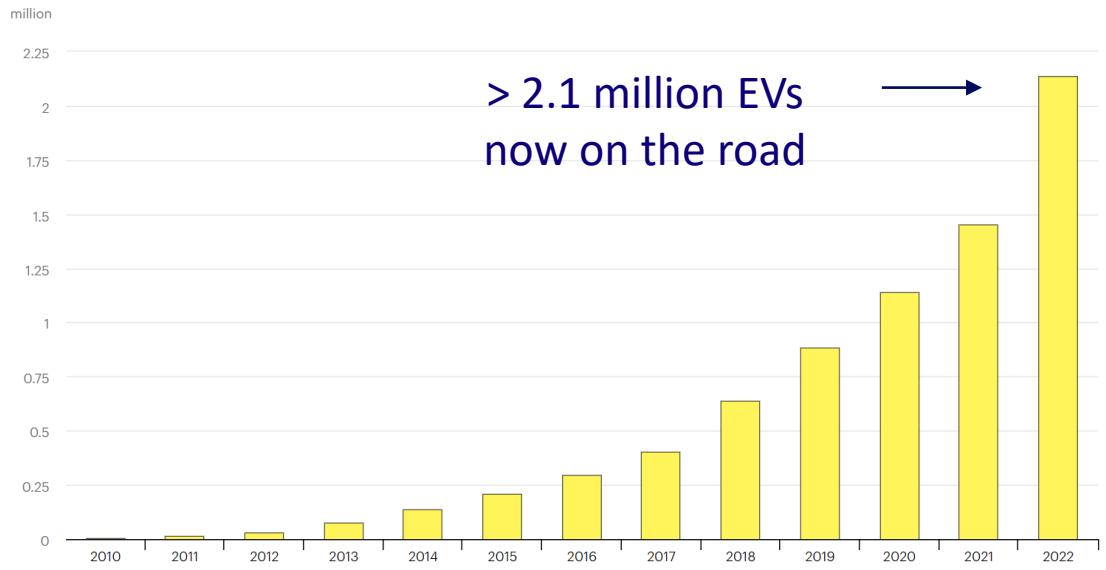
Explorer

Europe

(Production begins 2023 and ramps significantly in 2024)

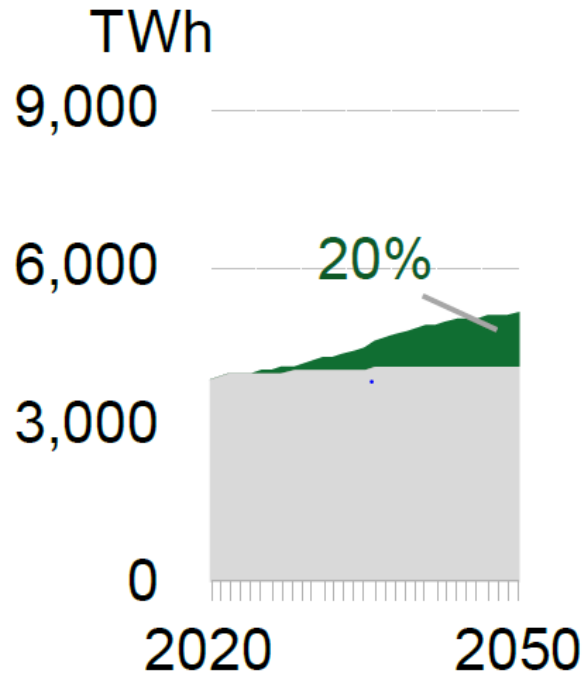
US Stock of Electric Vehicles

International Energy Agency, Global EV Outlook 2023



Additional Electricity Demand from EVs

Bloomberg NEF Electric Vehicle Outlook 2023



US EPA Proposal, by 2032

- ~70% EV penetration for light-duty cars, SUVs, and pickup trucks
- ~40% EV penetration for medium-duty van and pickup trucks


Ford

NARUC Summer Policy Summit

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VGIC
VEHICLE-GRID INTEGRATION COUNCIL

Unlocking EVs as a Strategic Grid Resource

Zach Woogen, Senior Policy Manager of VGIC

July 17, 2023 | NARUC Summer Policy Summit

Vehicle-Grid Integration Council is exclusively focused on unlocking the value of flexible charging and V2X

VGIC:

- Prioritizes integrity and credibility
- Supports collaborative engagement with all VGI champions
- Promotes healthy competition

LEADERSHIP CIRCLE MEMBERS

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HONDA
NISSAN GROUP OF NORTH AMERICA
NUVVE
STELLANTIS
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bp pulse
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Analyze · Simplify · Implement
dcbel
EnergyHub
ENPHASE.
FlexCharging
flo EV Charging
FREEWIRE
Gridwiz
Innovation Core SEI
IoTecha
KALUZA
KITU SYSTEMS
ninedot energy
PEAK POWER
powerflex EDF Renewables
qcells
sunrun
Synop
THE MOBILITY HOUSE
Utilidata
VELOCE
wallbox
WeaveGrid

ASSOCIATE MEMBERS

HOOSIERENERGY
SMUD

What is vehicle-grid integration (VGI)?

VGI encompasses the suite of ways EVs can provide services to the grid and increase the value proposition of EVs:

- V1G: one-direction, managed charging
- V2B/V2H: vehicle used to power a building or home
- V2G: bidirectional charging and discharging for grid services
- Station Demand Management: minimize cost and time for utility infrastructure upgrades
- Integrated DERs: co-located EV charging with solar and stationary energy storage

Why VGI now?

- Accelerate Transportation Electrification
- Support the Decarbonizing Power Sector
- Increase Affordability of Electricity
- Improve Grid Resiliency
- Foster Economic Activity

Since its founding, VGIC has:

- Helped establish the nation's first scalable VGI aggregation program for load reduction and V2G exports *(ELRP)*
- Led partnership to create the nation's first V2G Export Rate *(PG&E DAHRTP Settlement)*
- Helped secure approval of submetering in California, and a path forward for telematics-based VGI in CA and NY *(Submetering Decision)*
- Published tone-setting recommendations for advancing the connection of V2X equipment *(V2X Interconnection Best Practices)*

And much more…

VGI Playbook: opportunities to advance VGI

Charging infrastructure

- Consider and promote VGI strategies alongside charger deployment, not after
- Ensure VGI strategies are included in make-ready program marketing, education, and outreach

Rates

- Offer optional time-varying rate opportunities to manage load
- Offer optional export compensation for V2X and storage-backed charging

VGI forecasting

- Recognize value of flexible charging and discharging in grid planning practices

Grid modernization

- Support non-wires solutions to secondary distribution system upgrades

Programs

- Modify traditional demand response programs to support EVs
- Establish new managed charging, V2X, and tech-agnostic VPP programs for year-round optimization

Submetering and Telematics

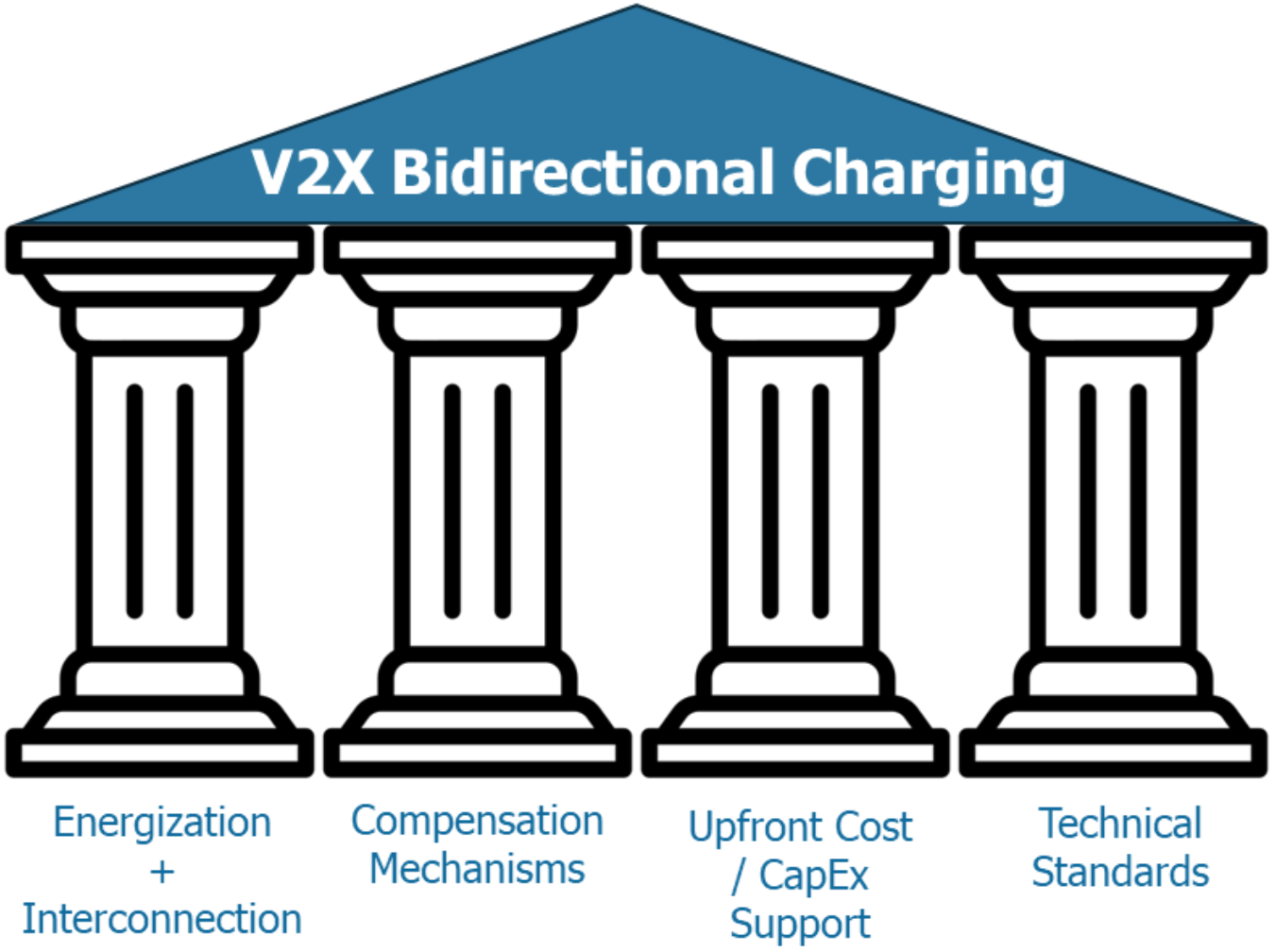
- Develop pathways to submeter using vehicle or charger to increase participation in EV rates and V2X use cases

V2X bidirectional charger interconnection

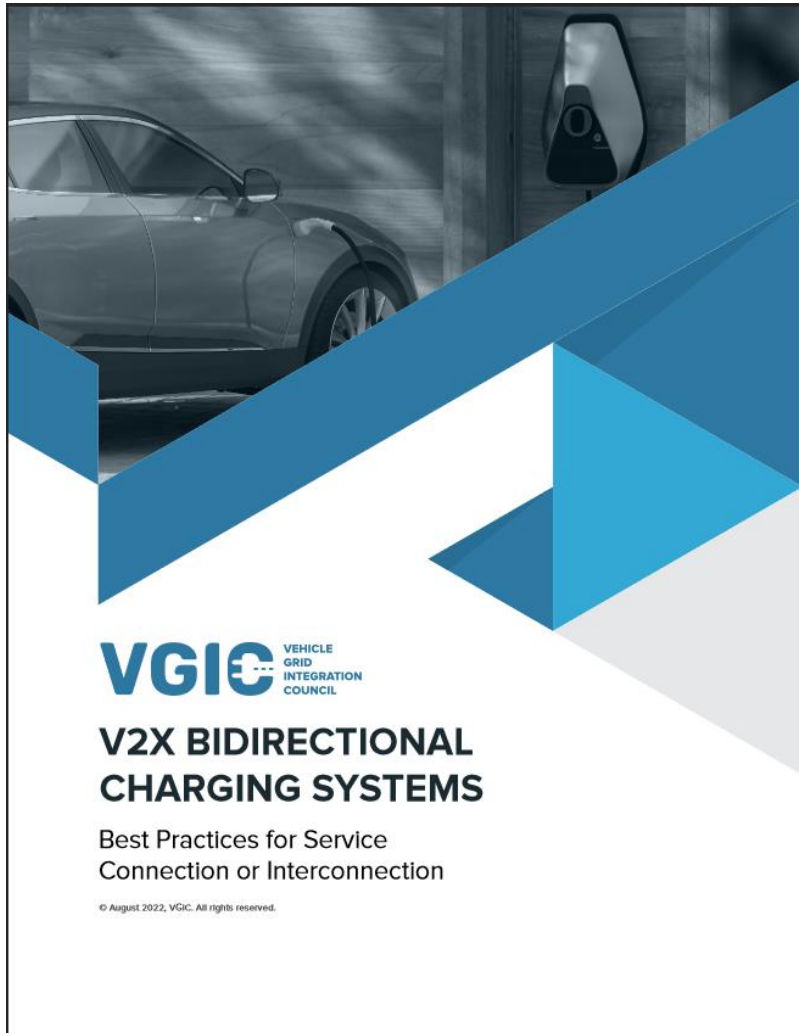
- Adopt streamlined framework for interconnection, leading to lower soft costs and faster deployment

EV and charging providers offering V2X bidirectional charging capabilities today (or soon)

Four Pillars of Unlocking V2X Bidirectional Charging



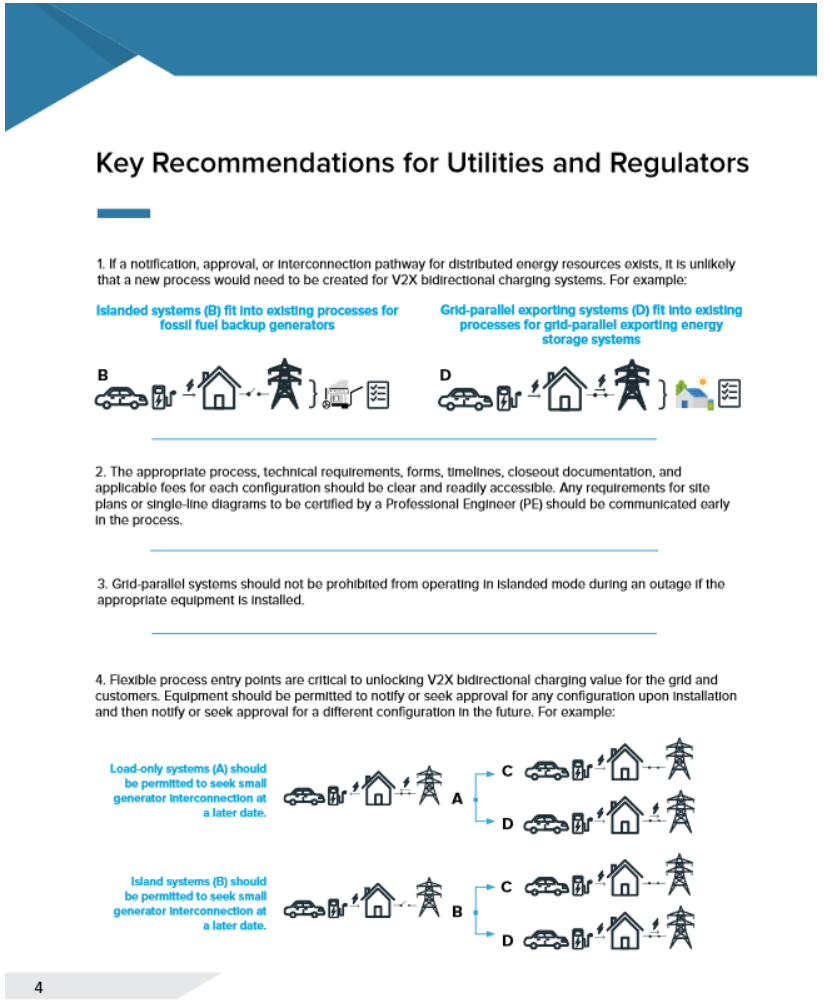
Strategic focus area: V2X EVSE connection and interconnection



VGIC VEHICLE GRID INTEGRATION COUNCIL

V2X BIDIRECTIONAL CHARGING SYSTEMS

Best Practices for Service Connection or Interconnection



Key Recommendations for Utilities and Regulators

1. If a notification, approval, or interconnection pathway for distributed energy resources exists, it is unlikely that a new process would need to be created for V2X bidirectional charging systems. For example:

Islanded systems (B) fit into existing processes for fossil fuel backup generators

Grid-parallel exporting systems (D) fit into existing processes for grid-parallel exporting energy storage systems

B D

2. The appropriate process, technical requirements, forms, timelines, closeout documentation, and applicable fees for each configuration should be clear and readily accessible. Any requirements for site plans or single-line diagrams to be certified by a Professional Engineer (PE) should be communicated early in the process.

3. Grid-parallel systems should not be prohibited from operating in islanded mode during an outage if the appropriate equipment is installed.

4. Flexible process entry points are critical to unlocking V2X bidirectional charging value for the grid and customers. Equipment should be permitted to notify or seek approval for any configuration upon installation and then notify or seek approval for a different configuration in the future. For example:

Load-only systems (A) should be permitted to seek small generator interconnection at a later date. A → C, D

Island systems (B) should be permitted to seek small generator interconnection at a later date. B → C, D

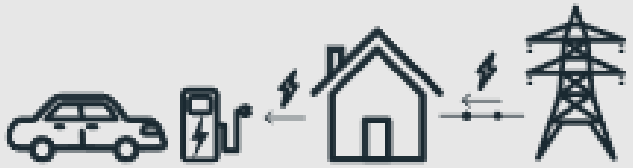
4

https://www.vgicouncil.org/s/VGIC-Special-Initiative-2022.pdf

Common V2X bidirectional charging system configurations

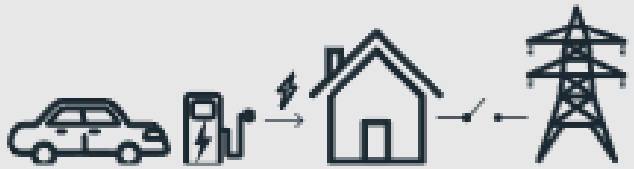
ENERGIZATION:

A. LOAD-ONLY MODE



No generator interconnection and little-to-no review required

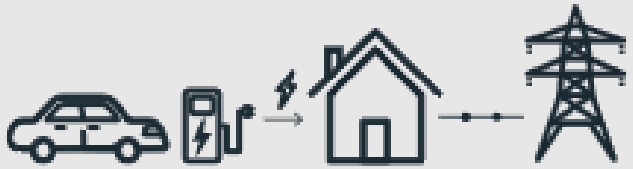
B. ISLANDED (FOR BACKUP)



No generator interconnection and little-to-no review required (e.g., notification-only, similar to fossil-fuel backup generator)

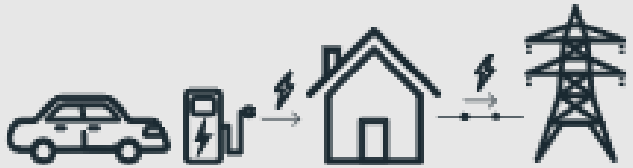
INTERCONNECTION:

C. PARALLEL, NON-EXPORT (discharge < site load)



Can fit within existing non-exporting small generator interconnection frameworks

D. PARALLEL, EXPORT (discharge > site load)



Can fit within existing exporting small generator interconnection frameworks

https://www.vgicouncil.org/s/VGIC-Special-Initiative-2022.pdf

Strategic focus area: V2X compensation

CA Emergency Load Reduction Program – EV/VGI Aggregation Pilot

Resi + Commercial Through 2025

PG&E SB 676 V2X Pilots

Resi + Commercial Through 2025

National Grid Connected Solutions

Commercial Only

NY VDER Tariff: ConEd, O&R, National Grid

Commercial Only

PG&E Commercial Day-Ahead Hourly Real-Time Pricing (DAHRTP) Export Compensation Rate Pilot

Commercial Only Through 2026

SDG&E Proposed Export Compensation Rate

Commercial Only – Timing TBD

VGIC

VEHICLE-GRID INTEGRATION COUNCIL

2023 Annual Member Meeting

Tuesday, October 17, 2023

Newlab Detroit

REGISTER NOW

Thank you!

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

VGIC VEHICLE GRID INTEGRATION COUNCIL

vgicouncil.org

Appendix

VGI Programs on the rise:

California

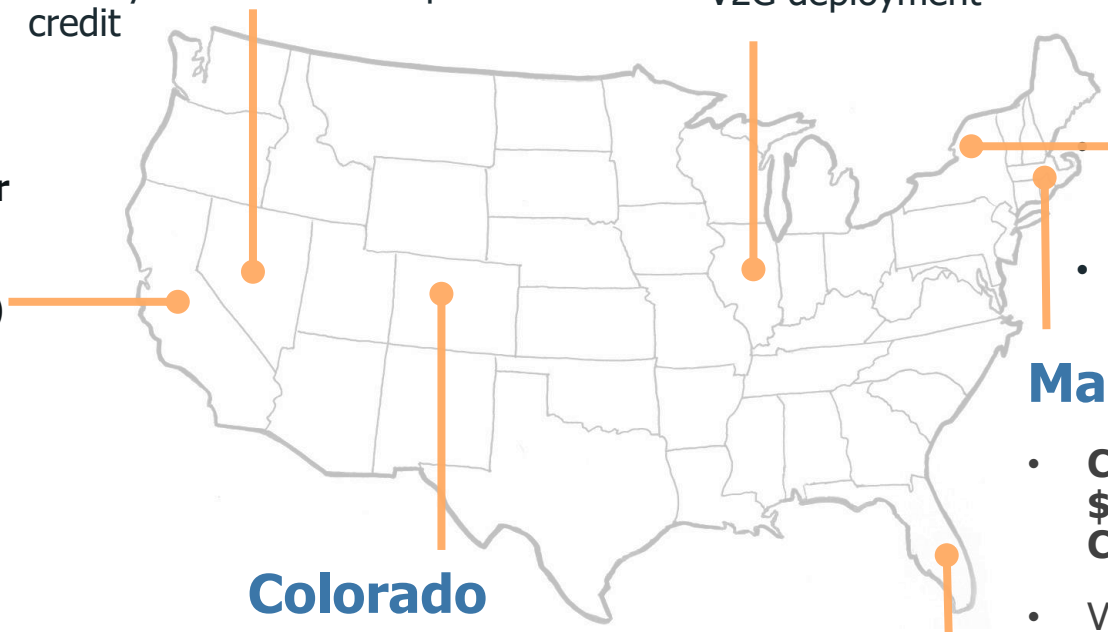
- Codified rules for V2G interconnection
- **Novel EV aggregation program pays $2/kWh for V1G/V2G during extreme load events (Emergency Load Reduction Program)**
- Nation's first export rate designed for EV customers (PG&E DAHRTP)
- Large-scale PG&E pilots for managed charging (evPulse) and V2X (VGI Pilots) across all customer groups
- Several active commercial deployments of V2G school buses (SDG&E)
- Adopted submetering protocol to increase EV rate participation

Nevada

- School bus V2G trial includes battery incentive and export credit

Illinois

- Blue Bird and Nuvve V2G deployment



New York

- **Currently launching mass-market residential managed charging programs, both EV- and charger-based**
- Commercial managed charging programs to launch Q4 2023
- Load factor demand charge alternative rate option to begin 2024/2025

Massachusetts

- **Customers currently earning over $10,000/vehicle/year with V2G in Connected Solutions program**
- VGI-capable (both V1G and V2G) chargers may claim Clean Peak Energy Certificates

Colorado

- Xcel Charging Perks OVGIP Pilot with BMW, Ford, GM, Honda
- V2G chargers can interconnect to the grid
- Fermata and Alliance Center V2B deployment
- Utility funding for EVs includes VGI pilots

Florida

- FP&L subscription-based unlimited off-peak charging program

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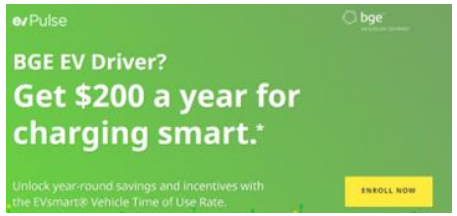
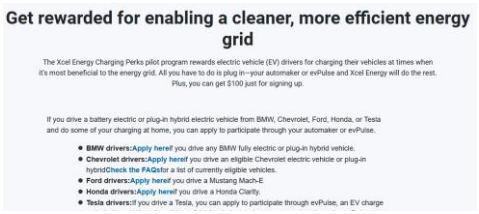
VEHICLE-GRID INTEGRATION COUNCIL

Strategic focus area: Telematics-based VGI and EVSE submetering

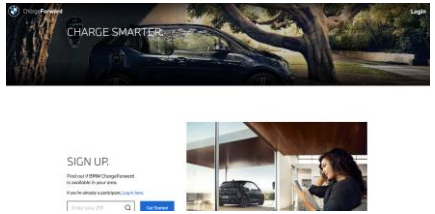
BG&E evPulse



Xcel Charging Perks Pilot



PG&E and BMW ChargeForward



PG&E evPulse

Duke Subscription Pilot

SVCE and MCE Programs

National Grid Charge Smart MA

ConEd and GM Pilot

PCE Telematics Pilot

Connecticut EV Charging Program

SMUD Managed EV Charging Pilot

Colorado Springs Rebate

Strategic focus area: ALM and storage-backed charging

Software-Based ALM (workplace charging, multi-family homes)

1. Instead of each station operating at full power all the time, **stations are controlled individually** based on charging demand.
2. This allows **more charging stations** to be installed while only using a fraction of the aggregate power traditionally required.
3. Businesses shave as much as **60% off** the cost of electrical system upgrades and peak demand charges.

Source: PowerFlex / EDF Renewables

Integrated or Co-Located Energy Storage (fleet depots, public DC fast chargers)

Source: FreeWire Technologies, Inc.

Source: Veloce Energy

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Electric Transportation Overview

Stephanie Gossman
Electric Transportation Manager

July 17, 2023

Georgia Power

More than Light-Duty On-Road Vehicles

80 unique EV on-road models by end of 2023 with many electric school and transit buses coming to Georgia via federal grant funding assistance

Source: EPRI

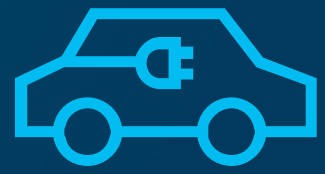
Many Off-Road Options, too

OEMs like John Deere have commitments to go electric, and electric aviation has been announced in Augusta

Powering Georgia's Electric Vehicle Future

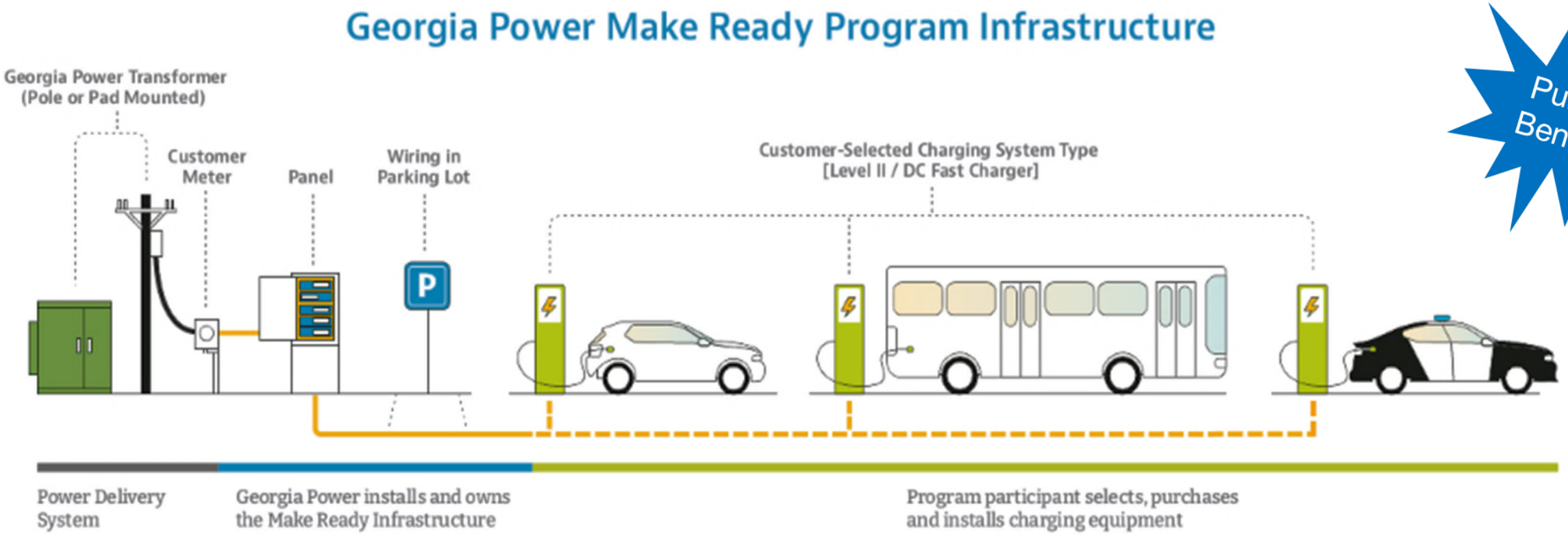
Investing in the Electric Grid

Fueling EVs with Cleaner Energy



Bringing ET Technologies to GA

Make Ready Program



Public Benefit

Includes

ET Charging Infrastructure includes panels, conduit, wiring and associated infrastructure on customer side of the meter.

May Include

Transformers and other power delivery equipment will utilize the standard line extension polices. Any additional upgrade costs may be covered through Make Ready program.

Does Not Include

- Charger equipment, future proofing
- Painting, wheel stops, bollards, etc.
- Restricted Access Chargers Outside Publicly Owned Fleets

Thank You

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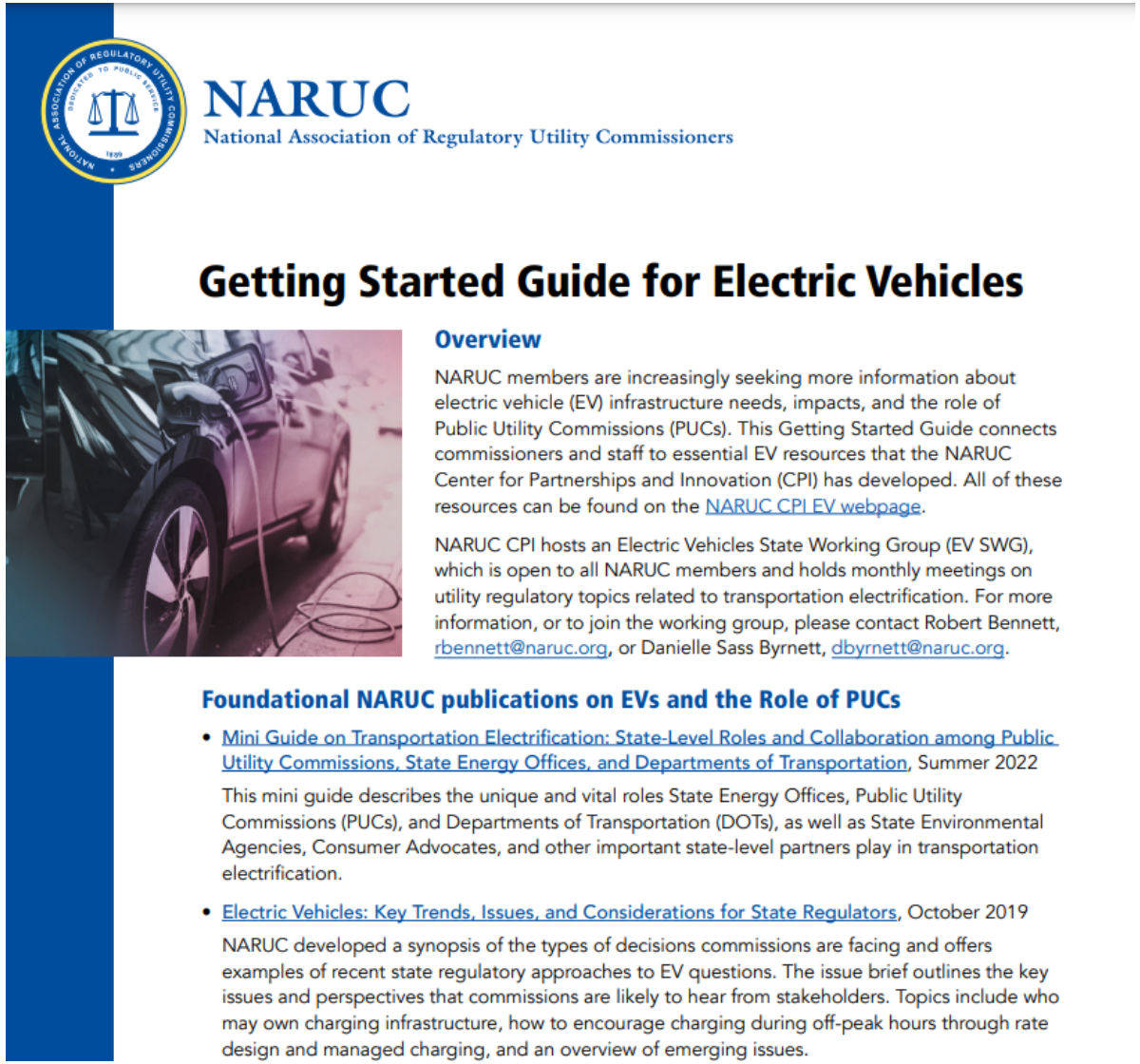
NARUC Summer Policy Summit

New Resource from the NARUC Center for Partnerships and Innovation:

Getting Started Guide for Electric Vehicles

July 2023



NARUC
National Association of Regulatory Utility Commissioners

Getting Started Guide for Electric Vehicles

Overview

NARUC members are increasingly seeking more information about electric vehicle (EV) infrastructure needs, impacts, and the role of Public Utility Commissions (PUCs). This Getting Started Guide connects commissioners and staff to essential EV resources that the NARUC Center for Partnerships and Innovation (CPI) has developed. All of these resources can be found on the NARUC CPI EV webpage.

NARUC CPI hosts an Electric Vehicles State Working Group (EV SWG), which is open to all NARUC members and holds monthly meetings on utility regulatory topics related to transportation electrification. For more information, or to join the working group, please contact Robert Bennett, rbennett@naruc.org, or Danielle Sass Byrnett, dbyrnett@naruc.org.

Foundational NARUC publications on EVs and the Role of PUCs

- Mini Guide on Transportation Electrification: State-Level Roles and Collaboration among Public Utility Commissions, State Energy Offices, and Departments of Transportation, Summer 2022

  This mini guide describes the unique and vital roles State Energy Offices, Public Utility Commissions (PUCs), and Departments of Transportation (DOTs), as well as State Environmental Agencies, Consumer Advocates, and other important state-level partners play in transportation electrification.

- Electric Vehicles: Key Trends, Issues, and Considerations for State Regulators, October 2019

  NARUC developed a synopsis of the types of decisions commissions are facing and offers examples of recent state regulatory approaches to EV questions. The issue brief outlines the key issues and perspectives that commissions are likely to hear from stakeholders. Topics include who may own charging infrastructure, how to encourage charging during off-peak hours through rate design and managed charging, and an overview of emerging issues.

NARUC Summer Policy Summit

Thanks for attending. The next session begins at 1:45 p.m.