## NARUC Electric Vehicles State Working Group

MARCH MEETING - MITIGATING ADVERSE GRID IMPACTS AND EXTRACTING VALUE MARCH 28, 2023

## Welcome

#### EV SWG Chair

#### Commissioner Katherine Peretick, Michigan Public Service Commission

#### EV SWG Vice-Chair

#### Chair Jason Stanek, Maryland Public Service Commission

NARUC Staff

• Danielle Sass Byrnett, Robert Bennett

Feel free to enter questions into chat at any time

3:00 PM 3:05 PM	<ul> <li>Welcome and Announcements – Commissioner Katherine Peretick (5 minutes)</li> <li>Agenda review</li> <li>Announcements</li> <li>Setting the Stage- Chris Irwin, Program Manager for Transactive Energy, Communications and Interoperability in Smart Grid, DOE OE (3-5 minutes)</li> </ul>	
3:10 PM 3:25 PM	<ul> <li>Presentation: Muffi Ghadiali, Head of Ford Pro Charging (15 minutess)</li> <li>Vehicle 2 Grid (V2G) Impacts</li> <li>Presentation: Steve Letendre, PhD, VP, Policy and Regulatory Affairs, Nuvve Holding Corporation (15 minutes)</li> <li>Smart Charging (V1G) impacts</li> </ul>	Agenda
3:40 PM	<ul> <li>Q&amp;A (20 minutes)</li> <li>Speakers will take questions from working group members</li> </ul>	
4:00 PM	<ul> <li>Closed Door Discussion &amp; Peer Sharing (20 minutes)</li> <li>Introductions: name, state, role,</li> <li>Working group members will discuss their own views and the actions their states have taken to date.</li> </ul>	
4:30 PM	Adjourn	

## Federal Updates

#### Please see the email from March 20<sup>th</sup>, for more info on:

- The U.S. Department of Transportation's (DOT) Federal Highway Administration (FHWA) recently announced the <u>Notice of Funding Opportunity for the Charging and Fueling Infrastructure (CFI)</u> <u>Discretionary Grant Program</u>. This round of funding makes up to \$700 million from Fiscal Years 2022 and 2023 funding available to strategically deploy EV charging and other alternative vehicle-fueling infrastructure projects in publicly accessible locations in urban and rural communities, as well as along designated Alternative Fuel Corridors.
- Consider signing up for the DOE Joint Office of Energy and Transportation email list to receive important updates including information about past and upcoming Joint Office Webinars. <u>https://driveelectric.gov/</u>
- ▶ The White House announced a new initiative, the EV Call to Action Challenge. This is a call for stakeholders to make independent commitments to support the transition to EVs across four categories: (1) tools and resources, (2) consumer education and support, (3) EV fleet expansion, (4) community charging. The White House will be highlighting commitments on a rolling basis starting with submissions received by Friday, March 24, 2023.

## Welcome

#### Moderator: Commissioner Katherine Peretick, Michigan Public Service Commission

Panelists

- Chris Irwin, DOE OE
- Muffi Ghadiali, Ford Pro Charging
- Steve Letendre, Nuvve Holding Corporation









#### U.S. DEPARTMENT OF ENERGY **EVGrid Assist** ACCELERATING THE TRANSITION

#### Mitigating Impacts and Extracting Value Range of Options

March 28, 2023

Christopher Irwin, U. S. DOE Office of Electricity



#### **Transportation Electrification is Imminent**

- Millions of vehicles will be connecting the grid in coming years
- Its important to understand our destination now to chart the best paths
  - To harness the value for consumers and utilities
- There is a span of approaches, and we will probably use all of them





#### No guarantees, but enormous potential

- EPRI staff made a "back of the napkin" estimate of the aggregate battery capacity of future EV populations.
- IF those EV's are V2G capable, they can export to the grid as much as they can draw from the grid.
- Even with discounts in the assumptions, it's a very large LOAD OR RESOURCE.



#### EPRI US V2G Capacity Potential Projection





### **Approaches Span a Range of Options**

- Vehicle Grid Integration CAN and WILL start simply
- Higher penetrations make more complex integrations worth the effort
  - (Grid appetite for control services grows)
- Complexity will be invisible to most participants, but especially the consumer
- Customer-owned EV's won't work
   for free



COMPLEXITY





#### A note about grid services...







# To Contact EVGrid Assist: EVGrid@hq.doe.gov

# **THANK YOU**



# **Commercial Electrification Perspectives**

Muffi Ghadiali General Manager Ford Pro Charging Mainstream Commerical Vehicles Are Now Electrified

> Mobile Service

PRO

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Illium

HIL HILL





Electric Vehicles and Charging Forc

PRO

cannot be separated





~ 60% of Fleet Managers Say Transitioning to EVs is a Headache

#### **Customers face Cost and Operational Challenges**



"We're not going 100% electric instantly, need a transition plan. We need to start now"

> Operations Director Utility Fleet

"We need integration across vehicles, chargers and how our fleet operates"

> Director of Transportation School District

"If we cannot control demand charges, electricity is more expensive than diesel"

> Fleet Operations Manager Transit Bus Operator

Operational risks and energy costs are the new roadblocks to fleet electrification

### Providing a Complete Solution





## Opportunities, and help needed

 Enable a seamless transition for customers with holistic vehicle-grid solutions

 Focused regulatory and technical policies that leverage V2G, V2X, Demand Response etc. and mitigate grid impact

 Incentives and new value streams that are designed for commercial and fleet customers





**PRO**<sup>m</sup>

# NUVE

#### INTELLIGENTLY ELECTRIFYING THE PLANET

#### Mitigating Adverse Grid Impacts and Extracting Value: NARUC Electric Vehicle State Working Group

STEVE LETENDRE, PhD VP, POLICY AND REGULATORY AFFAIRS MARCH 28, 2023

## A GLOBAL FOOTPRINT

- Headquartered in San Diego, CA
- Offices in Newark (Delaware), London, UK, and Copenhagen, Denmark
- 50+ employees
- 25+ years of V2G R&D
- 6+ years of continuous V2G commercial operations in Denmark
- US focus on electric school bus market





## **Renewable Grid Needs Storage**



 NREL's Storage Future Series estimates that 6.0 TWh of energy storage needed for zero carbon grid.



• Over 90% of lithium-ion batteries will be in EVs.



# From Drain to Gain: Mitigating the Impacts of EV adoption on the grid

### Managed Charging

V1G & Grid Services V2G & Grid Services

NUVVE

23

## **Vehicle-to-Grid V2G**

Nuvve controls power flow in and out of EV chargers and creates a <u>V</u>irtual <u>P</u>ower <u>P</u>lant or **VPP** out of many small EV batteries to deliver energy services.



## V2G-AC vs. V2G-DC

#### V2G-AC (2 - 3 years)



V2G-DC (today) EV DC AC **CCS** Connector Or CHAdeMO **Bi-directional** inverter Description Power conversion <u>off-board</u> the vehicle **Advantages** Interconnection process is straight forward as inverter is off-board Disadvantages Station and installation is more expensive





to install

Disadvantages

## **The Importance of Bi-directional Charging**

- Reduce the overall cost of ownership by unlocking the value that EVs provide as grid resources.
- Supporting the integration of variable sources of generation including wind and solar.
- Displace the need for stationary storage resources and the associated raw materials needed for their manufacture.
- Enhance grid flexibility through V2G dispatch during periods of extreme grid strain avoiding regional power outages.
- Providing resilience using EV with V2G during grid outages meeting essential loads at critical facilities.



NUVVE

## NUVVE'S COMMERCIAL V2G WITH SCHOOL BUSES

THE LION ELECTRIC CO'

• Standard V2G School Buses are available with CCS plugs



**BLUE BIRD** 

- Nuvve through our JV, Levo Mobility, offers a complete V2G fleet solution:
  - Buses
  - Chargers
  - Installation
  - Financing











## **Deployments Under Construction / Planned**

- Cajon Valley
  - SDG&E territory
  - 6 DCFC & 6 Lion Electric buses
  - Participated in summer 2022 ELRP
- Ramona USD
  - SDG&E territory
  - 8 DCFCs & 8 Blue Bird buses
  - Recently gained PTO and will enroll in 2023 ELRP.
- San Diego USD
  - SDG&E territory
  - 3 DCFCs, 13 L2 and 3 Blue Bird buses, 10 IC buses
- Suffolk Transportation Services
  - PSEG LI territory
  - 11 DCFCs and 11 Blue Bird buses
  - Waiting on final construction and PTO

## **Policy Priorities**

- ✓ Create <u>incentives</u> for V2G deployments and <u>compensation mechanisms</u> that represent the full stack of values that TE and V2G offers.
- ✓ Streamline interconnection standards and processes for V2G.
- ✓ Include V2G in grid impact studies and resource planning activities.
- ✓ Help "future proof" policies to incorporate bi-directional capabilities into infrastructure planning processes and funding.
- Expedite the development and implementation of V2G-related specifications and technical standards.



# **THANK YOU**

Contact: Steve Letendre, PhD <u>sletendre@nuvve.com</u> 802-779-3580

V2G charging solutions: <u>https://nuvve.com/contact/</u>



NUVVE.COM

## Questions?

Raise your hand to ask a question or type a question into the question box

## Introductions

Please share your name, role, time at the commission, time on the working group 

- Arizona ٠
- California ٠
- Colorado ٠
- Connecticut ٠
- District of Columbia Louisiana ٠
- Delaware ٠
- Florida ٠
- Georgia ٠
- Hawaii •

- Idaho
- Illinois
- Indiana
- Kentucky
- - Massachusetts
  - Maryland
  - Maine
  - Michigan

- Minnesota ٠
- Missouri
- New Mexico
- New York
- North Carolina
- Nevada
- Ohio
- Oregon
- Oklahoma

- Pennsylvania
- Puerto Rico
- Rhode Island
- South Carolina
- Texas
- Utah
- Vermont
- Washington
- Wisconsin

Please send any feedback or inquiries to <u>rbennett@naruc.org</u>

Next EV SWG meeting: Tues, April 25<sup>th</sup>, at 3pm ET

<u>WWW.NARUC.ORG/CPI-1/ENERGY-</u> <u>INFRASTRUCTURE-</u> <u>MODERNIZATION/ELECTRIC-</u> <u>VEHICLES/</u>

## Appendix: Resources for Reference

- DOE's EV Grid Assist webinar series (June November) recordings are posted at: <u>www.energy.gov/eere/evgrid-assist-accelerating-transition</u>
- Presentations and recordings of past EVSWG events are available on the NARUC website: <u>www.naruc.org/cpi-1/energy-infrastructure-</u> <u>modernization/electric-vehicles/</u>
- EVSWG Listserv: <u>NARUC-EVSWG@lists.naruc.org</u>
- ICYMI 4 NARUC EV publications released late 2022:
  - Models for Incorporating Equity in Transportation Electrification
  - Electric Vehicle Interoperability: Considerations for Public Utility Regulators
  - Considering Interoperability for Electric Vehicle Charging: A Commission Case Study
  - <u>Transportation Electrification: State Level Roles and Collaboration among Public Utility Commissions,</u> <u>State Energy Offices, and Departments of Transportation</u>