NARUC Electric Vehicles
State Working Group

APRIL MEETING
APRIL 28, 2020
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 PM</td>
<td>Welcome and Introductions (10 minutes)</td>
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<tr>
<td></td>
<td>• Agenda review</td>
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<td>• Roll call, by state</td>
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<tr>
<td>3:10 PM</td>
<td>Presentation: The Brattle Group (15 minutes)</td>
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<tr>
<td></td>
<td>• Ryan Hledik, Principal, and Tony Lee, Consultant, will present on managed charging of EVs.</td>
</tr>
<tr>
<td>3:25 PM</td>
<td>Presentation: Avista Utilities (15 minutes)</td>
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<tr>
<td></td>
<td>• Mike Vervair, E-Mobility Engineer, will present on Avista’s EV managed charging pilot program.</td>
</tr>
<tr>
<td>3:40 PM</td>
<td>Presentation: Electric Power Research Institute (15 minutes)</td>
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<tr>
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<td>• Dan Bowermaster, Program Manager for Electric Transportation, will present on vehicle-to-grid (V2G) technology and capabilities.</td>
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<tr>
<td>3:55 PM</td>
<td>Closed Door Discussion (30 minutes)</td>
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<td>• Working group members will discuss their own views and the actions their states have taken to date.</td>
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<tr>
<td>4:25 PM</td>
<td>Next Steps and Announcements (5 minutes)</td>
</tr>
<tr>
<td>4:30 PM</td>
<td>Adjourn</td>
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</table>
Working Group Members

States:
- Arizona
- California
- Colorado
- Connecticut
- D.C.
- Florida
- Georgia
- Hawaii
- Illinois
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New Jersey
- New York
- North Carolina
- Ohio
- Oregon
- Puerto Rico
- South Dakota
- Texas
- Vermont
- Washington
- Wisconsin

National/Federal Partners:
- NARUC
- U.S. DOE
- U.S. EPA
Managed Charging and V2G

Preparation Questions

- Does your state have any programs for the active management of EV charging?
- If so, how is charging managed? How are customers compensated?
- Has your commission or any utility in your state explored V2G?

Pre-Read Materials

  - Managed Charging: p. 35-36
  - Vehicle-to-Grid: p. 38
Electric Vehicle Managed Charging

CONSIDERATIONS FOR AN EMERGING OPPORTUNITY

PRESENTED TO
NARUC EV Working Group

PRESENTED BY
Ryan Hledik
Tony Lee

April 28, 2020
Why managed charging?

**Unmanaged charging is expensive**
- 20 million EVs = approx. **$100 billion** in infrastructure investment
- Need for new power plants, transmission and distribution infrastructure, customer hardware...

**Consumers will benefit**
- Reduced charging costs
- Streamlined home charger installation

**The environment can also benefit**
- If charging is scheduled to reduce renewables curtailment and avoid hours supplied by high-emitting resources
There are only 1.5 million EVs on the road… so why worry about managed charging now?

Technological disruption can happen quickly


EV share of new vehicles sold in Santa Clara County, CA in 2018: >20%
Advantages of EVs

- Lower fuel cost
- Minimal maintenance
- Clean
- Quiet
- Fun to drive
- Can fuel at home

All of these advantages are permanent

Advantages of ICE vehicles

- Lower up-front purchase price
- Dependable fueling infrastructure (no range anxiety)
- Consumer confidence in reliable, proven technology
- Diverse model availability

How long will these advantages last?

There are only 1.5 million EVs on the road... so why worry about managed charging now?
"Active" vs "passive" managed charging: What’s the difference?

<table>
<thead>
<tr>
<th>Active Managed Charging</th>
<th>Passive Managed Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated dispatch signal</td>
<td>Time-varying retail rates</td>
</tr>
<tr>
<td>“Direct load control”</td>
<td>Peak time rebates</td>
</tr>
<tr>
<td>Vehicle-to-grid or vehicle-to-home (backup power)</td>
<td>Timer-based charging</td>
</tr>
</tbody>
</table>
“Active” vs “passive” managed charging: Advantages of each

**Active Managed Charging**
- Flexibility and precision in managing load
- Real-time control of individual chargers across system
- More value through wider variety of grid services

**Passive Managed Charging**
- Lower deployment cost (if AMI has been adopted)
- Greater customer control
- Significant industry experience with TOU rates, and demonstrated ability to significantly shift EV load
“Active” vs “passive” managed charging: Current landscape

Active Managed Charging

Utility Managed Charging Pilots

- Avista’s EVSE Pilot achieved 75% of load shifting to off-peak hours

- PG&E: Demonstrated ability to shift load to hours with renewables curtailment.
- SCE: Commercial & apartment EV charging loads reduced by 42% during DR events.
- SMUD: Managed charging reduces charger integration costs by avoiding transformer upgrades

Passive Managed Charging

Share of Residential Customers Offered Time-Varying EV Rate
Offered by 50 utilities across 26 states

What should happen next?

**Two no-regrets opportunities:**

**Utility-specific EV load flexibility potential studies**
- What are the incremental system costs of EV adoption?
- What are the options for avoiding these costs?
- Which managed charging options are most cost-effective?

**Managed charging pilots**
- Address significant gaps in research and technology
- Do it while there’s still time
Illustrating the benefit of EV managed charging potential studies

What is the ideal way to manage charging on this system?

1. Low EV charging load during system peak (4-5 pm), with modest contributions to the need for new generation capacity.

2. Evening spike (10 pm) could require distribution upgrades (especially with geographically-clustered adoption), exceeding generation capacity costs.
Additional Brattle research in this area...
Ryan Hledik specializes in regulatory and planning matters related to the emergence of distributed energy technologies.

Mr. Hledik has consulted for more than 50 clients across 30 states and 9 countries. He has supported his clients in matters related to energy storage, load flexibility, distributed generation, electrification, retail tariff design, energy efficiency, and grid modernization.

Mr. Hledik’s work has been cited in regulatory decisions establishing procurement targets for energy storage and demand response, authorizing billions of dollars in smart metering investments, and approving the introduction of innovative rate designs. He is a recognized voice in debates on how to price electricity for customers with distributed generation. He co-authored Saudi Arabia’s first Demand Side Management (DSM) plan, and the Federal Energy Regulatory Commission’s landmark study, A National Assessment of Demand Response Potential.

Mr. Hledik has published more than 25 articles on retail electricity issues and has presented at industry events throughout the United States as well as in Brazil, Belgium, Canada, Germany, Poland, South Korea, Saudi Arabia, the United Kingdom, and Vietnam. His research on the “grid edge” has been cited in The New York Times and The Washington Post, and in trade press such as GreenTech Media, Utility Dive, and Vox. He was named to Public Utilities Fortnightly’s Under Forty 2019 list, recognizing rising stars in the industry.

Mr. Hledik received his M.S. in Management Science and Engineering from Stanford University, where he concentrated in Energy Economics and Policy. He received his B.S. in Applied Science from the University of Pennsylvania, with minors in Economics and Mathematics. Prior to joining Brattle, Mr. Hledik was a research assistant with Stanford’s Energy Modeling Forum and a research analyst in Charles River Associates’ Energy Practice.

The views expressed in this presentation are strictly those of the presenter(s) and do not necessarily state or reflect the views of The Brattle Group, Inc. or its clients.
Tony Lee is a Consultant in The Brattle Group’s San Francisco office. He specializes in wholesale market design, environmental policy analysis, resource planning, and economic analysis of generation, transmission, and demand-side resources. He has extensive experience developing and operating economic models of electricity systems. Mr. Lee holds a B.A. in Economics and a B.S. in Engineering, both from Swarthmore College.
Bibliography


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THE POWER OF ECONOMICS

brattle.com
Electric Vehicle Supply Equipment (EVSE) Pilot

Home stations: 92 networked and 114 non-networked

Workplaces, Fleets and MUDs: 104 networked and 63 non-networked

Public: 37 networked and 9 non-networked

7 DC Fast Chargers

EVSP platform

User Web Portal

Utility Web Portal
Typical residential driver session (Dx level impact)

Residential EVSE demand without DR

Graph showing the demand for EVSE over time from 3:30 PM to 7:55 PM, with a peak demand at 4:45 PM and a sharp drop at 5:00 PM.
Avista baseline residential profile (system capacity impact)

![Daily Residential EV Profile](image)

- $n_{\text{days}} = 40,624$
- $n_{\text{sessions}} = 36,279$
- $n_{\text{drivers}} = 104$
## Residential DR goals and path

<table>
<thead>
<tr>
<th>Objective</th>
<th>Method</th>
</tr>
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<tbody>
<tr>
<td>Determine how much load, energy can be shifted to off peak</td>
<td>Send curtailed load profiles during peak hours via OCPP, track meter data</td>
</tr>
<tr>
<td>Maintain high customer satisfaction levels</td>
<td>Maintain transparent communications and roll out in phases to ensure kinks worked out</td>
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<tr>
<td></td>
<td>Conduct period surveys and interviews and adjust based on feedback</td>
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<tr>
<td></td>
<td>Give customers ability to opt out of DR events via phone app and track opt outs</td>
</tr>
<tr>
<td>Use information in cost-benefit analysis for future program</td>
<td>Add data to Ratepayer Impact Measurement and Regional Perspective Cost models</td>
</tr>
<tr>
<td>Communications framework</td>
<td>Communications pathways</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>OpenADR</td>
<td>Pathway agnostic</td>
</tr>
<tr>
<td>ISO 15118</td>
<td></td>
</tr>
<tr>
<td>IEEE 2030.5</td>
<td></td>
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<tr>
<td>Web portal (manual)</td>
<td></td>
</tr>
<tr>
<td>OCPP</td>
<td>Wi-Fi</td>
</tr>
<tr>
<td>OCPI</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Proprietary</td>
<td>PLC</td>
</tr>
<tr>
<td></td>
<td>Cellular</td>
</tr>
</tbody>
</table>

- Used in Avista DR pilot
Residential DR rollout

- Customers rolled out in multiple waves
- Minor delays experienced due to changes in station messaging
- 92 residential networked EVSEs were sent DR requests daily, although not all requests received due to connectivity challenges
- Small scale DR testing at workplace and fleet locations during winter mid-morning peak
Opting out of residential DR events

Residential Opt Outs

- No: 90%
- Yes: 10%

$n_{sessions} = 1,876$

Distribution of Residential Opt Outs

- Driver1: 5%
- Driver2: 3%
- Driver3: 2%
- Driver4: 2%
- Driver5: 5%
- Driver6: 2%
- Driver7: 25%

$n_{opt\,outs} = 281$
Individual residential DR session impact

Figure 3: Example DR charging session with 75% peak load reduction
Baseline:
\[ n_{\text{days}} = 15,715 \]
\[ n_{\text{sessions}} = 12,976 \]

DR:
\[ n_{\text{days,DR}} = 3,143 \]
\[ n_{\text{sessions}} = 1,876 \]
Fleet DR and Baseline Profile Comparison

DR:
- $n_{\text{days}} = 398$
- $n_{\text{sessions}} = 1614$
- $n_{\text{ports}} = 4$

Baseline:
- $n_{\text{days}} = 91$
- $n_{\text{sessions}} = 202$
- $n_{\text{ports}} = 4$

Workplace DR and Baseline Comparison

DR:
- $n_{\text{days}} = 478$
- $n_{\text{sessions}} = 453$
- $n_{\text{ports}} = 4$

Baseline:
- $n_{\text{days}} = 289$
- $n_{\text{sessions}} = 277$
- $n_{\text{ports}} = 4$
Effect of DR on Fully Charging PEVs

- Fleet Location:
  - Before DR: 78%
  - After DR: 72%

- Workplace Location:
  - Before DR: 42%
  - After DR: 84%

$n_{\text{sessions}} = 2,546$
Avista customer perspective costs and benefits without managed charging (2019-2038)

- Costs and Benefits (NPV 2019$)
  - Costs: $917, T&D Cost: $38, Gen Cap Cost: $648
  - Benefits: $2,809

Net Benefit: $1,206

Charts show costs and benefits with different categories.
Avista customer perspective costs and benefits with managed charging (2019-2038)
Opportunities for improvements: O&M and reliability

<table>
<thead>
<tr>
<th></th>
<th>Installation cost per port</th>
<th>Annual O&amp;M per port</th>
<th>% uptime</th>
<th>% online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential AC Level 2 - networked</td>
<td>$2,445</td>
<td>$370</td>
<td>98%</td>
<td>66%</td>
</tr>
<tr>
<td>Commercial AC Level 2 - networked</td>
<td>$6,035</td>
<td>$600</td>
<td>86% - 93%</td>
<td>76% - 86%</td>
</tr>
<tr>
<td>DC fast charging site</td>
<td>$128,084</td>
<td>$1,550</td>
<td>87%</td>
<td>87%</td>
</tr>
<tr>
<td>Residential AC Level 2 – non-networked</td>
<td>$1,766</td>
<td>$5</td>
<td>100%</td>
<td>NA</td>
</tr>
<tr>
<td>Commercial AC Level 2 – non-networked</td>
<td>$4,472</td>
<td>$185</td>
<td>99%</td>
<td>NA</td>
</tr>
</tbody>
</table>

Network switching

- To avoid “vendor lock” and to verify interoperability capabilities, Avista switched EVSP networks on L2 stations
- A total of 15 commercial L2 stations changed networks without swapping stations
- Tiered approach: some stations had HD, modem and / or SIM card swapped
- Worked with EVSP and HW manufacturer to switch 2 stations completely OTA
Questions?

Get a copy of Avista’s EVSE pilot project report by Googling “Avista EVSE report” or at www.myavista.com

Contact me at Michael.Vervair@avistacorp.com for further questions
Electric Transportation

State of the EV market and Vehicle-Grid Integration

Dan Bowermaster
Sr. Program Manager, Electric Transportation
dbowermaster@epri.com

NARUC Webinar
April 28, 2020
EPRI conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public.

EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including reliability, efficiency, affordability, health, safety and the environment.

- EPRI members represent 90% of the electricity generated and delivered in the United States with international participation extending to nearly 40 countries.

Social Media: Facebook | LinkedIn | Twitter | YouTube
Electric Transportation is a global market

Europe (2019): 3.6%
- Norway (53.9%)
- Iceland (25%)
- Sweden (11%)
- Switzerland (5.5%)
- Denmark (4.3%)
- Germany (4%)
- France (3.4%)
- Belgium (3.2%)

The future has more uncertainty than ever
But purchasing decisions are made locally
Adoption - What does it take for a customer to buy an EV?

1. Automotive OEMs
2. Car dealers
3. Customers
   - Does it meet my needs?
   - Do I like it?
   - Can I afford it today?
   - How do I fuel it?

Wild card: impact of COVID 19 and recession?

Of the top 25 best-selling cars, only one has a plug-in option today
New EV Registrations in 2019

Regions of interest:

Western US*: California, Oregon, Washington
Eastern US*: DC, Maryland, Massachusetts, New York, North Carolina, Virginia
Mountain West, Midwest, & Texas*: Colorado, Idaho, Kansas, Nebraska, Texas
Great Lakes**: Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, Wisconsin
South & Southeast US**: Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, South Carolina, Tennessee

* Regions based on states that contained a ‘Top 15’ county over any of the 4 quarters of 2019
** Regions selected to cover additional areas of the US

Source: InsideEVs.com; IHS/Polk, 2020.
New EV Registrations 2019
Western US: California, Oregon, Washington

Region covers 133 counties
79 counties have market shares exceeding US national average
13 counties have market shares exceeding regional average

National average 1.9%
Regional average 6.8%

Source: InsideEVs.com; IHS/Polk, 2020.
EPRI Consumer Guide to EVs – out now

Source: 2020 EPRI Consumer's Guide to EVs,
Source: 2020 EPRI Consumer’s Guide to EVs.

Changes:
• Updated format
• MSRP included
• New icons for BEV, PHEV and vehicle type

Under evaluation:
• Online and mobile versions
• Translation into Spanish
More electric crossovers, SUVs, and trucks are coming in 2020-2021

Photos: Cedric Daniels, Alabama Power, a division of Southern Company (January 2020); Dan Bowemaster EPRI (November 2019)
The bulk of EV charging in US will be done at home and work (AC). Public charging is largely DC fast charging.

Public (DC) charging (~5-10%) – SRP, 2018 3%
- Necessary for adoption of BEVs (not PHEVs)
- Four challenges:
  1. Separate networks
  2. Different plugs
  3. Infrastructure costs, rates, utilization
  4. Increasing power levels

Workplace charging (~15%) – SRP, 2018 16%
- Extends electric range of PHEVs, short-range BEVs
- Minimal distribution grid impacts
- One plug
- Challenges with parking and accessibility

Home charging (75-80%) – SRP, 2018 81%
- Many customers charge at 120V AC or use an existing 240V dryer outlet
- Minimal distribution grid impacts
- Existing infrastructure companies serve this market
- Opportunities for TOU rates, smart charging, and further customer study
- ~2,800 kWh/residential EV/year
North American utilities are proposing ~$3B in EV charging infrastructure

Key Challenges
- EV awareness
- Customer education
- Easy and reliable public charging infrastructure (to find, access, use, and pay)

Legend (Budget $)
- Make-ready / rebate: $0.4M
- Utility-owned: $8M
- Hybrid: $72M

Updated: 4/13/2020; Source: North American Utility Electric Transportation Charging Infrastructure Program Overview - 2019 status
Public Charging Infrastructure Density is Increasing

Source: PlugShare, February 2020
DC charging power is increasing
Market trends are leading to higher power DC fast charging

<table>
<thead>
<tr>
<th>Power (kW)</th>
<th>Year</th>
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<tbody>
<tr>
<td>0</td>
<td>2011</td>
</tr>
<tr>
<td>50</td>
<td>2012</td>
</tr>
<tr>
<td>100</td>
<td>2013</td>
</tr>
<tr>
<td>~150 kW</td>
<td></td>
</tr>
<tr>
<td>350 kW</td>
<td>2014</td>
</tr>
<tr>
<td>1.5 MW</td>
<td>2015</td>
</tr>
<tr>
<td>4.5 MW</td>
<td>2016</td>
</tr>
</tbody>
</table>

Tesla Supercharger 90kW
Tesla Supercharger 120kW
CHAdemo 50kW
CHAdemo/CCS 50kW
And here come the really big EVs

Photo credits: Mark Kosowski, Dan Bowemaster
V2G Overview
State of the technology April 2020

- What V2G can do to manage grid impacts of charging?
- How soon is V2G likely to be possible?
- What are the unknowns of V2G?
- What are the challenges of V2G related to technology/payment/battery health?

- Bottom line: how does V2G make sense for the customer as well as the grid, and how does it scale?
Research Question Categories

- Bus Operations
- Customer Satisfaction
- Environmental Impact
- Charging Operations
- Distribution Impacts
- Transmission Services
- Cost vs. Benefit

Research Question Evaluation Methods

- Strategy
- Design
- Cost-Benefit Analysis
- Simulation
- Survey
- Data Collection
- Active Testing
Bus Operations

1. How should bus routing be optimized considering timing, efficiency, and battery capacity (esp. during cold weather)?

2. How many buses are required to serve the territory effectively?

3. How to accommodate after/hours programs and sporting events?

4. How to optimize bus (passenger) capacity, battery size, route length, and travel time?

5. What is the degradation of the bus batteries due to providing grid services along with normal operations?
Customer Satisfaction

6. How reliable and available are electric buses compared to diesel?

7. How do electric buses affect the local community (noise, local air quality, safety, etc.)?

8. What is the total cost of ownership of the electric buses compared to diesel?

9. How does the bus driving experience change in terms of daily operations, training, etc.?

10. What challenges exist for installing new charging infrastructure (timing, land use, aesthetics)?
11. How much do electric buses reduce the carbon intensity of school transportation?

12. How much do electric buses reduce local particulate emissions ($\text{NO}_x$, $\text{SO}_x$)?

13. What are the environmental lifecycle implications and disposal options of electric buses and chargers?
14. How should bus depots schedule and operate charging for both turnaround and grid services?

15. How are different charging types and rates best combined?

16. What type of backup or local generation is needed to ensure reliable bus operation?
Distribution System Impact

17. How to best manage any voltage or thermal issues on existing infrastructure caused by additional bus load?

18. How to best utilize the V2G charger capacity (active and reactive) to support the distribution system?

19. How to best select the interconnection location (electrically) for minimal impact and maximum grid benefit?

20. What additional infrastructure (transformers, lines, and or substations) will be required to serve electric buses?

21. Can V2G be utilized to defer other distribution system investments?

22. How to best structure the interconnection process and system commissioning for V2G units?
Transmission Services

23. What is the normal (baseline) charging profile for defining grid services?

24. How should buses be aggregated to bid into the PJM market?

25. Are buses capable of high-speed services such as frequency regulation (AGC)?

26. How much bus capacity can be reasonably committed as reserves?

27. Would buses be more effective as demand response or energy storage in the market?

28. What is the benefit of using buses for energy arbitrage during normal operation?
Study of Cost vs. Benefit

29. What is the overall cost-benefit of converting to electric buses?

30. How would these benefits change over time and with scale?
What about V1G? Open Vehicle-Grid Integration Platform

Solves the Many-to-Many problem

Data/Analytics Services

Energy Services

Business Efficiency for automotive OEMs and Utilities

Source: Dave McCreacle (Ford Motor Company); Adam Langton (BMW).
Open Vehicle-Grid Integration Platform (OVGIP)

**EV-Grid Services**

**Data/Analytics Services**
- Predictive analytics

**Energy Services**
- Managed Charging Schedules
- EV as power supply back to Building/Grid

Source: Dave McCreadle (Ford Motor Company); Adam Langton (BMW)
Lessons Learned from the past two decades
EVs and charging

- EV technology improvements
- Decreased battery costs
- Impact of policy and incentives
- Importance of customer choice
- Compelling emotional reasons to drive an EV
- Charging can be as easy a 120V wall outlet
- Autonomous driving still very challenging
Looking ahead to 2040
Numerous key questions remain

- Structure
- Options
- Ownership model
- Customer experience
- Roles

Photo credit: Dan Bowermaster, February 2019, EPRI
EPRI EV Resources

Technical Reports:
- The Impact of Incentives on Electric Vehicle Adoption: National Average Results

Presentations:
- Commercial and Industrial Electric Transportation: Presentation to Colorado EV Coalition

Case Studies/Quick Reads:
- Fast Charging in a Rural Interstate Corridor: Southern California Edison Case Study
- Fast Charging in a Mixed-Use Urban Redevelopment Community: Georgia Power – Atlantic Station Case Study
- DC Fast Charging at Busy Interstate Service Plaza: Eversource Case Study
- EPRI Electric Transportation Hotline: EV Battery Recycling and Rare Earth Metals
- Consumer Guide to Electric Vehicles
Together...Shaping the Future of Electricity
Does the working group have any additional questions for the panel?
Peer Discussion – Commissioners and Commission Staff Only

Facilitators

- Working Group Chair Maria Bocanegra and Illinois Commerce Commission Staff
- Working Group Vice-chair Jason Stanek and Maryland Public Service Commission Staff
Discussion Questions

1. Do you expect managed charging to play a large role in managing EV load? Why or why not?
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2. How does active managed charging compare to passive managed charging, such as through time-varying rates? What are the benefits and drawbacks of managed charging?
Discussion Questions

1. Do you expect managed charging to play a large role in managing EV load? Why or why not?

2. How does active managed charging compare to passive managed charging, such as through time-varying rates? What are the benefits and drawbacks of managed charging?

3. What barriers to managed charging pilots or large-scale programs exist? What additional information would you like to see?
Discussion Questions

1. Do you expect managed charging to play a large role in managing EV load? Why or why not?

2. How does active managed charging compare to passive managed charging, such as through time-varying rates? What are the benefits and drawbacks of managed charging?

3. What barriers to managed charging pilots or large-scale programs exist? What additional information would you like to see?

4. Do you expect V2G to play a large role in managing EV load? What is the largest roadblock for widespread V2G implementation (e.g. battery health, economics, technical challenges, etc.)?
Announcements

May Meeting:

- Topic: *Ensuring equity: infrastructure buildout and impact on rates*
- **May 26, 3:00 – 4:30pm ET**
- Speakers and agenda to come

EVSWG Listserv: NARUC-EVSWG@lists.naruc.org

Presentations and recordings of past EVSWG events: [www.naruc.org/cpi/cpi-past-events/](http://www.naruc.org/cpi/cpi-past-events/)