U.S. EPA's State and Local Energy and Environment Webinar Series

EPA United States Environmental Protection Agency

Electric Vehicles: The Utility Connection

December 11, 2019
2:00 – 3:30 PM Eastern

Two audio options:

1. Listen via computer
2. Call in to 1-855-210-5748

How to Participate

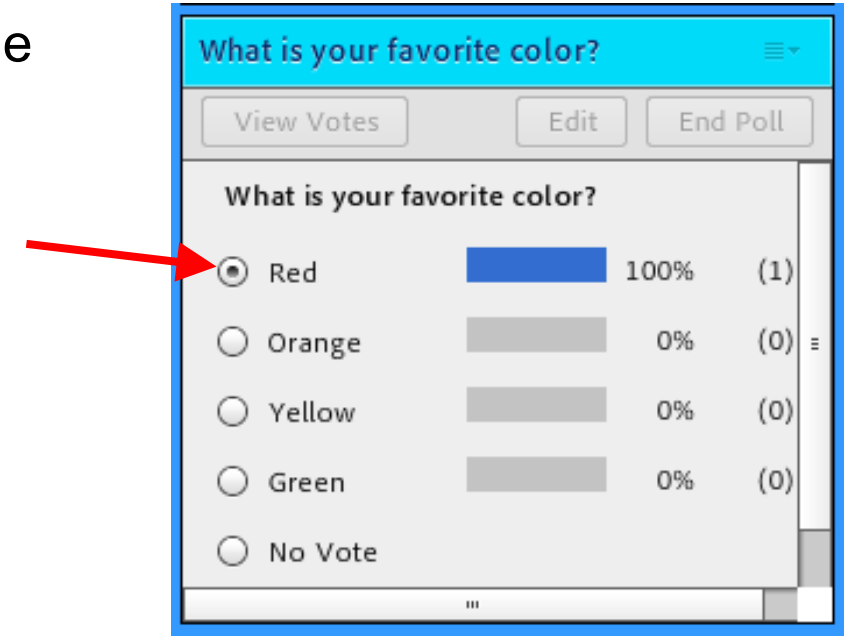
Question and Answer

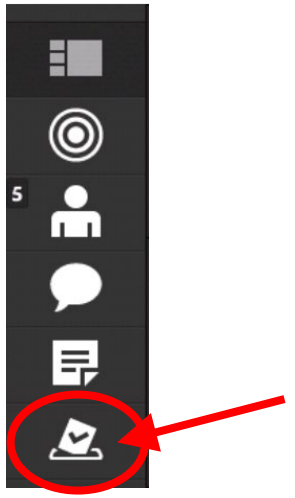
- Enter your question in the Q&A box
- Questions will be moderated at the end
- EPA will post responses to unanswered questions on the State and Local Webinar Series page

How to Participate

Polling

- We'll ask several poll questions during the webinar
- On mobile devices or tablets
  - Exit full screen mode
  - Tap the Poll icon





Today's Agenda

- **Andrea Denny**, Office of Atmospheric Programs, U.S. Environmental Protection Agency (EPA)

  Jessica Daniels, Office of Transportation and Air Quality (OTAQ), EPA

  Introduction
- **Erika Myers**, Smart Electric Power Alliance

  The Role of Utilities and Vehicle-Grid Integration
- **Hanna Terwilliger**, Minnesota Public Utilities Commission

  Minnesota Public Utilities Commission Transportation Electrification Efforts
- **Emeka Anyanwu**, Seattle City Light

  Building an Action Plan for Transportation Electrification in Seattle
- Question and Answer Session

The views expressed by speakers on this webinar are solely those of the participants and EPA does not endorse any products or commercial services mentioned in this webinar.

Introduction

Andrea Denny

Local Energy and Environment Program Lead

Jessica Daniels

Environmental Protection Specialist

U.S. Environmental Protection Agency

U.S. EPA's State and Local Energy and Environment Program

- Investing in energy strategies that lower emissions can be an effective way for state, local and tribal governments to achieve multiple goals:
  - Improve air quality and public health
  - Strengthen energy systems
  - Reduce greenhouse gas emissions
  - Save money
- We offer free tools, data and technical expertise about energy strategies, including energy efficiency, renewable energy and other emerging technologies, to help state, local and tribal governments achieve their environmental, energy and economic objectives.
- Access all of these resources at the Energy Resources for State, Local, and Tribal Governments site

State and Local Energy and Environment Program

U.S. EPA's State and Local Energy and Environment Program

- Electrification Webinar Series
  - Electric Vehicles (EVs): The Utility Connection - today
  - Additional Topics (shared mobility, codes, planning, etc) - starting February 2020
  - Get notifications by subscribing to our newsletter
  - Access all webinar materials at: State, Local, and Tribal Webinar Series
- Past Webinars
  - State and Local Experience with Workplace EV Charging featuring speakers from EPA's ENERGY STAR program; the Colorado Energy Office, and the City of Fort Collins, Colorado
  - EV Trends and Projections featuring speakers from U.S. Department of Energy, The International Council on Clean Transportation, and The National Governors' Association
- ENERGY STAR Certified EV Supply Equipment
  - Level 1 and Level 2 Certified Chargers are available; Direct Current (DC) Fast coming Spring 2020
  - Buying guides and sample procurement language available
  - California Energy Commission (CALeVIP Program) and New York State Energy Research and Development Authority have adopted ENERGY STAR purchasing requirements for all Level 2 chargers

U.S. EPA's State, Local, and Tribal Transportation Resources

- EPA's Office of Transportation and Air Quality protects human health and the environment by reducing air pollution and greenhouse gases from mobile sources and the fuels that power them, advancing clean fuels and technology, and encouraging business practices and travel choices that minimize emissions.

- We help state, local, and tribal governments achieve their environmental and other objectives by providing expertise on:
  - State Implementation Plans
  - Transportation Conformity
  - Vehicle Emissions Inspection & Maintenance and state fuel programs
  - Travel Efficiency and Greenhouse Gas (GHG) Planning
  - MOVES, Calculators, and Tools

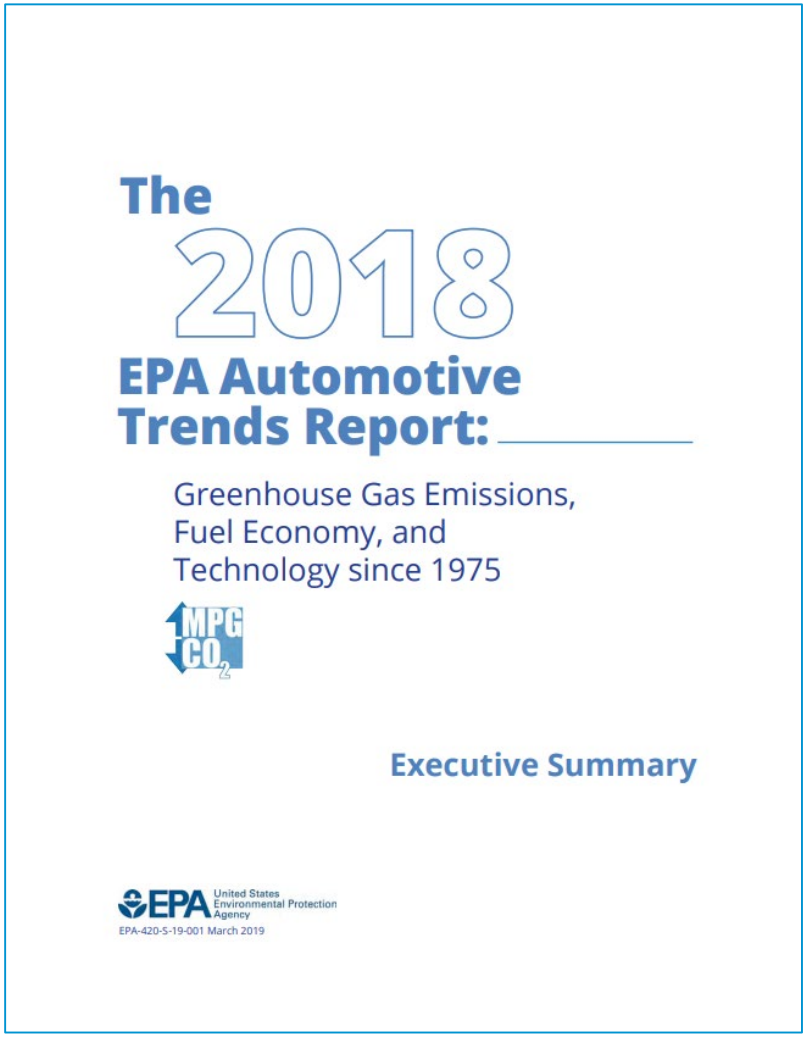
- Access all of these resources at the State and Local Transportation Resources page

OTAQ's Voluntary Programs and Initiatives

- EPA's OTAQ also has several voluntary programs and initiatives for state, local, and tribal governments as well as other stakeholders
- Clean Diesel Program– To reduce diesel emissions that impact public health
  - Includes grants and rebates under the Diesel Emissions Reduction Act (DERA)
- Ports Initiative– To improve environmental performance near ports
- SmartWay– To advance sustainable transportation supply chains

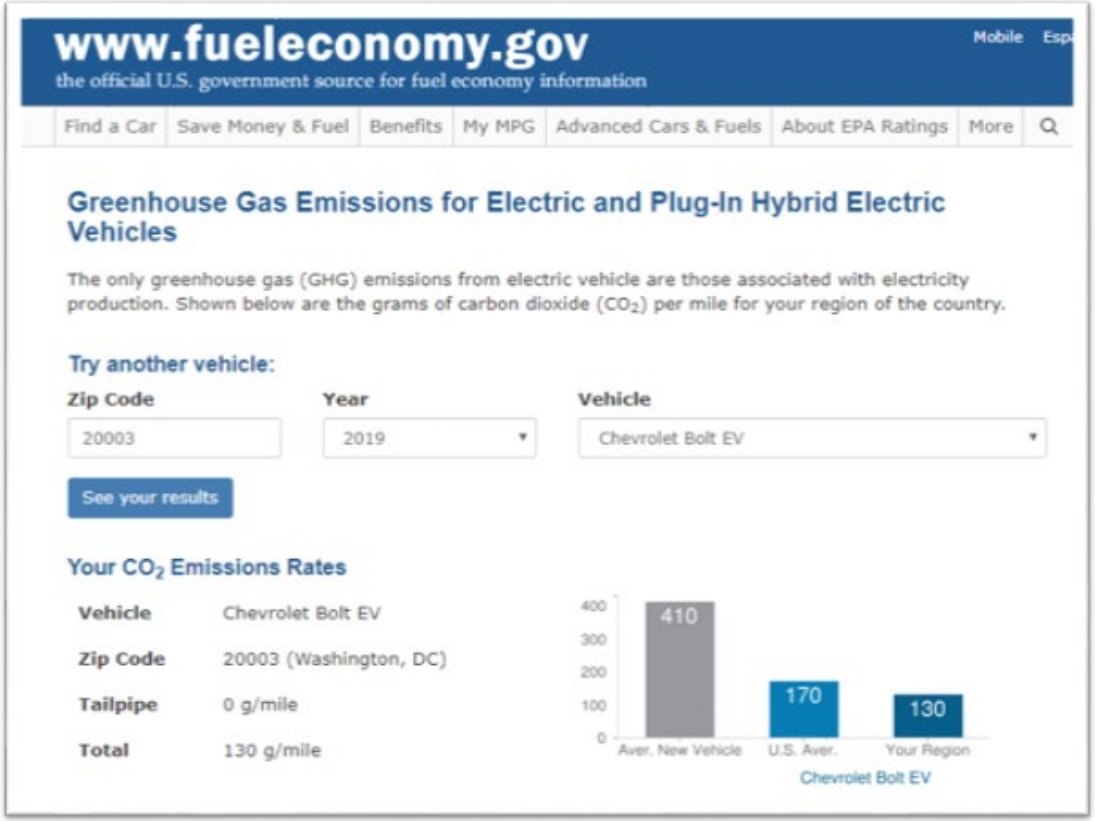
Electric Vehicle Trends

- EPA Automotive Trends Report
  - Public information about new light-duty vehicle greenhouse gas emissions, fuel economy data, technology data, and auto manufacturers' performance in meeting the agency's GHG emissions standards
- EVs, plug-in hybrid electric vehicles (PHEVs), and fuel cell vehicles (FCVs) are a small but growing percentage of new vehicles



EPA Resources for Consumers

- Beyond Tailpipe Emissions Calculator
- Green Vehicle Guide
  - Learn more about EVs, PHEVs, and hydrogen fuel cell vehicles
  - Learn more about the
  - EPA Fuel Economy and Environment Label
  - Find low-emitting vehicles and information on vehicle emissions



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State and Local
Energy and Environment Program

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Poll 1

The Role of Utilities and Vehicle-Grid Integration

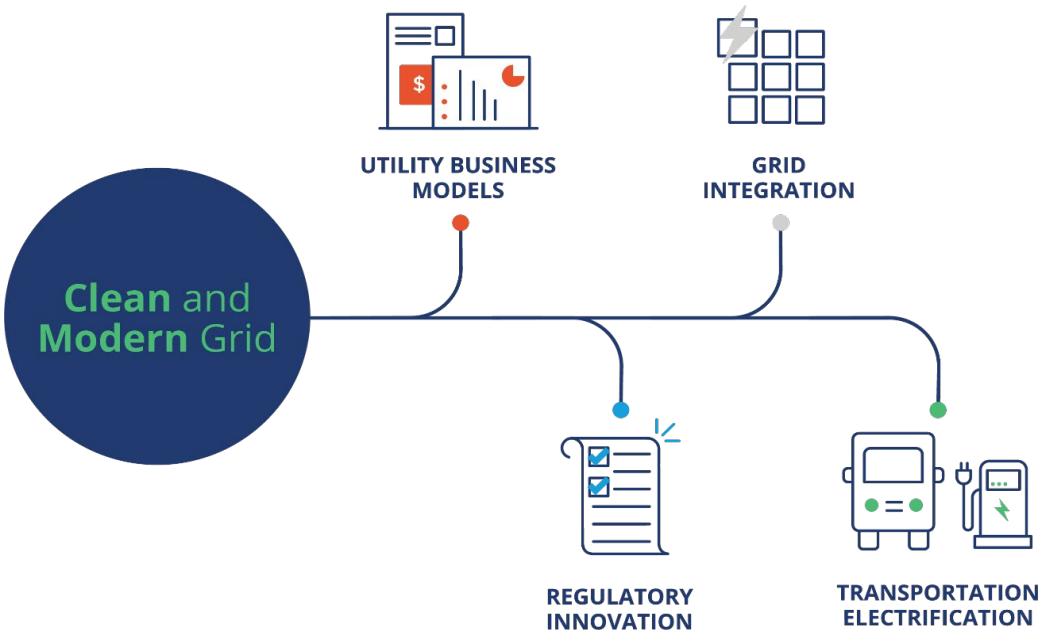
Erika Myers

Smart Electric Power Alliance

The Role of Utilities and Vehicle-Grid Integration

Erika Myers,
Principal,
Transportation
Electrification

December 11, 2019



Smart Electric Power Alliance

About Smart Electric Power Alliance (SEPA) - Four Key Pathways

Smart Electric Power Alliance

Utility Business Models

Utilities need sustainable business models that facilitate and support a carbon-free energy future.

Regulatory Innovation

State regulatory processes must be flexible and agile, enabling the timely and effective deployment of new technologies, partnerships and business models.

Grid Integration

Clean energy must be easily integrated and result in maintained or improved levels of affordability, safety, security, reliability, resiliency and customer satisfaction.

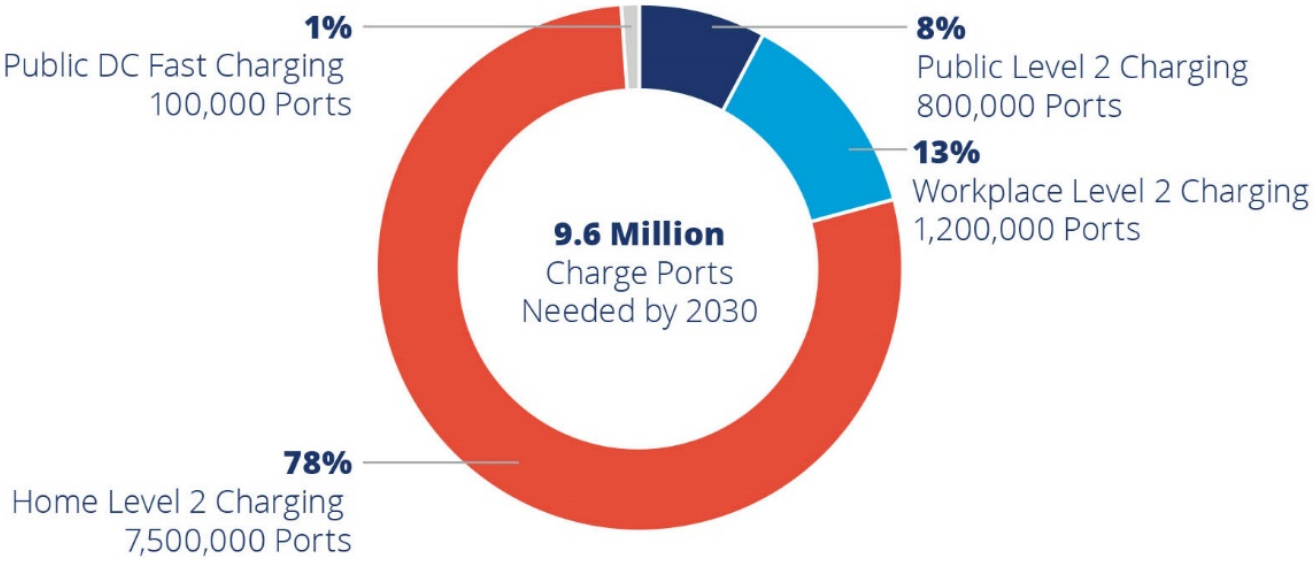
Transportation Electrification

The nation's fleet of light, medium and heavy-duty vehicles should be powered by carbon-free electricity.

Electric Vehicle (EV) Infrastructure Forecasts

Smart Electric Power Alliance

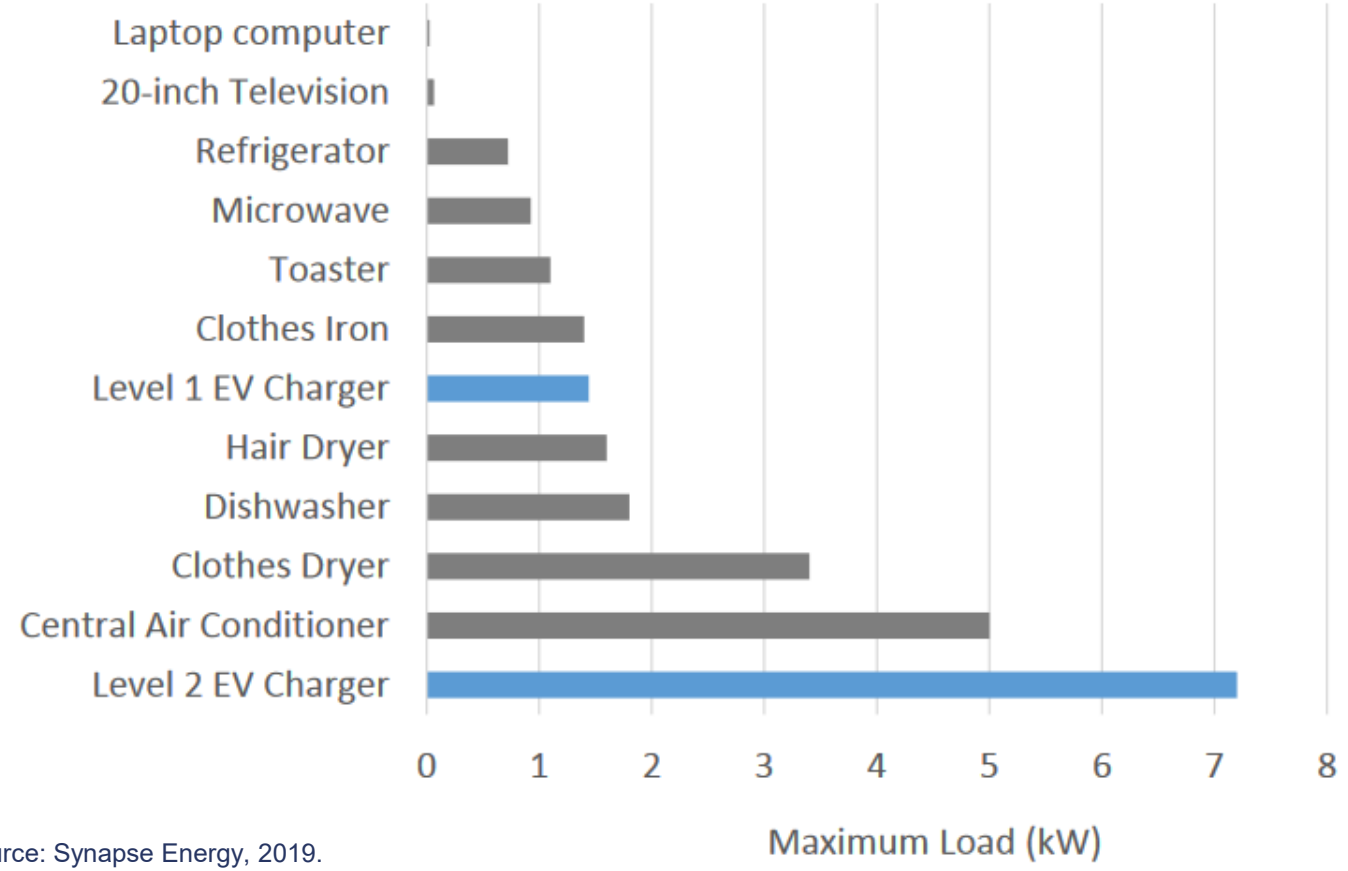
Figure 2: EEI/IEI Forecast for EV Charging Infrastructure in 2030 by Location



Source: EEI/IEI, 2018.[18]

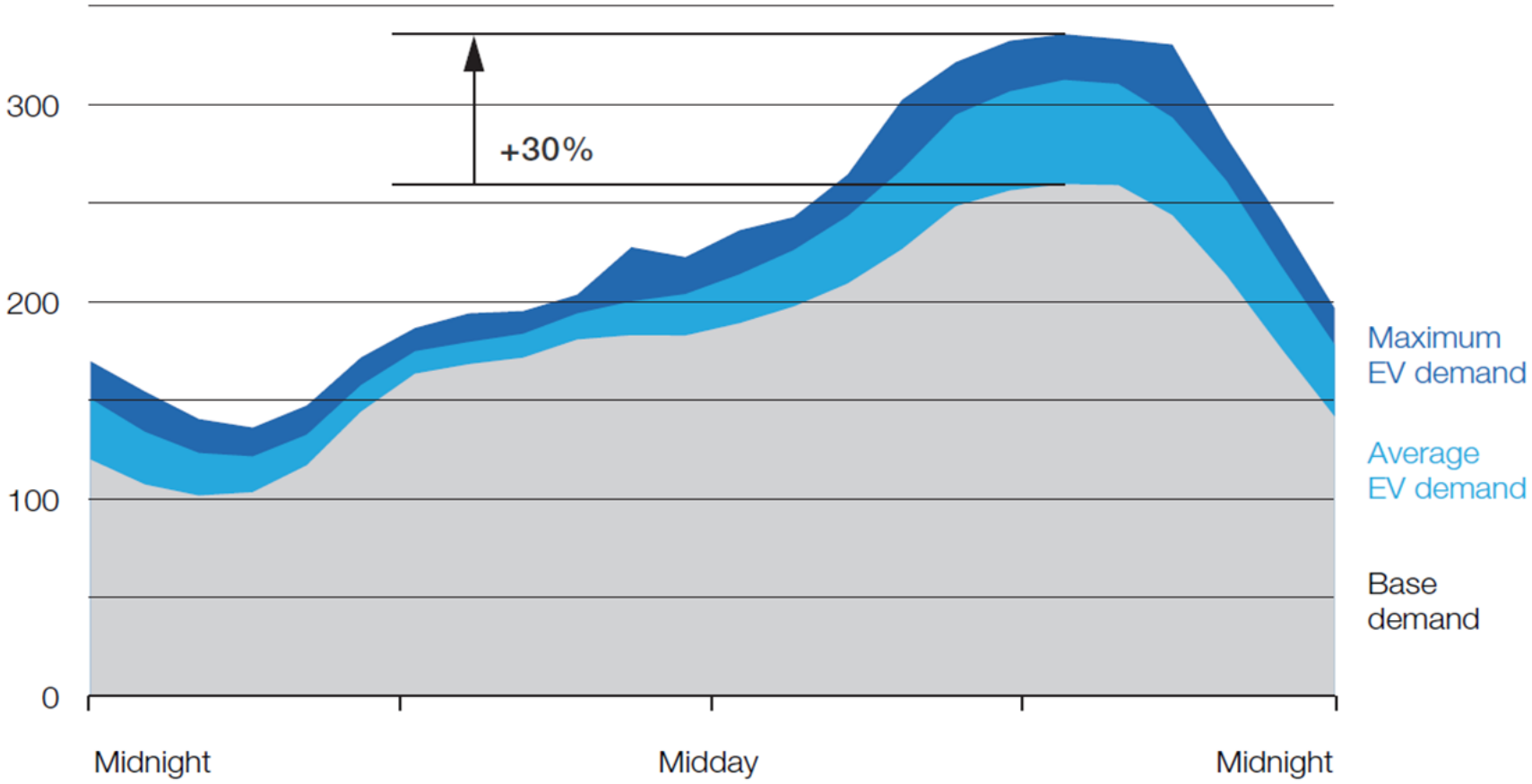
EEI: Edison Electric Institute
IEI: Institute for Electric Innovation

Impact of Residential EV Charging



Source: Synapse Energy, 2019.

kW: Kilowatt



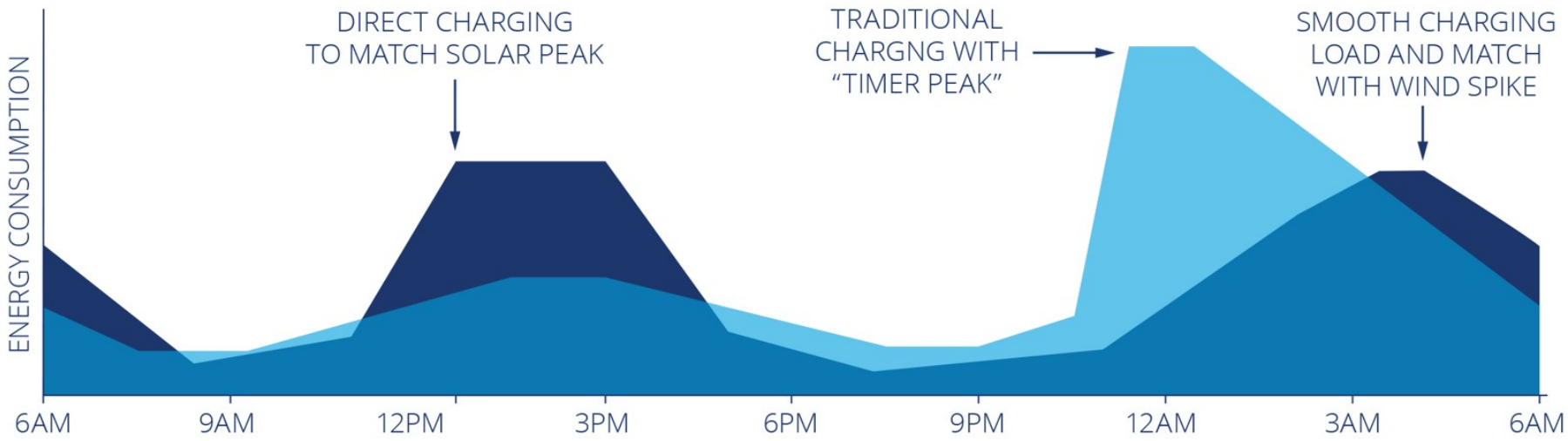
Feeder circuit load, 150 homes with 2 vehicles per household, with 25% electric-vehicle (EV) penetration for Midwestern U.S. on a typical day in September, kilowatts

Source: Synapse Energy, 2019.

Load Management is Important

Smart Electric Power Alliance

FIGURE 1: OPPORTUNITIES FOR EV MANAGED CHARGING TO MEET GRID NEEDS (ILLUSTRATIVE)



Source: BMW of North America, 2016 with edits by Smart Electric Power Alliance, 2017

Note: The light blue area illustrates the impacts of a hypothetical TOU residential charging rate with the lowest rate period beginning at 11 pm. The dark blue area shows how managed charging could distribute charging loads with peaks in renewable energy generation.

TOU: Time-of-Use

Managed Charging Strategies

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Passive managed charging relies on customer behavior to affect charging patterns.

Active managed charging relies on communication (i.e., “dispatch”) signals originating from a utility or aggregator to be sent to a vehicle or charger to control charging in a predetermined specific way.

Passive	Active
EV time-varying rates, including time-of-use rates and hourly dynamic rates	Direct load control via the charging device
Communication to customer to voluntarily reduce charging load (e.g., behavioral demand response event)	Direct load control via automaker telematics
Incentive programs rewarding off-peak charging	Direct load control via a smart circuit breaker or panel

All Utilities Are Not the Same….

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Table 2: Potential Residential EV Load Management Options Based on Utility System Conditions				
EV Load Management Option	**Penetration of Light-duty Residential EVs**	**Available Distribution Capacity (including substations/ transformers/ feeders)**	**Integration of Intermittent Loads (e.g., solar, wind)**	**Cost of On-Peak Electricity**
Passive				
Behavioral Load Control (e.g., text message during system peak)	Low	High	Low	Average
Generic Time-of-Use Rate	Low	High	Medium	Above average
Generic Dynamic Pricing Rate	Low	High	High	High
EV Time-of-Use Rate	Medium	Medium	Medium	Above average
EV Dynamic Pricing Rate	High	Medium	High	High

… Some Have a Different Starting Point

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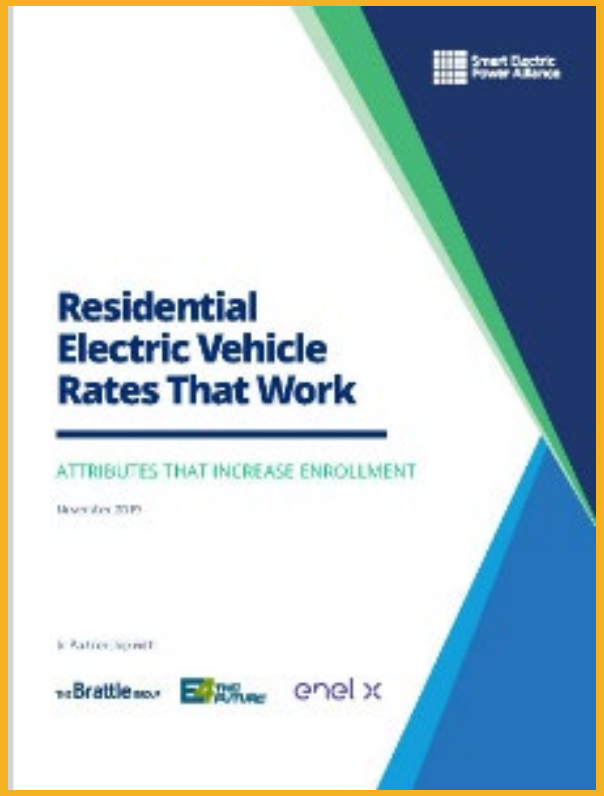
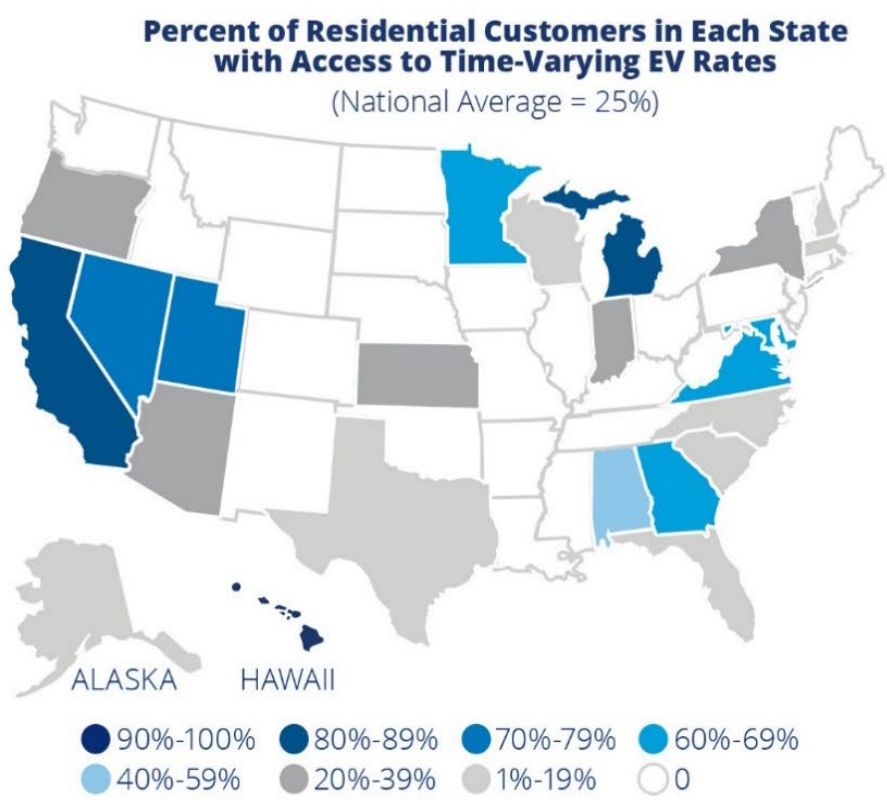
Table 2: Potential Residential EV Load Management Options Based on Utility System Conditions				
EV Load Management Option	**Penetration of Light-duty Residential EVs**	**Available Distribution Capacity (including substations/ transformers/ feeders)**	**Integration of Intermittent Loads (e.g., solar, wind)**	**Cost of On-Peak Electricity**
Active				
Managed Charging (designed to minimize distribution impacts)	High	Low	High	Above average
Managed Charging (designed to minimize on-peak electricity costs)	High	Medium	High	High
Vehicle-to-Grid	High	Low	High	High

Source: Smart Electric Power Alliance, 2019.

Passive Managed Charging



EV Rates Landscape



Source: Smart Electric Power Alliance & The Brattle Group, 2019.

28 investor-owned utilities, **12** municipal utilities, and **10** electric cooperatives	**18** pilot programs, **46** fully implemented residential rates

Of the 64 EV rates, **58** were TOU rates, **1** was a subscription rate with an on-peak adder, and **5** were off-peak credit programs.

How the rate applies to the home load:

- **35** rates apply to the **total household energy consumption**, including the EV charging load.
- **21** rates **apply strictly to EV charging**. These rates typically require the installation of a second meter or submeter, and two rates are metered from a submeter in the EV charger itself.
- **8** rates allowed customers to **choose between whole home or EV-only options**.

Why Utilities Created EV Rates

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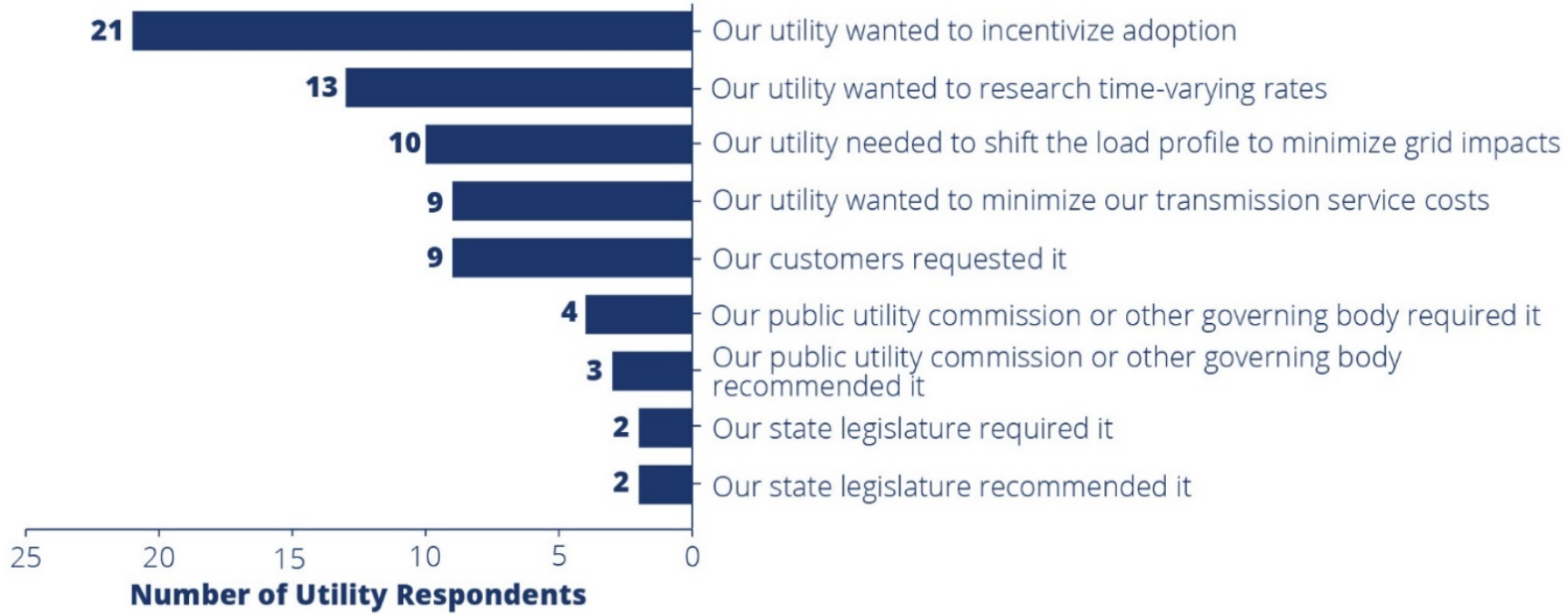
Figure 8: Reasons Utilities Created EV Time-Varying Rate



Source: Smart Electric Power Alliance & The Brattle Group, 2019. N=29. Respondents selected all that applied.

EV Rates Work When….

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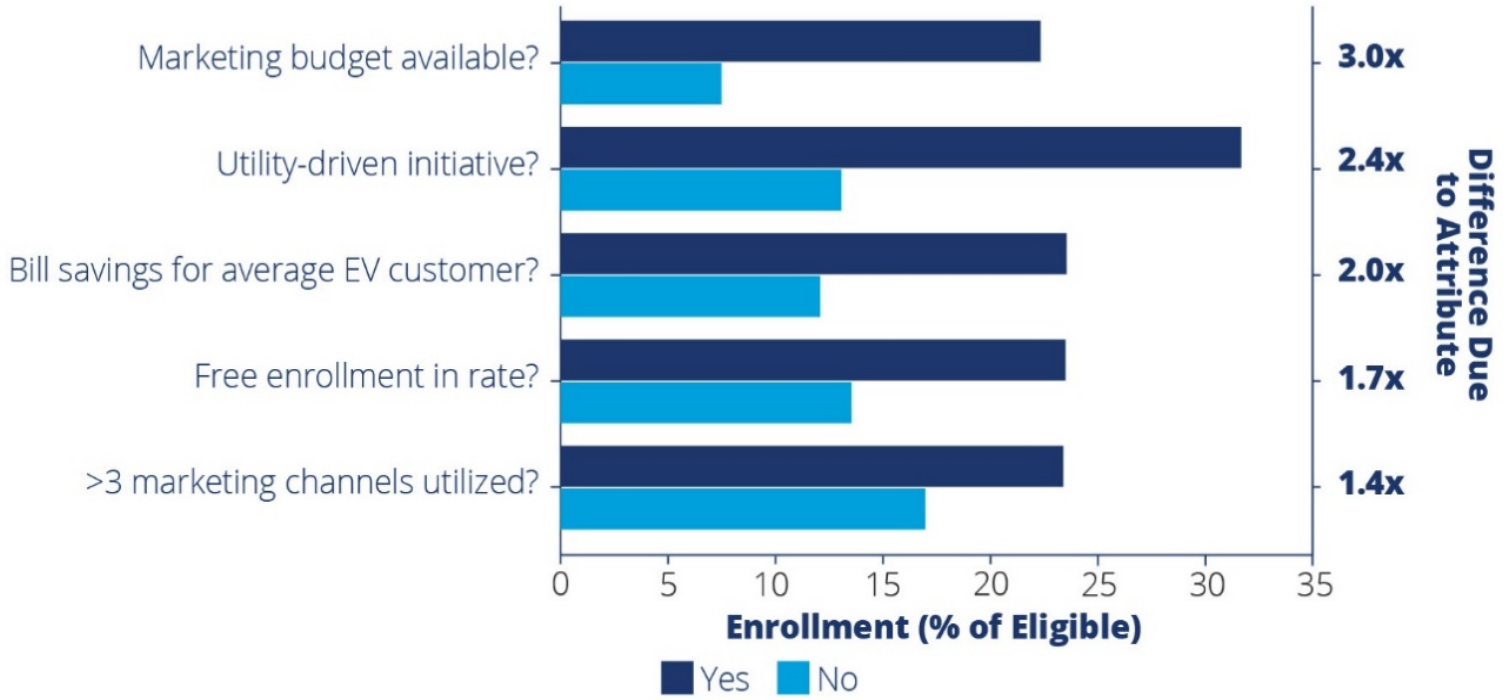
Figure 1: Average Enrollment by EV Time-Varying Rate Attribute



Source: Smart Electric Power Alliance & The Brattle Group, 2019. N=20

Main Challenge: Metering

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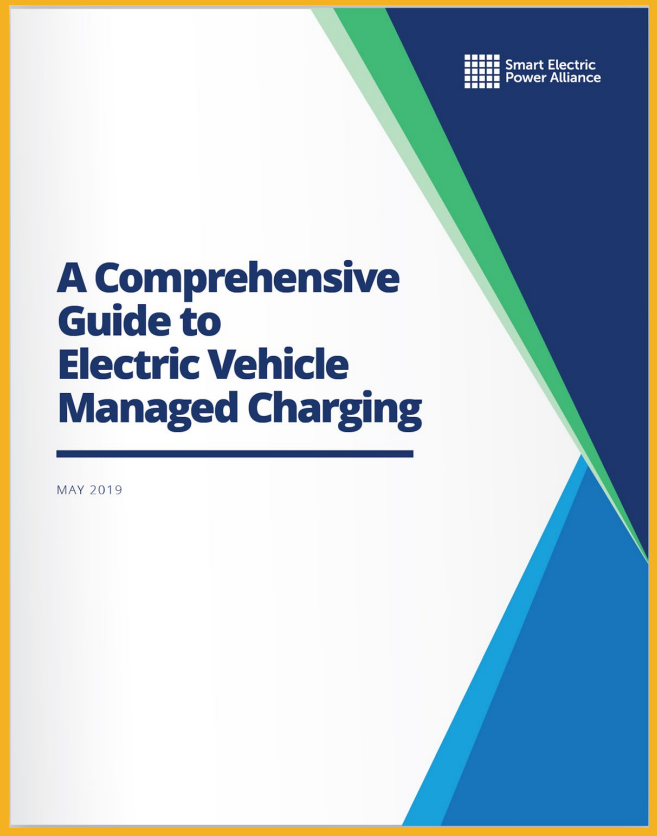
	Existing Meter	Secondary Meter	Submeter	EVSE Telemetry	AMI Load Disaggregation
Ability to Meter EV Charging Separately	No—Does not separate the EVSE from rest of load	Yes	Yes	Yes—Accuracy for billing purposes depends on EVSE manufacturer	Yes—Accuracy depends on ability to identify unique kW signature of EVSE
Utility Bill Integration	Easiest to integrate	Easiest to integrate	Easier to integrate	Difficult to standardize among multiple vendors and retroactively integrate into billing system; data via AMI backhaul more accurate	Depending on the format of the disaggregated data, may not integrate
Consumer Participation Cost	No additional cost	Depending on tariff, no up-front cost to consumer, or consumer pays for the full cost	Depending on tariff, no up-front cost to consumer, or consumer pays for the full cost	No additional cost if consumer already purchased the equipment; potential additional cost for compatible EVSE	Depending on tariff, some cost for administration, third-party costs, or equipment
Volume of Eligible Customers with AMI	Highest—independent of EVSE type	Highest—independent of EVSE type	Highest—independent of EVSE type	Limited to eligible EVSE vendors	Highest—independent of EVSE type

Source: Smart Electric Power Alliance, 2019.

AMI: Advanced metering infrastructure
EVSE: Electric vehicle supply equipment

Active Managed Charging



How does it work?

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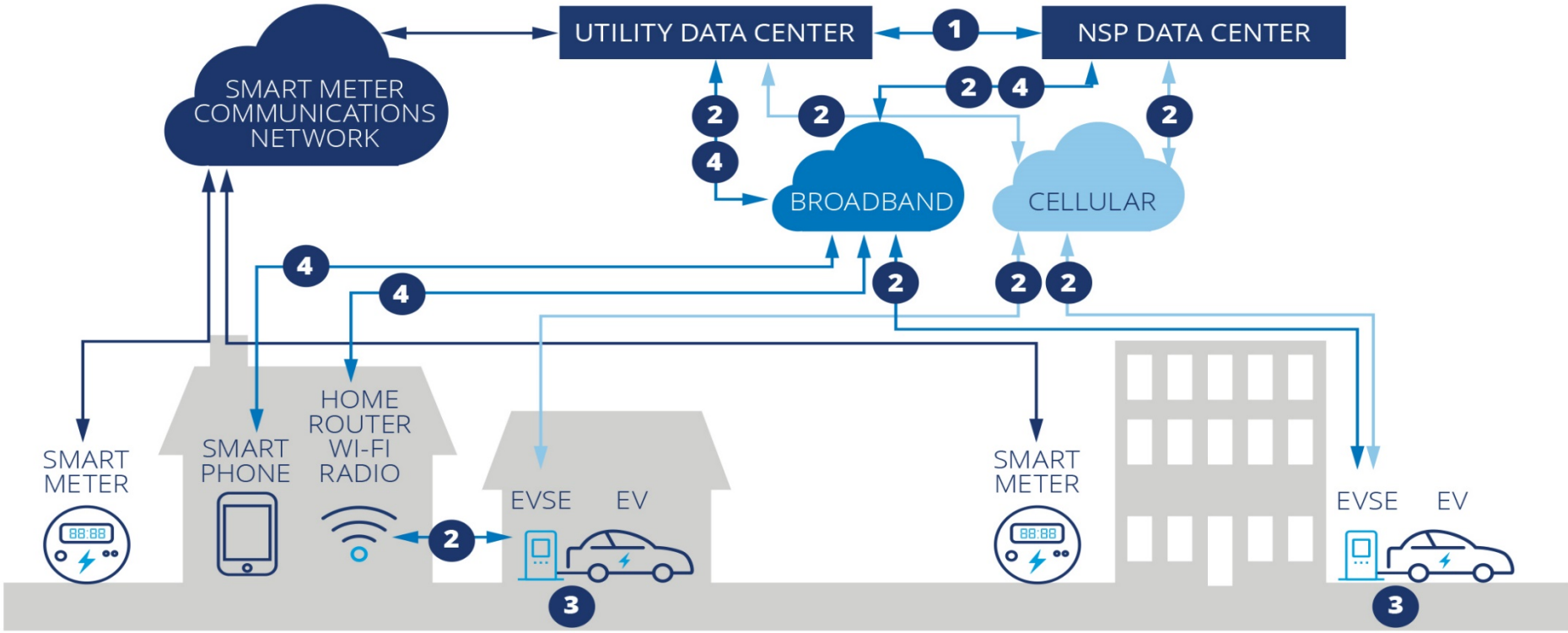
FIGURE 11: USE OF OPEN PROTOCOLS IN MANAGED EV CHARGING



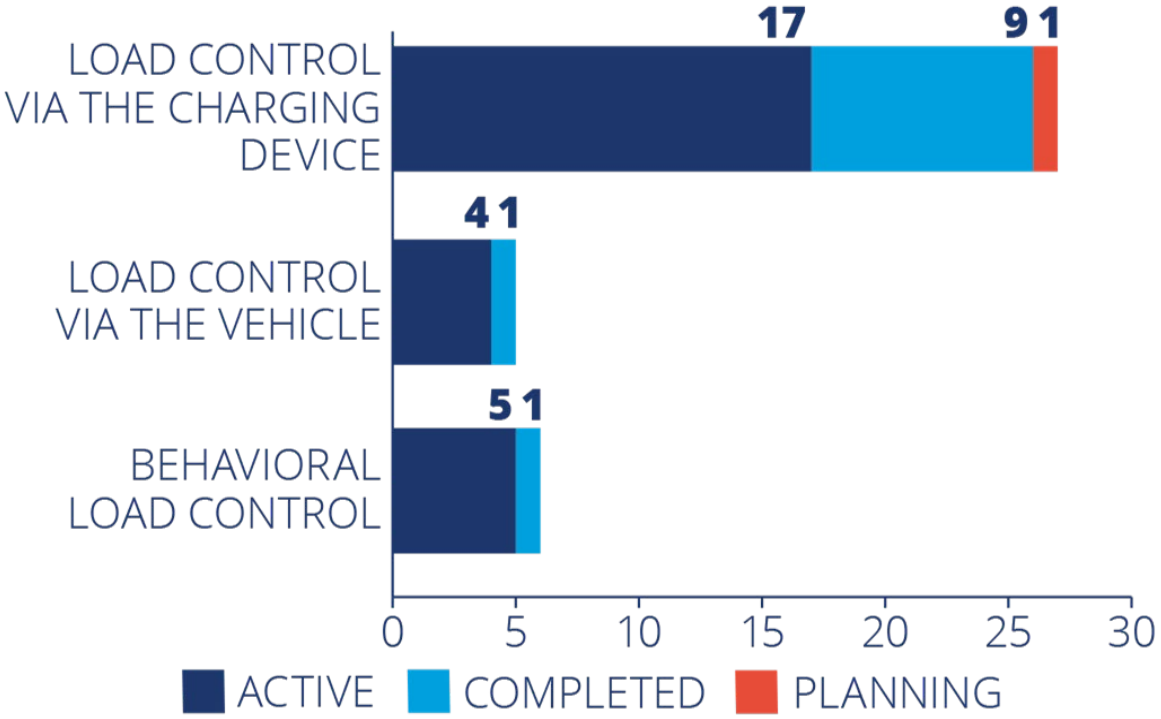
Source: Siemens, EV Technical Workshop, NY Public Service Commission, July 2018.

NSP: Network Service Providers
OCPI: Open Charge Point Interface
OCCP: Open protocol for charging electric cars
SAE: Society of Automotive Engineers
ISO/IEC: International Organization for Standardization/ International Electrotechnical Commission

Managed Charging Projects To Date

Smart Electric Power Alliance

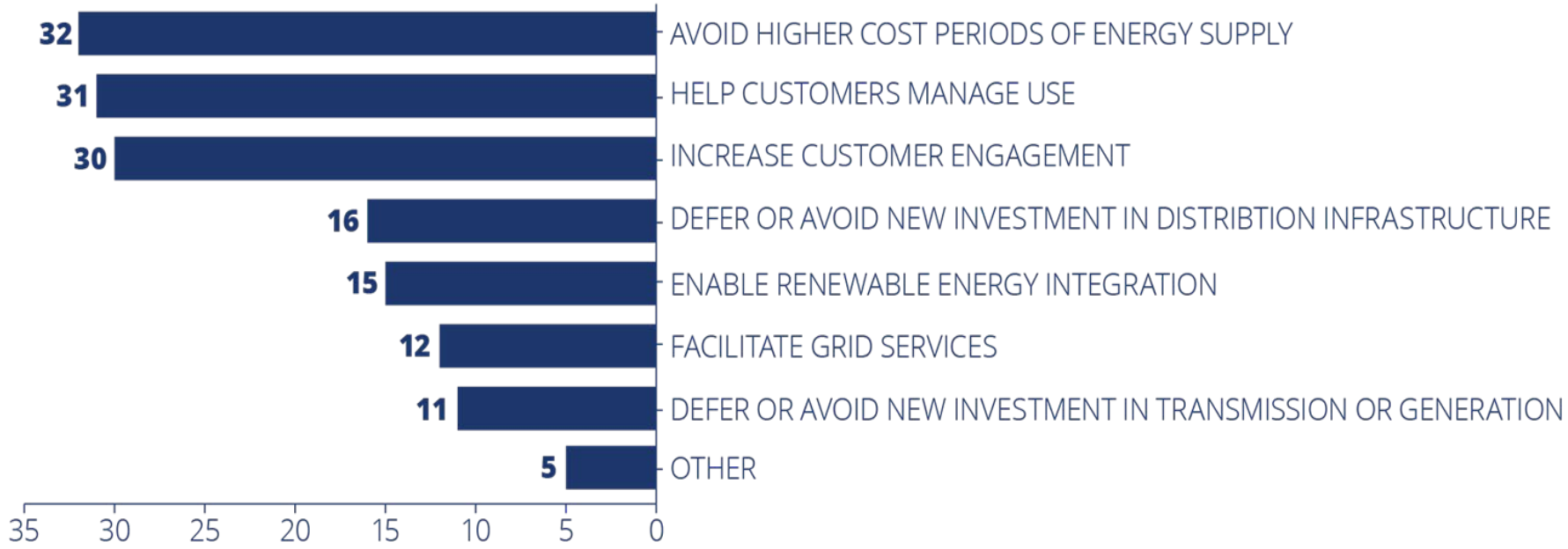
Utility-run managed charging projects by type and stage, United States (2012-2019)



Source: Smart Electric Power Alliance, 2019. See Appendix A for details.
n=38

How Utilities are Using Managed Charging

How are utilities using or planning to use managed charging programs?

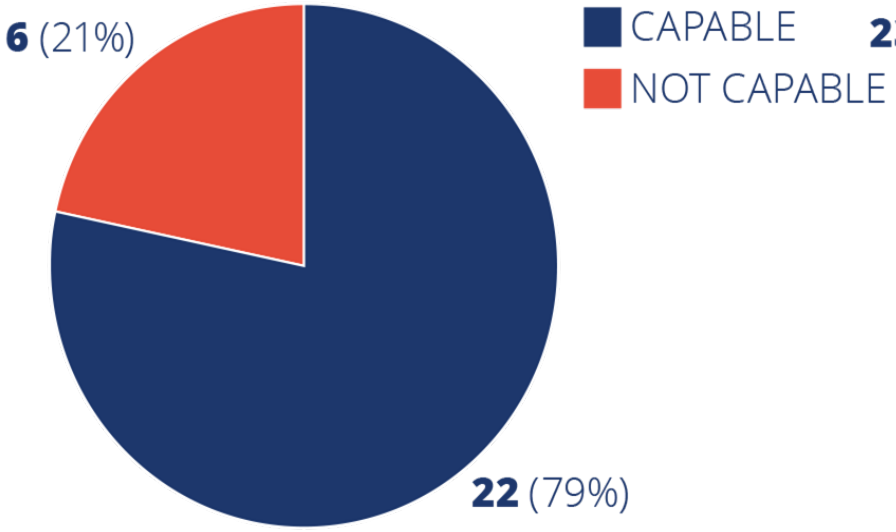


Source: Smart Electric Power Alliance, 2019. N=48. Note: Utilities selected all that applied.

State of the Managed Charging Industry

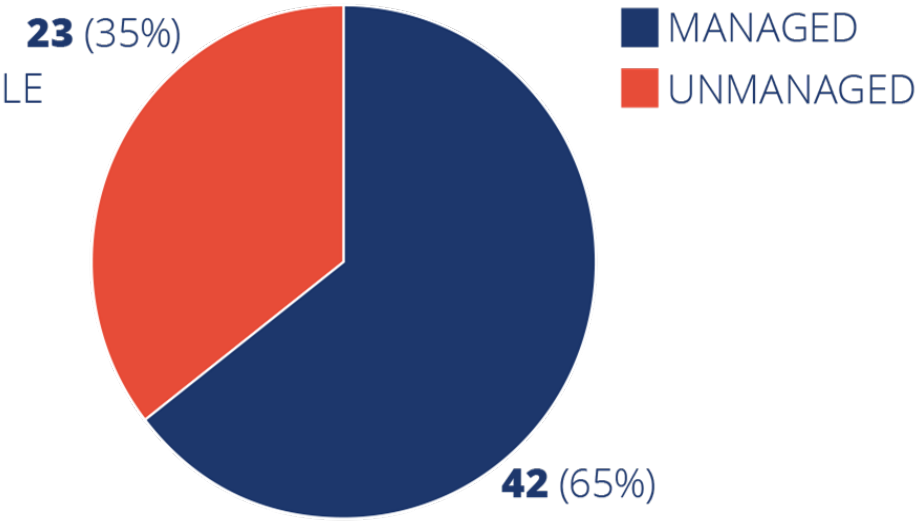
Smart Electric Power Alliance

Network Service Providers (NSPs)



Source: Smart Electric Power Alliance, 2019.

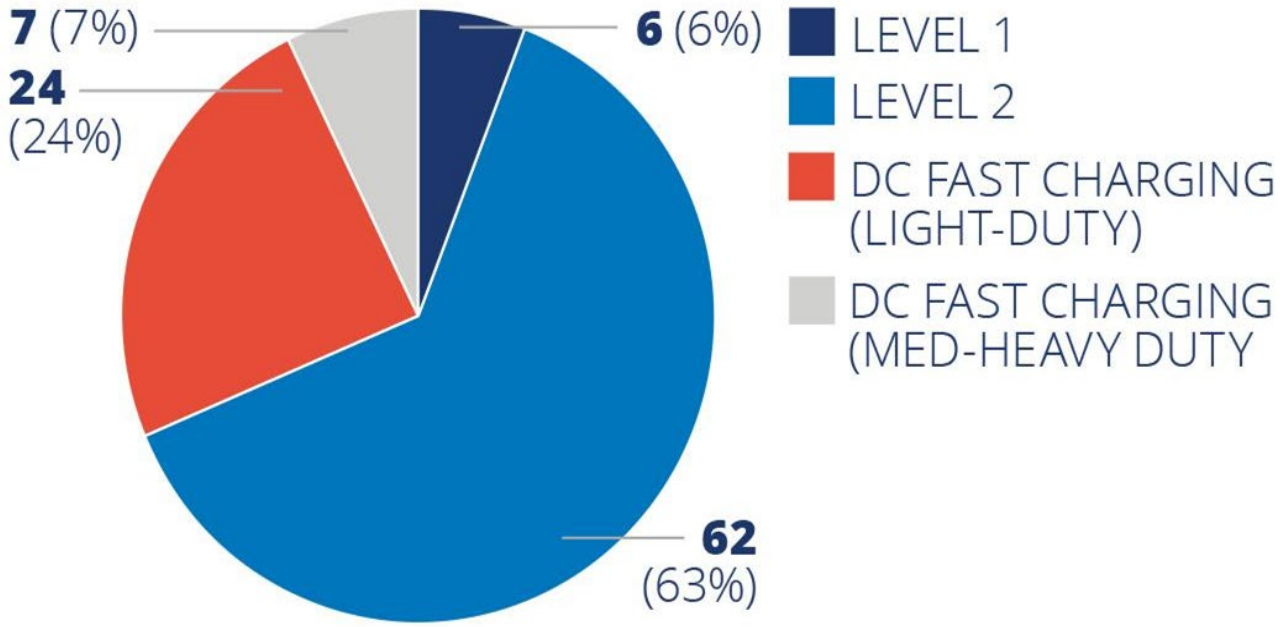
Electric Vehicle Supply Equipment (EVSE) Manufacturers



Source: Smart Electric Power Alliance, 2019.

State of the Managed Charging Industry (Cont'd)

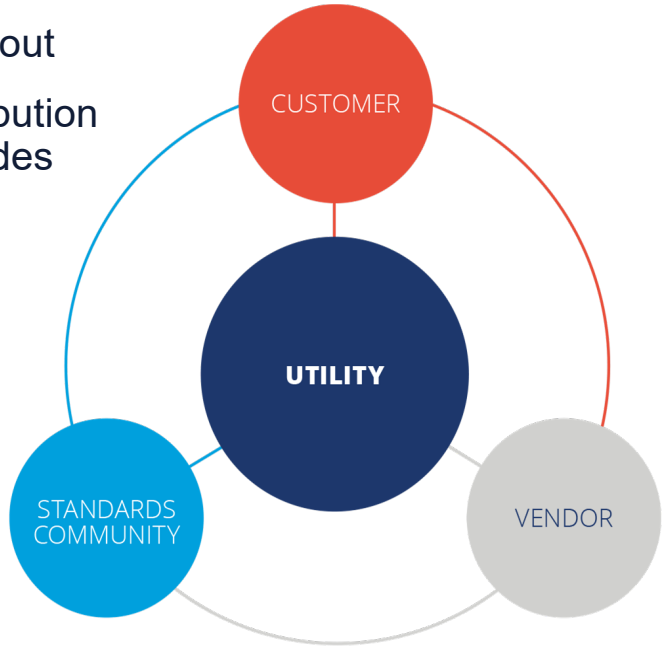
Number of Managed Charging Capable EVSE by Level, U.S., 2019



Source: Smart Electric Power Alliance, 2019. Note: Some manufacturers offer multiple configurations of chargers in a series type. Only one base configuration in a series was included in the tally.

Next Steps

- **Quantify the value** of managed charging
- **Define the business model** for managed charging – including costs and payback for utility and EV customer – and establish industry standards to reduce barriers, costs, and complexity
- Work with EV industry to **develop industry-wide standards for the entire 'ecosystem'**
- Provide customers with **maximum flexibility** – including opt-out
- Gain visibility **where EV resources are located** on the distribution system, and define cost-benefit of avoided distribution upgrades
- Proactively engage customers and **provide information** on managed charging-capable charging EVSE and NSPs
- Identify **least-cost and reliable communication** solutions



Source: Smart Electric Power Alliance, 2019

SEPA EV Working Group

Smart Electric Power Alliance

- Open to all SEPA members; 450+ members to date
- Monthly group calls on the third Thursday from 4-5pm eastern
- Subcommittees
  - Distribution Planning for EVs
  - Managed Charging/vehicle-to-X (V2X)
  - Utility Rates, Tariffs, and Incentives
- In-person Meet-ups
- Find out more at sepapower.org

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HEADQUARTERS

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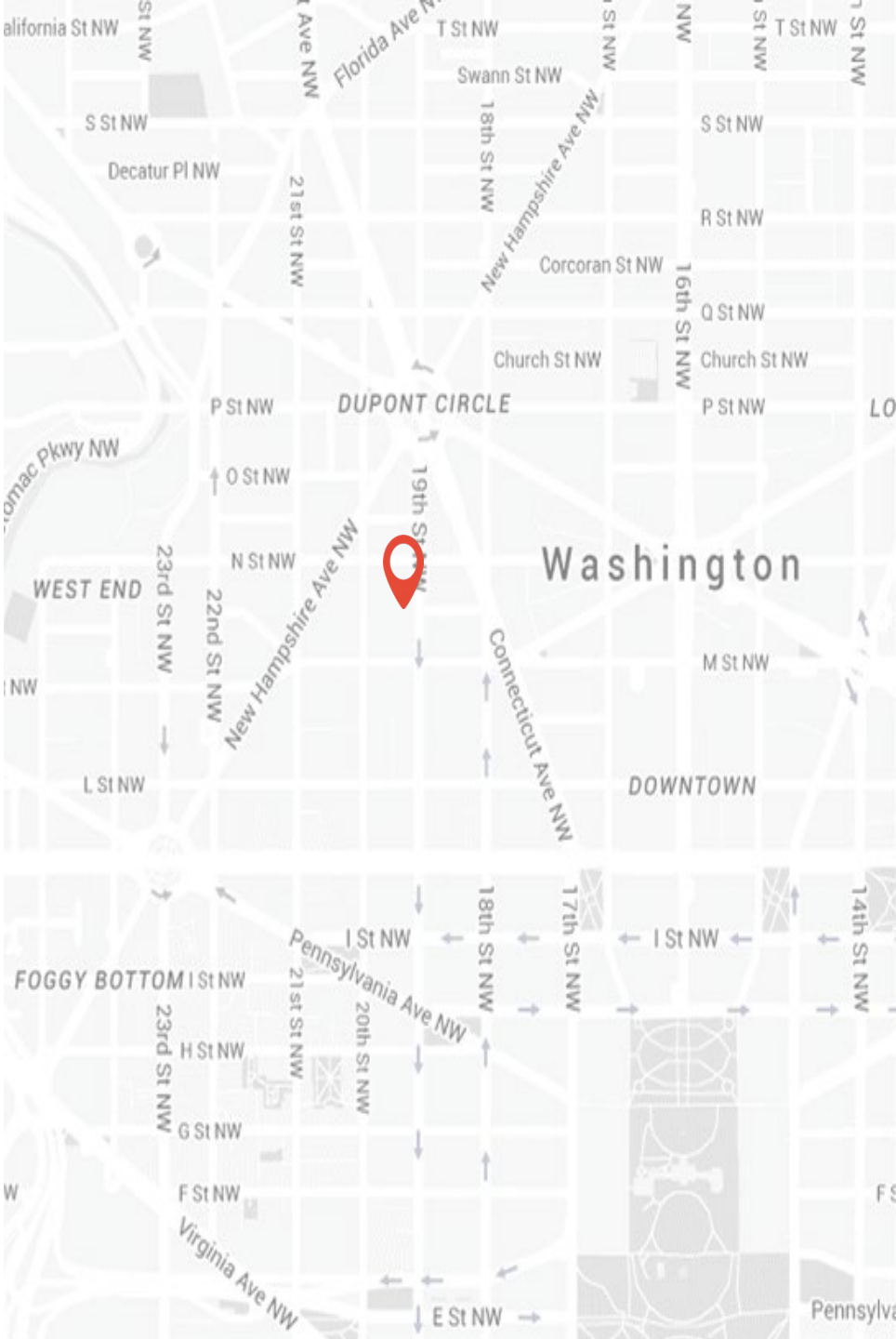


Poll 2

Minnesota Public Utilities Commission Transportation Electrification Efforts

United States Environmental Protection Agency

Hanna Terwilliger

Minnesota Public Utilities Commission

MINNESOTA
PUBLIC UTILITIES COMMISSION

Minnesota Public Utilities Commission (PUC) Transportation Electrification Efforts

Hanna Terwilliger | Economic Analyst

mn.gov/puc/

The ideas expressed are the views of the presenter, and not the Minnesota Public Utilities Commission.

Minnesota Public Utilities Commission

- The Commission’s mission is to protect and promote the public's interest in safe, adequate and reliable utility services at fair, reasonable rates.
  - Quasi-judicial
  - Independent, consistent, professional and comprehensive oversight and regulation of the following industries “affected with the public good:” electricity, natural gas, need for and physical location of “large energy facilities”, and limited telecommunication (landline phone).
- Approximately 60 staff in Executive, Financial Analysis, Economic Analysis, Energy Facilities Permitting, Legal, Consumer Affairs Office, and Administrative Services.


Katie Sieben
Chair

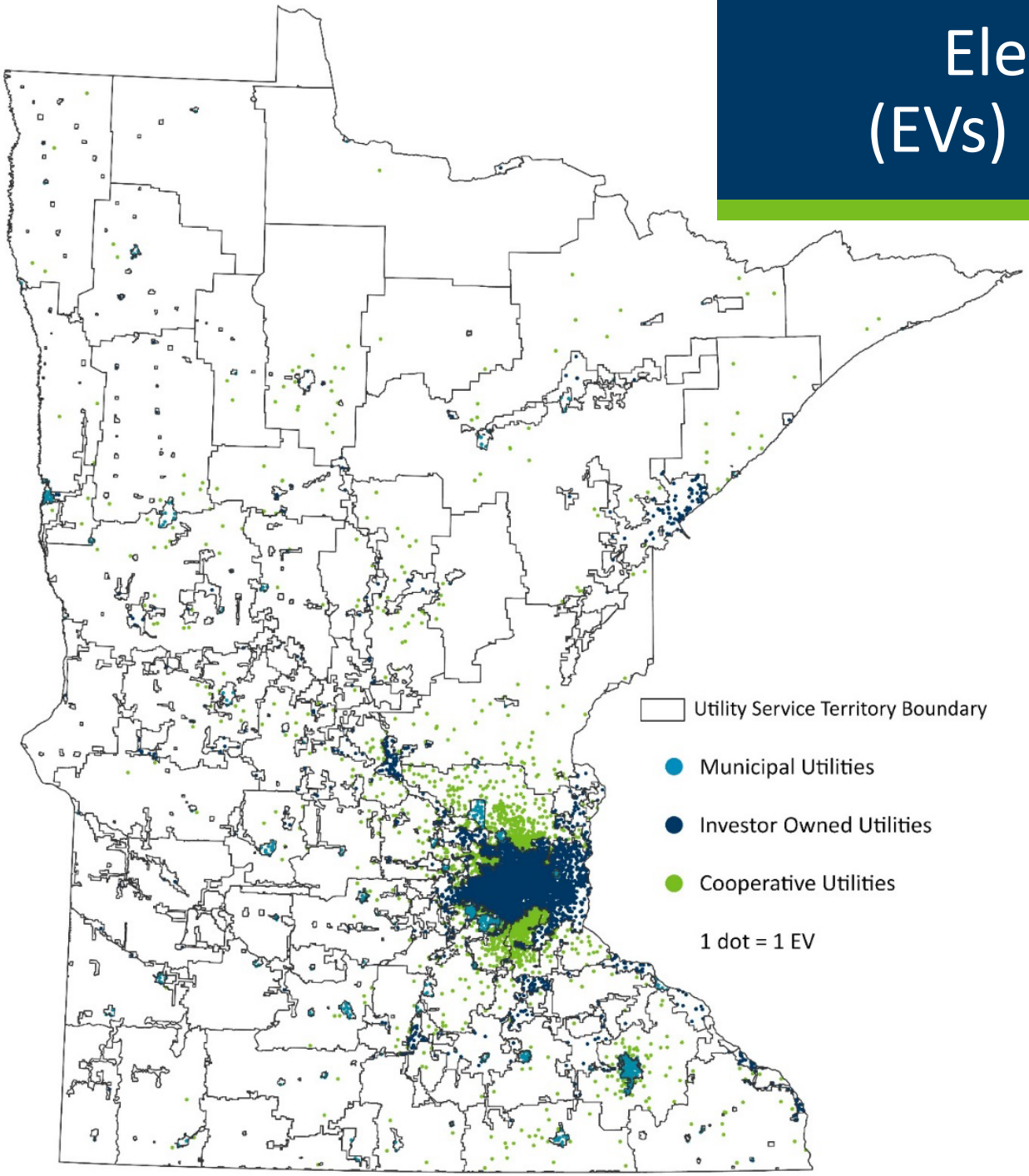

Dan Lipschultz
Vice Chair


Matt Schuerger
Commissioner


John Tuma
Commissioner


Valerie Means
Commissioner

Electric Vehicles (EVs) in Minnesota



Major EV Policy in Minnesota

- Minnesota Public Utilities Commission
  - EV Charging providers exempt from Commission regulation
  - Minn. Stat. 216B.02: *"public utility"…does not include … a retail seller of electricity used to recharge a battery that powers an electric vehicle*
  - Commission reviews and approves utility EV rate and infrastructure pilots and program requests from regulated utilities
- Minnesota Pollution Control Agency (MPCA)
  - Regulates air quality: Gov. Walz announced MN to adopt Zero Emission Vehicle (ZEV) standards, MPCA will do rulemaking
  - Oversees funds disbursement for Volkswagen Settlement

Commission EV Inquiry

MN PUC Docket No. 17-879

Commission initiated its Inquiry into EV Charging and Infrastructure in December of 2017 to explore the following:

1. The possible impacts of EVs on the electric system, utilities, and utility customers, including the potential electric system benefits;
2. The degree to which utilities and utility regulatory policy can impact the extent and pace of EV penetration in Minnesota; and
3. Possible EV tariff options to facilitate wider availability of EV charging infrastructure.

Existing and Forthcoming EV Dockets

Docket #	Description	Utility
12-874 15-111 15-112 15-120	Residential Electric Vehicle Services	Dakota Electric Xcel Energy Otter Tail Power Minnesota Power
17-817	Residential EV Service Pilot	Xcel Energy
17-879	Inquiry into Electric Vehicle Charging and Infrastructure Transportation Electrification Plans (Filed June 1 annually)	All investor owned utilities
18-643	EV Infrastructure Pilots	Xcel Energy
19-186	Residential EV Subscription Pilot	Xcel Energy
19-337	EV Commercial Charging Pilot	Minnesota Power
19-559 (pending)	Home EV Service	Xcel Energy

Utility	Program	Filing Deadline
Otter Tail Power	DC Fast Charging Pilots	December 12, 2019
Xcel Energy	Commercial and Industrial EV Rate	January 17, 2020
Minnesota Power	Residential Charging	End of Second Qua, 2020
Xcel Energy	Multi-Unit Dwelling EV Program	August, 2020

MN Interagency EV Working Group

- Goal: share information about agency work on EVs
  - MN Pollution Control Agency (convener)
  - MN Department of Administration
  - MN Department of Transportation
  - MN Department of Commerce
    - State Energy Office
    - Regulatory Division
  - MN Public Utilities Commission

State, Local, and Tribal Government Involvement

- Local governments are important stakeholders for utilities and Commissions to hear from on EV planning
- Need input from government bodies that are electrifying their transportation on whether options will advance their goals

Example: Xcel Energy Infrastructure Pilots

MN PUC Docket No. 18-643

- Pilot will provide "make-ready" EV charging infrastructure and optional EV chargers for fleets
- 2nd pilot will provide make-ready infrastructure for public charging and community mobility hubs

Figure 2
Diagram of EV Community Mobility Hubs

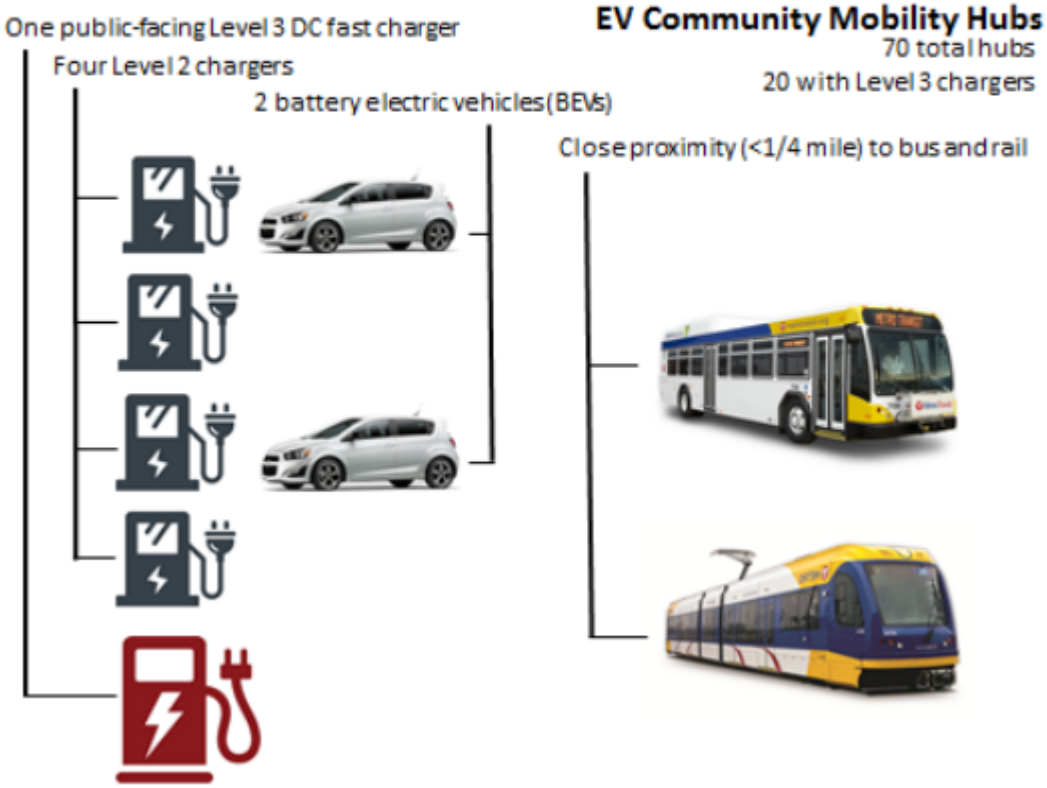


Image: Xcel Energy, MN Docket 18-643, Initial Filing

MINNESOTA
PUBLIC UTILITIES COMMISSION

Thank you!

Hanna Terwilliger
hanna.Terwilliger@state.mn.us
651-201-2243

For more MN PUC EV information:
Electric Vehicles

Poll 3

Building an Action Plan for Transportation Electrification in Seattle

EPA United States Environmental Protection Agency

Emeka Anyanwu

Seattle City Light

Seattle City Light

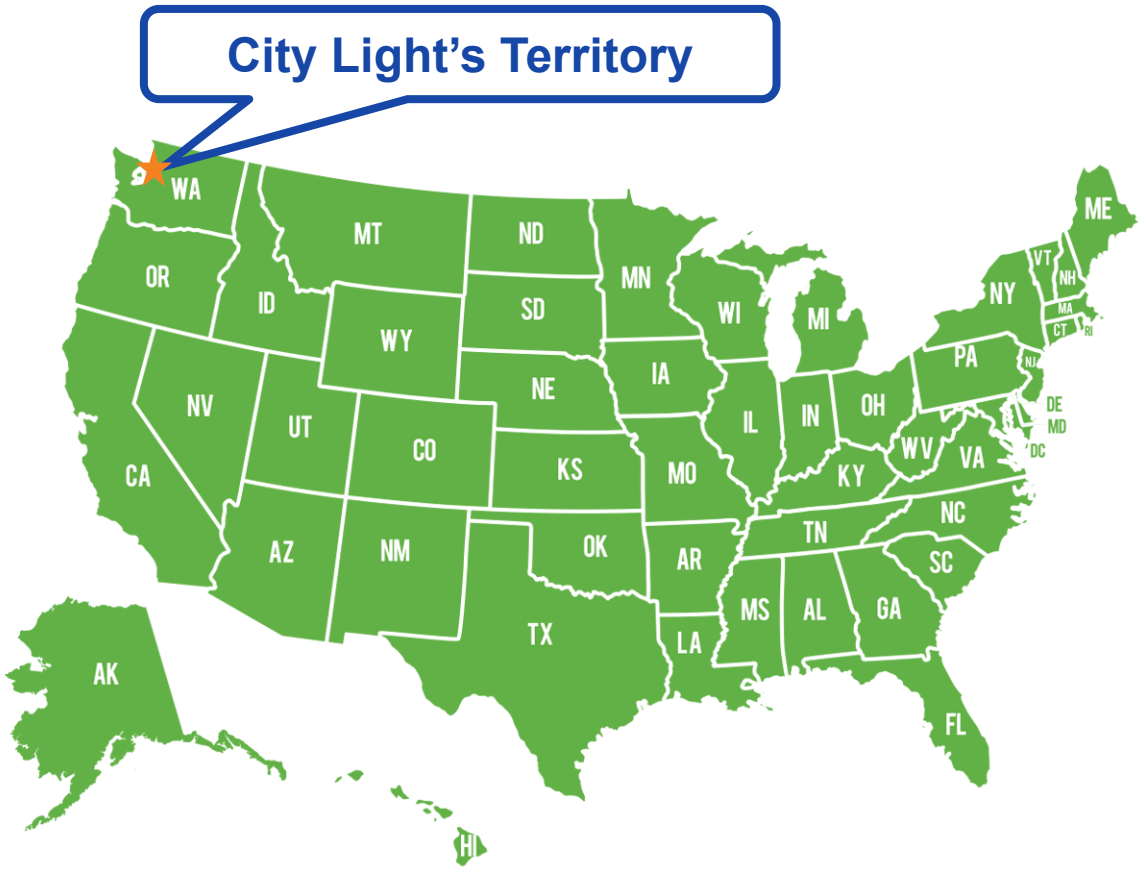
BUILDING AN ACTION PLAN FOR TRANSPORTATION ELECTRIFICATION IN SEATTLE

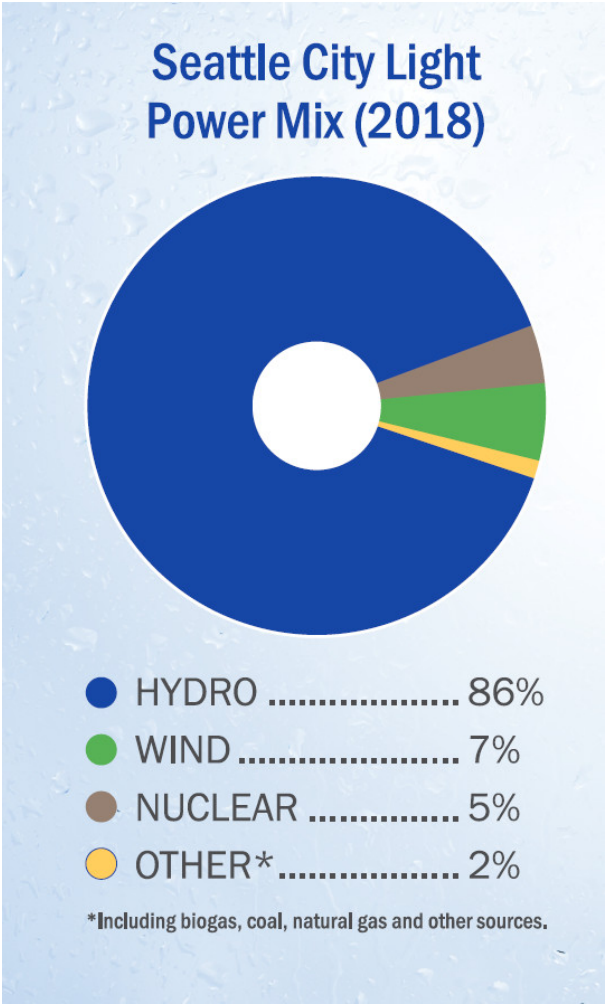
EPA Webinar – "Electric Vehicles: The Utility Connection"

Emeka Anyanwu
Energy Innovation & Resources Officer, Seattle City Light

December 11, 2019

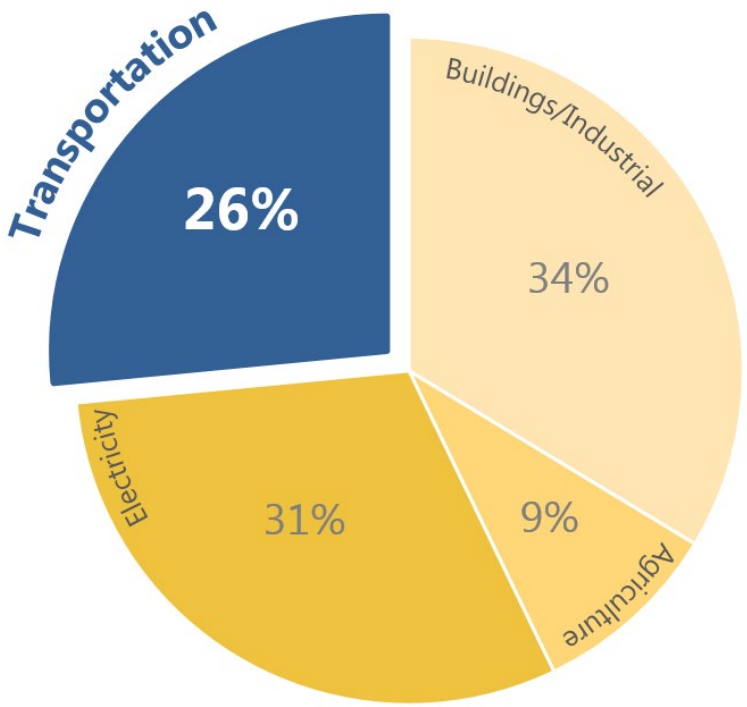
CITY LIGHT QUICK FACTS



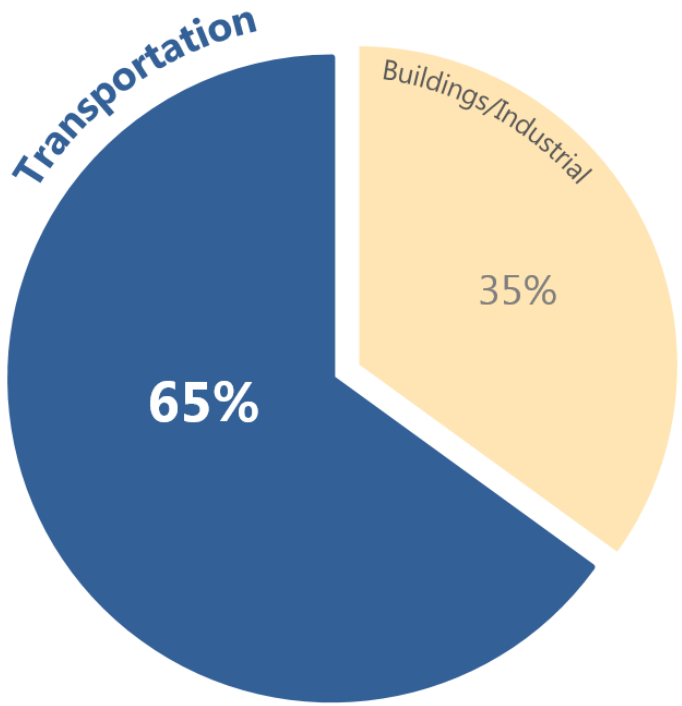


CARBON EMISSIONS

US AVERAGE



SEATTLE



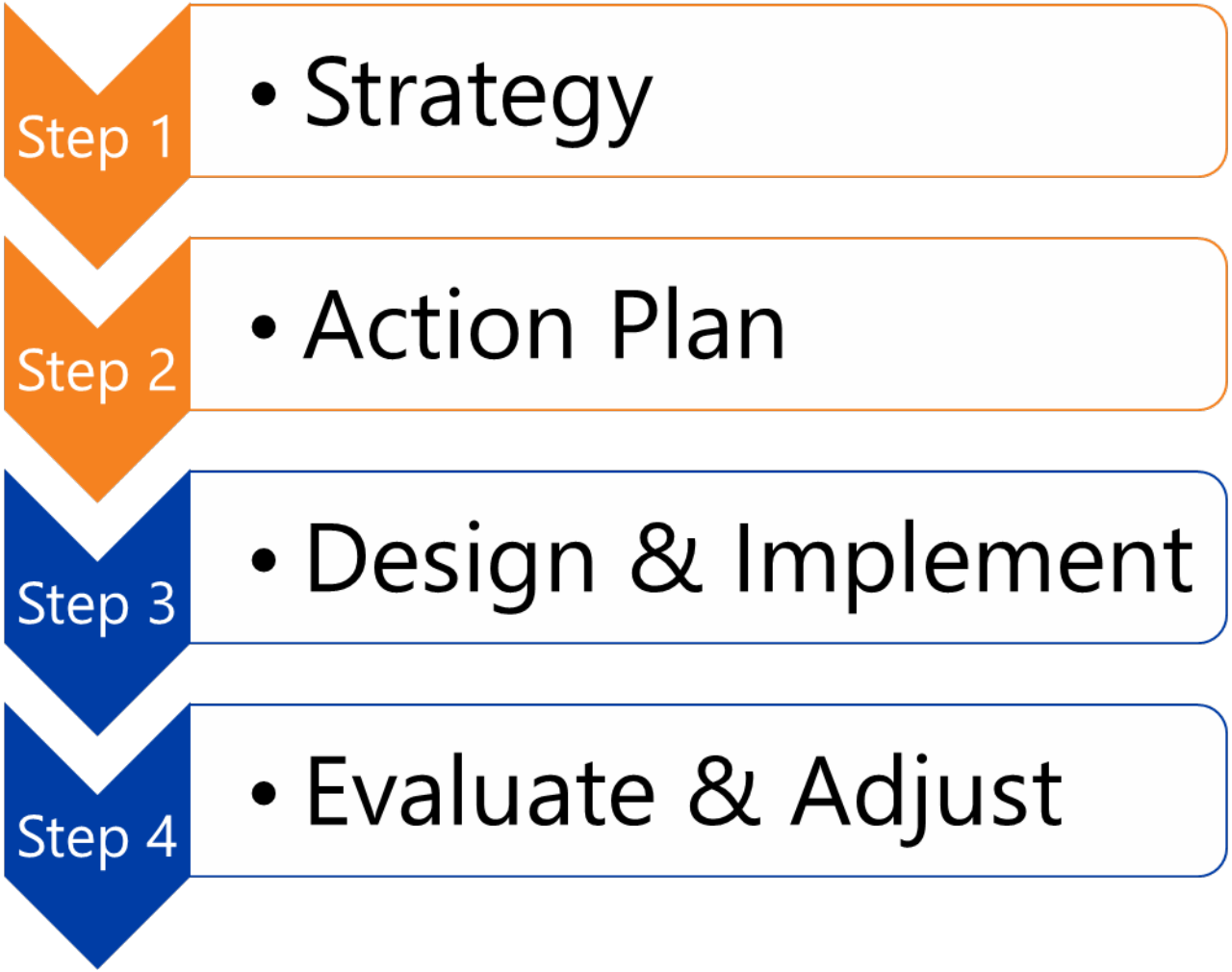
Utility of the Future

Seattle City Light

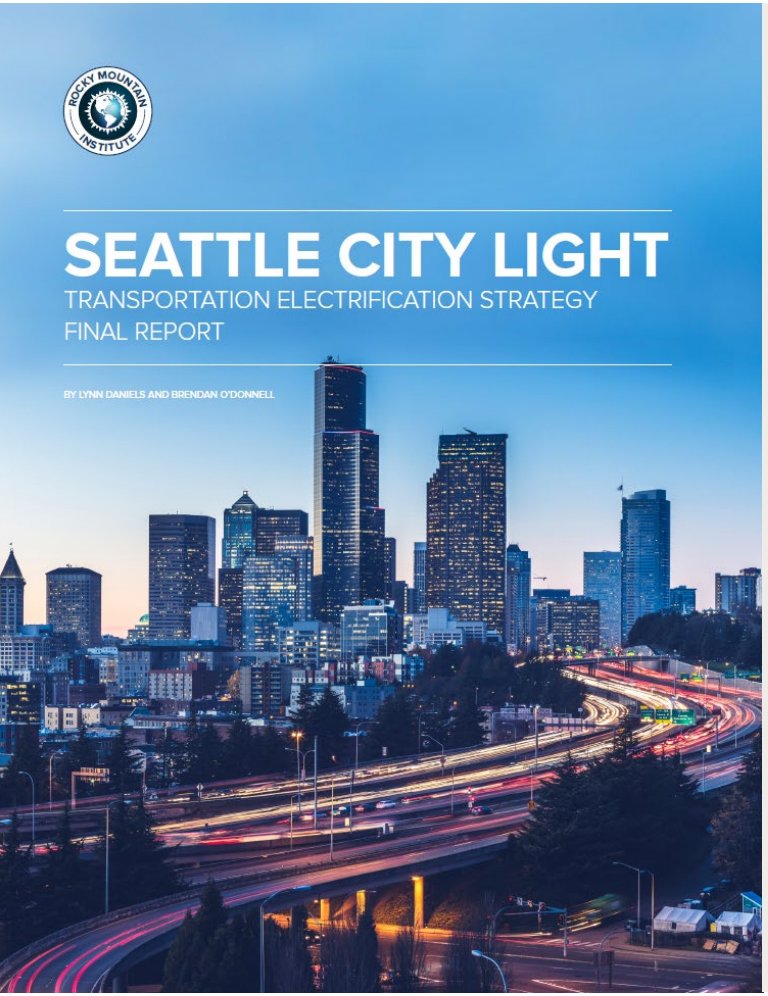
WASHINGTON STATE HOUSE BILL 1512

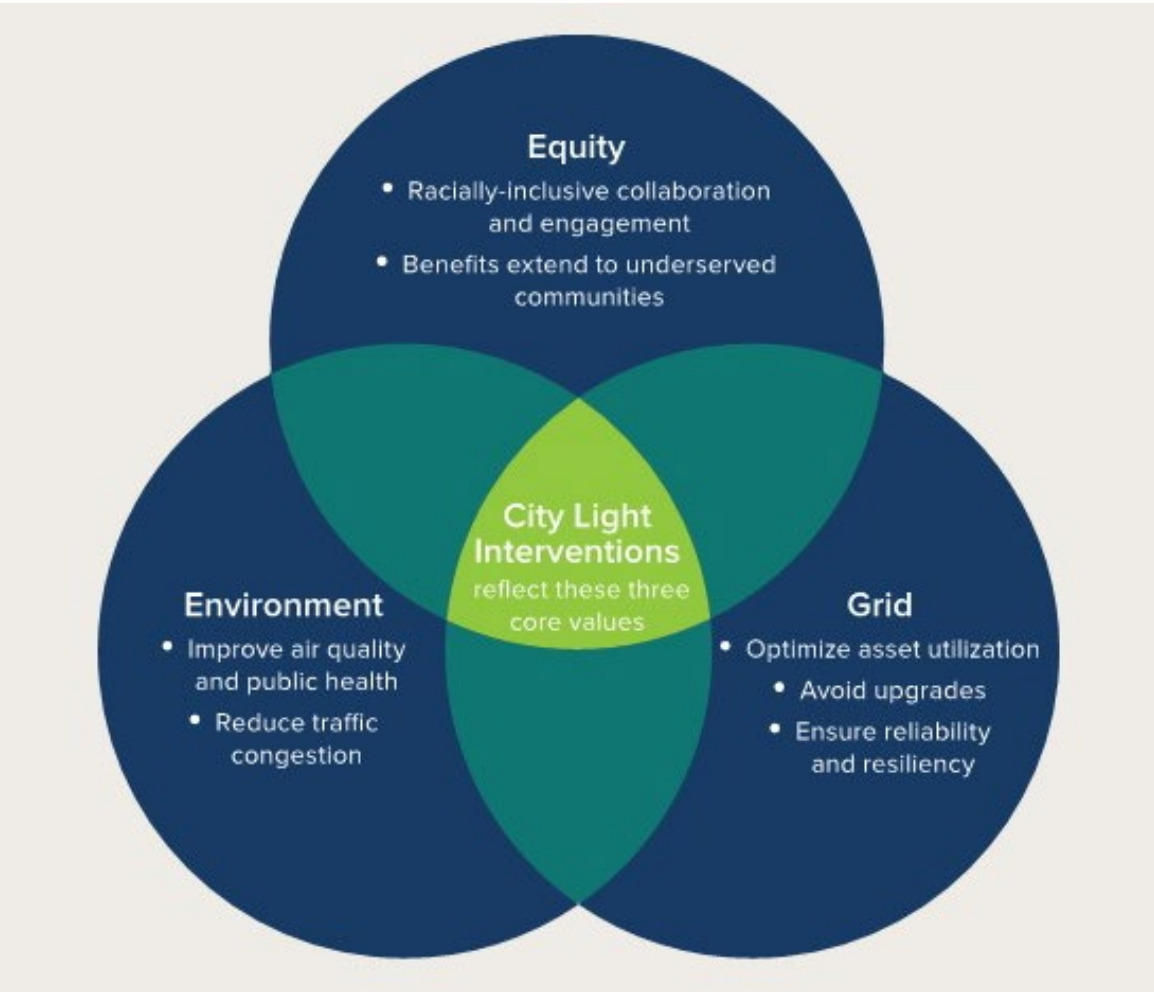
TRANSPORTATION ELECTRIFICATION JOURNEY

TRANSPORTATION ELECTRIFICATION JOURNEY



STEP 1: INTERNAL STRATEGY DEVELOPMENT





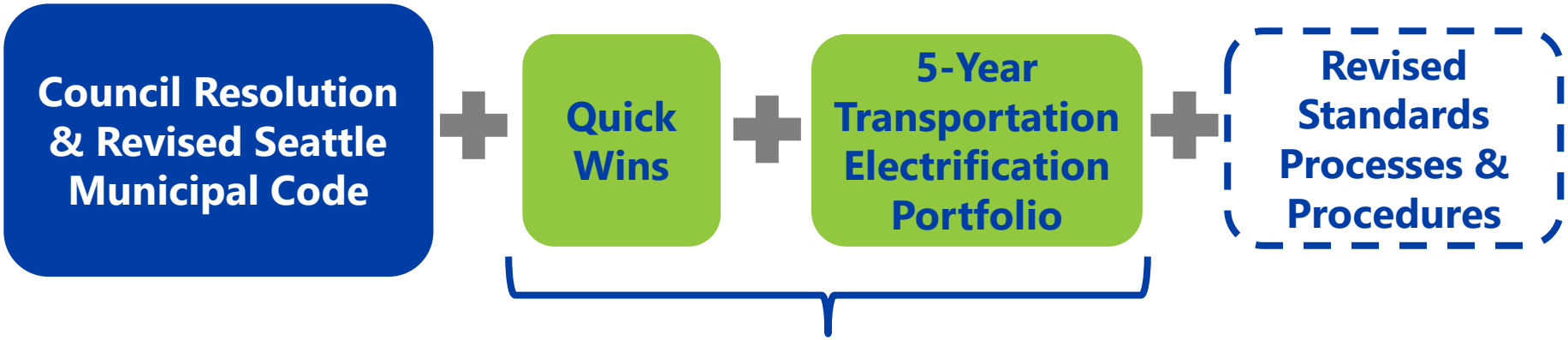
STEP 1: STRATEGIC UTILITY INTERVENTION AREAS

Invest in charging infrastructure with emphasis on universal **access** and expanding **coverage**

Develop new **rates** and improve customer **service** for the transportation market

Prepare for **medium & heavy-duty commercial fleet** electrification

STEP 2: ACTION PLAN SCOPE



- **Details process for Phase 1 & Phase 2 community & stakeholder engagement**
- **Includes high-level budget based on rate impact threshold**

STEP 2: ENGAGE UNDERSERVED COMMUNITIES

STEP 2: OTHER LESSONS LEARNED

TRANSPORTATION ELECTRIFICATION ACTION PLAN: TIMELINE

	2019					2020			
Project Workstream	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
Project Planning									
Stakeholder Engagement Strategy									
Stakeholder Outreach & Engagement (Phase 1)									
5-Year Transportation Electrification Portfolio									
Budget & Rate Impact									
Draft Action Plan									
Resolution & Ordinance									
City Light & Mayor's Office Approvals									
Council Briefing Prep & Vote									

Emeka Anyanwu

Energy Innovation & Resources Officer

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Question and Answer Session

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