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The Electric Vehicle Market: Utility Perspective and Considerations for Utility Infrastructure Deployment

August 2015

Discussion Points

- Introduction: Utility Scale Electric Vehicle Infrastructure Opportunity
- The U.S. Electric Vehicle Landscape
 - Market Growth and Benefits
 - Roles Utilities Can Play
 - Example Utility Activity
- Deployment Considerations
 - Key Questions
 - Key Deployment Considerations
 - Maturity Model for PEV Programs
- How We Can Help



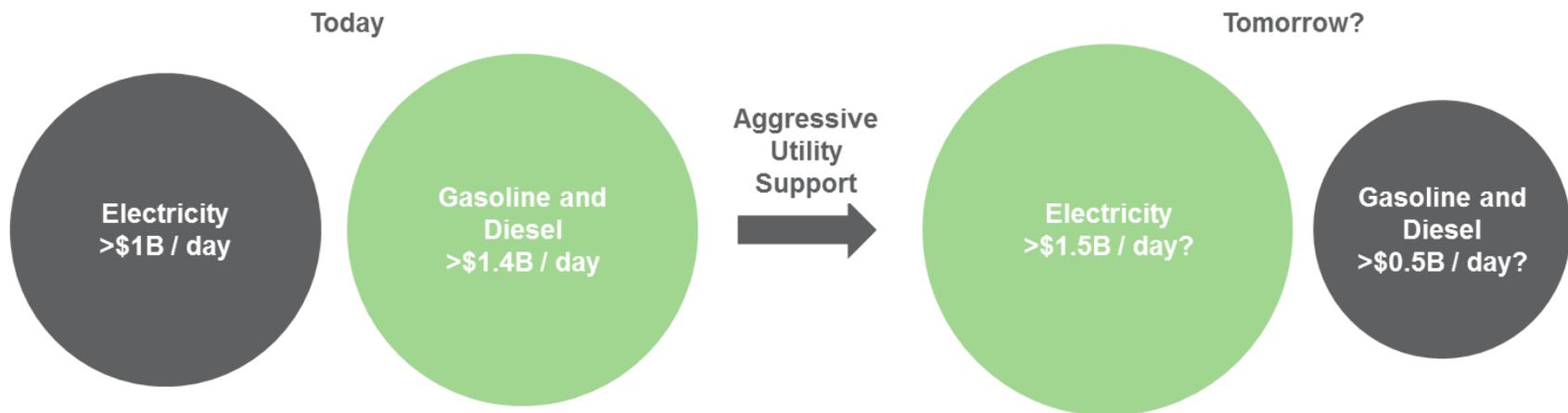
Utility Scale Electric Vehicle Infrastructure Opportunity

The growth of the Plug-In Electric Vehicles (PEV) is creating an opportunity for forward-thinking utilities to leverage their size and scale and deploy PEV charging infrastructure to support load growth, extend customer engagement, and grow the PEV market

- This presentation is designed to help utilities who are considering the expansion of their current electric transportation program to include more PEV infrastructure and those who are considering the initial launch of their PEV program
 - Key program criteria and design considerations are presented to help encourage the thoughtful planning and design of a PEV infrastructure program that will help your utility capitalize on the growing PEV market

The Transportation [Fuel] Market – An Unprecedented Opportunity?

- “By proactively accelerating the widespread adoption of EVs and plug-in hybrids, the electric industry could consume a significant portion of the revenue from the transportation energy market” – Elias Hinckley
- Though aspirational, one scenario described in a recent United Nations Report, consisting of aggressive utility support, describes a major shift from gasoline/diesel to electricity as a transportation fuel



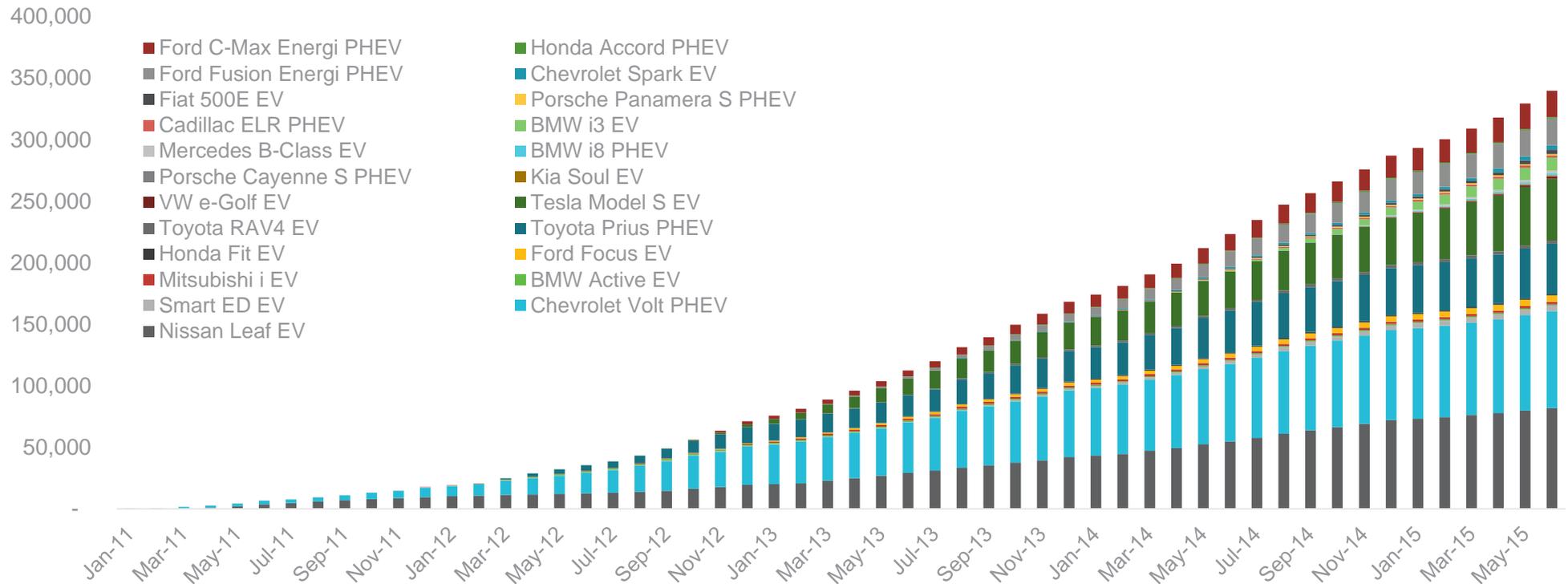
Sources: “Pathways to Deep Decarbonization,” The Institute for Sustainable Development and International Relations and Sustainable Development Solutions Network (SDSN) 2014; “Forget the Death Spiral: Electric Vehicles Offer a Major Growth Opportunity for Utilities,” Elias Hinckley, Greentech Media

The Plug-in Electric Vehicle Market Growth

The PEV market has grown rapidly since 2010, both in volume and diversity, and forward-looking utilities recognize the opportunities in embracing this market

- PEV sales are a small fraction of total U.S. vehicle sales (less than 1% of the 16.5M vehicles sold in 2014), but they are growing fast
- Total PEVs on the road in the United States grew from 345 vehicles in 2010 to roughly 340,000 PEVs by June 2015
- 119,710 PEVs were sold in the U.S. in 2014, a 23% jump from 2013 and a 128% jump from 2012
- More manufacturers, models, and PEV protocols are entering the market

Cumulative U.S. PEV Sales



Source: ScottMadden analysis; HybridCars.com; Fortune.com

Benefits to Electrification of Transportation

Utilities should consider starting now to support the electrification of transportation for four key reasons:

- Load impacts
 - Load growth – PEV owners use 58% more electricity on average
 - Callable resource – PEVs represent battery storage for demand response events
 - Load shift – Time-of-use (TOU) pricing encourages PEV owners to charge off-peak
- Customer benefits
 - With gasoline nearly \$3.00 per gallon, the comparable cost for fueling an electric vehicle is less than \$1.00 per gallon
 - Electric cars¹ have lower operating costs vs. gas powered cars – lower cost per gallon equivalent and lower maintenance costs
- Energy independence and local economic impact
 - The United States imports a significant percentage of its oil, but electricity is heavily domestically produced
- Environmental benefits
 - Transportation produces 27% of U.S. greenhouse gas (GHG) emissions – passenger cars and trucks account for 83%
 - High penetration of PEVs could lead to major GHG reductions²
 - PEVs would contribute to a reduction in criteria pollutants (nitrogen oxides, particulate matter, hydrocarbons, sulfur oxides, etc.)

Unlike distributed solar, utilities should consider shaping the future of electric transportation rather than being shaped by it...starting now!

¹ Battery electric vehicles (BEVs)

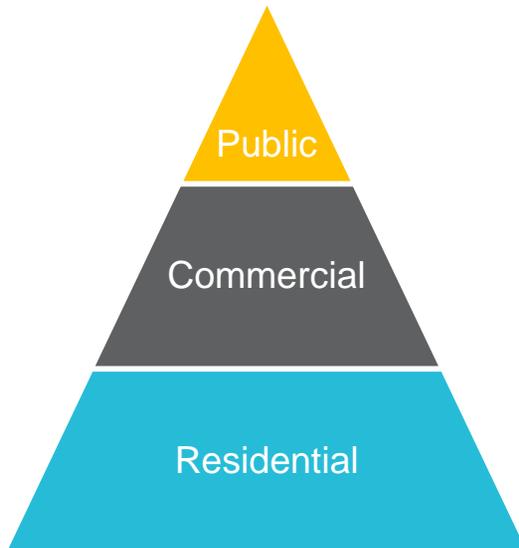
² According to a California Air Resources Board study of GHG emissions from the transportation sector

Utility Roles in PEV Expansion

Utilities can play key roles in growing the PEV market across the (a) residential, (b) commercial, and (c) public market segments through:

- Offering rebates on PEVs and charging stations (primarily commercial and residential)
- Offering rate incentives (primarily commercial and residential)
- Deploying infrastructure to develop a PEV ecosystem, including transformation infrastructure and (potentially) PEV charging stations

EPRI Charging Segment Pyramid



Utility Market Approaches

- Deploy public charging to develop PEV ecosystem, relieve range anxiety
- Establish a pricing construct that fits utility needs based on time, event, or kWh pricing

- Determine need for commercial PEV TOU rate
- Establish/deploy commercial incentive program or infrastructure

- Establish need for residential PEV TOU rate
- Establish/deploy residential incentive program or infrastructure

Select Utility Proposals for PEVs

California investor-owned utilities (IOUs) have engaged in a significant manner over the last year.



SDG&E's Vehicle to Grid Integration Pilot

- Proposed mid-2014 to spend \$103 million
- Hourly time-variant rate and associated grid-beneficial charging infrastructure
- 5,500 networked charging stations in multi-family dwellings and workplaces between 2015 and 2025
- Third parties will build, install, operate, and maintain PEV charging facilities; SDG&E will own assets
- Segments addressed: community, workplace



SCE's Charge Ready Program

- Proposed late 2014 to spend \$355 million between 2015 and 2019
- 1,500 charging stations at long dwell-time locations
- SCE will locate, design, build, own, and maintain the electrical infrastructure
- Customers will choose, own, operate, and maintain the charging stations
- Segments addressed: community, workplace



PG&E's Electric Vehicle Infrastructure and Education Program

- Proposed early 2015 to spend \$654 million between 2016 and 2022
- 25,000 Level 2 and 100 DC fast-charging networked stations
- PG&E will contract with site hosts and provide the PEV service connection at no cost through a separate service drop, instead of through existing infrastructure
- PEV service providers will deploy and operate the chargers through a competitive bidding procurement, but PG&E will own them
- Segments addressed: community, workplace, rural

Note: Community includes locations open to public access – e.g. retail, multi-family, non-access controlled workplace

Select Utility Proposals for PEVs (Cont'd)

California is not the only market where utilities are leading and supporting the growth of the PEV market.



KCP&L's Clean Charge Network

- Proposed early 2015
- 1,000 Level 2 stations and 15 DC fast-charging stations networked as part of the KCP&L Clean Charge Network in Kansas and Missouri
- Segments addressed: community, workplace



Georgia Power's Get Current, Drive Electric Campaign

- Proposed late 2014 to spend \$12 million between 2014 and 2016
- Includes residential and commercial rebates for customer-owned infrastructure, as well as a media campaign
- Georgia Power will locate, design, build, own, and maintain a public network of 60+ stations with DC fast chargers and Level 2 stations, networked
- Segments addressed: community, workplace, residential, rural



Austin Energy Plug-In Austin

- Austin Energy is providing 50% of cost up to \$1,500 for Level 2 charging stations to cover purchase and installation – residential and workplace installations
- Multi-family installations fit either residential or workplace installations
- Plug-In EVerywhere™ network offers unlimited charging for <\$5/mo.
- More than 220 Plug-In EVerywhere stations at more than 80 locations
- Segments addressed: residential, workplace, community

Key Questions

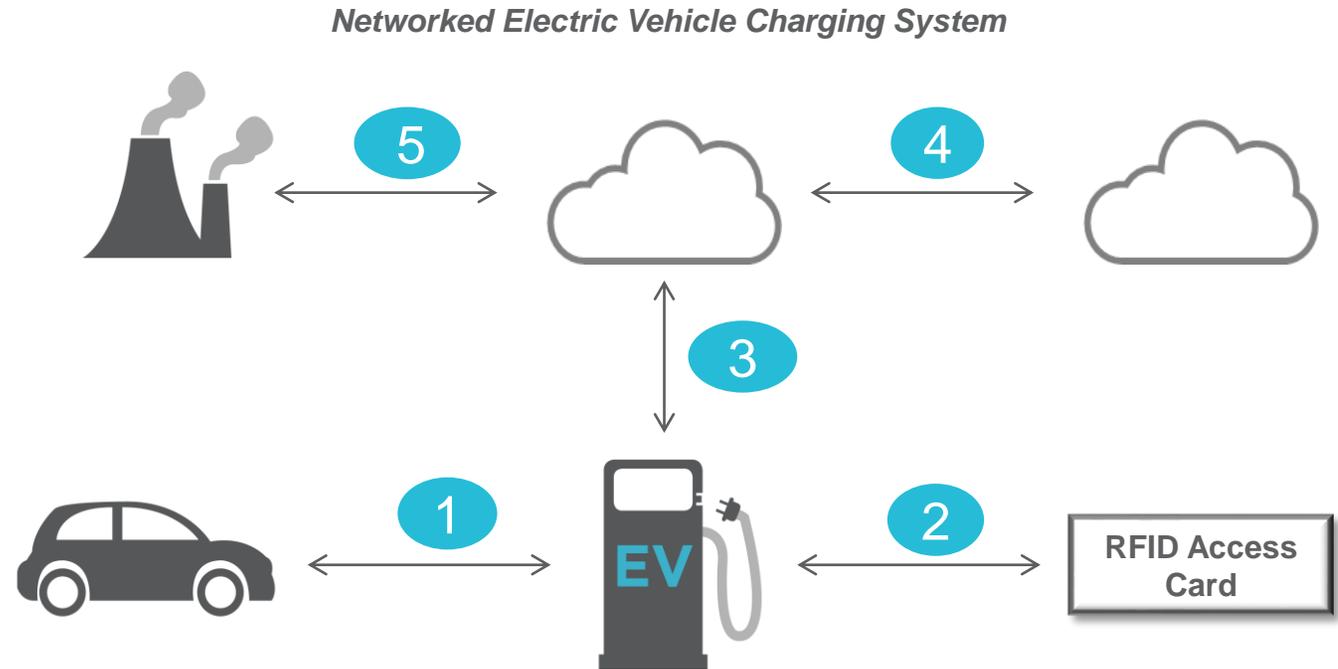
Successfully implementing an EV program is not simple and requires a coordinated approach to successfully enter the market. There are some critical issues that must be addressed such as:

- What approach does your business model support?
- What approach fits with your regulatory framework?
- How can you build partnerships to ensure success?
- Where will you site EV charging infrastructure?
- What hardware and network solutions will you deploy?

The Need for Interoperability

Interoperability is the ability of different systems to communicate, exchange data, and use the information that has been exchanged and is a key concern for electric vehicle support equipment (EVSE) systems in five areas:

- Vehicle to PEV support equipment (EVSE)
- Card to EVSE reader (RFID)
- Network to hardware
- Network to network
- Utility to network



Must Optimize Customer Service and Support

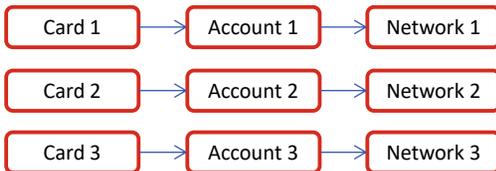
Creating a positive customer experience is crucial to growing the PEV market and is effected by:

- Availability of stations (well maintained and in good locations, suitable levels)
- Customer service and support
- Network interfaces (mobile and web)
- Network to network interoperability, i.e. roaming

The Evolution of Roaming

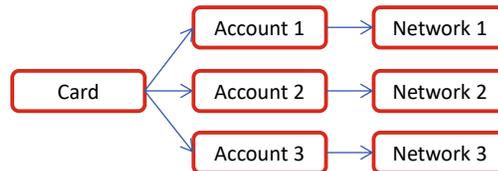
The Past

“Many cards, many accounts”
Blink, Chargepoint, Greenlots, etc.



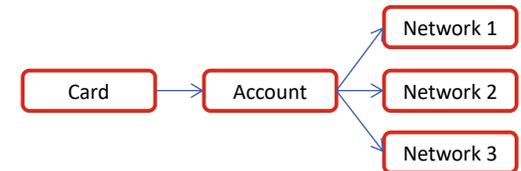
The Present

“One card, many accounts”
Nissan EZ Charge, BMW ChargeNow



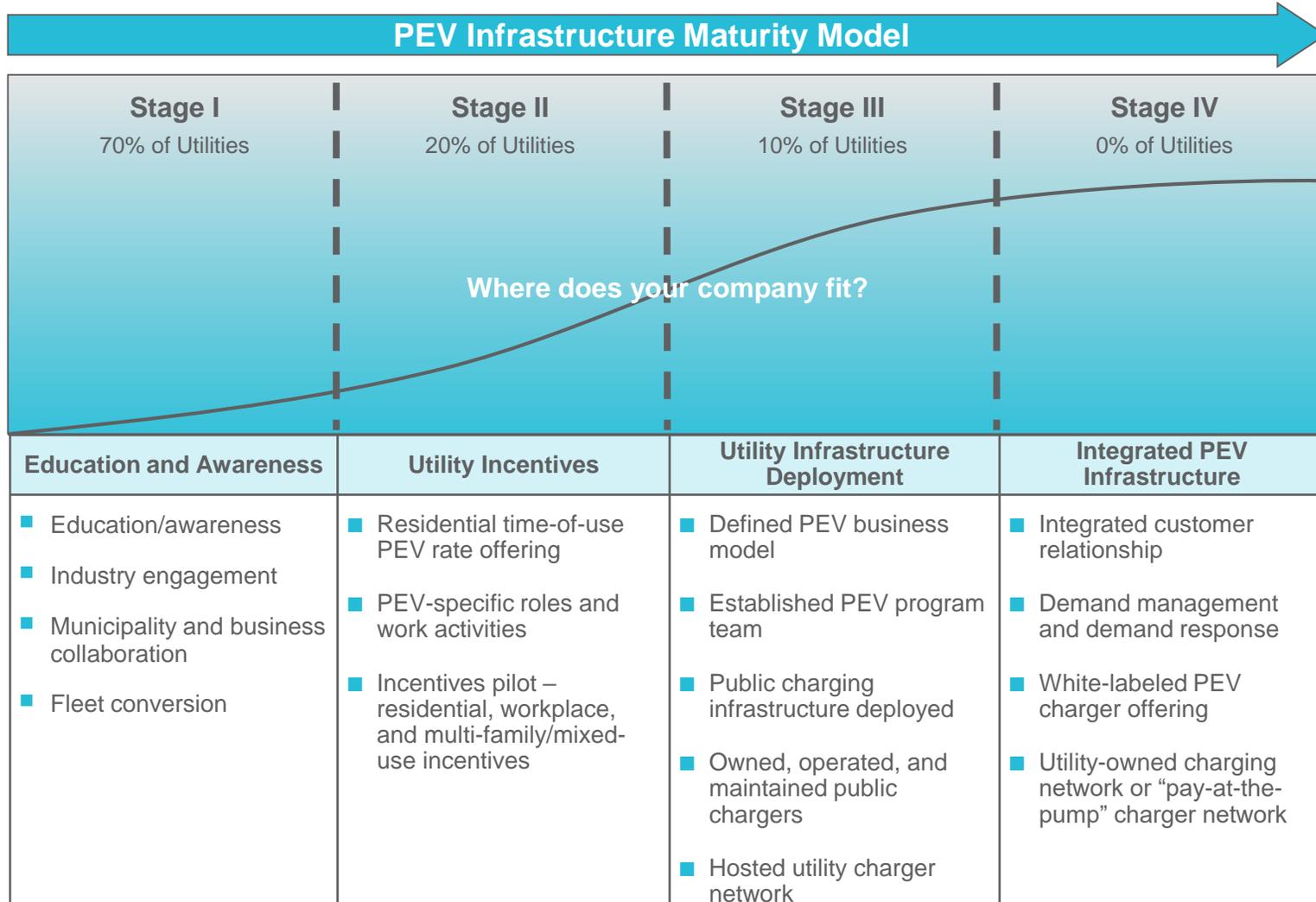
The Future

“One card, one account”
ROEV (not yet developed)



The PEV Maturity Model for Utilities

Utilities move through various stages of PEV program maturity as they implement and operate an PEV program.



Source: ScottMadden analysis

ScottMadden's Capabilities for PEV Infrastructure Deployment

Through our experiences helping utilities deploy PEV infrastructure, ScottMadden can provide support in:

- PEV market assessment and opportunity evaluation
- Project team structure development and roles and responsibilities definition
- Rebate program design and implementation
- Technology assessment, selection, and implementation
- Community charging station network design, siting assessment, and development
- Education and awareness media campaign development

Our deep understanding of utility businesses has helped us assist in implementing new technologies for utilities from rooftop solar to electric vehicles.



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