**1) EVs – A Beneficial Grid Resource with Environmental & Economic Benefits**

A widescale shift from vehicles that are powered by petroleum-based fuels to those charged by electricity can provide valuable benefits to society, including reduced greenhouse gas (GHG) emissions, improved local air quality, and increased local revenue (by using local electricity as opposed to imported fossil fuels).

EVs can also be utilized as a relatively flexible grid resource. If managed appropriately – through controlled charging and storage – they can be leveraged to make the grid more efficient, reducing electric rates and increasing reliability for all utility customers.¹

Furthermore, EVs can be used effectively as new load to support the transition of the underlying generation sources to cleaner resources, increasing the benefits of the shift further. Corporate customers and cities, together with their utilities, are well-positioned to unlock these benefits of EVs.

   **a. The Promise of EV Controlled Charging**

Grid efficiencies are achieved when EVs are set to charge during periods when electricity demand is low or in periods of surplus, also known as V1G. Incentivizing this controlled charging, through programs like demand response, can help avoid adding load during peak periods and can also fill in system troughs, improving overall system-balancing and grid utilization.

   **b. The Potential for Energy Storage**

EVs can further increase grid efficiencies by effectively operating as “intelligent” batteries that store energy at key moments. This potential to charge strategically provides the ability to utilize excess wind or solar power to charge EV batteries at minimal cost, further enhancing system optimization potential.

In addition to strategic charging, which requires one-direction flow, EV batteries also have the potential to provide power back to the grid at critical times. This functionality requires a bi-directional energy flow and data between the grid and the vehicle (i.e., “Vehicle to Grid, or V2G”). Though promising, there are obstacles that must be overcome to fully utilize EVs in V2G services: technical (i.e., the wear on a battery that charges and discharges frequently), and behavioral (i.e., vehicle owners allowing their vehicles to be used as a resource).²

**2) Gaining Traction: Signs of Momentum for EVs**

Various stakeholders have taken significant steps to advance the EV transition:

- 96 businesses, including auto manufacturers and utilities, have signed the Transportation Electrification Accord, committing to advancing an equitable, prosperous and electrified transportation future that provides public benefits.³
- Nine states have signed a Multi-State MOU to mobilize at least 3.3 million EVs by 2025.⁴

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² Numerous pilots are underway to address these obstacles (reference articles are available upon request).
³ See the Transportation Electrification Accord.
⁴ National Conference of State Legislatures, “State Efforts to Promote Hybrid and Electric Vehicles.”
• Electrify America is investing $2 billion over the next 10 years in EV infrastructure and education/outreach.  
• Familiar brands have hit the road with EV offerings, e.g.: BMW i3, Chevrolet Bolt EV, Chrysler Pacifica, Ford Fusion Energy, Honda Clarity PHEV, Nissan Leaf & Tesla Model 3.

3) Unlocking EV Benefits Through Collaboration

As a nascent industry with high capital costs and initial barriers to the adoption of vehicles and charging infrastructure, beneficial integration of EVs requires cooperative engagement. There are abundant opportunities for large energy customers, including private corporations and public municipalities, to collaborate with utilities to drive a more efficient and cleaner electric grid at lower cost through both the adoption and integration of EVs. These customers can play a role by adopting EVs into their fleets, deploying public EV chargers in facilities, adding workplace charging, encouraging employee EV adoption. Utilities can play a critical role as fuel suppliers, charging infrastructure providers, electric system integrators/optimizers, and designers of innovative rates and products for EV customers.

Customer-utility collaboration opportunities could take some of the following forms:

• Utilities could support the installation of public charging infrastructure at large energy customer locations. This includes financial and/or practical support for electric vehicle supply equipment (EVSE) and supporting equipment.
• Customers with EV fleets or employee vehicles could share data from transportation practices (e.g., length and timing of driving routes) to enable better utility asset planning.
• Utilities could incentivize customers with EV fleets (especially large city bus fleets or similar corporate fleets that are deployed and charged during specific times) to act as a grid resource – by managing the timing of charging or serving as an aggregate, large-scale battery.
• Large energy customers and utilities could partner on pairing the adoption of EVs with the transition to a cleaner grid – by managed charging of fleets and pairing new load with renewable energy.
• Customers, such as retail or hospitality, could provide the real estate to host EV chargers, whether owned by utility or third party, to advance access to public charging infrastructure.

4) Challenges & Opportunities: Overcoming Barriers with the Right Incentives

• In the transition to EVs, many utilities and state regulators have not yet been successful in fully agreeing to the role of utilities. In some states, regulators have supported a leading role for utilities in the transition to EVs, whereas in other states the role for utilities and third parties is still unclear, which prohibits fully achieving the grid efficiencies that are possible. To overcome this, private corporations, public municipalities and utilities must work together to identify opportunities to advance and support each other in achieving transportation needs while benefiting the grid (e.g., advocate at the state level for utilities to have a role, connect and work together to ensure efficient planning and integration, etc.).
• The existing regulatory environment may not fully incentivize grid optimization using EVs as a grid-stabilizing resource. Under current regulation in many states, utilities could make higher returns by allowing EVs to charge at will and building new capacity to support peak load, rather than attempting to manage EV charging to benefit the grid. However, proactive regulatory mechanisms that incentivize and reward utilities for their performance – encouraging utilities to ensure EVs are managed on the grid

5 Electrify America (https://www.electrifyamerica.com/)
in a way that benefits all customers – can solve this. One potential model is the use of new utility earnings mechanisms (e.g., performance-based incentives), such as those used in 26 states for energy efficiency programs.6

- **For fleet owners, the economics of EV adoption can be difficult to calculate or may involve high start-up costs that discourage investment.** When a fleet manager considers the operational changes required, such as the costs of procuring and managing EVs, installing charging infrastructure, setting up charging schedules, and retraining drivers on new vehicles, the switching costs to go electric can be challenging. To ease the overall costs of transitioning to EVs, the beneficial impacts from reduced carbon and localized air pollutants as well as the benefits of utilizing customer EVs as a grid resource should be valued. Rate designs or other incentives7 (e.g., utilizing smart charging, time of use, demand response) can be utilized to account for and compensate EV customers for the benefits provided. In addition, education on the total lower cost of ownership of EVs is important.

- **Customers considering hosting EV charging infrastructure face barriers related to ownership, management, and liability risks, in addition to questions on GHG accounting.** Some of these challenges can be mitigated when the charging infrastructure is owned by either a utility or third-party. Utilities, either independently or in conjunction with third party infrastructure providers, can play a key role in developing a simplified hosting process which underlines the impacts and benefits of hosting EV chargers. Customers can benefit from the expertise of utilities as the electric system integrators and operators, reducing capital expenses from infrastructure investment, and potentially, energy charges.8 And utilities can also provide solutions that allow EV charging to align with and contribute to the hosting facilities’ sustainability goals – going beyond the benefits of enhancing customer experience and increasing public charging infrastructure.

In overcoming these barriers, third party stakeholders and investors must also be aligned in striving for beneficial EV integration. Instead of promoting or evaluating actions based solely on the number of EVs, metrics should also focus on overall sustainability impact. For customers with fleets and/or the ability to host public charging infrastructure, priorities could be carbon reductions and improved local air quality, while for utilities, priorities could be increased grid efficiency, lower costs for all rate-payers, and carbon emissions reductions.

5) **Going Further Together to Achieve System-Wide Benefits**

It is only with timely and full recognition of aligned interests and the subsequent strategic partnerships between utilities, corporations, cities and others will system-wide benefits of transportation electrification be realized. With collaboration, the transition to EVs can be accomplished in a manner that maximizes carbon emissions reductions, integrates EVs on the grid efficiently, and reduces costs for all rate-payers. Areas of potential collaboration include:

- Developing new business models that increase public EV infrastructure access;
- Designing rates that incentivize customers to integrate EVs in ways that benefit the grid;
- Determining pathways to maximize the carbon emissions reductions of EVs; and
- Educating regulators to understand areas of potential synergies between customers and utilities and pathways that are beneficial for all consumers.

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7 California regulators and others are currently analyzing opportunities to measure the impact EVs on the grid.
8 See the Transportation Electrification Accord.