

Principles for Utility Investment in Electric Vehicles

HIGHLIGHTS

For more than a century, our cars and trucks have been fueled almost exclusively by oil. Today, electric vehicles give us the potential to power our vehicles with a diverse set of energy sources, including clean and renewable energy.

Working together, policymakers, regulators, communities, and utilities can help accelerate the transition to electric vehicles. With the right utility investments and policies, utilities will be able to serve new markets; electric vehicle drivers will have convenient charging options wherever they go; utility customers could benefit from lower rates and a more efficient grid; and all residents will benefit from cleaner air, a healthier community, and a more stable climate.

Electric vehicles (EVs) represent both an enormous opportunity and a significant challenge for our utilities. Converting our vehicle fleet to electricity could add as much as 1,000 terawatt-hours of demand onto our electric grid, an increase of about 25 percent of current levels (Fitzgerald and Nelder 2017). If managed correctly, this large and flexible load could significantly increase the efficiency of our electric system, which would benefit not only EV drivers but also all ratepayers, providing lower costs. In the long run, widespread deployment of EVs could also be a source of energy storage, filling a critical need as our electricity system moves away from fossil fuels toward intermittent sources of power, such as wind and solar. Without proper management of EV charging, however, the additional power needed to fuel EVs will require significant new capacity, reducing pollution benefits and imposing additional costs on ratepayers.

Building more EV infrastructure will help more people make the switch to an EV, saving money and reducing emissions. Consumer studies have consistently found that inadequate access to charging infrastructure remains one of the most pressing obstacles to EV adoption. We have had more than a hundred years to build the massive infrastructure necessary to support our gasoline and diesel vehicles, including more than 100,000 gas stations fed by million of miles of pipeline. Creating an EV charging network that can compete with our oil infrastructure will require tens of thousands of new charging stations.



Installing EV charging equipment at office buildings and retail centers can help expand EV ownership by giving more people access to convenient charging options. Workplace charging can also take advantage of high midday solar production.

Here are 10 key principles that should guide utilities as they consider how to invest in EV technology:

Provide Chargers Where People Live and Work

Most EV charging happens at home. An EV driver with access to home charging can begin each day with a full tank, and given current battery ranges, that is usually sufficient to serve their daily driving needs. Overnight charging is also ideal for the grid, taking advantage of relatively low electricity use at night. Providing universal access to home charging therefore stands as a top priority for infrastructure investments. Utilities should invest in infrastructure in apartment buildings and consider strategies to reduce the up-front cost of home charging installations, such as rebates and on-bill financing.

Providing charging at workplaces can be a valuable perk for employees and can help encourage EV purchases. An employee with access to workplace charging is six times more likely to purchase an EV than an average worker (DOE 2015). As we add more solar to the grid, workplace charging will also take advantage of high midday solar production.

Create a Network of High-Speed Chargers along Highways

Most days, overnight and workplace charging will be sufficient to provide EV drivers with the energy they need for their daily commutes. But consumers also want to be able to take their vehicles for long road trips, or for an emergency charge. A network of fast chargers along highways—capable of recharging an EV in 30 minutes or less—will be a critical component of our infrastructure.



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High-speed charging along highways—such as this charging station near Interstate 45 outside of Houston, Texas—is critical to enabling EV owners to take longer road trips.

Appropriate time-of-use pricing can save an EV driver more than \$1,000, compared with gasoline costs over the life of a conventional vehicle.

Maximize Benefits to Ratepayers and the Grid

EVs can provide significant benefits to ratepayers and improve the efficiency of the electric grid if EV charging occurs during times of low electricity demand or high renewable energy production. Utilities can encourage drivers to charge their vehicles efficiently through time-of-use rates that provide additional savings for charging at night, or other times of low electricity use. Appropriate time-of-use pricing for EVs can deliver savings to ratepayers of more than \$1,000 per vehicle, compared with gasoline costs over the life of the vehicle (Fitzgerald and Nelder 2017). In the long run, utilities should work with auto companies to advance vehicle-to-grid integration technologies that would allow EVs to act as a source of storage, improving the reliability and efficiency of the grid.

Establish Fair Electricity Rates for EV Charging

Creating a transparent and fair price structure will be important to making EV charging efficient. For example, high fixed or demand charges can make it difficult to create a viable business model for public fast-charging stations (Fitzgerald and Nelder 2017). Charging rates should ensure significant cost savings compared with diesel and gasoline equivalents. Installation of advanced metering infrastructure can help utilities establish a rate designed to promote efficient EV charging.

Support Electrification of Trucks and Buses

Heavy-duty vehicles such as trucks and buses are major contributors to global warming pollution as well as to local air pollution, such as nitrogen oxides and particulate matter that cause significant health problems (Chandler, Espino, and O’Dea 2016). Electric buses can reduce fuel costs and alleviate air pollution in congested urban areas. Investments in charging infrastructure and station equipment can help



San Joaquin RTD / Creative Commons (Wikimedia Commons)

California's San Joaquin Regional Transit District has deployed electric buses in its fleet serving Stockton and other nearby cities. Investments in charging infrastructure and equipment can help make electric buses cost effective for fleet managers and transit agencies.

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Support Electrification of New Mobility Services

Ride-hailing services such as Uber and Lyft play an increasingly large role in our transportation system. As we look to the future, the rise of automated vehicles could make these “mobility service” companies cheaper and more popular. Transportation network companies (TNCs) currently report that inadequate access to fast-charging infrastructure in areas of high demand is one of the greatest barriers to EV use among their drivers (George and Zafar 2018). In addition, TNC drivers will require fast-charging rates that are cost competitive with gasoline. Utilities should work with TNCs to develop infrastructure proposals that meet the needs of TNC drivers and can speed electrification of this critical market.

Ensure Low-Income Communities Benefit from Electrification

Improving access to EVs in low-income communities remains a significant policy challenge that requires creative solutions. Integration of EVs into ride- and car-sharing networks, installation of more charging stations in apartment buildings, and electrification of transit and freight vehicles can help ensure

that low-income residents benefit from the transition to electric transportation. Utilities should also work closely with state programs that provide increased rebates to low-income consumers and extend incentives to buy used EVs.

Create an Open and Competitive Market for EV Charging

The market for charging infrastructure is developing rapidly, with new technology and new business models being explored by auto companies, charging equipment providers, and utilities. Utility investments in EV infrastructure should support this robust and competitive marketplace. One option is for utilities to focus exclusively on “make-ready” infrastructure, while providing rebates for site hosts and other third parties to purchase and own the actual EV charger. Alternatively, utilities could procure charging equipment through a transparent and competitive process that provides site hosts with a range of charging equipment options. Either way, utilities should work with auto companies and charging equipment providers to ensure that the infrastructure investments we make today will account for continued improvement in EV charging technology.

Utilities should also take steps to ensure that charging stations are consistent and reliable. Charging infrastructure built with ratepayer funds should meet the highest national standards for interoperability, so drivers of all EVs can use all available charging equipment. Whether owned by the utility



Electric vehicle charging infrastructure needs to be consistent, reliable, and well maintained. Utilities should work with auto companies and charging equipment providers to ensure that charging stations can stay up to date with the latest EV technology. Charging stations should also meet the highest national standards for interoperability, so EV drivers can use the charging equipment regardless of the EV model they own.

or by a third party, charging stations should be well maintained, so drivers can be confident that they will be able to charge their vehicles every time.

Engage Stakeholders in an Open and Transparent Process

Creating a strong market for EVs will require coordination among many stakeholders. Utilities should work closely with the auto industry, community groups, developers, state and local governments, and workplaces to determine how best to deploy EV infrastructure. It will be particularly important for utilities to reach out to low-income residents and communities that suffer disproportionately from vehicle pollution to ensure that the needs of these groups are well represented.

Educate the Public on Benefits of Electrification

Limited consumer awareness continues to be a major obstacle to widespread deployment of EVs. Less than half of consumers can name a single make and model of a plug-in vehicle, and 95 percent of consumers are not aware of consumer incentives for EVs (Jin and Slowik 2017). Utilities can leverage their existing relationships with consumers to help inform drivers of the potential benefits of electrification, including additional programs available to support drivers, charging rates, and incentives.

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