



Choosing the Electric Avenue: Unlocking Savings, Emissions Reductions, and Community Benefits of Electric Vehicles

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Executive
Summary



IISR's
**ENERGY
DEMOCRACY
INITIATIVE**

Executive Summary

The U.S. vehicle market will undergo a massive technology disruption from electric vehicles in the coming decades. Many analysts see the potential for surging sales of these efficient vehicles to enable smart grid management, but few have explored the local impact of electric vehicles: promoting energy democracy. Electric vehicles offer a natural use for solar energy, a pathway to pump more local solar power onto the grid, and a source of resilient power when the grid goes down. Ultimately, electric vehicles are another tool to miniaturize the electricity system, providing unprecedented local control.

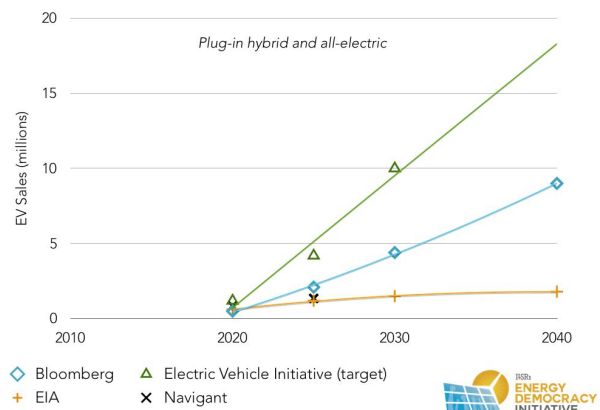
The imminent transformation requires immediate attention to policy and planning. Electric utilities typically produce 15-year or longer “resource plans” to map out additions of new power plants and power lines that will last for decades. But electric vehicles may have an impact much sooner than the 40-year lifetime of these traditional resources, or even the 15-year timeframe of resources plans. The rising numbers of electric cars on U.S. roads may impact utility plans well within their current planning horizon. The time for action is now.

Surging Electric Vehicle Sales

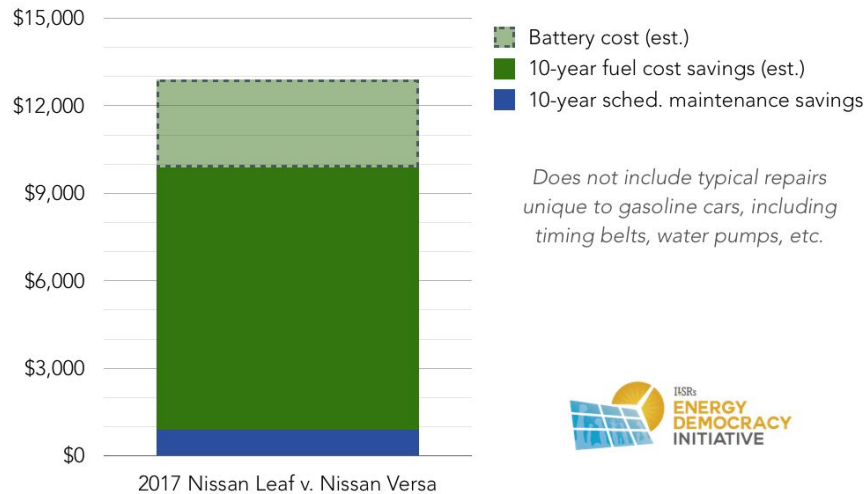
With sales rising rapidly as range expands and costs fall, many forecasters expect significant deployment of electric vehicles by 2040. Electric grid managers will have to account for the impact of transportation electrification and accommodate a wide range of vehicle adoption forecasts.

Prospective car buyers will also consider the long-term opportunity, as the total cost of electric vehicle ownership becomes comparable to gas-powered cars. Already, avoided scheduled maintenance and fuel costs are likely to save electric car drivers as much as \$10,000 compared with owning a comparable internal combustion vehicle.

U.S. ELECTRIC VEHICLE SALES FORECASTS



ELECTRIC VEHICLE OWNERSHIP 10-YEAR SAVINGS

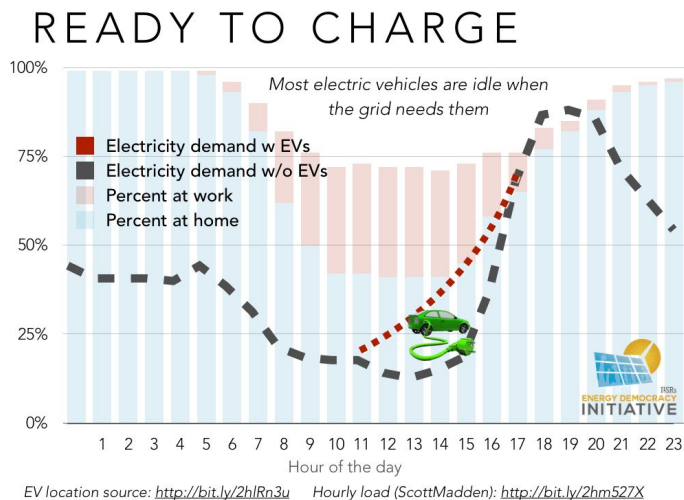


Making the Grid More Efficient

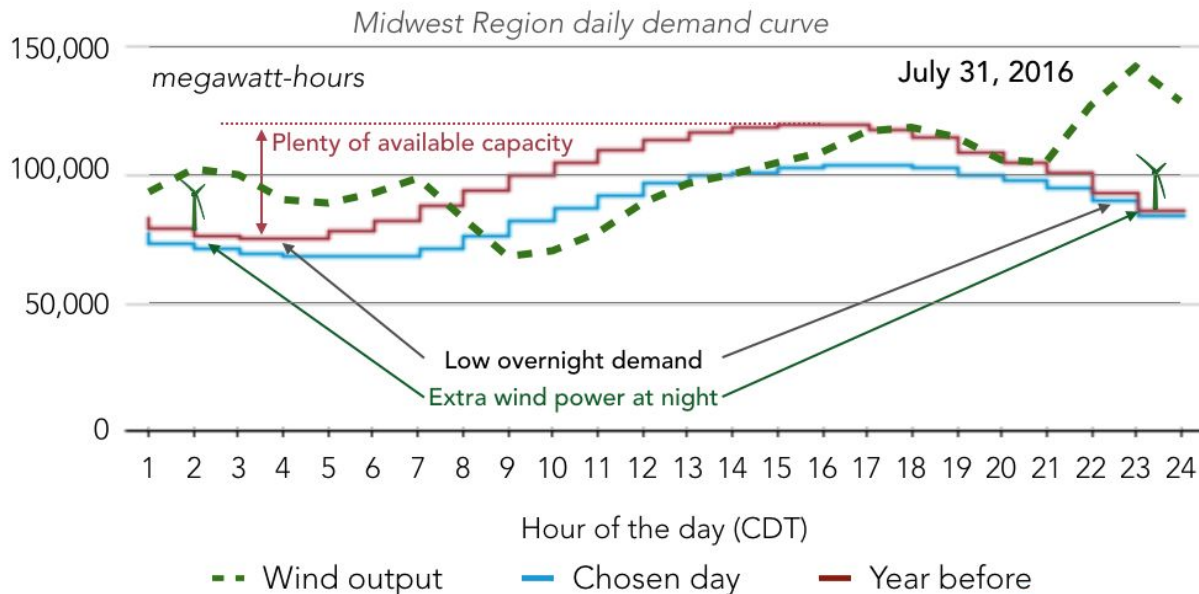
As a large new source of electricity demand, electric vehicles can cut transportation-related pollution and give grid managers unprecedented ability to make the electricity system more efficient.

Timed charging of electric vehicles means afternoon surges in electricity demand can be smoothed out (shown right) by steadily increasing demand from electric cars.

Additionally, electric cars can soak up excess energy supply by charging overnight to absorb surplus wind energy, as shown in the following chart from the Midwest Independent System Operator.



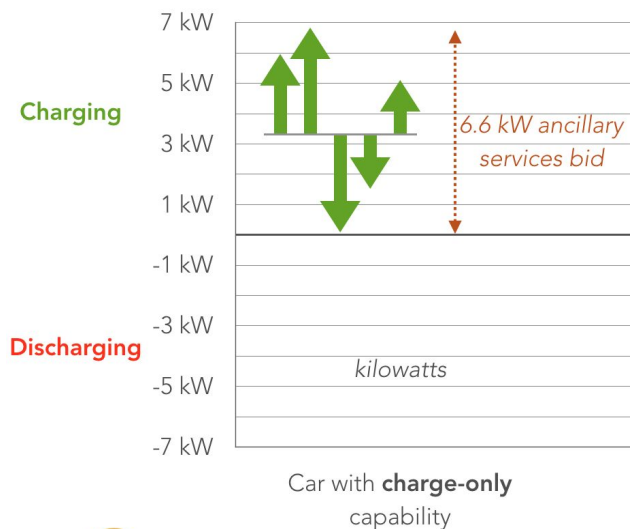
AMPLE OVERNIGHT POWER SUPPLY



Source: U.S. Energy Information Administration



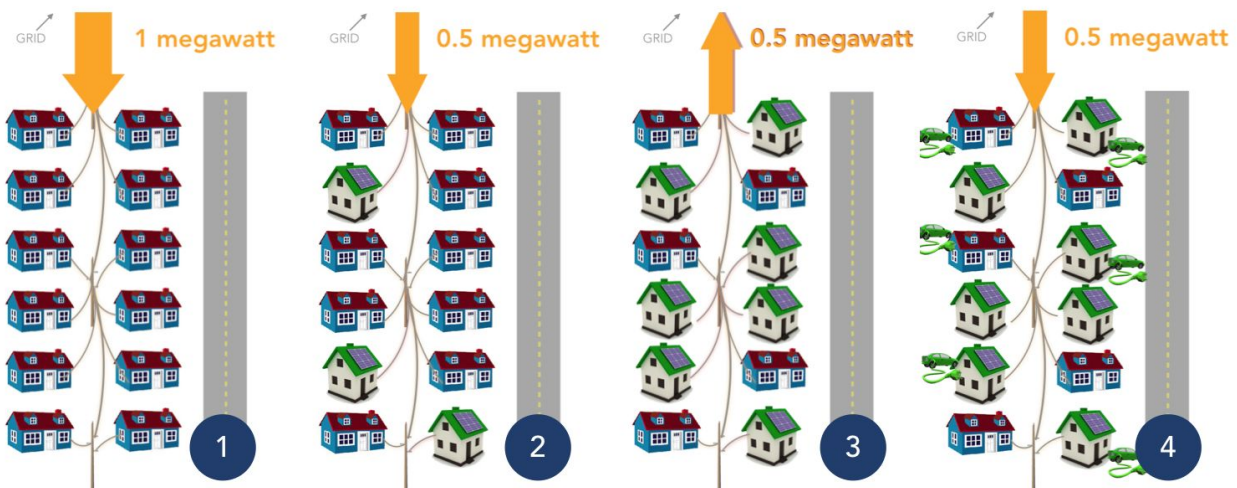
ELECTRIC VEHICLES CAN PROVIDE GRID SERVICES



Finally, electric cars can support the basic balancing act of the grid by adjusting their charging levels second-to-second in order to maintain a steady voltage and frequency (a practice called “ancillary services”). Taking advantage of this power will require new market rules, but vehicles with nothing more than a Level 2 charger could provide valuable services to the grid, often able to respond more quickly than existing power sources.

Enabling Energy Democracy

Electric vehicles can crucially expand the opportunity and capacity for local energy production and resiliency. Like solar, electric cars are a conspicuous way to burnish an owner's environmental or self-reliance bona fides and to save money. But the combination of the “sexy electrics” -- solar and electric cars -- is also a marriage of complementary technologies, an increasingly inexpensive power source and a flexible power user. Individuals can fuel their vehicle using sun from their rooftop. Communities can generate more solar locally by putting more of that power to use at home, to power vehicles. The following graphic illustrates how electric vehicles could absorb daytime solar energy, enabling more homes and businesses to go solar without requiring grid upgrades.



As solar grows, it reduces demand for grid power (2). If it grows further, solar can power the entire local grid and “backfeed” to the larger grid (3). Adding electric vehicles (4) can absorb this excess local production.

Finally, electric vehicles can provide resilient power to communities under threat of severe weather or natural disasters, since today's electric vehicles already have enough battery power to run an average American home for 24 hours.

Getting the Right Rules

The power of electric cars won't flow automatically, but instead requires the proper rules to expand and refine charging infrastructure, charging policies and prices to incentivize grid-friendly behavior, and incentives for access that ensure all Americans (car owners or not) can benefit from transportation electrification. ILSR's recommendations are below:

Infrastructure

- Utilities should finance private chargers and invest in public charging networks based on future revenue from sales of electricity to power vehicles (and/or implement inclusive, tariff-based on-bill financing). Regulators should ensure choice and competition in charging hardware for private and public chargers.
- Public charging infrastructure should be well distributed geographically and equitably, especially in areas where private parking and charging is less available, such as near multi-family housing and business districts.
- Cities should allow residents and businesses to use Property Assessed Clean Energy (PACE) financing for electric vehicle charging hardware, and also lead by example by electrifying fleet vehicles and providing public access to fleet charging stations.

Charging

- Utilities should offer charging plans that include substantial discounts for charging during off-peak hours or absorbing excess renewable energy supply.
- Utilities should lower barriers (such as hardware and installation costs) to accessing discounted charging programs.
- Utilities, charger manufacturers, and automakers should harmonize technology to allow for vehicle charging to follow and accommodate renewable energy supply.
- Cities should work with utilities and car dealers to offer bundled solar and electric vehicle purchases, and deploy policies to support on-site charging from solar.

Incentives and Access

- Electric vehicle incentives should be means-tested.
- Car-sharing and transit systems should be electrified due to widespread health and environmental benefits.

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