

Transportation Electrification 101

A Guide for Local Leaders

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1. How do I get up to speed on electric transportation and electric vehicles?

To better understand the world of electric transportation, these are some helpful vocabulary words to know:

TERM	DEFINITION
Charging Infrastructure	The charging station (also known as Electric Vehicle Supply Equipment or “EVSE”) and the supporting electric delivery system that connects electric vehicles to the energy grid.
Level 1 Charger	A Level 1 charger is the slowest type of charger and relies on a typical household power outlet. Level 1 chargers come as standard equipment with electric vehicles. Level 1 charging is intended for overnight charging and will typically add fewer than 5 miles of range per hour.
Level 2 Charging Station	Level 2 charging stations are the most common type of charging station and require a 240-volt outlet, the same as a clothes dryer. Level 2 chargers provide between 3 to 19 kilowatts of power, which translates to between 5 and 60 miles of range per hour for a passenger EV. Level 2 charging is also intended for overnight charging at home or public charging at locations where an EV will be parked for an extended period.
Direct Current Fast Charger (DCFC)	A DC Fast Charging station provides greater than 20 kilowatts of power, though typically will provide at least 50 kilowatts. Current DCFC provide up to 350 kilowatts of power and can add over 100 miles of range in fewer than 10 minutes. Due to their higher power, DCFC are usually located along major highway corridors to facilitate long range EV travel.

Electric Vehicle (EV)	EVs are vehicles that are at least partially powered by electricity. EVs include Battery Electric Vehicles (BEVs) that are powered only by an onboard battery, and Plug-in Hybrid Electric Vehicles (PHEVs) that are powered by an onboard battery that is charged from the energy grid and an internal combustion engine.
Energy Grid	A complex and interconnected system that includes power generation, transmission, distribution, and end use.
Fleet	Multiple vehicles that are owned or leased by one entity, company, or government agency.
Light-, Medium-, and Heavy-Duty	The three general classifications of vehicles used when describing their weights. Light-duty covers most passenger cars and trucks, while medium- and heavy-duty tends to denote larger commercial trucks and buses. A full breakdown can be found here .
Managed Charging	A tool employed by some EV programs to affect customer charging patterns. Managed charging programs utilize price signals and/or technology in the vehicle or the charging equipment to adjust the timing of and rate of charge.
Off-Peak Charging	A type of managed charging program that incentivizes customers to re-charge their vehicles when electricity demand is low (e.g., overnight).
Regulatory Structure	Investor-owned electric companies are regulated at the federal level through legislation and agency actions (e.g., Federal Energy Regulatory Commission, Environmental Protection Agency, Cabinet Departments, etc.), at the state level by Public Utility Commissions, Public Service Commissions, Corporations Commissions, state legislatures and agencies, etc., and at the local level through building codes, city-led environmental initiatives, and more. Electric cooperatives and public power utilities may be exempt from some or all state regulation.

Zero Emission
Vehicle (ZEV)

A term used by the 10 states that have adopted California's [ZEV standards](#), which require automakers to sell an increasing share of ZEVs within the state adopting the standard. ZEVs typically include EVs and hydrogen fuel cell vehicles.

2. What are the benefits of electrifying the transportation sector?

The benefits of electrifying the transportation sector can be broken down into three areas: economic, environmental, and equity.

Economic

Electric vehicles have lower fuel and maintenance costs than their traditional counterparts. EV drivers spend the equivalent of about \$1.20 per gallon, based on the average residential cost of electricity or about [half the cost of gasoline](#). Electricity prices are less volatile than gasoline prices, providing more price certainty for individuals, companies, and municipalities.

As U.S. [automakers continue to invest in EV manufacturing](#), the continued growth of electric transportation options could increase economic output and generate hundreds of thousands of new jobs, while also saving customers money to use on other goods and services.

Although the purchase price of an EV is somewhat higher than their conventional counterparts; according to [Consumer Reports](#), most EV owners end up paying substantially less in maintenance and operation costs over the lifetime of the vehicle. Competition and a growing domestic supply chain will lower costs over the next decade

as well, as 50 EV models from multiple manufacturers are available today and nearly 130 models are [expected](#) by 2023. Additionally, current and future federal incentives for acquisition could further reduce the cost of purchasing an electric vehicle.

Environmental

With no tailpipe emissions, EVs leverage the benefits from an increasingly clean energy grid. [As of year-end 2020](#), carbon emissions from the U.S. power sector were 40% below 2005 levels—the lowest level in more than 40 years—and 15% below the transportation sector.

Equity

Broadly, electrification provides health benefits to all communities, including historically underserved communities, by removing traditional air pollutants and improving local air quality. Further, as electric companies are obliged to serve all customers, they can ensure that communities of all sizes and income levels share in the benefits of electrification. Electric companies currently advance equity through the deployment of charging infrastructure to areas that may not be served by third-party charging companies and through incentive programs that lower the threshold for entry into the electric vehicle market.

3. What are the biggest hurdles to accelerating the adoption of electric vehicles?

The primary barriers to adoption can generally be broken down into three categories: vehicle availability, charging infrastructure availability, and customer awareness.

Vehicle availability and supply chain constraints

Most major automakers already sell EVs, and the market is poised to grow dramatically over the next decade. A [report](#) from the Edison Electric Institute and the Institute for Electric Innovation predicts that, by 2030, U.S. EV sales will exceed 3.5 million per year and that 18.7 million passenger EVs will be on U.S. roads.

Charging infrastructure availability

EV drivers need a robust, publicly accessible charging network so they can charge and drive an EV in the same way as a conventional vehicle. Electric companies are investing nearly \$3 billion in customer programs and projects to deploy charging infrastructure and to accelerate electric transportation. Increasing investment from all stakeholders—including electric companies, automakers, charging network providers, and others—will help drive transportation electrification.

Today, public charging infrastructure is needed at destinations to allow charging while parked and along travel corridors to allow long-distance travel. [Listen to a great success story](#) out of Utah about how government and private partners advance electrification agendas.

Customer and Seller awareness

Educating future EV owners/drivers and fleet managers on the net-positive lifetime value of purchasing an electric vehicle, compared to its combustion counterparts, will help drive demand. Additionally, ensuring vehicle dealers and salespeople are informed about elective vehicle technology and benefits so they can answer questions from potential new EV customers.

4. What can cities do to advance electric transportation?

If they haven't already, cities should begin examining how electrification benefits their community, not only improving the quality of life, but also creating a more economically competitive business area. With President Biden's recent executive order to electrify the federal fleet, and as major corporations like FedEx and Amazon make similar announcements, cities should prepare now for increased transportation electrification.

This includes examining helpful policies to promote electric vehicle adoption, the [funding mechanisms](#), industry and labor partnerships, and community buy-in to advance electric transportation.

Policies to promote adoption

For example, adding an electric vehicle ready ordinance to your codes is a great way to ensure newly constructed homes and/or building will be ready for future EV charging infrastructure. EV-ready requirements can be a cost-effective way to prepare a building for the addition of EV charging equipment at a later date.

- [AchiEVe: Model Policies to Accelerate Electric Vehicle Adoption](#)
- [Summary of Best Practices in Electric Vehicle Ordinances](#)
- [Electrifying Transportation in Municipalities: A Policy Toolkit for Electric Vehicle Deployment and Adoption at the Local Level](#)
- [Procure electric vehicles for your municipal fleet](#)

Funding Mechanisms

- Public bonds for community resiliency investments and transportation investments
- Federal dollars

- State dollars
- Private foundation dollars
- Private investment

Industry Partnerships

One way to accelerate electric transportation options is to coordinate and partner with your local electric company on pilot or full-scale programs to expand EV charging infrastructure in your area. Leverage already existing partnerships to expedite the electrification process in your locality. For example, Baltimore Gas & Electric has a program in Maryland that installs public charging infrastructure at municipal or government-owned facilities, such as this [project](#) at a recreation center in Annapolis. Southern California Edison also supports public charging infrastructure through its Charge Ready program, such as this [project](#) at the Los Angeles County Fair in Pomona.

When considering larger projects, like light rail or fleet electrification, it is also worthwhile to search for other industry and labor partners that may be affected by such a transition. Local labor leaders can go a long way in advancing projects that bring good jobs to local communities.

Community Buy-in

Community buy-in is an important element for your electric transportation project to be successful. Educate the community in the plethora of benefits that exist:

- Air quality improvements
- Economic competitiveness
- Interconnectedness with regional commercial and business hubs
- Job creation

- Creation of new business opportunities and partnerships

Cities can also establish, and advocate for updating, [building codes](#) that allow for the easy and safe installation of charging infrastructure. These include codes requiring newly constructed buildings to pre-wire a certain amount of parking spaces for charging infrastructure. Making parking spaces “EV Ready” during construction is typically much cheaper than retrofits. Other options include requiring EV charging stations to be installed so that occupants can charge on Day 1 of the building being open.

Lastly, cities, towns, and villages, should work to expand charging infrastructure at public locations, such as libraries, recreation centers, schools, and city hall.

5. What partners may exist to help expand access to EVs in my community?

- Your local electric company
- The federal government through the [DOE Clean Cities Coalition Network](#)
- The National League of Cities
- State Programs
- Nonprofit Grant Programs – Bloomberg

6. What resources exist to help disadvantages communities access the benefits of electric transportation?

[Public and private investment](#) should work to apply a lens of equity to investments in electric transportation buildout. Some examples of where that is happening include:

- In some jurisdictions, electric companies are required to devote a percentage of their investment in charging infrastructure programs in qualifying and disadvantaged communities. Companies, including [Portland General Electric](#), [Southern California Edison](#), and [Xcel Energy](#), offer rebates and incentives to qualifying communities to help install charging infrastructure in underserved areas.
- [Disadvantaged communities and communities of color](#) have higher levels of respiratory disease and early death, leading some [jurisdictions](#) and [companies](#) to begin considering how more passenger vehicles and heavy-duty vehicles (e.g., 18-wheelers) can be converted economically to Zero Emission Vehicles, and how their addition will affect load demand and the energy grid.
- Electric company [investment in underserved communities has more than doubled](#) since the end of 2019 and that number is expected to continue rising.

7. How are electric companies preparing for an electrified transportation sector?

[The energy grid](#) is ready for electric transportation. Electric companies are investing more than \$120 billion each year, on average, in smarter, cleaner, and more resilient energy infrastructure to deliver the energy future customers want. These investments are key to enabling innovative customer solutions, including smart, sustainable transportation.

As of 2021, investor-owned electric companies are investing nearly \$3 billion in customer programs and projects to deploy charging infrastructure and to accelerate electric transportation.

Increasing investment from all stakeholders—including electric companies, municipalities, automakers, charging network providers, and others—will help drive transportation electrification.

8. Where can I find information about EV programs in my area?

- Reach out to your local electric company for information about programs and projects in your community.
- Reach out to your [State Municipal League](#).
- The U.S. Department of Energy's Alternative Fuels Data Center maintains a [database](#) of federal and state programs to support electric transportation.
- Reach out to your Governor's offices to see who leads the electrification efforts in your state. This can usually be found in the Department of Economic Development, Department of Environmental Quality, or the Department of Energy and Efficiency.

9. Are there examples of EV projects that I can review?

We encourage you to see the wide array of electrification programs offered by the nation's investor-owned electric companies. An interactive map can be found [here](#).

10. What's next for EVs?

By 2030, it is estimated that U.S. EV sales will exceed 3.5 million per year and 18.7 million passenger EVs will be on U.S. roads, requiring about 9.6 million charging

stations. If this trend holds, more than 20% of new car sales will be EVs in the next decade. Battery costs continue to fall, and more automakers and suppliers are investing in EV technology and competing for business. With federal, state, and industry incentives, the electric vehicle market share is poised to grow exponentially and dramatically.

In addition, states are charting a course toward requiring all new vehicle sales to be zero-emission, as indicated by California's [executive order](#) and a [letter](#) sent by 12 state governors to the Biden Administration. Meanwhile, the Infrastructure Investment and Jobs Act includes significant funding for electric transportation and building out a charging infrastructure network, with potentially more funding on the way. Get ready to start those (electric) motors!