



Mobile Sources and Rhode Island

Zero Emission Vehicles (ZEVs)

What are Zero Emission Vehicles?

Zero emission vehicles, or 'ZEVs' are vehicles that do not omit exhaust or pollutants from an onboard source of power. ZEVs include the following:

- **Battery Electric Vehicles (BEVs)** are powered entirely by an electric motor supplied with electricity stored in batteries. BEVs have no internal combustion engine.
- **Plug-In Hybrid Electric Vehicles (PHEVs)** are powered by a combination of electricity and gasoline. PHEVs can typically run on battery-power alone. When the battery is empty, the gas engine kicks in.
- **Fuel Cell Electric Vehicles (FCEVs)** are run by an electric motor and use a fuel cell to convert hydrogen into electricity. Currently, FCEVs are only found in California where the charging infrastructure is located.

Why Drive an Electric Vehicle?

Electric vehicles offer the best and most affordable alternative to petroleum-based transportation. EVs are powerful, have smooth and quick acceleration, and offer a quiet drive. Additionally, EVs are less expensive than vehicles with internal-combustion engines when the total lifetime cost is considered.

How are EVs Charged?

EVs are primarily charged at home by plugging into a standard 120-volt plug. EVs can also fill up at one of the many public charging stations around the state. There are three types of EV chargers:

- **Level 1 Chargers** are typical 120 V outlets. These typically charge EVs in tens of hours.
- **Level 2 Chargers** are the most common charger found at homes and businesses.
- **Level 3 (DCFC) Chargers**, otherwise known as "direct current fast chargers" can charge an EV in 1 hour or less.



Credit: Forbes Magazine

A Note on Hybrid Electric Vehicles

By regulatory standards, a 'hybrid' electric vehicle is an EV that can be re-charged by plugging into a power source. Many automakers sell 'hybrid' vehicles with no plug. These vehicles use a large battery in conjunction with the internal combustion engine, and can never run on electricity alone, thus always producing tailpipe emissions.

Impact of ZEVs on the Environment

EVs are significantly cleaner than the newest gasoline-powered cars, even when the effects of electricity generation and factored in. The Battery Council International reports that 99% of all lead-acid batteries are recycled. Additionally, a study by MIT demonstrated that used batteries from EVs could have a second life as a back-up storage battery for small renewable energy sources.

The Future of EVs

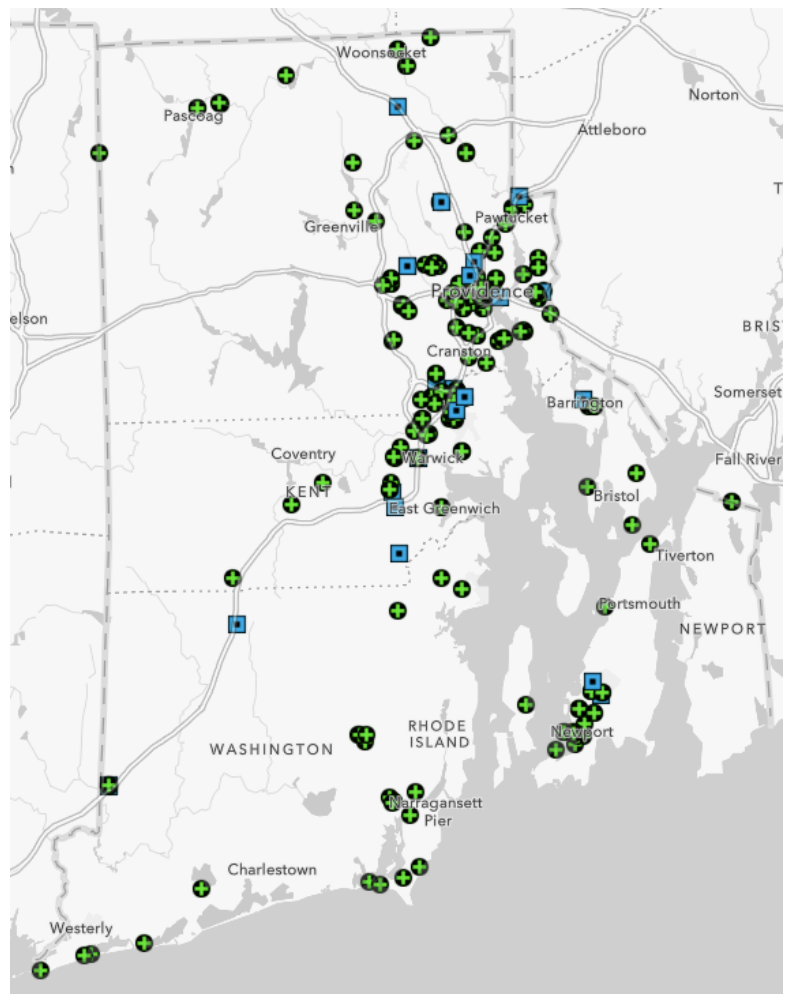
Electric vehicle deployment is expected to rapidly increase in the next few decades. California's Advanced Clean Cars II (ACC II) regulations will require all new vehicles sold in California to be ZEVs by 2035. Other states that follow California's emissions regulations, including Rhode Island, are expected to adopt ACCII.

The Future of Charging

As EV adoption is projected to exponentially increase in the future, charging infrastructure will need to keep pace. The federal government launched the National Electric Vehicle Infrastructure (NEVI) program to facilitate this growth. NEVI provides \$5 billion to state governments through 2026 to establish dedicated EV charging infrastructure along major roadways. In Rhode Island, the I-95 corridor from Pawtucket to Hopkinton was nominated as the state's first NEVI corridor.



*The All-Electric Volkswagen ID.4
Credit: Motor Trend*



*Green = Level 2 Charger
Blue = DCFC Charger*

Did You Know?

The first electric car debuted in 1887 when William Morrison, an Iowa chemist, attached an electric motor to his carriage.