Background

As technology continues to improve and a wider selection of vehicle designs and styles become available, the popularity of electric vehicles (EVs) is gaining momentum with drivers. In 2017, U.S. sales of electric vehicles alone were up 20 percent over the previous year.1 With the use of domestically produced energy, these vehicles are not only environmentally friendly, but also reduce U.S. dependency on imported oil. EVs also offer a smoother acceleration and require less maintenance than gas-powered vehicles.

AAA conducted primary research to understand the impact varying climates have on real-world driving range and operational costs by evaluating five commonly battery electric vehicles (BEV) available for sale throughout the United States.

Key Findings

When HVAC is not in use, estimated driving range for electric vehicles was moderately impacted by hot and cold temperatures when compared to testing conducted at 75°F.

- On average, an outside temperature of 20°F, resulted in a 12 percent decrease in driving range while an outside temperature of 95°F, resulted in a 4 percent decrease.

HVAC use resulted in considerable reductions in driving range.

- On average, an outside temperature of 20°F, resulted in a 41 percent decrease in driving range while an outside temperature of 95°F, resulted in a 17 percent decrease.

Depending on outside temperature, HVAC use resulted in a significant monetary cost increase.

- On average, an outside temperature of 20°F, resulted in a cost increase equal to an additional $24.27 for every 1000 miles while an outside temperature of 95°F, resulted in a cost increase equal to an additional $7.94 for every 1000 miles.

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2 This temperature is referenced because baseline testing is conducted at this temperature per the SAE standard J1634.
Methodology

AAA conducted primary research in partnership with the Automotive Club of Southern California’s Automotive Research Center (ARC) in Los Angeles, California to understand impacts of ambient temperature on electric vehicle driving range with and without the use of the HVAC system. Testing was conducted using the following equipment: ampere-hour meter, OBD-II scan tool and dynamometer.

Test vehicles were selected using a pre-determined set of criteria such as availability for sale throughout the United States with a minimum EPA estimated driving range of 100 miles. One vehicle per manufacturer was tested to prevent over representation of a single brand. Additional information on methodology can be found in the full report [here](#).

Recommendations

There are some precautions electric vehicle owners can take before hitting the road to help offset potential reductions in driving range. AAA recommends drivers:

- Plan ahead. When drivers are aware of the weather conditions before heading out, they can plan for more frequent stops for charging as well as identify the location of charging stations. Drivers can access these locations through AAA’s Mobile app or TripTik Planner.

- Make time to “pre-heat” or cool down the inside of the vehicle while still connected to the charger. This will reduce the demand on the vehicle’s battery to regulate cabin temperature at the onset of driving. If possible, park the vehicle in a garage to help stabilize cabin temperature.

- While electric vehicle range varies less in areas with warm weather year-round such as Florida, Hawaii and California, drivers in other parts of the country shouldn’t be discouraged. Owning an electric vehicle in these regions just requires some additional planning.