



# Service Bulletin

Bulletin No.: 19-NA-210

Date: October, 2019

## TECHNICAL

**Subject: Diagnostic Aid – EV Range Loss on Bolt EV**

Brand:	Model:	Model Year:		VIN:		Engine:	Transmission:
		from	to	from	to		
Chevrolet	Bolt EV	2017	2020	All	All	All	All

<b>Involved Region or Country</b>	North America, South Korea, Middle East, Brazil
<b>Condition</b>	Some customers may comment on the EV range estimate to be lower than desired when the battery pack is fully charged. This estimate is always displayed while driving, which makes it highly visible to the driver. Some customers may describe the condition as not being able to fully charge the vehicle.
<b>Cause</b>	The cause of the condition may be that the EV range estimate will change because it accounts for current climate conditions, driving history, and internal battery factors while attempting to be as accurate as possible.

### Service Procedure

Chevrolet wants customers to have confidence in the EV range of the Bolt EV. This bulletin will help summarize four categories that could be causing a reduced EV range estimate. Refer to the new

procedure in SI, *Hybrid/EV High Voltage Battery Reduced Range Analysis*, for a step-by-step procedure with full detail. A new limited-use labor operation code was created to use for this diagnosis when a physical battery repair is not required.



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**Figure 1:** Instrument Cluster showing a full charge and less than EPA label range or the Canada EnerGuide label range.

The EV range estimate is analogous to the fuel range estimate on a traditional vehicle. Customers may be more sensitive to EV range fluctuations due to EV range anxiety and their commitment to the technology.

#### Category 1 – Defective Individual Battery Cell

Unique to the Bolt EV and not available on other GM products, the vehicle will lower the available EV range based on the individual battery cell with the lowest state of charge. This helps prevent a large voltage drop in a defective cell, but it does not set a diagnostic code or a Service Vehicle Soon light indicating that remedial action is being taken by the Hybrid/EV Propulsion Control Module #2. The only indication to the driver is a reduced EV range estimate. Follow the *Hybrid/EV High Voltage Battery Reduced Range Analysis* procedure in SI to determine if this is the reason for the customer's

range loss and replace the appropriate battery section, if needed. Note the state of charge variation % on the repair order.

#### Category 2 – Outside Temperature, Cabin Temperature, Terrain and Technique

Seasonal variation and driving history will impact the EV range estimate. The Bolt EV stores eight months of historical data for four individual factors which are now accessible in GDS2 under the Energy Usage History Data screen under the HPCM2 module. Follow the *Hybrid/EV High Voltage Battery Reduced Range Analysis* in SI to determine if this is the reason for the customer's range loss. The 2017 and 2018 model years display this data as a unitless score. Beginning in the 2019 model year, this data is displayed in units of distance impact. The average score from each of the last eight months is available to show which factor, if any, has changed over time. History 1 is the average from the last 30 days. History 8 is from eight months

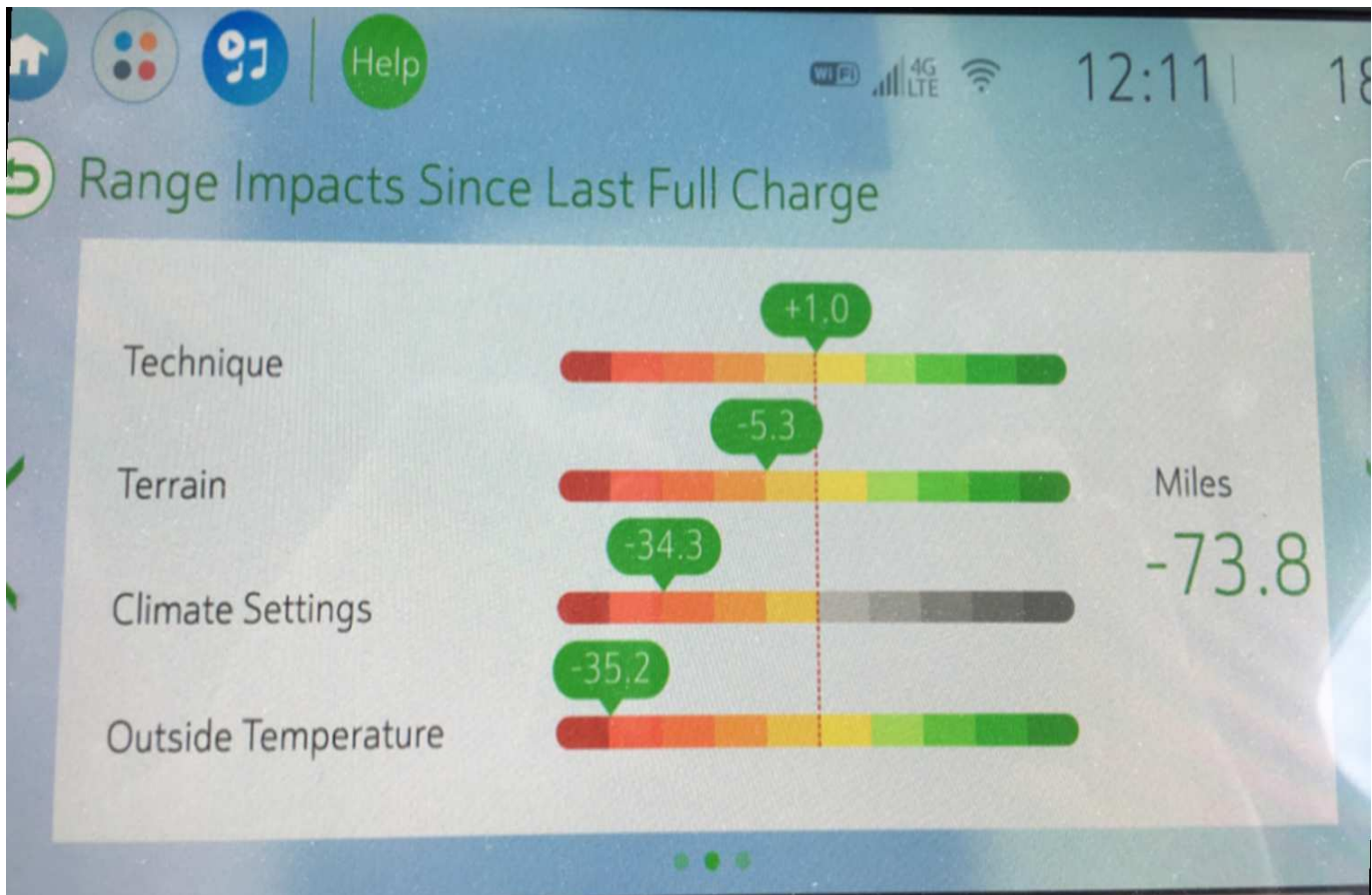
ago. This historic vehicle data, along with driving tips to maximize range in the SI procedure, may be printed out to share with the customer.

Total Score - History 1	8 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 2	1 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 3	-2 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 4	-1 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 6	0 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 8	0 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 7	0 mi	Hybrid/EV Powertrain Control Module 2
Total Score - History 8	0 mi	Hybrid/EV Powertrain Control Module 2

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**Figure 2:** Example Energy History Data from GDS2 on a 2020 Bolt EV where History 1 shows a *better* than expected range over the last 30 days

An independent study by AAA found that all electric vehicles have significant range loss during winter months. If desired, refer to the AAA study at the following link for details: <https://newsroom.aaa.com/2019/02/cold-weather-reduces-electric-vehicle-range/>



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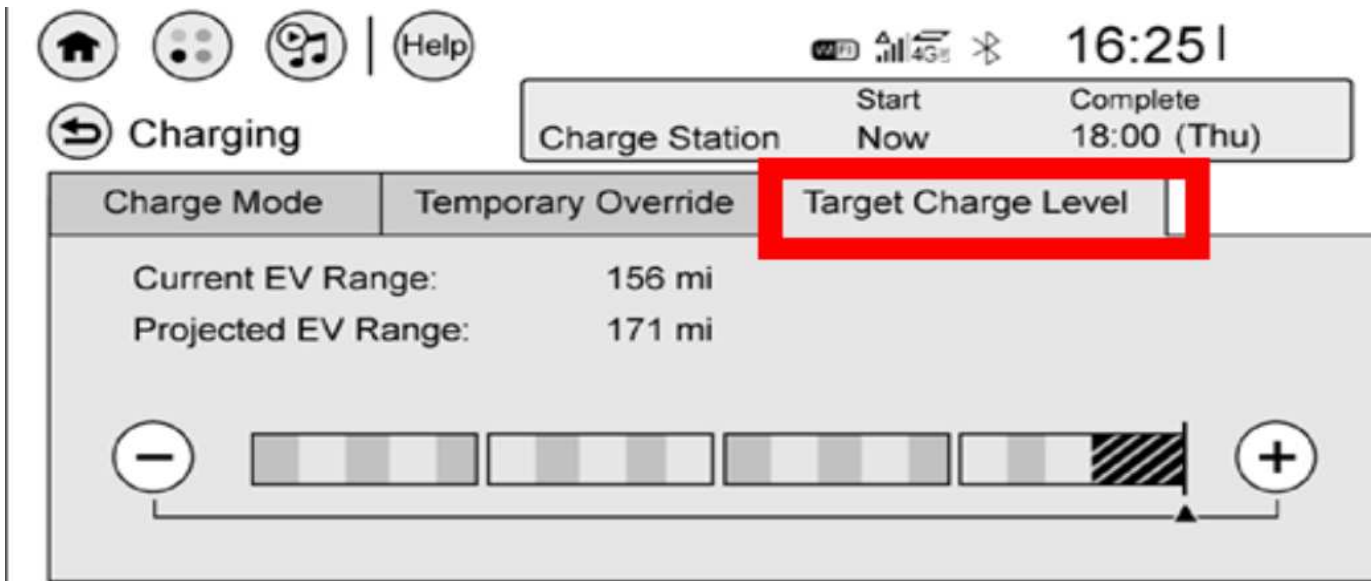
**Figure 3:** Miles of winter impact on a 2019 Bolt EV with an outside temperature of  $-8^{\circ}\text{C}$  ( $18^{\circ}\text{F}$ ).

Electric vehicles, even in mild climates such as California, can have several miles of seasonal range variation. Encourage the customer to watch these four factors in the energy display on the center screen. The data in this customer display will reset to zero on each full charge event. Note on the repair order if one of these factors from historical GDS2 data is the primary reason for the loss of EV range along with the actual *Total Score\_History 1* value. Perform an EV Range Reset as needed, following the instructions in the SI procedure.

**Note:** Do not perform a battery capacity reset in GDS2 for a category 2 range loss.

### Category 3 – Target Charge Level or Hilltop Reserve

The Bolt EV has a feature to limit the maximum state of charge in the charging settings on the center display. Any setting less than maximum will reduce available EV range. For 2017 and 2018, this was known as Hilltop Reserve. Note the setting for this category on the repair order.



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**Figure 4:** Target Charge Level screen on a 2019 or newer Bolt EV

**Category 4 – Battery Pack Capacity Degradation**

Like all batteries, the amount of energy the battery pack can store *will* decrease with time and distance driven. In North America, if the battery loses more than 40% of its capacity during the eight year or 100,000 mile / 160,000 km EV warranty period, the pack may be replaced for the customer. Follow the *Hybrid/EV High Voltage Battery Reduced Range Analysis* in SI to determine if this is the reason for the customer’s range loss. As demonstrated by the first three categories, the EV range estimate is impacted by much more than pack capacity. Share with the customer that the battery pack was evaluated for replacement and provide the present capacity value from GDS2 and at what capacity the pack will be replaced under warranty (refer to SI). Note the pack capacity on the repair order, in Amp-hours.

**Conclusion**

As Bolt EVs age, there may be a combination of factors contributing to reduced range, such as use of a non-OEM replacement tire (shown by a negative Terrain score), combined with some pack capacity loss, and cabin heater use (shown by a negative Climate Settings score). The important task is to differentiate items which require battery repair versus which items are normal for the vehicle. The goal is for the customer to understand why a repair was or was not performed on the vehicle for an EV range concern.

**Warranty Information**

If the battery pack requires repair (Category 1 or 4), use the associated labor operation for a pack or section replacement with appropriate diagnosis time to complete the SI reduced range analysis procedure.

If no physical repair is needed (Category 2, 3, or 4), use the new labor operation code below and provide the following on the repair order from the GDS2 Energy Usage History Data and charge settings:

Category 1 – Cell State of Charge Variation %: \_\_\_\_\_

Category 2 – Total Score – History 1 value: \_\_\_\_\_ primarily caused by \_\_\_\_\_

Category 3 – Target Charge Level or Hilltop Reserve Setting: (Maximum Charge or Less than Maximum)

Category 4 – Battery Pack Capacity (Ah): \_\_\_\_\_

The following labor operation is covered under the EV propulsion warranty with coverage code (V) in North America.

Labor Operation	Description	Labor Time
5031139	Hybrid/EV High Voltage Battery Reduced Range Analysis	0.9 hr*

\*The November 1 update of the Labor Time Guide will contain this change.

Version	1
Modified	Released October 13, 2019

**Additional SI Keywords:** battery, range, EV, electric, charge, charging, charges, low, reduced, 4T, capacity, degradation, mileage, miles, distance, estimate, anxiety, score, energy, voltage