Insights for More Reliable Electric Vehicles

January 2022

Consumer Reports | Data Intelligence

BACKGROUND

Consumer Reports is an independent, nonprofit member organization that works side by side with consumers for truth, transparency, and fairness in the marketplace. CR empowers and informs consumers, incentives corporations to act responsibly, and helps policymakers prioritize the rights and interests of consumers in order to shape a truly consumer-driven marketplace.

As part of this ongoing effort, the 2021 Auto Reliability and Satisfaction Survey of CR members was conducted from April to September 2021. Responses were collected from owners of over 358,000 vehicles to understand what problems they experienced in the past 12 months and, if they had to do it all over again, whether or not they would still purchase their vehicle.

In line with CR's mission, this report has been written for the industry to provide more explanation and guidance on the reliability of Electric Vehicles (EVs) based on our most recent survey data (model years 2019-21, 3,533 EV sample size, 21 models).

More from Data Intelligence

To download other reports, find out how to license the full Auto Reliability and Satisfaction survey data, including consumer verbatims, and learn more about CR Data Intelligence—a marketplace change program that fosters the development of products, standards, and policies that prioritize safety, security, performance, and quality for consumers—please visit data.consumerreports.org or email dataintelligence@cr.consumer.org.

CR is committed to researching EVs on behalf of consumers and automakers. The 2021 Auto Reliability and Satisfaction survey was updated to include questions about EV driving range and specific problem areas related to EVs. If you have suggestions for upcoming CR member surveys, please share them here.

OVERVIEW: THE CURRENT STATE OF EVs

- Per an Executive Order from President Biden, by 2030, half of all new vehicles sold should be zero-emissions vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.
- While EV sales are trending up, they currently make up only 4% of 2021 new vehicle sales. (Source: Wards Intelligence)
- CR's 2021 Auto Reliability and Satisfaction survey results reveal that current EV owners are highly satisfied. In fact, survey respondents with EVs report the highest owner satisfaction (76%) of all vehicles (model years 2019 and higher).
- However, respondents also report significant reliability issues with EVs. Electric SUVs were the least reliable car category.

CR INSIGHTS + KEY TAKEAWAYS FOR MANUFACTURERS

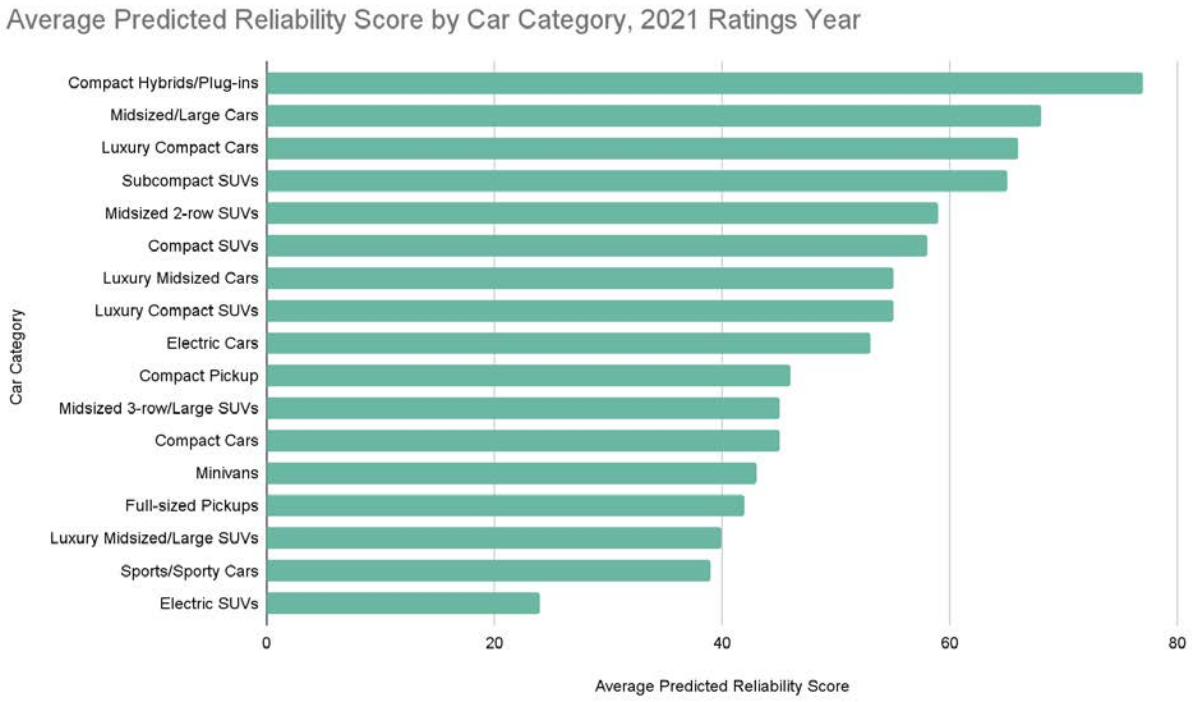
- **The reliability of EVs has significant room for improvement in order to appeal to the majority of new-car buyers who are looking for reliable vehicles.** Reliability is "extremely important" (top box) to 71% of new-car buyers, according to CR's most recent National Car Buying Survey.
- Despite the high satisfaction rates of current EV owners, who may have been early to adopt EVs for specific reasons such as environmental concerns or interest in new technologies, the mainstream car buyer prioritizes reliability. By providing additional data on EV reliability problem areas, CR hopes to influence future manufacturing decisions that make EVs more reliable, and in turn, more appealing to the majority of new-car buyers.

- There are lessons to be learned from CR's Auto Reliability data to improve EV reliability:
    - **Compact Hybrids and Plug-in Hybrids are the most reliable.** While "simple" electric drive systems can and do have electrical failures and battery pack problems, most of these vehicles are built on proven systems.
    - **Electric SUVs are the least reliable.** The highest problem areas in EVs often have no connection to the drivetrain. Issues are most commonly found in other components: In-car Electronics, Noises & Leaks, Power Equipment, Climate System, Body Hardware, Drive System, and Paint & Trim.

- **Automakers should focus on building an electric platform and establishing the EV itself as a mainstream vehicle with the same systems and technology that have already proven reliable in their current lineups.** If components other than the drivetrain have proven to be reliable, including them may increase the likelihood that the vehicle will have fewer issues.

DEEP DIVE: EV RELIABILITY DATA

In CR's 2021 Auto Reliability analysis, compact hybrid/plug-ins were the most reliable car category while electric SUVs were the least reliable car category.



EV vs. ICE Vehicles Overall Problem Rates

On average, EVs have significantly higher problem rates than internal combustion engine (ICE) vehicles across model years 2019 and 2020. Newer model 2021 vehicles have less exposure, which may explain the comparable overall problem rates. However, problem rates for certain problem areas in Model Year (MY) 2021 EVs are still higher than MY 2021 ICE vehicles, as seen in the chart on page 5.

Overall Problem Rate by Model Year (MY)	MY 2019		MY 2020		MY 2021	
	EVs	ICEs	EVs	ICEs	EVs	ICEs
Overall Problem Rate	16.34	11.58	15.65	9.56	5.05	5.80
Model Count	7	145	8	121	6	102
Sample Size	1,140	32,812	1,347	26,428	1,046	18,290

EV Reliability Problem Rates and Top Problem Areas

The most troublesome EV problem areas are In-car Electronics, Noises & Leaks, Power Equipment, Climate System, Body Hardware, Drive System, and Paint & Trim. Problem rates shown below are for models with sufficient survey sample (45+). Examples of “problems reported by CR members” are from optional survey questions.

Problem Rate by Problem Area and Model Year (MY)	MY 2019		MY 2020		MY 2021	
	EVs	ICEs	EVs	ICEs	EVs	ICEs
In-car Electronics	4.97	3.19	2.84	3.38	2.35	1.90
Noises & Leaks	0.67	1.38	3.63	1.24	0.77	0.75
Power Equipment	2.37	1.50	1.89	1.46	0.77	0.62
Climate System	1.02	0.78	1.68	0.77	1.36	0.36
Body Hardware	0.50	0.63	2.62	0.58	0.59	0.30
Drive System	2.21	0.65	1.10	0.48	0.51	0.38
Paint & Trim	0.60	0.72	2.37	0.56	0.42	0.35
Engine Electric	1.22	0.39	0.93	0.36	0.17	0.26
Engine Major	1.06	0.42	0.98	0.40	0.17	0.36
Steering/Suspension	0.53	0.78	0.86	0.62	0.16	0.37
Engine Minor	0.70	0.61	0.62	0.47	0.00	0.25
Brakes	0.56	0.77	0.52	0.64	0.00	0.26
Transmission Minor	0.62	0.78	0.00	0.54	0.00	0.39
Transmission Major	0.53	0.47	0.00	0.37	0.00	0.35
Engine Cooling	0.13	0.18	0.00	0.10	0.00	0.03
Exhaust System	0.00	0.11	0.00	0.04	0.00	0.05
Emissions/fuel system	0.00	0.81	0.00	0.47	0.00	0.17

Examples of EV Reliability Problem Areas

- In-car Electronics
  - Audi e-Tron MY 2019 In-car Electronics problem rate is 11 compared to the model year average of 3.4. Problems reported by CR members include the display screen going blank.
- Noises & Leaks
  - Tesla Model X MY 2020 Noises & Leaks problem rate is 9.6 compared to the model year average of 1.3. Problems reported by CR members include seals and weather stripping, air and water leaks, wind noise, and squeaks and rattles.
- Power Equipment
  - Audi e-Tron MY 2019 Power Equipment problem rate is 5.1 compared to the model year average of 1.5. Problems reported by CR members include exterior lights.
- Climate System
  - Tesla Model S MY 2020 Climate System problem rate is 6.9, 6.1 points above the model year average. Problems reported by CR members include automatic climate control and temperature sensors failing.
- Body Hardware
  - Tesla Model X MY 2020 problem rate of 5.8 is 5.1 points above the model year average. Problems reported by CR members include issues with gull wing doors not closing properly.
- Drive System
  - Chevrolet Bolt MY 2019 Drive System problem rate is 4.0, 3.3 points above the model year average. Problems reported by CR members include electrical failure, drive unit replacement, and other faulty components.
- Paint & Trim
  - Tesla Model Y MY 2020 Paint & Trim problem rate is 7.2, 6.5 points above the model year average. Problems reported by CR members include trim coming loose, and blotchy/mismatched paint on body panels.