Press release
Norwegian Automobile Federation

Oslo, 16.03.2020

Worlds largest EV test
Electric vehicles lose range and charge slower in colder climate

EVs have a range loss of close to twenty percent in winter conditions, concludes Norwegian consumer organization.

Electric vehicles are becoming increasingly more popular. Range is still an important factor when choosing an EV, but advertised range is not necessarily what you experience in real life.

The Norwegian Automobile Federation (NAF) has tested the range and charge time of popular electric vehicles in winter conditions. 20 vehicles were driven until they stopped completely and shut down, to measure their real world range.

- The fact that EVs suffer loss of range in colder temperatures is not new. But now we know just how much colder climate and snow affects range, consumption and charge time, says Nils Sødal, senior communications advisor for Norwegian Automobile Federation.

No car manages their own WLTP range

NAF collected 20 of the best-selling electric car models you can buy from Norwegian dealerships as of January 2020.

The test focused on range, consumption and rapid charge time. To test all the cars equally, the test drive was performed without preheating of neither cabin nor battery. All cars drove the same route on the same day, with similar style of driving, and climate control settings.

The EVs lost in average 18.5 percent of their range compared to their WLTP range.

Hyundai KONA came closest to its own stated WLTP range, with a deviation of only 9 percent compared to WLTP. KONA is the car with the longest actual range in the lowest price bracket and it has a decent charging speed.

Opel Ampera-e only managed 70 percent of the stated range (WLTP). The car still has a good range that meets most needs. But the combination of a high price and a battery pack that only charges with a maximum of 50 kW, makes Ampera-e appear outdated in today's electric car market.

The Tesla Model S LR has the longest WLTP range on the market. In the real life range test the Model S went the furthest, but the Tesla veteran has the second-largest deviation compared to the WLTP range in the test and manages only 74 percent of the stated range.

Worth noting is that the Model S, at the end of the test, drove in more challenging driving conditions than the other models. The last miles were driven in relatively deep, new snow which increase the consumption severely.

EVs don’t suddenly shut down

Contrary to popular beliefs, EVs don’t just suddenly shut down when they run out of battery.

The test shows that all the EVs give plenty of warnings before they run out of power, and you maintain driving comfort and speed even after the first warning.

-The test shows that most EVs maintain speed until the last few kilometers. Then the drivers all experienced a loss of acceleration and a limit on maximum speed. In some cars the heating automatically shut down.

-A fun fact worth knowing is that if you run completely out of power you can still drive a few more kilometers. Just shut the car down and leave it for a short while, maybe half an hour to an hour, and you'll have power enough to drive even a few more kilometers. This is extremely practical if you happen to stop just a few hundred meters short of a charging station or your home, explains Sødal.

Complicated rapid charging

The test team also measured how the cars performs during rapid charge, focusing on effect and time.

Rapid or fast charging with roadside chargers of an electric car is not necessarily straight forward. Charging speed, meaning how many kilowatts the battery can handle, depends on many factors such as state of charge, battery temperature and outside temperature.

-Our test concludes that even if you do everything right, it can still be difficult to get the battery warm before charging in winter time and therefore charge slower than advertised, says Sødal and continues:

-Worth noting is also the lack of standardization when it comes to advertising charge time. Some advertise the effect (kilowatts) the car can charge with, others measure the time spent on the fast charge station and some refer to kilometer charged in either 30 minutes or 60 minutes.

The Audi e-Tron 55 quattro has the fastest charging speed on the market. It charged til 80 % in just 27 minutes and holds the charging curve at a very high level throughout the test.

In the opposite end we find Opel Ampera-e and Renault Zoe. Both cars have large battery packs but only support 50 kW charging. In fact Renault Zoe only manages 40 kW, and barely that. This means that fully charging the battery on a rapid charge station becomes a time consuming affair.

Consumers need transparency

The consumer organization now calls for more realistic advertisement of winter range and charge speed.

-Even though the WLTP-range is closer to real life range than its predecessor, NEDC, it is still not accurate. Too many consumers are disappointed in their cars real life range and have not been aware of how much external factors reduce both range and charge time, says Sødal.

-Buyers need to be made aware of the difference between WLTP range and real life range with more than just a foot note, especially if they live in countries with colder climate, concludes Sødal.

How the test was performed

To test all the cars equally, the test drive was performed without preheating of neither cabin nor battery. All cars drove the same route on the same day, with similar style of driving, and climate control settings.

The test stared in Oslo, in 3 degrees, sleet and rain and ended in Hafjell in -6 degrees and heavy snow. The test route consisted of city driving, highways and country roads in speeds from 60 kmh to 110 kmh. All the cars had one climb through a mountain pass. The longest running cars climbed two mountain passes.

The charge test was done in -2 degrees. All cars were driven on the highway for a minimum of two hours, to ensure that the battery was warm. The cars were driven straight to the charging station, without standing in line waiting. All the cars charged from less than 10 percent to minimum 80 percent.

Range results

Car make and model	Specific WLTP range for test car *	Official WLTP	Actual range	Difference in kilometers	Difference in %**
Tesla Model S	610	610	469,8	160,2	26,26 %
Tesla Mode X	507	507	419,6	87,4	17,24 %
Hyundai Kona	449	449	404,5	44,5	9,91 %
Tesla Model 3	560	560	404,4	155,6	27,79 %
Kia e-Niro	455	455	360,3	94,7	20,81 %
Kia e-Soul	452	452	352	100	22,12 %
Audi e-tron 55 quattro	398	431	341	57	14,32 %
Jaguar I-pace	436	470	333,8	102,2	23,44 %
Renault Zoe 50	380	395	316,3	63,7	16,76 %
Mercedes-Benz EQC	404	417	307	97	24,01 %
Nissan Leaf 62 kWt	385	385	298,7	86,3	22,42 %
Opel Ampera-e	423	423	296,9	126,1	29,81 %
Hyundai Ioniq	311	311	279,3	31,7	10,19 %
Audi e-tron 50 quattro	299	332	259	40	13,38 %
BMW i3 120Ah	310	310	245,8	64,2	20,71 %
Seat Mii Electric	258	258	226,6	31,4	12,17 %
Volkswagen e-UP!	251	258	226	25	9,96 %
Skoda Citigo-e iV	258	258	220	38	14,73 %
Nissan Leaf 40 kWt	270	270	208,9	61,1	22,63 %
Volkswagen e-Golf	222	231	198,1	23,9	10,77 %

**When available, we have used the specific WLTP range for the test car used in the range test, not just the general official WLTP. This can mostly be found in larger SUVs such as Mercedes-Benz EQC, both Audi e-tron 50 and 55, Jaguar I-PACE, but also VW e-Golf. Especially tyre dimensions have a significant impact on range.*

***Difference in kilometers and percent is calculated from WLTP range for specific model.*

For further information see:

Link to website with further results:
https://www.naf.no/elbil/aktuelt/elbiltest/ev-winter-range-test-2020/

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