

## Saving Electricity on the Road:

# THE KEY ROLE OF DRIVING BEHAVIOUR IN THE BATTERY AGING OF ELECTRIC VEHICLES

**Wiener Neudorf 01. 02. 2024** - AVILOO Battery Diagnostics has conducted a comprehensive study on the influence of driver behaviour on battery aging in electric vehicles to contribute to transparency in the field of electromobility.

The analysis, shown in diagram no. 1, included 402 vehicles of the same brand, whose energy consumption was measured in kWh per 100 km. The results revealed significant differences between different user behaviours and showed that energy consumption can be divided into three distinct categories:

1. Moderate driver behaviour (green category in graphic 1): Characterized by economical, defensive driving, careful battery care, low charging cycles (e.g. preconditioning at the socket), mostly urban trips with little highway use, and economical use of air conditioning and heating.
2. "Lead-foot" driving (red category in diagram 1): This driving behaviour is characterized by nervous driving, primarily on the highway or hilly terrain. It includes frequent recuperation, intensive preheating, and preconditioning (especially without being plugged in), as well as intensive heating and air conditioning.
3. Medium category (yellow category in chart 1): No extreme values.

On average, economical users consume 16-18 kWh/100 km, while high-consumption users consume almost twice as much (Graph no. 1).

With larger vehicles, the driving behaviour has the same effect, except that the overall consumption is higher. Graph no. 2 shows another vehicle type with a different vehicle architecture (larger, heavier, less efficient drive system), in which the average consumption even exceeds that of the first vehicle by approx. 9 kWh/100 km.

Other factors, such as the use of air conditioning and heating, also have a significant influence on energy consumption. A representative example of this is a vehicle with 600,000 km, which had a lifetime consumption of 30.8 kWh/100 km, while a comparable vehicle from the AVILOO fleet only consumed 27.8 kWh/100 km. After detailed communication with the customer, it was confirmed that the decisive influencing factors were the continuous preconditioning of the vehicle without plugging it into the socket, a considerable highway share of 80% and a particularly aggressive and nervous driving style.

"It's only through simple driver behaviour that you can achieve a 10%-reduction in consumption, which not only leads to considerable energy savings over the service life, but also means that 100,000 km in one car is comparable to 110,000 km in another," emphasizes Nikolaus Mayerhofer, AVILOO CTO. "If preconditioning is used, then the charging cable should always be connected. In this way, many charging cycles can be saved in winter, especially for short trips, by up to 20-30%. Defensive driving helps you avoid frequent and heavy recuperation, thereby helping to reduce charging cycles and achieving possible savings of up to 5%."

Higher energy consumption not only means higher electricity costs, but also more cycles for the batteries, which leads to faster aging. The study will continue with further vehicle tests under special conditions, for example, to investigate the effects of additional loads (bicycles, roof box) or the use of air conditioning and heating systems.

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