



Slides:

Influence of **temperatures** on the **charging
behaviour** of BEV's

Fastned

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Temperatures **do** affect
charging behaviour of the
battery





Optimal temperature is different per battery

Vehicles that tend to **charge** on a **higher voltage** tend to need a **lower battery temperature** than vehicles that charge faster on a higher current

Examples of vehicles that charge on a **higher current**:

Tesla Model 3/Y — optimal temperature +30°

Examples of vehicles that charge on a **higher voltage**:

KIA EV6/9 — optimal temperature +20°





Optimal temperature = faster charging



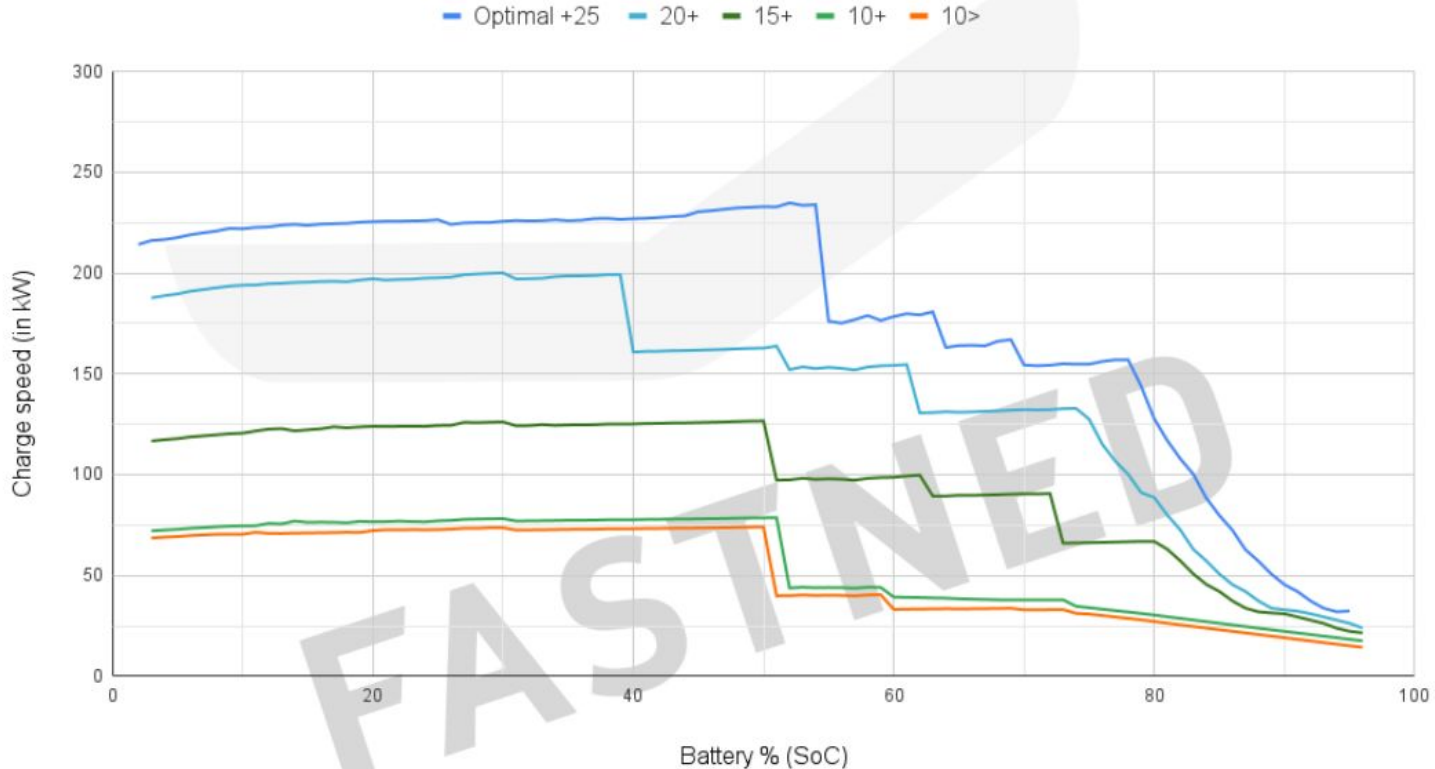
Pre-heat the battery if possible to get the battery on the right temperature (normally around 20/25 degrees)



The moment a vehicle is **connected** to a fast charger the vehicle will **automatically heat** the battery to the optimal temperature



Chargespeed KIA EV6 minimal battery temperature



Test with the KIA EV6 LR and it's charging behaviour in different temperatures. In the graph it clearly shows that the **optimal temperature** for the EV6 battery is **+25 degrees**, only then it will reach the max peak power of 230 kW



Season



Volvo EX40 (82 kWh)
* vehicle can pre-heat battery

100 kW

↓ -20%

80 kW

Toyota bZ4X (75 kWh)
* vehicle cannot pre-heat battery

70 kW

↓ -32%

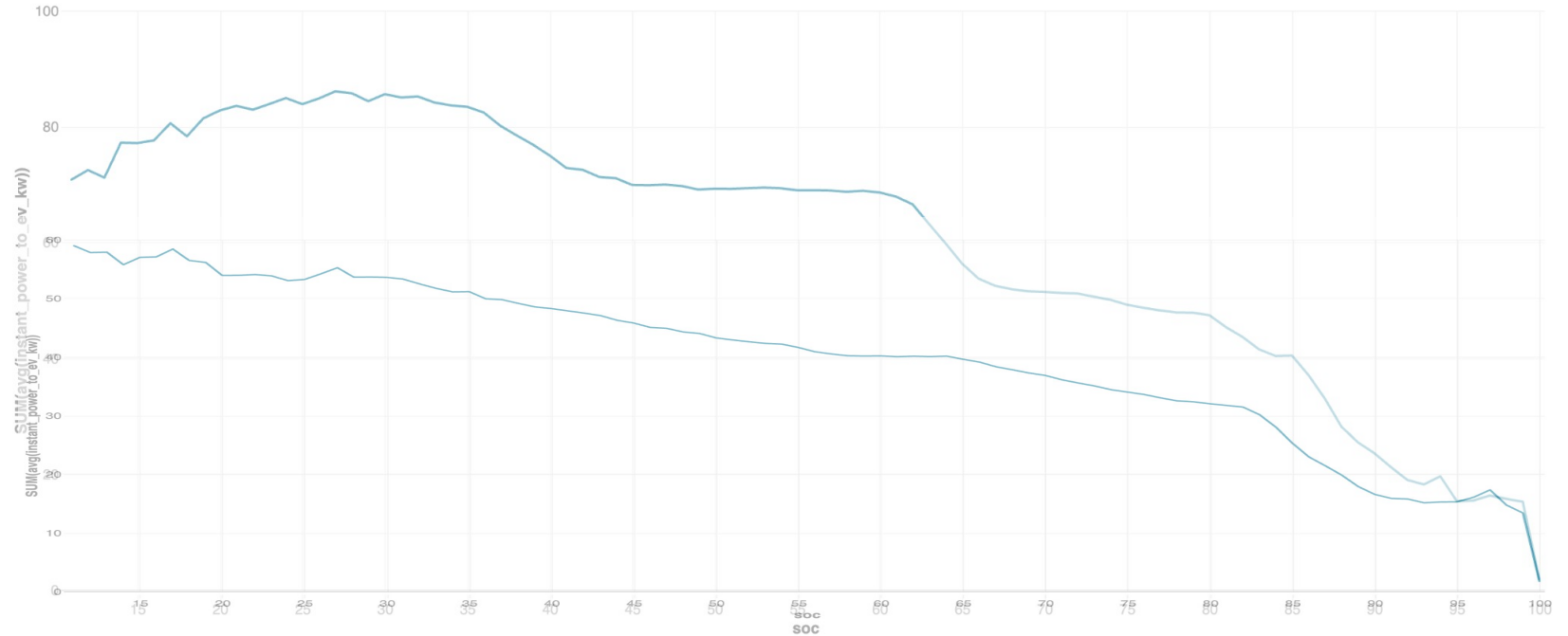
47 kW

Average charge speeds in summer compared to winter



Data driven case

Note:
In this period, the Peugeot e-2008 (2020 - 2023) was unable to pre-heat it's battery. Peak charge speed is 100 kW



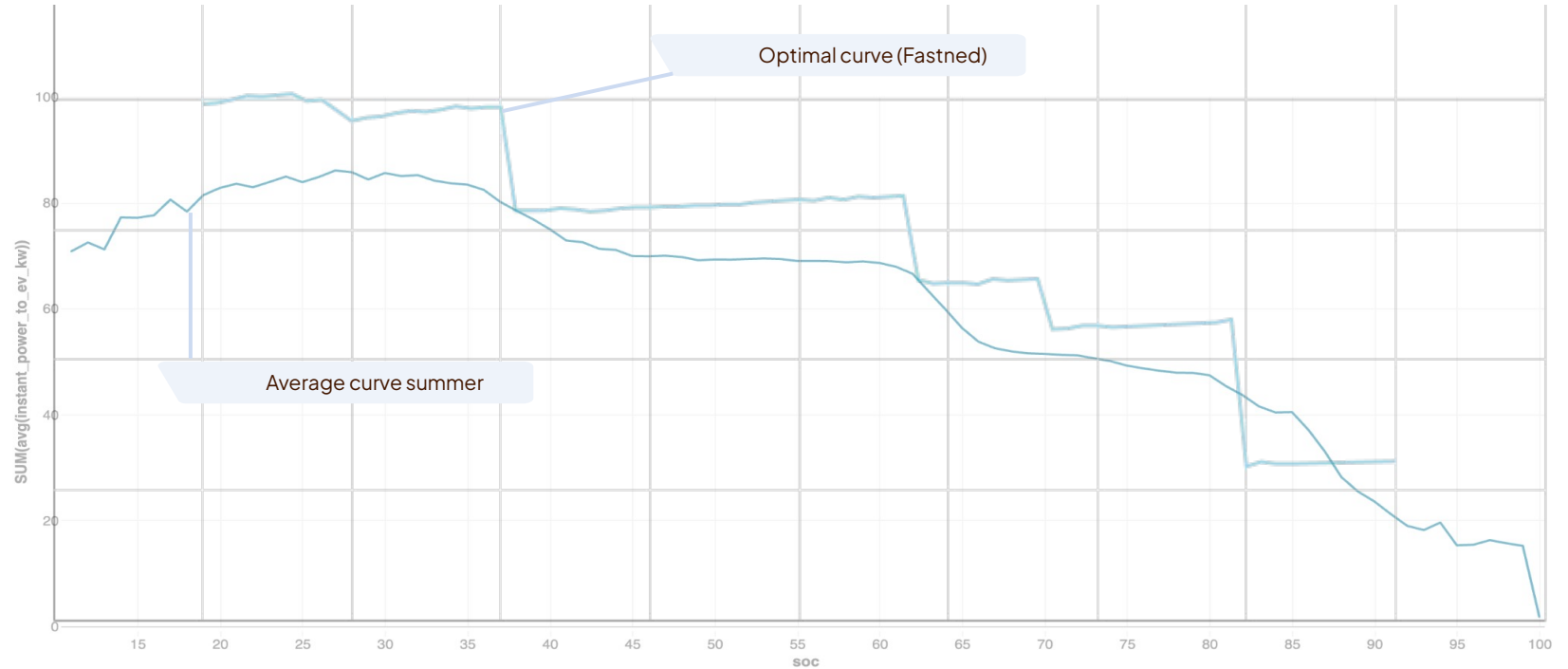
Sessions of the Peugeot e-2008 (50 kWh usable):

1. Average charging curve of this vehicle on the Fastned network in August 2024 (warmest month in NL) - AVG temperature was 19,8 degrees during this month
2. Average charging curve of this vehicle on the Fastned network in January 2024 (coldest month in NL) - AVG temperature was 3,9 degrees during this month



Data driven case

Note:
In this period, the Peugeot e-2008 (2020 - 2023) was unable to pre-heat it's battery. Peak charge speed is 100 kW , the newest 54 kWh variant has another curve



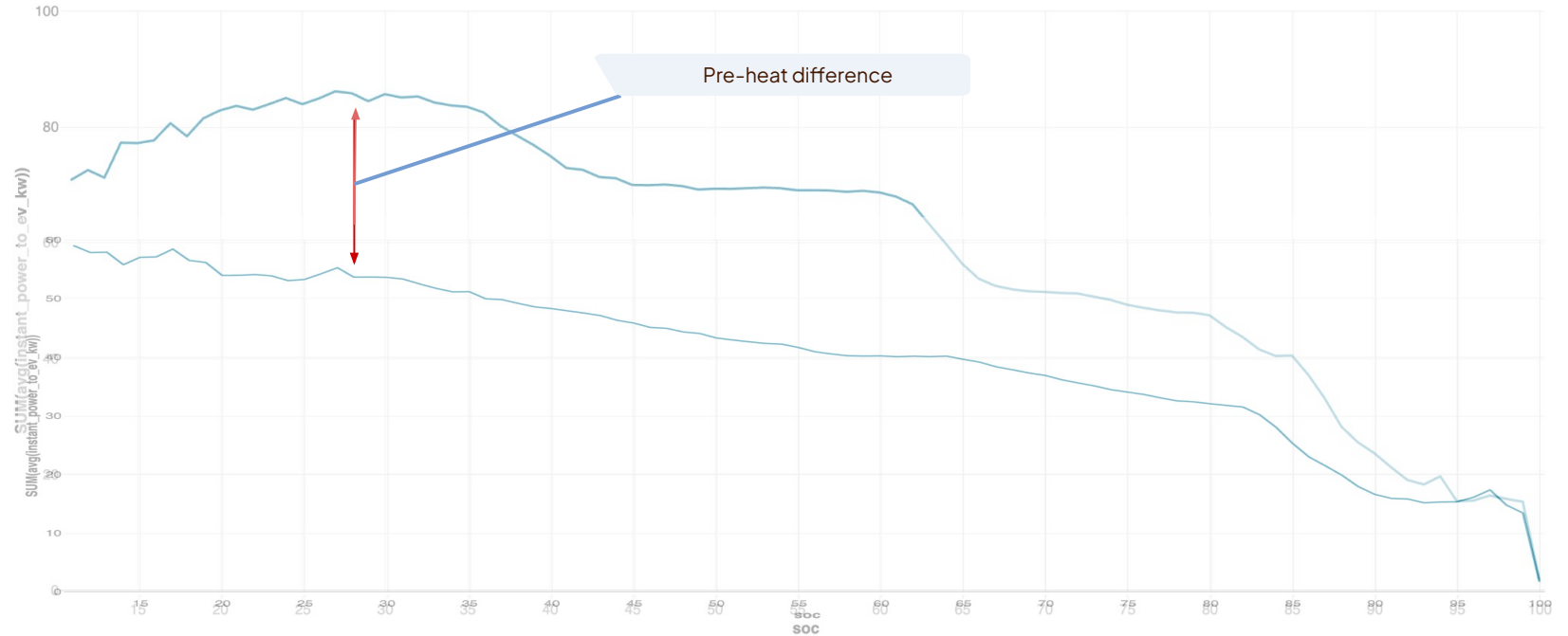
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Data driven case

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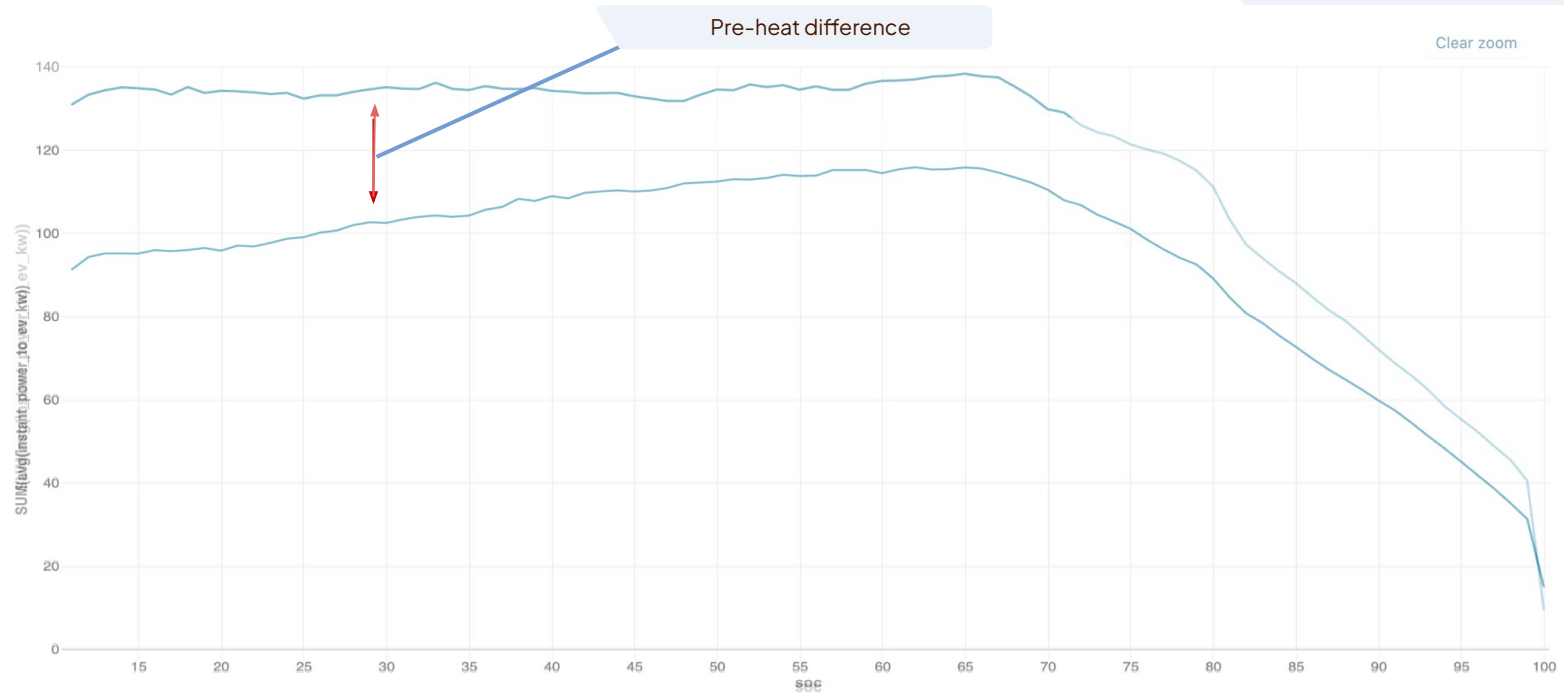
Importance of battery temperature:

With a pre-heat function in the vehicle, the customer is able to receive the average charge curve during warmer temperatures easier. This way the vehicle is already heated up when arriving at the charging station,



Data driven case

Note:
In this period, the Audi e-tron 55 (2019 - 2022) was unable to pre-heat its battery. Peak charge speed is 150 kW



Sessions of the Audi e-tron 55:

1. Average charging curve of this vehicle on the Fastned network in August 2024 (warmest month in NL) - AVG temperature was 19,8 degrees during this month
2. Average charging curve of this vehicle on the Fastned network in January 2024 (coldest month in NL) - AVG temperature was 3,9 degrees during this month