SOLAR TEST RESULTS

REAL LIFE TEST

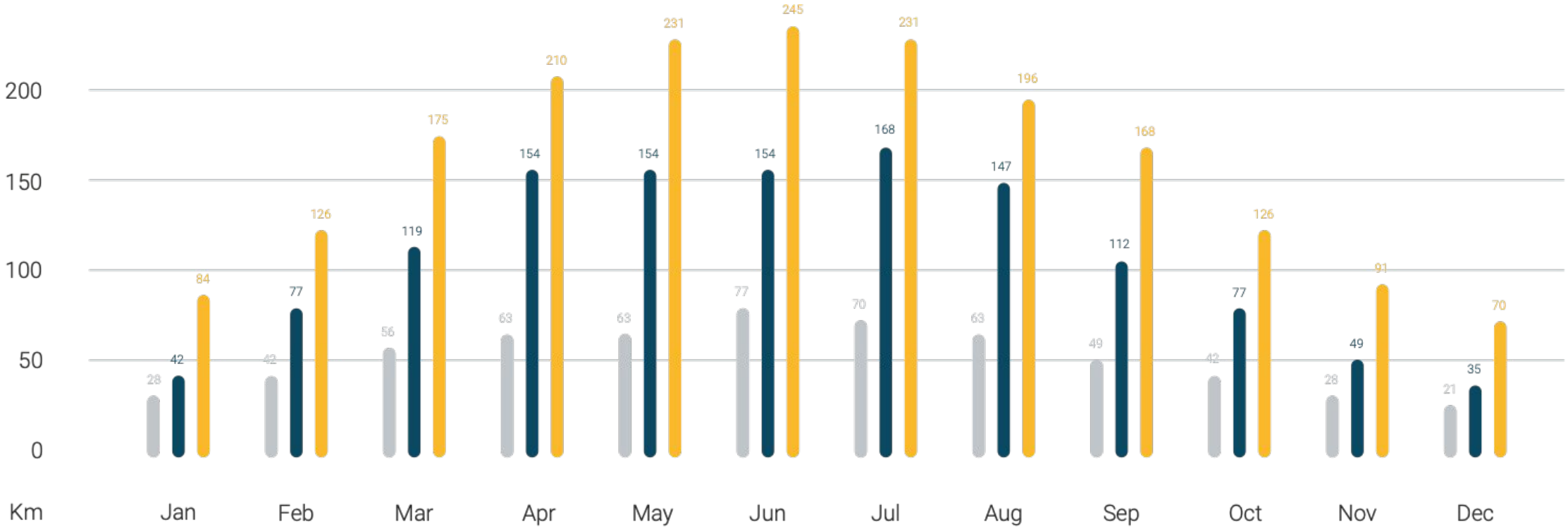
Solar charging SVC3-01 on 13.12.2022

SOLAR CHARGING

THE STATUS QUO

SOLAR CHARGING

Communication on our website: Sion solar range per week (in Munich)



CLOUDY SKY: Cloudy all day

AVERAGE: Range per week, based on average meteorological data of one month

CLEAR SKY All day sun

SOLAR CHARGING

THE TEST SETUP

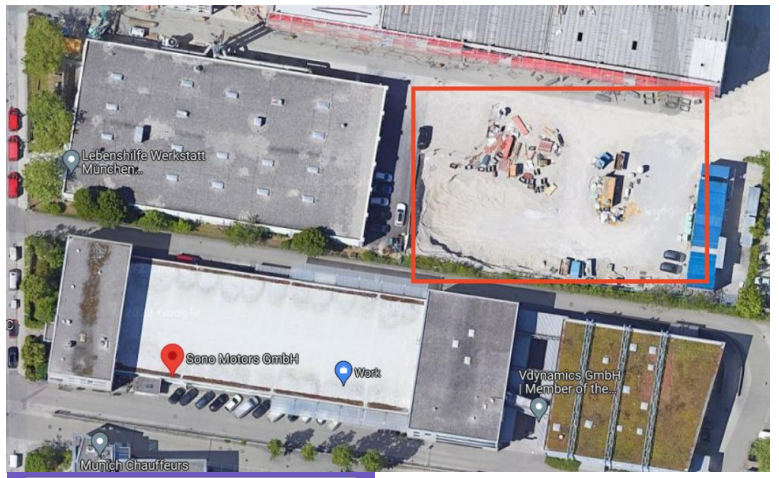
Our solar charging test setup on 13.12.22

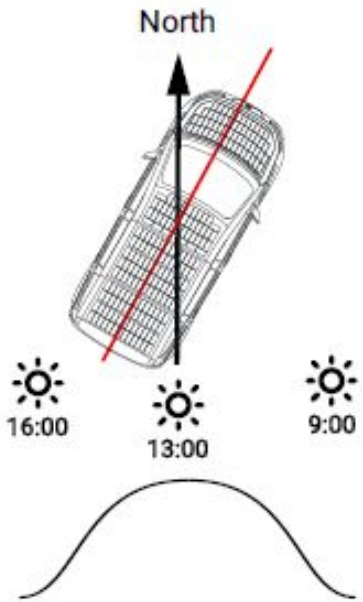
Short overview:

- We prepared one of our SVC3 validation vehicles (SVC3.01) for a community video and, together with Sebastian Böttger (Community Supervisory Board Member) and our experts, explained more about solar charging.

Operating conditions and test setup (1)

- The location for the video was on the rooftop of a parking garage next to our headquarters in Waldmeisterstraße 76 in Munich, Germany.
- The ambient temperature was -7°C (-11 at night) and the weather conditions were a mix of cloudy, foggy and sunny, so we can say it was an average day for this time in the year.
- The car was positioned north-east, to keep the worst case scenario while observing the effect of PV integrated on the body side. So, we didn't position the vehicle in an optimal way on purpose.

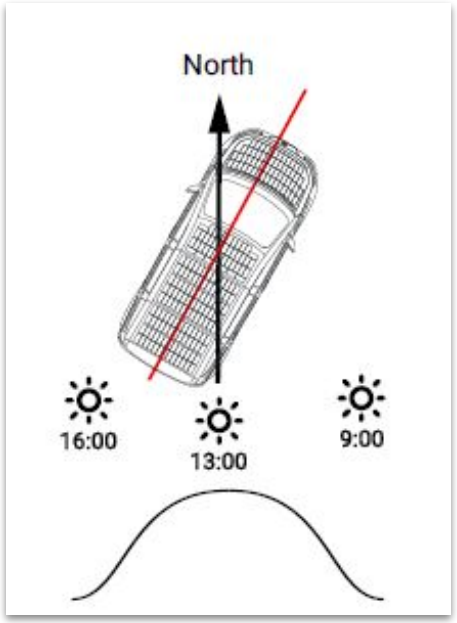


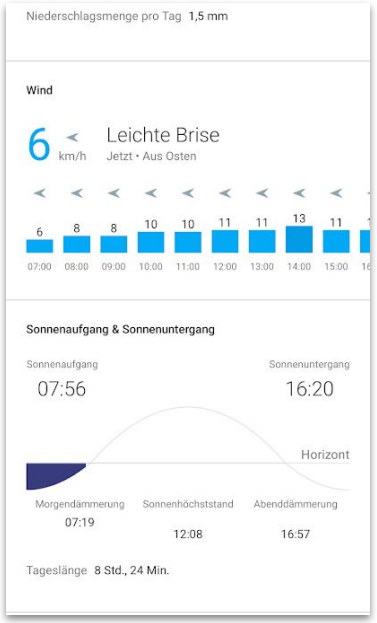


Our solar charging test setup on 13.12.22

Operating conditions and test setup (2)

- **Daylight lasted** from 07:56 to 16:20
- The **usable charging window** was 5.5 hours to input energy in the HV battery of the car.
- As you may know, December in Munich is one of the worst case scenarios for solar charging, we have few daylight hours and the sun does not stand as high as in summer times. That is the reason for the mismatch between the **daylight length** and the **usable charging window**

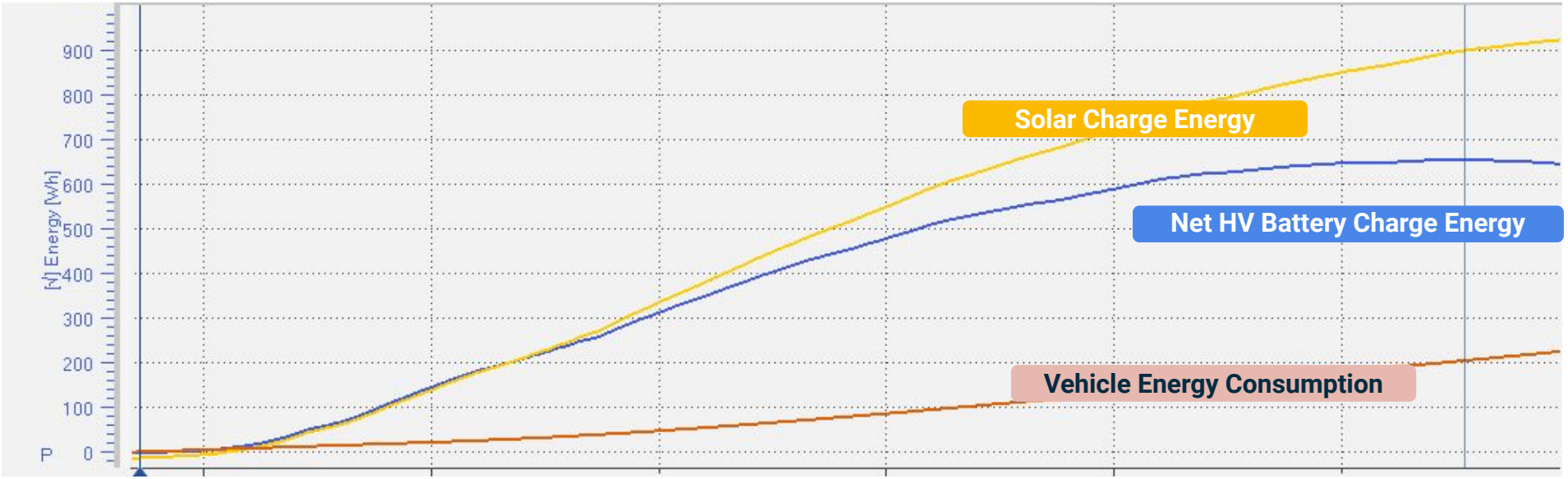




SOLAR CHARGING

THE TEST RESULTS

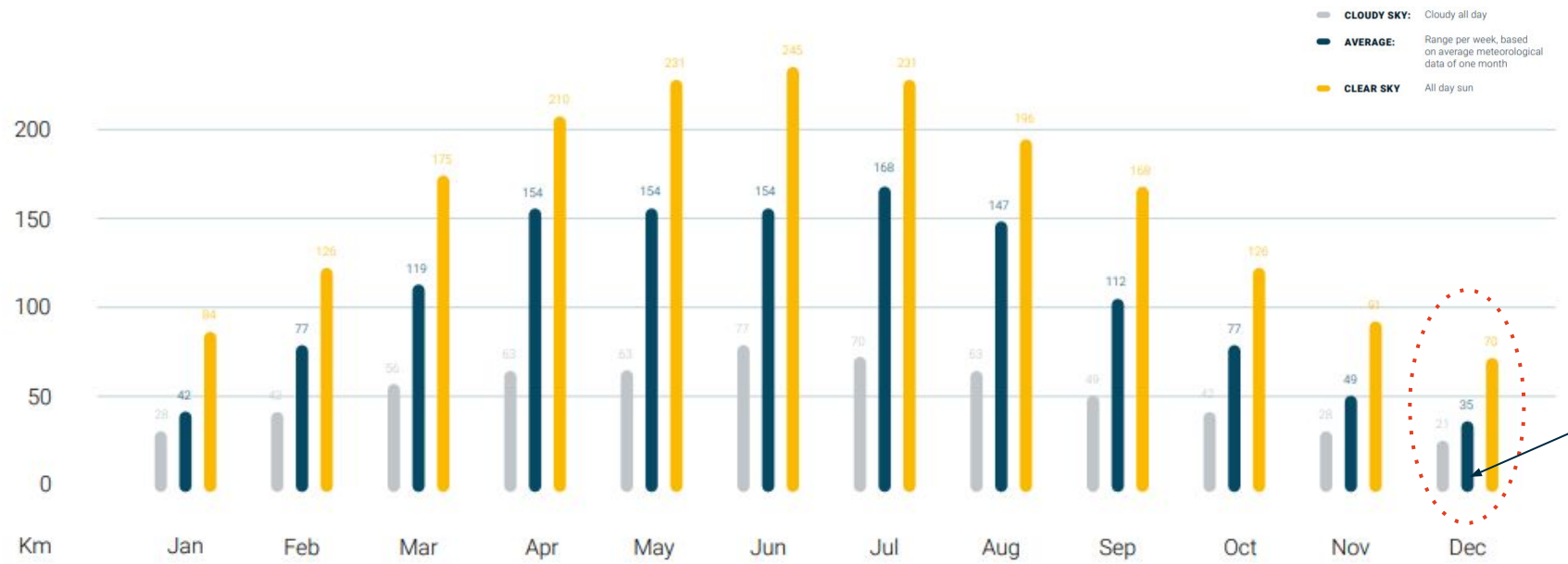
Solar charging results of SVC3-01 on 13.12.22



- We observed 290Wh were consumed during the test by the 12V connected ECUs and consumers.
- Moreover, additional logging equipment such as the telematics unit contributed to the consumption raise, which is still anyway under optimization. Indeed, this consumption is still being optimized, and we aim for a reduction of up to ~50%, if only the necessary control units (MCU, VCU, etc) are active, which are really needed for solar charging.
- HV battery charging window 5.5 hours through solar
- Solar charge-in (MCU energy out) = 940 Wh
- Vehicle energy consumption = 290 Wh (12V standby consumption not optimized yet)
- HV battery net energy in = 650 Wh = HV battery state of charge (SOC) increase of 1.3%

SONO MOTORS

Solar charge results of SVC3-01 on 13.12.22



Target:
35 km weekly solar range equals to 5 km per day

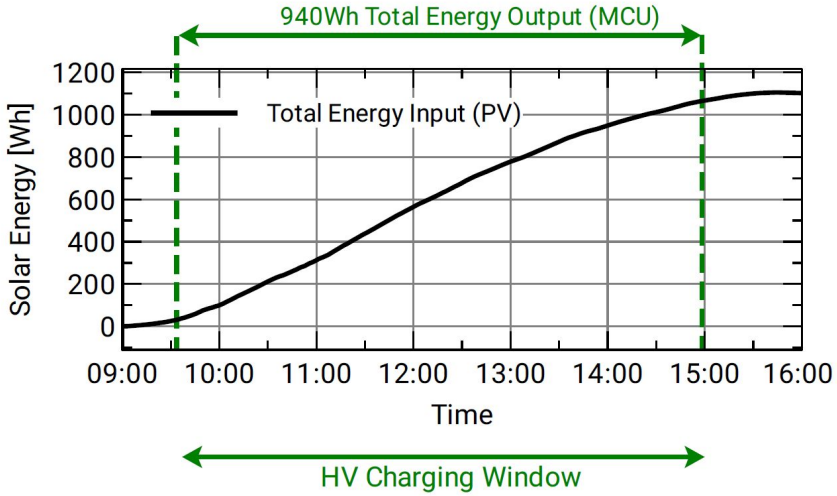
- **650 Wh = equivalent of ~ 4 km WLTP range* = 28 km weekly range**
- **~ 6 km per day / 42 km per week WLTP range would be achieved without energy consumption in the vehicle**
- **12 V energy consumption needs to be further optimized. The goal is to reduce this consumption by half in order to achieve 1 km more per day → Our target: 35 km weekly range in December**

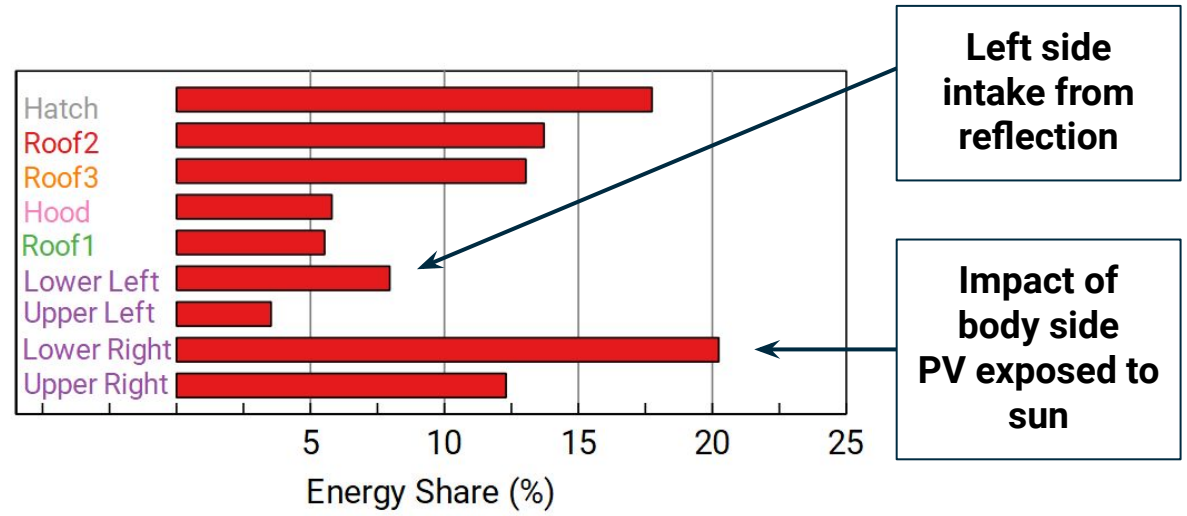
* 16.4 kWh / 100 km WLTP range at 23 °C, current measured values show significantly better consumption values. More details soon.

Solar charge results of SVC3-01 on 13.12.22

- In total, we achieved 940Wh of solar energy yield during the day.
- High voltage battery net input was 650Wh, which corresponds, based on our actual value for WLTP
- Currently 16.4 kWh/100km (current measured values show significantly better consumption values. More details soon), to a range estimation of 4 km.
- Despite the missing optimization, this is already close to our target of 5 km per day for mixed weather conditions in December in Munich.
- 5 km/day = 35 km/week → inline with our current public communication

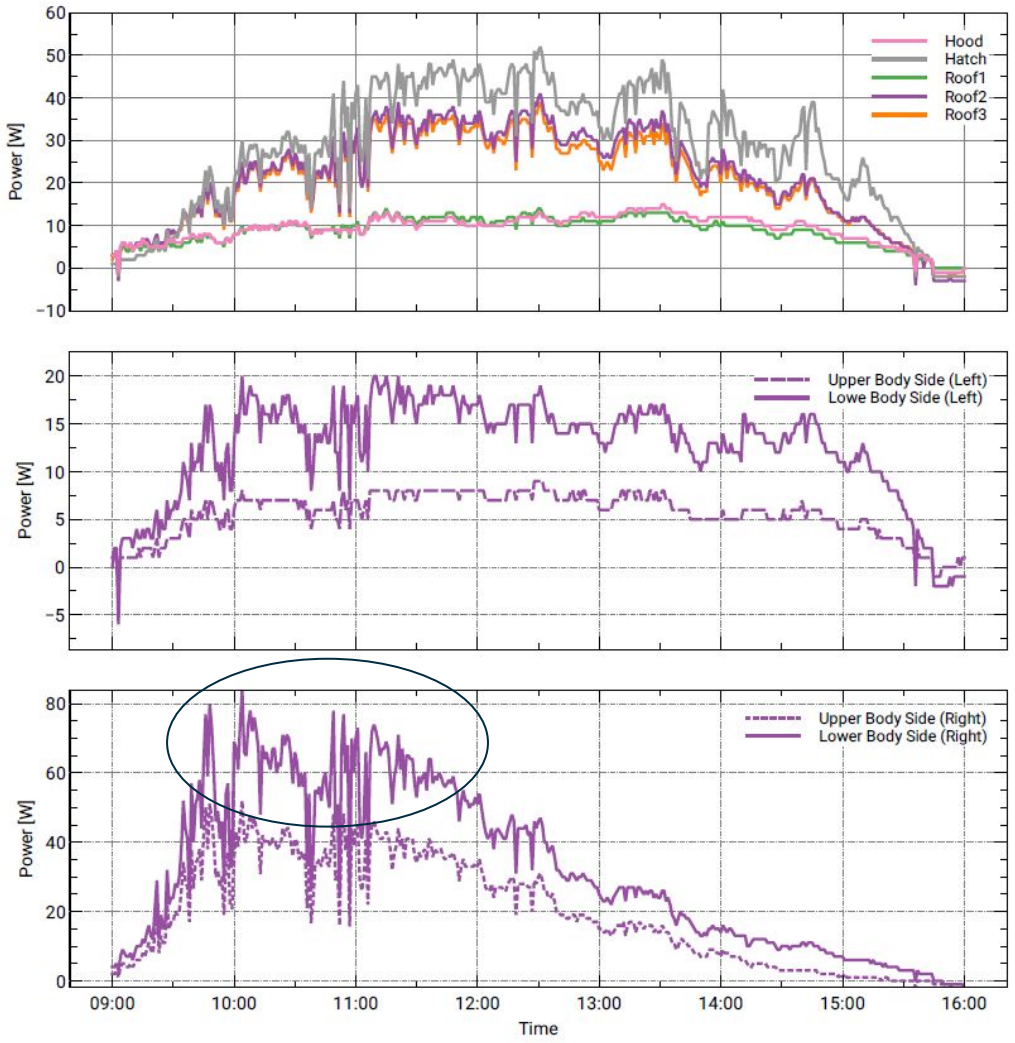
Roof contributed for only 32% of total energy intake in winter showing importance of solar integrated in the sides, hatch and hood for a solar electric vehicles (ViPV)

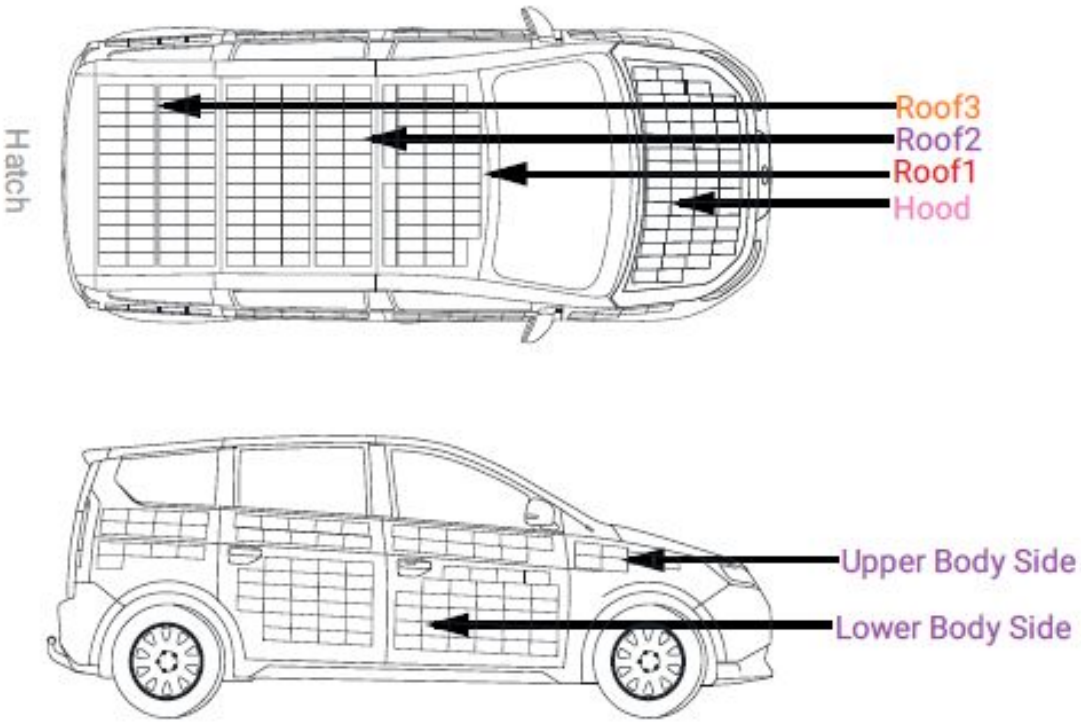




POWER INPUT IN THE MCU

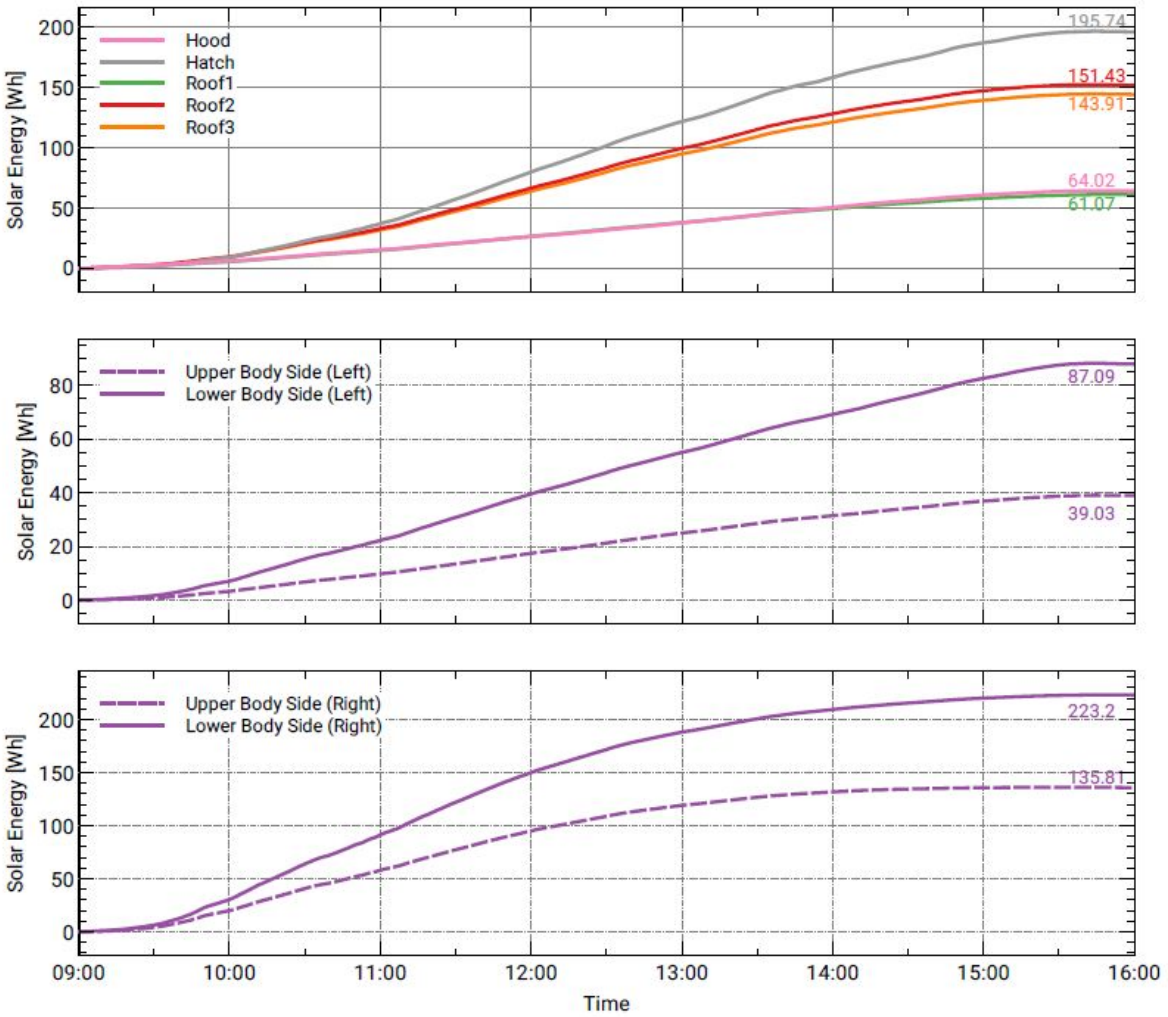
Why solar integration on the side of the car matters

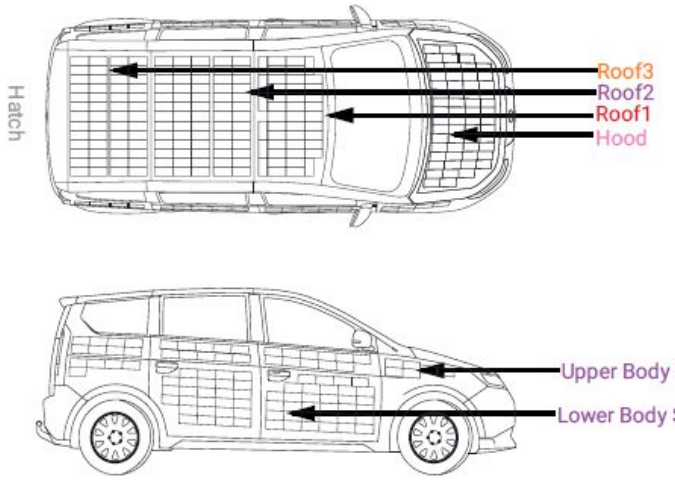


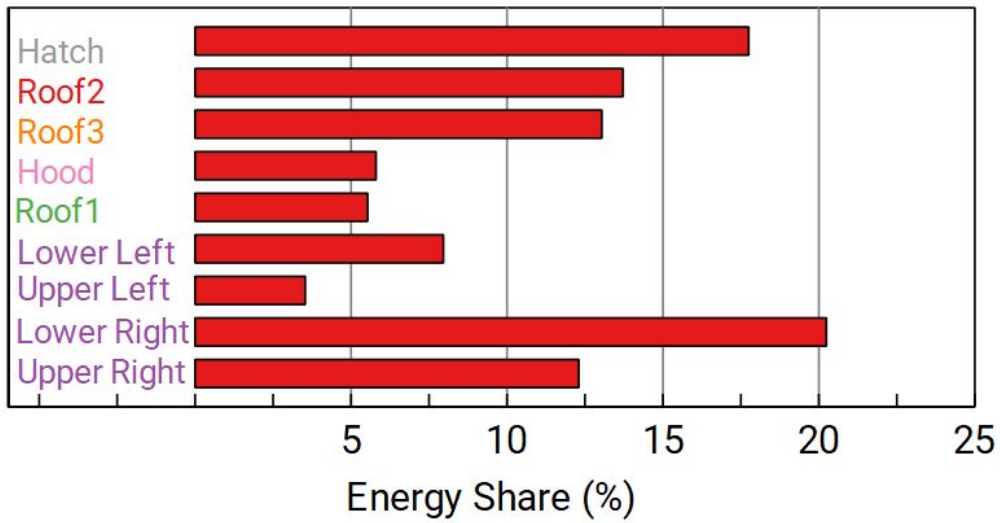


ENERGY INPUT IN MCU

Why solar integration on the side of the car matters







SOLAR CHARGING

CONCLUSION + NEXT STEPS

SOLAR CHARGING WINTER TEST

Conclusion from the solar test

Solar integration works!

- Solar charging also works in harsh winter conditions in Central Europe
- We achieved 4 km/day, in line with the confidence interval from weather variability for December
- We extrapolated 28 km/week vs our communicated 35 km on an average December week
- Through further stand-by consumption optimization, we can achieve our targeted 35 km/week

Solar side body integration is important!

- Rooves contributed to only ~30% of total energy intake in winter
- ~70% of the total energy yield for the test day comes from the solar body-side integration
- All-around PV (ViPV) and solar side body maximize yielding and increase the total exploitable surface exposed.
- The yielding impact of the solar side body integration raise awareness on the importance of a conscious user parking behavior in specific conditions.

SOLAR CHARGING WINTER TEST

Next steps

- Assess yielding performance in other scenarios
- We will optimize our low voltage power consumption to get the best results for the solar range
- We continue to invest in partnerships to provide Sion owners a solar parking assistance in the infotainment.
- Additionally, we are close to releasing some good news from our physical test from the test track and the roller bench for WLTP-consumption.
- Preliminary results give us some optimistic perspective to release a reduction of our estimated energy consumption compared to our actual WLTP value of ~16.4 kWh/100 km
- This would have an additional positive effect on our solar range

OUR VISION

A WORLD WITHOUT FOSSIL FUELS.

SONO MOTORS GMBH

Waldmeisterstrasse 76

80935 Munich | Germany

T +49 (0)89 45 205 818

E info@sonomotors.com

W sonomotors.com

VAT DE305560734

District Court Munich HRB 224131

Managing Directors: Laurin Hahn, Jona Christians,

Torsten Kiedel, Thomas Hausch, Markus Volmer