Using solar PV, BESS and V2G for grid support

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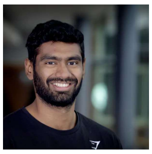
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Thanks to all current and past members of the group as well as collaborators!

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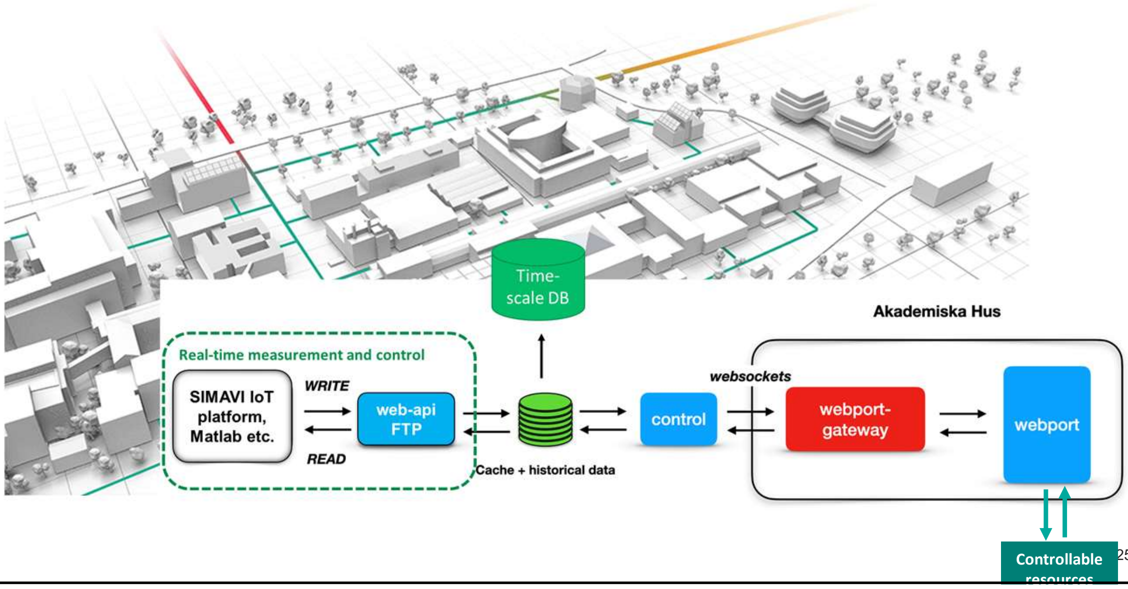
Chalmers Testbädd



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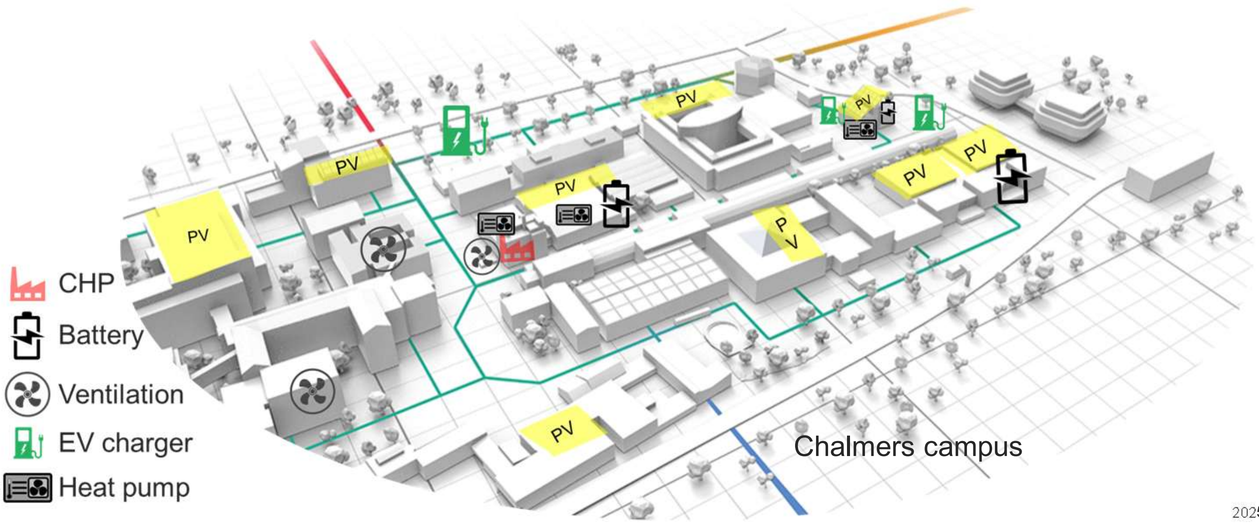

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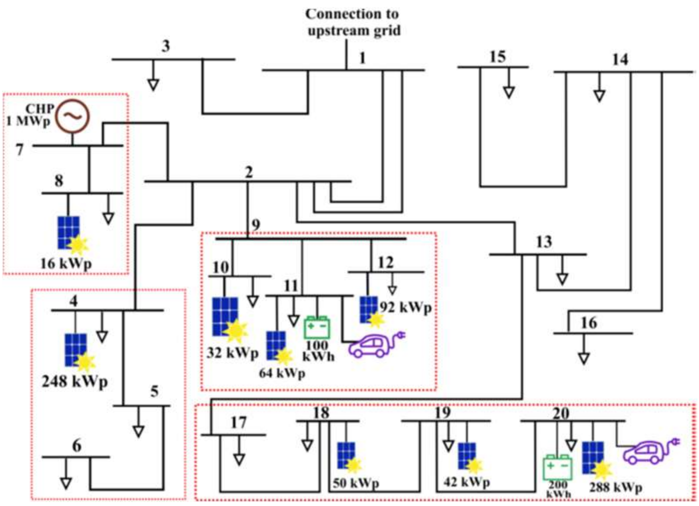

Test case for Swedish demos

- Demonstrate smart grid techologies and flexibility provision

➡

- ✓ Congestion forecast tool
- ✓ Flexibility provision
- ✓ Reactive power control for PVs
- ✓ Dynamic state estimation based protection
- ✓ Real-time visualization of distribution grids

- Test and demonstrate the market designs
  - Utilizing the developed tools and controls in WP5

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  - Local Energy Markets (LEM)

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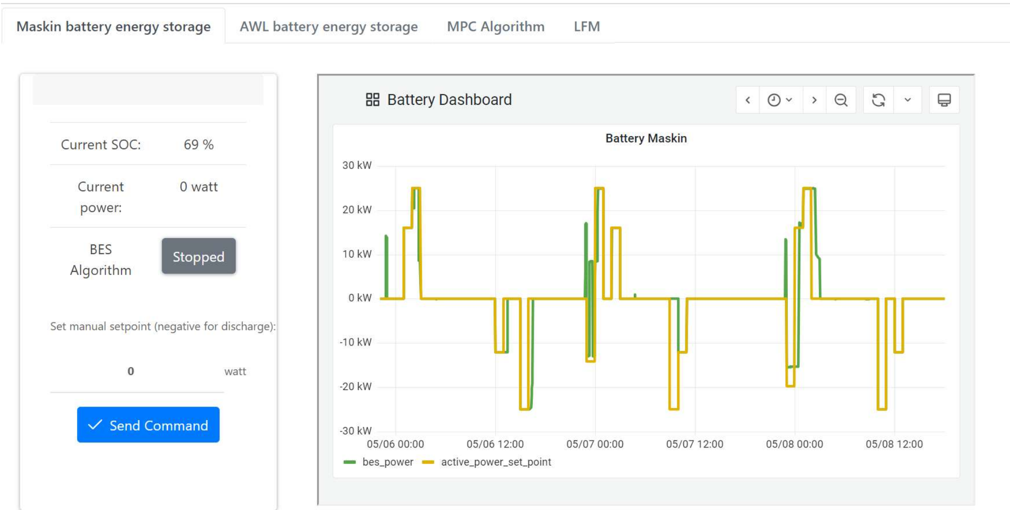
WP5



- Congestion forecast tool
- **Control of flexibility resources**
- MPC based voltage control
- **Flexibility exploitation**
- State estimation based protection
- Real time visualisation

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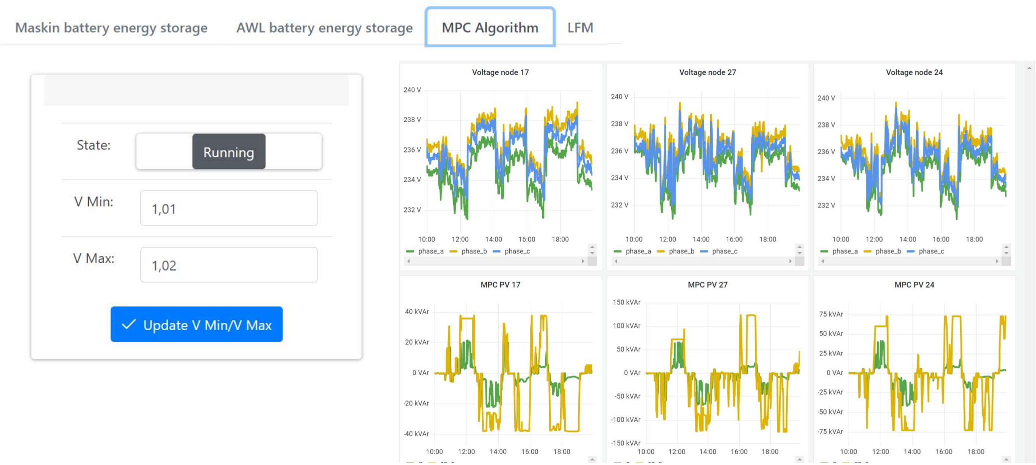
WP5

Site Management Dashboard



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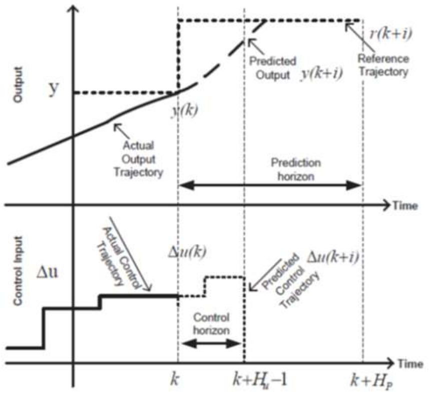
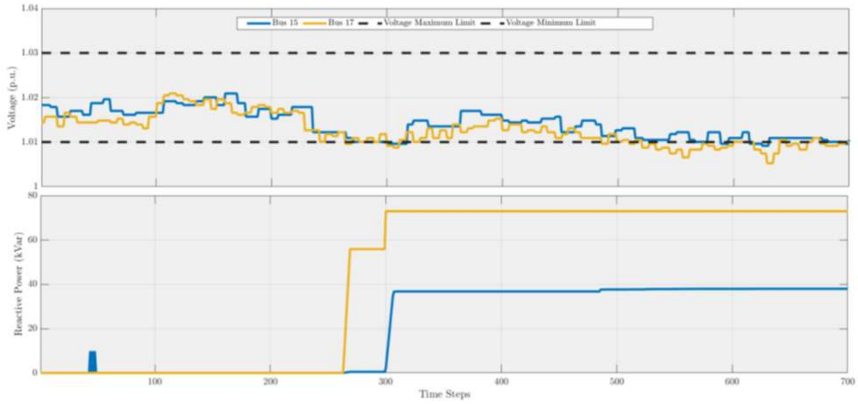
Voltage support using solar PVs

- Voltage variations
  - Control/support from renewable resources, storages etc.





R. Sharma, et. al. Demonstration of grid monitoring, control, and flexibility supported by IoT, report Chalmers

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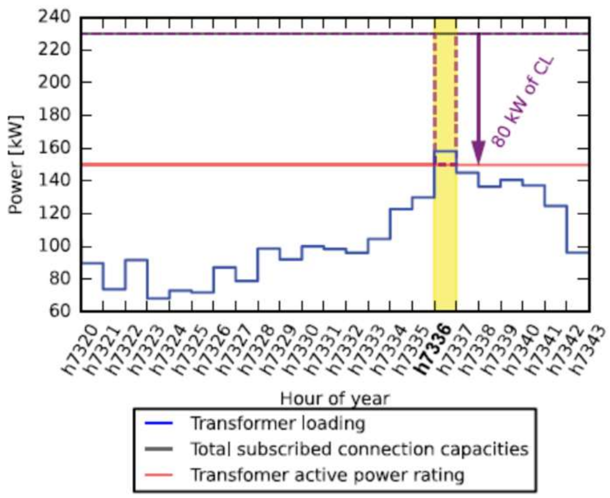
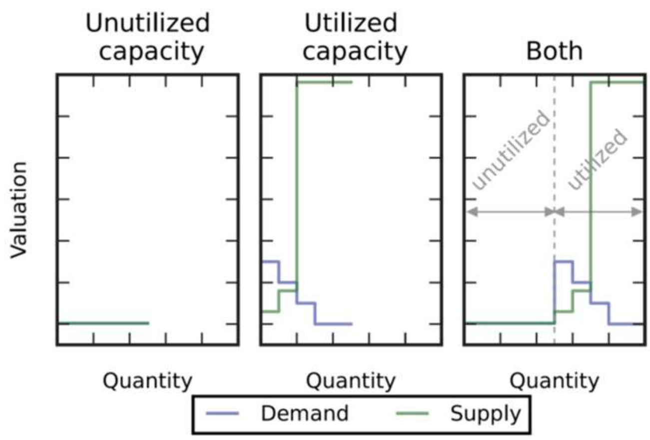
Local flexibility markets – capacity limit





12 Background | Local markets | Balancing markets | Outlook 2025-09-23

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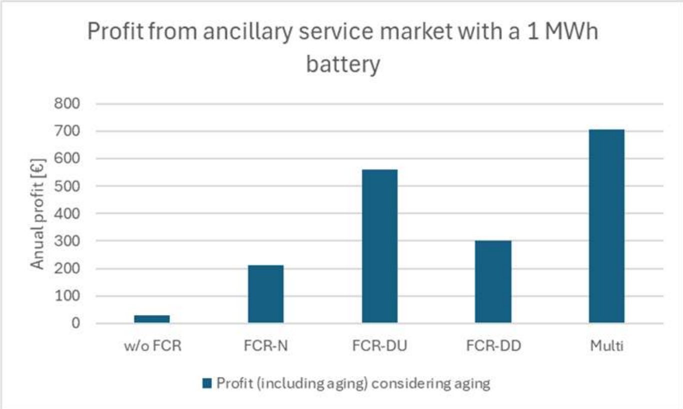
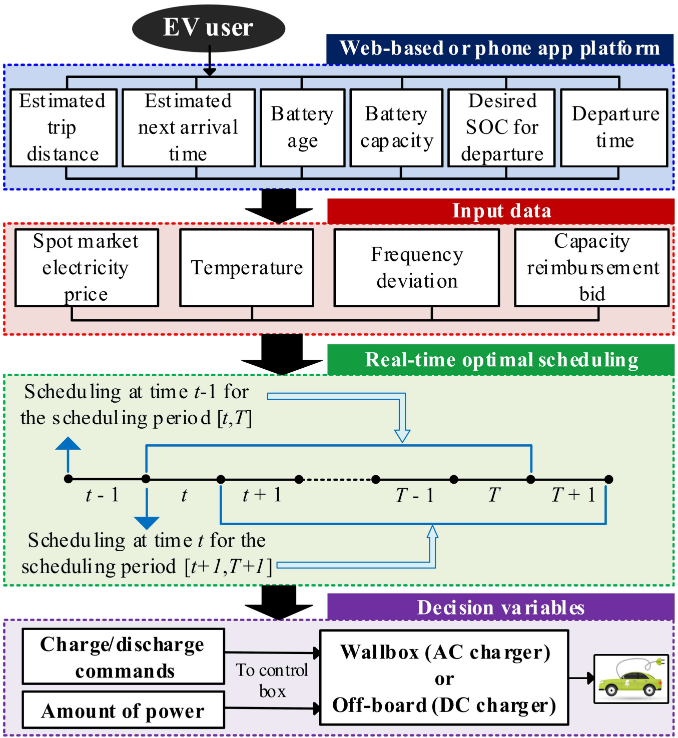
Participating in balancing markets

- Value of providing ancillary services from a 1MWh/1MW battery
  - Only spotprice arbitrage
  - FCR-N
  - FCR-D
  - Multimarket
- How much does the battery aging impact the participation?

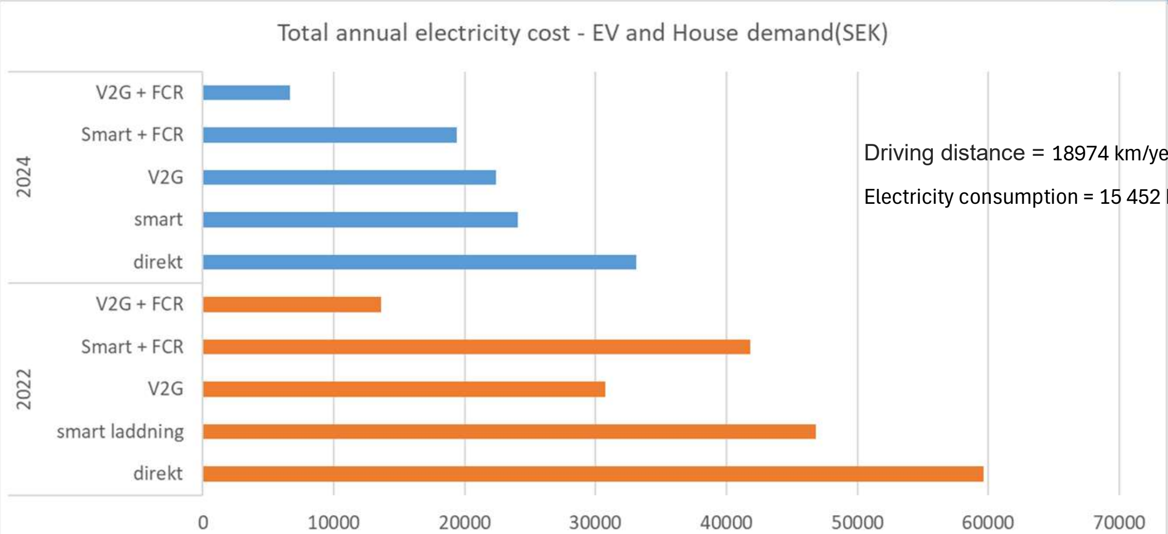


Balancing markets – Vehicle to Grid

- Does V2G create any value for the EV owner or any other stakeholder?
- How does V2G impact the battery aging?



Electricity cost for different charge scenarios



Driving distance = 18974 km/year

Electricity consumption = 15 452 kWh/year

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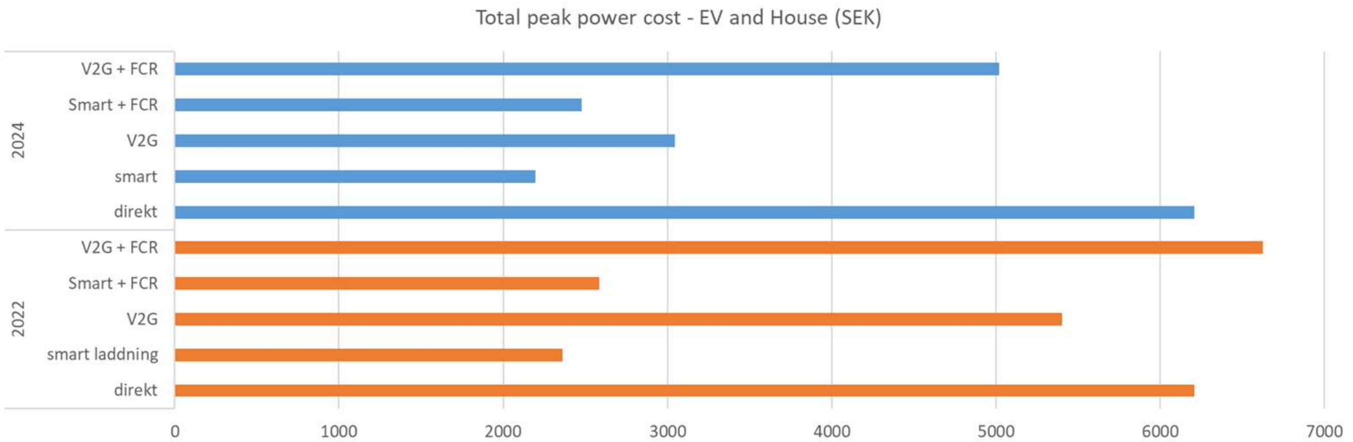
Peak power cost



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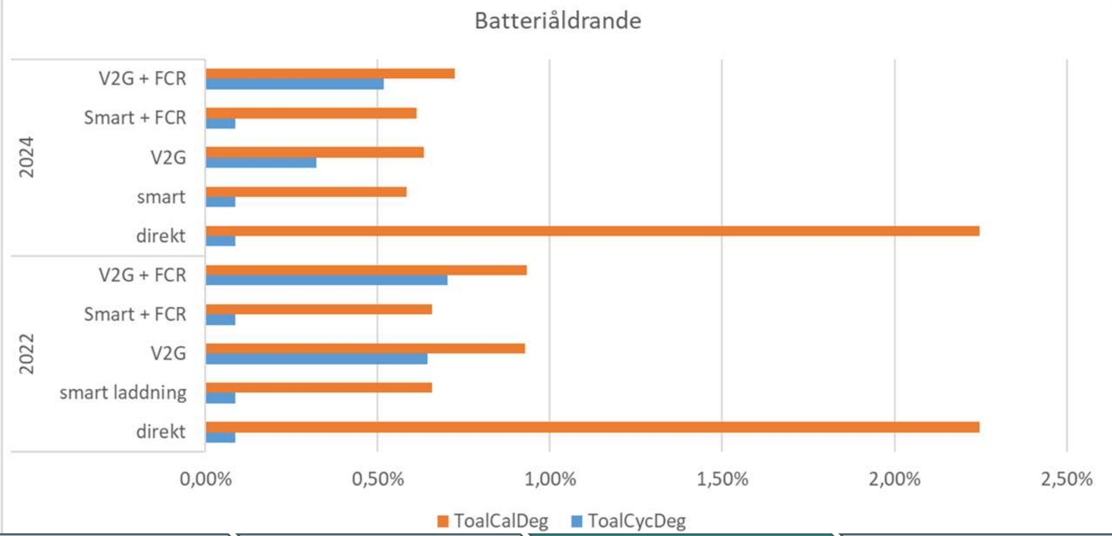
Battery aging



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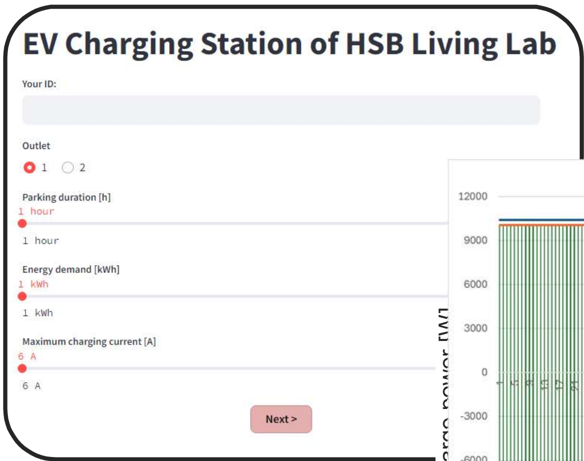
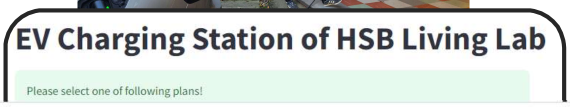
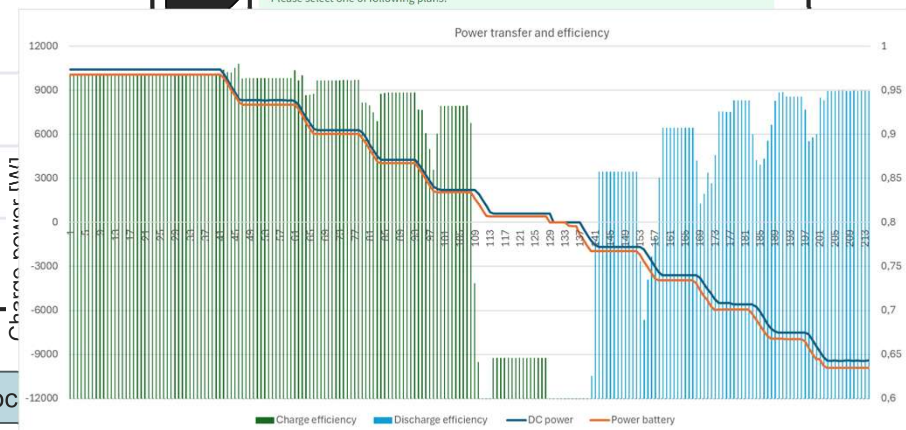
V2G demonstrations







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