
# Effects on the self-consumption and self-sufficiency for household solar producers when introducing an electric vehicle

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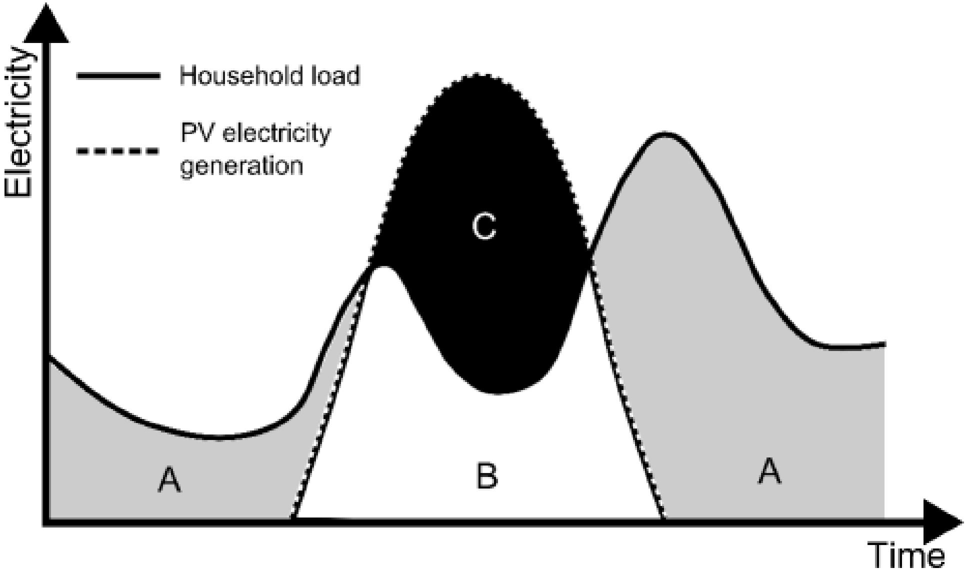
# Can an electric car replace a stationary battery for prosumers?

- Prosumers have incentives for self-consumption
  - Economic
    - Depends on tariff structure and taxes
  - Self-sufficiency
    - Interest in providing their own electricity

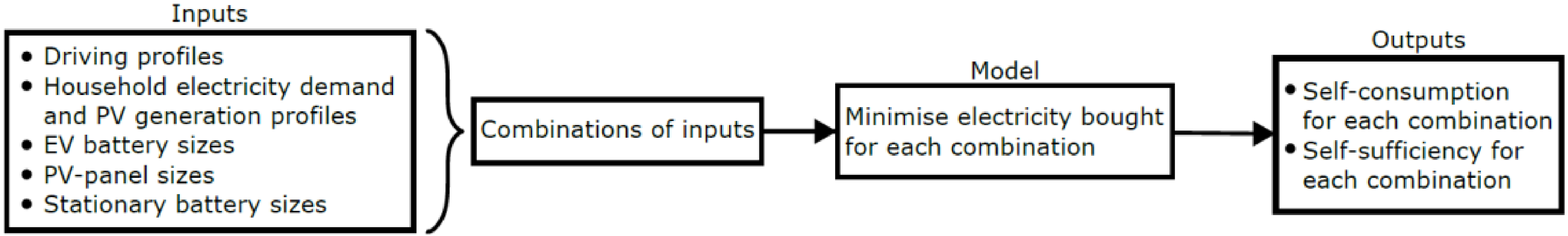
# Can an electric car replace a stationary battery for prosumers?

$$self\text{-}sufficiency = \frac{B}{A + B}$$



# Method

- Optimization with the objective of minimizing bought electricity
- Measured driving profiles for western Sweden (426)
- Measured household electricity demand profiles for Sweden (2221)
- With and without V2H



# Method

$$\text{ALR} = \frac{\textit{array size } (W_p)}{\textit{average annual household load, excluding EV } (W)}$$

$$\text{BDR} = \frac{\textit{battery energy capacity } (Wh)}{\textit{average annual hourly household demand, excluding EV } (Wh)}$$

Dwelling 25 000 kWh/year

ALR3 = 8.6 kWp
BDR2 = 5.7 kWh

Dwelling 5 000 kWh/year

ALR3 = 1.7 kWp
BDR2 = 1.1 kWh

# Self-sufficiency

- EVs comparable at higher ALRs
- Shows diminishing returns with increased EV-battery size
- Combo of EV and stationary even better, but not additive

Dwelling 25 000 kWh/year

ALR3 = 8.6 kWp
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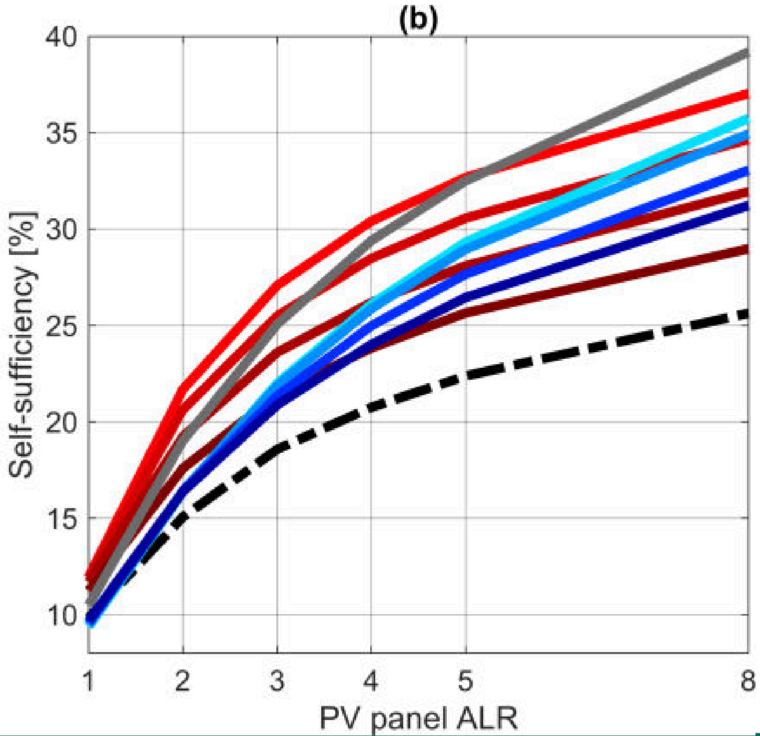
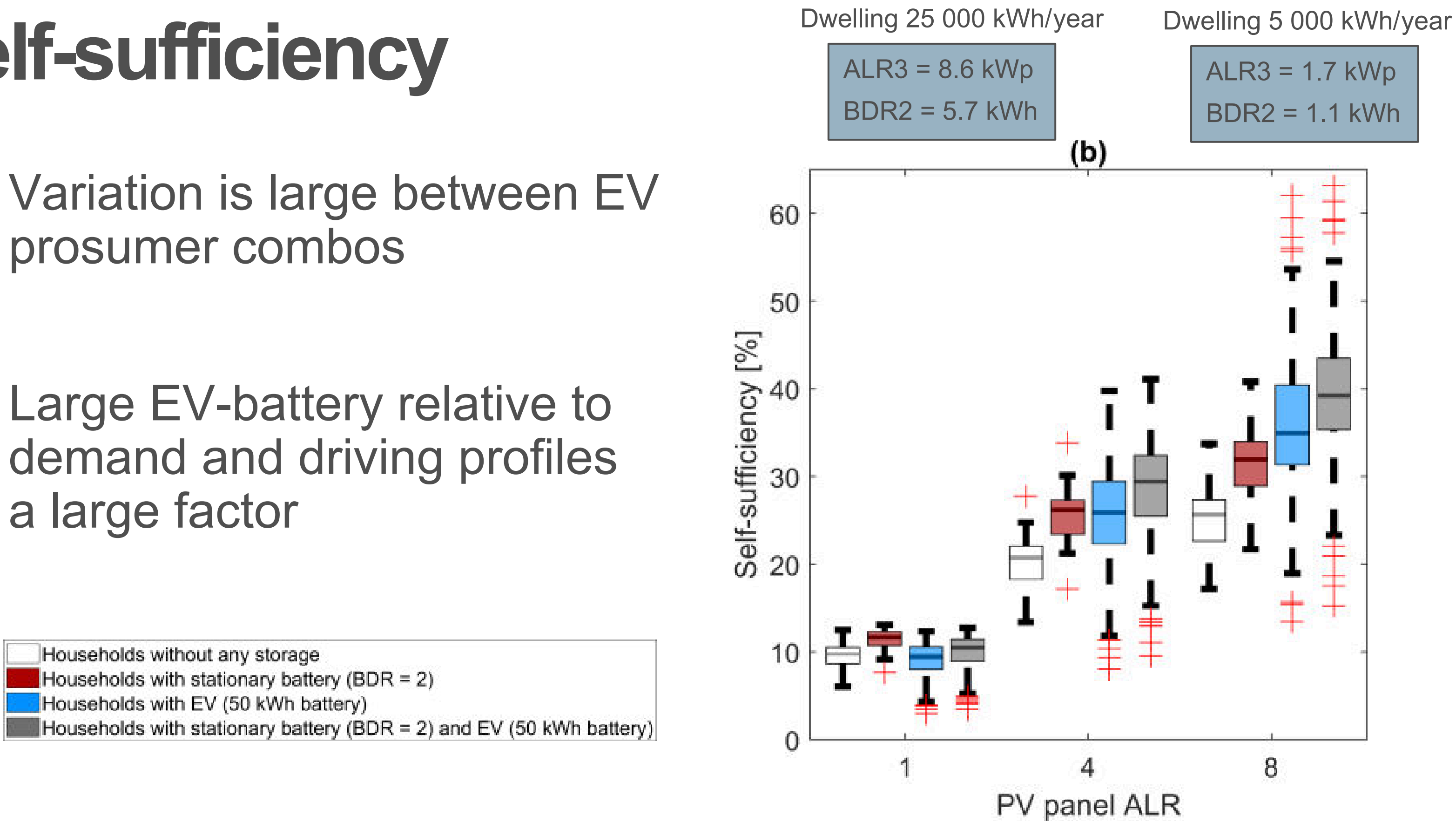


# Self-sufficiency

- Variation is large between EV prosumer combos

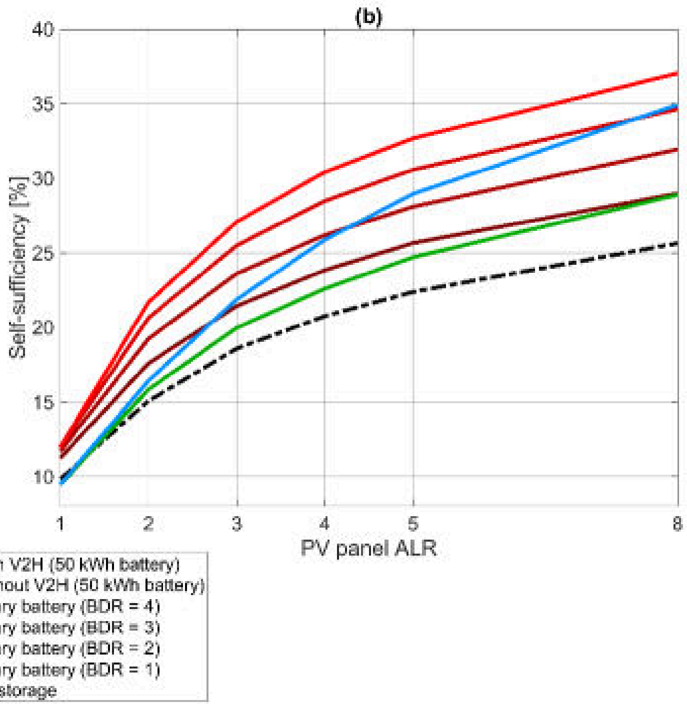
- Large EV-battery relative to demand and driving profiles a large factor



# The impact of vehicle to home

- V2H is important

- Difference of a BDR of 2 at high ALRs, equivalent of a normal sized home battery

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# Conclusions

- Can it replace stationary batteries?
  - Dependent on household demand and driving profile, but to an extent yes
- V2H important
- Possibly better at more southern latitudes
- Driver for consumers?
  - Value of 40-250 €/year (Swedish conditions)

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# Increase in number of battery cycles