Advanced statistical methods for determining the hosting capacity of medium and low voltage networks

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PROBLEMS

HIGH SOLAR ENERGY TARGET IN SWEDISH ELECTRICITY MIX
BAD IMPACTS OF VARIABLE RENEWABLE ENERGY (VRE) ON ELECTRICITY GRID
UNCERTAINTIES OF INPUT VARIABLES IN LOAD FLOW CALCULATION
UNCERTAINTIES OF TECHNOLOGY DEPLOYMENT AT THE GRID CUSTOMERS

INSTALL SOLAR ENERGY AS MUCH AS POSSIBLE
LIMIT THE VRE WITH HOSTING CAPACITY
HOSTING CAPACITY UNCERTAINTIES
UNREALISTIC HOSTING CAPACITY
DETAILED PROBLEMS

ORIENTATION AND TILT ARE OFTEN ASSUMED TO BE UNIFORMLY FACED IN ONE DIRECTION.

NO INSIGHT INTO THE EXPECTED SPATIAL SPREAD OF NEW RESIDENTIAL PV.
OBJECTIVES

• Analyze the rooftop profiles of single family houses
• Impact analysis of different methods of modelling single family house’s rooftop
• Probabilistic adoption model considering socio-economic data and peer effects

APPROACHES

LiDAR → Rooftop topology and annual solar irradiance

Hosting capacity analysis

Uniform  Real roof data
• Socio-economic drivers of residential PV systems applied for in Uppsala: property ownership type, average income, share of households with cars, age group, unemployment rate. Some of the factors differ from the previous studies in different countries.

• A prediction is generated, districts with a high population of students are predicted to have a lower PV penetration. Knowing local conditions is important.

• A comparison to the solar generation potential shows a good synergy between physical and socio-economic factors.

• Flat or optimized roofs assumption is not rational. If the roof data are not available, a new better way to model it should be studied.

• High penetration of PV systems in residential houses may be hampered by the availability of good roofs first, before it reaches the hosting capacity.

• Optimized roofs assumption overestimate the impact of PV systems.
FUTURE WORKS
THANK YOU!

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