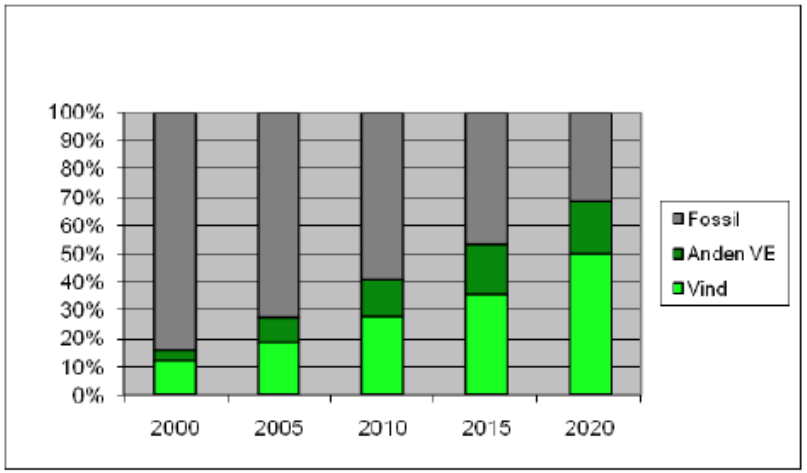
FLEXIBLE BUILDINGS IN LOW-VOLTAGE NETWORK ENVIRONMENT – PRELIMINARY STUDIES AND IDEAS FOR FUTURE WORK

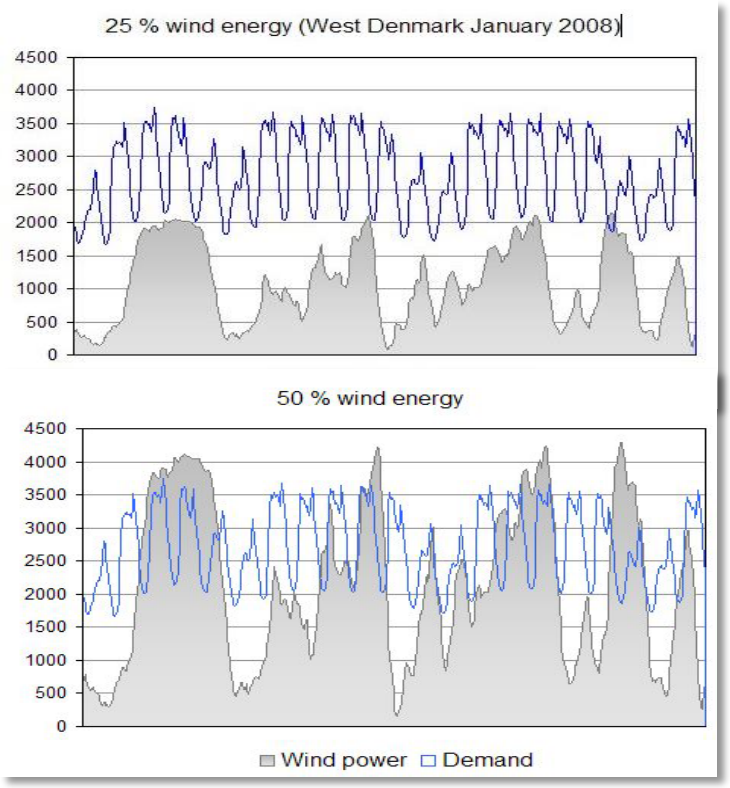
ANNA MARSZAL-POMIANOWSKA (AJM@CIVIL.AAU.DK)
IKER DIAZ DE ZERIO MENDAZA
AALBORG UNIVERSITY

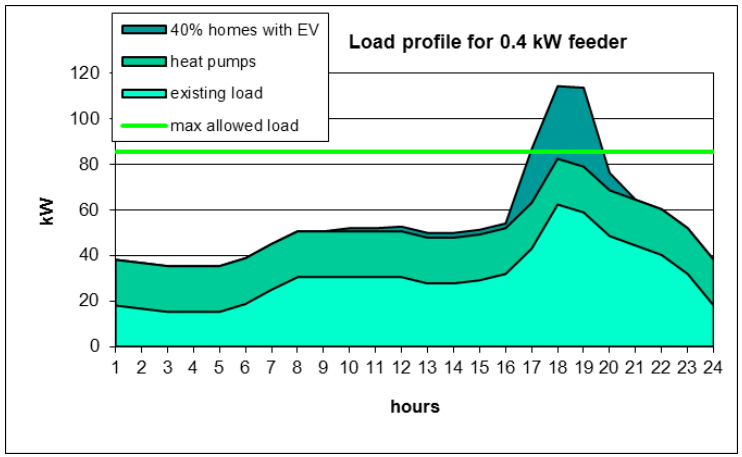
AALBORG UNIVERSITY
DENMARK

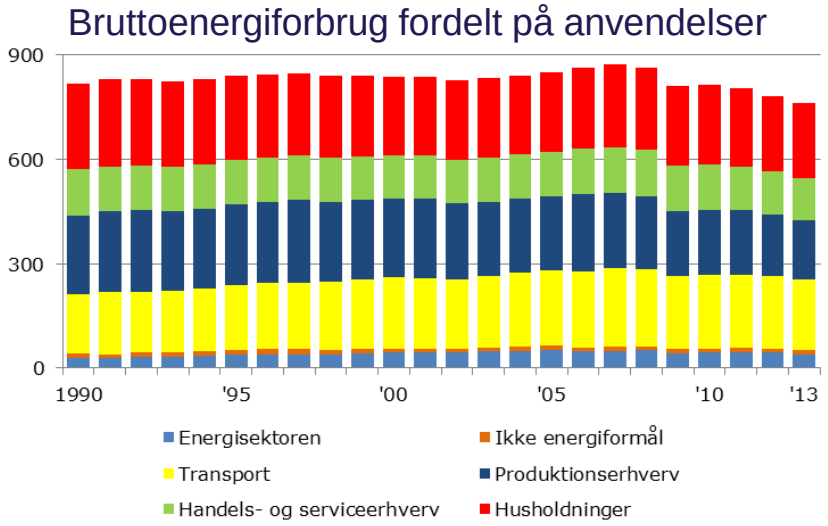
MOTIVATION

Figur 2. Udviklingen i VE-andelen af elforsyningen frem mod 2020.









AALBORG UNIVERSITET
DENMARK

DFF POSTDOC

RESEARCH QUESTION:

How can operational bottlenecks in the interaction between Near Zero Energy Building and the power grid interaction be avoided and what performance indicators can optimize NearZEB design for an intelligent interaction with the power grid?

PARTICIPANTS:

AAU - Civil Engineering and Energy Technology Department

Uppsala University, Sweden

Insero Energy

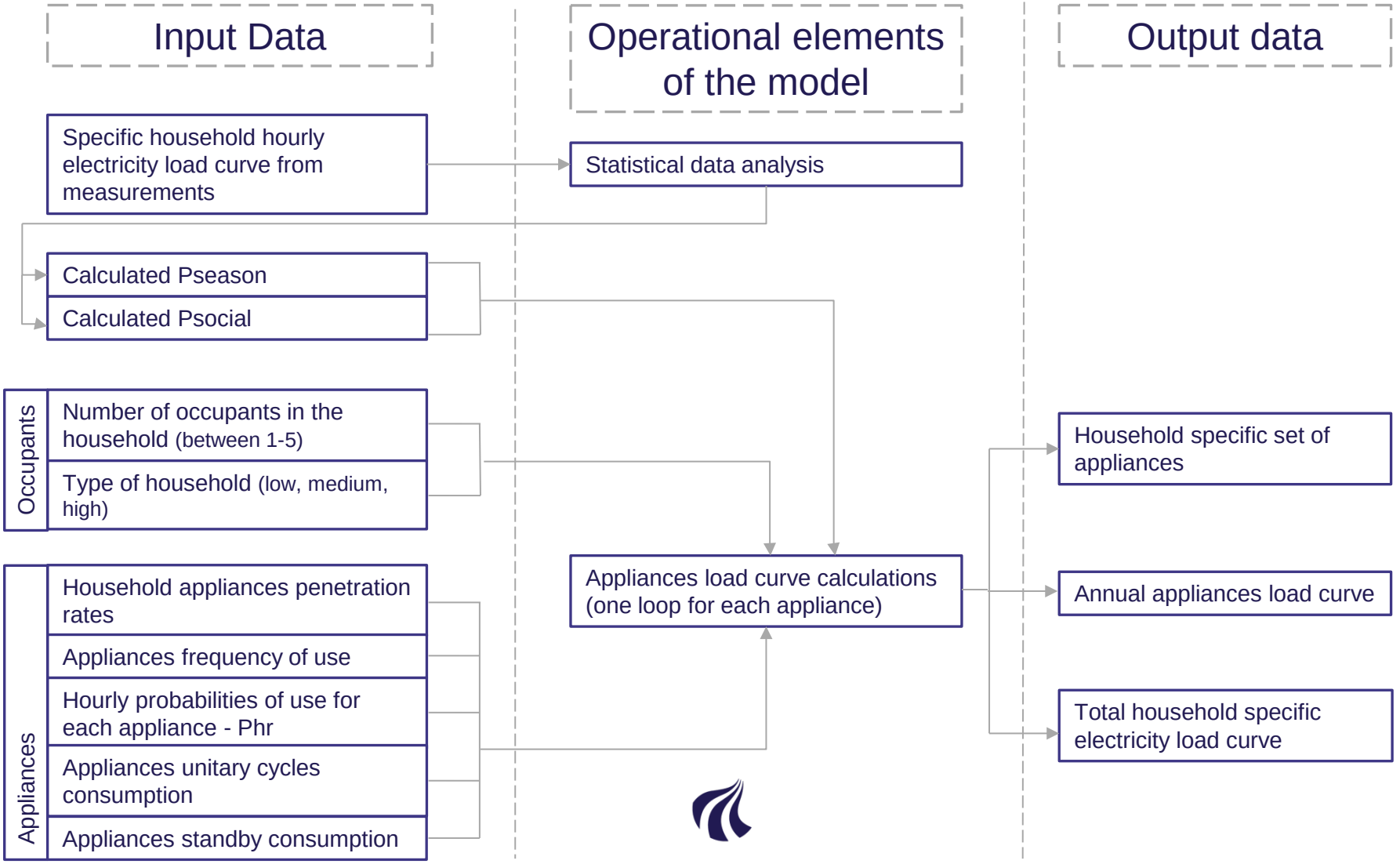
DURATION:

January 2013 – July 2016

AALBORG UNIVERSITY
DENMARK

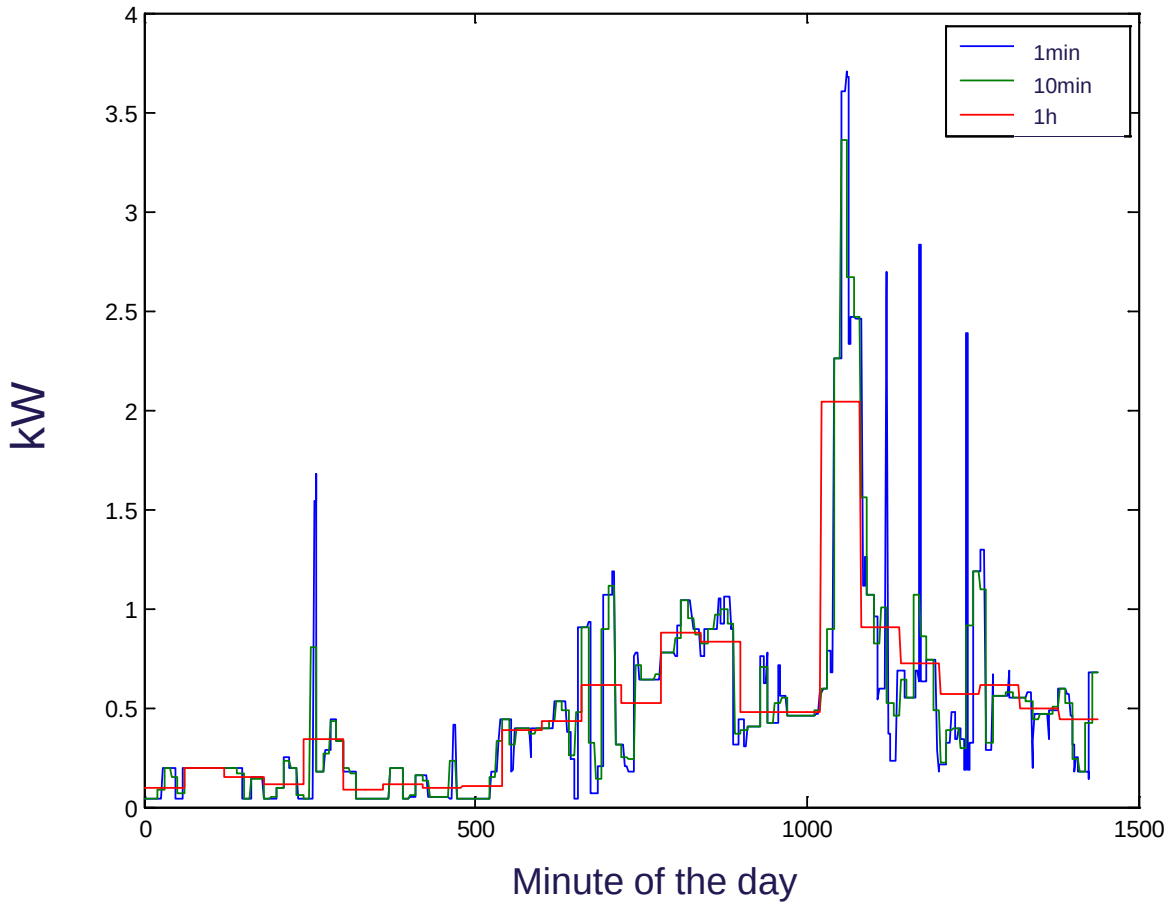
ENERGY LOAD MODEL

Empirical-probabilistic bottom-up approach model

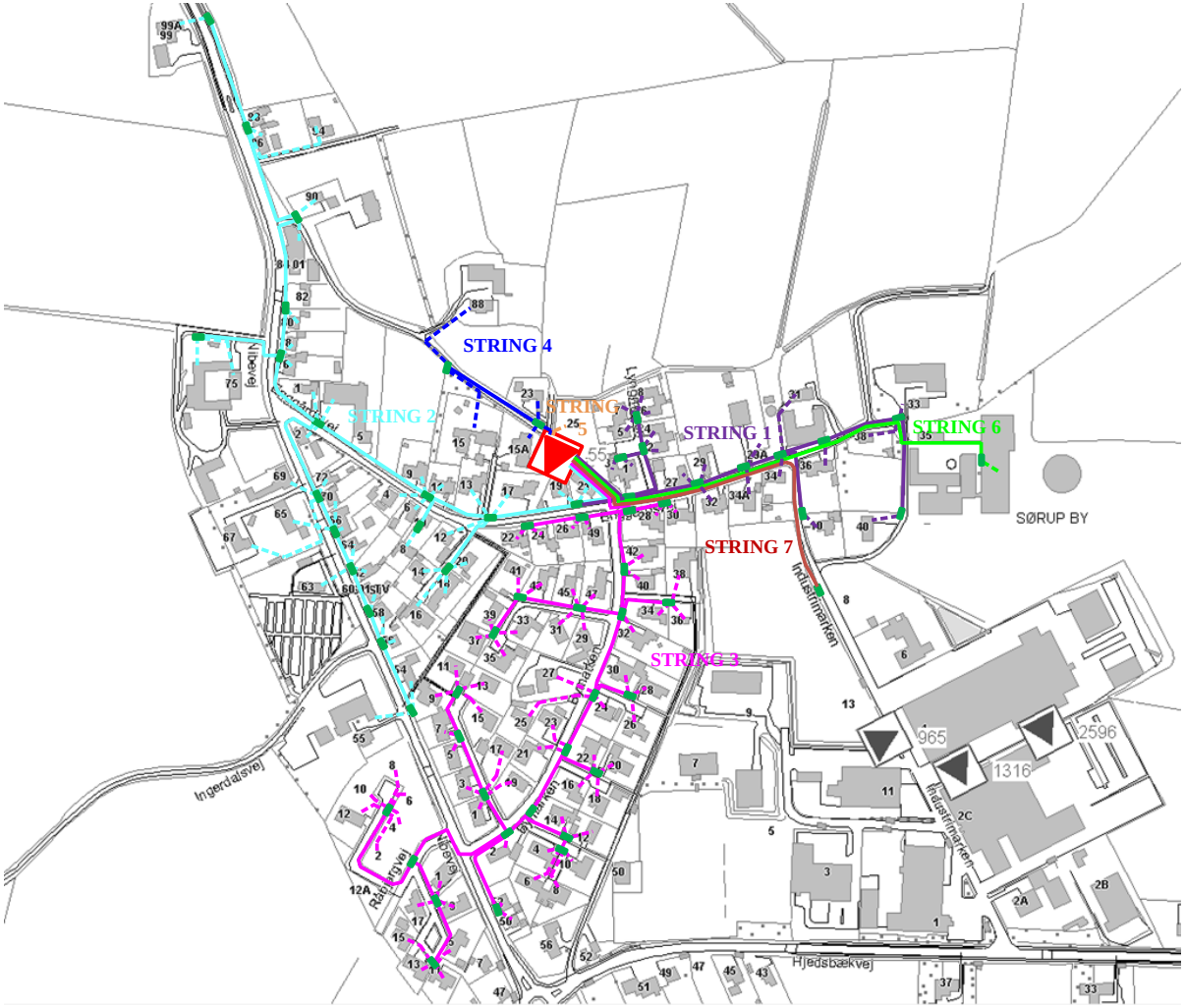


AALBORG UNIVERSITY
DENMARK

OUTPUT OF THE MODEL

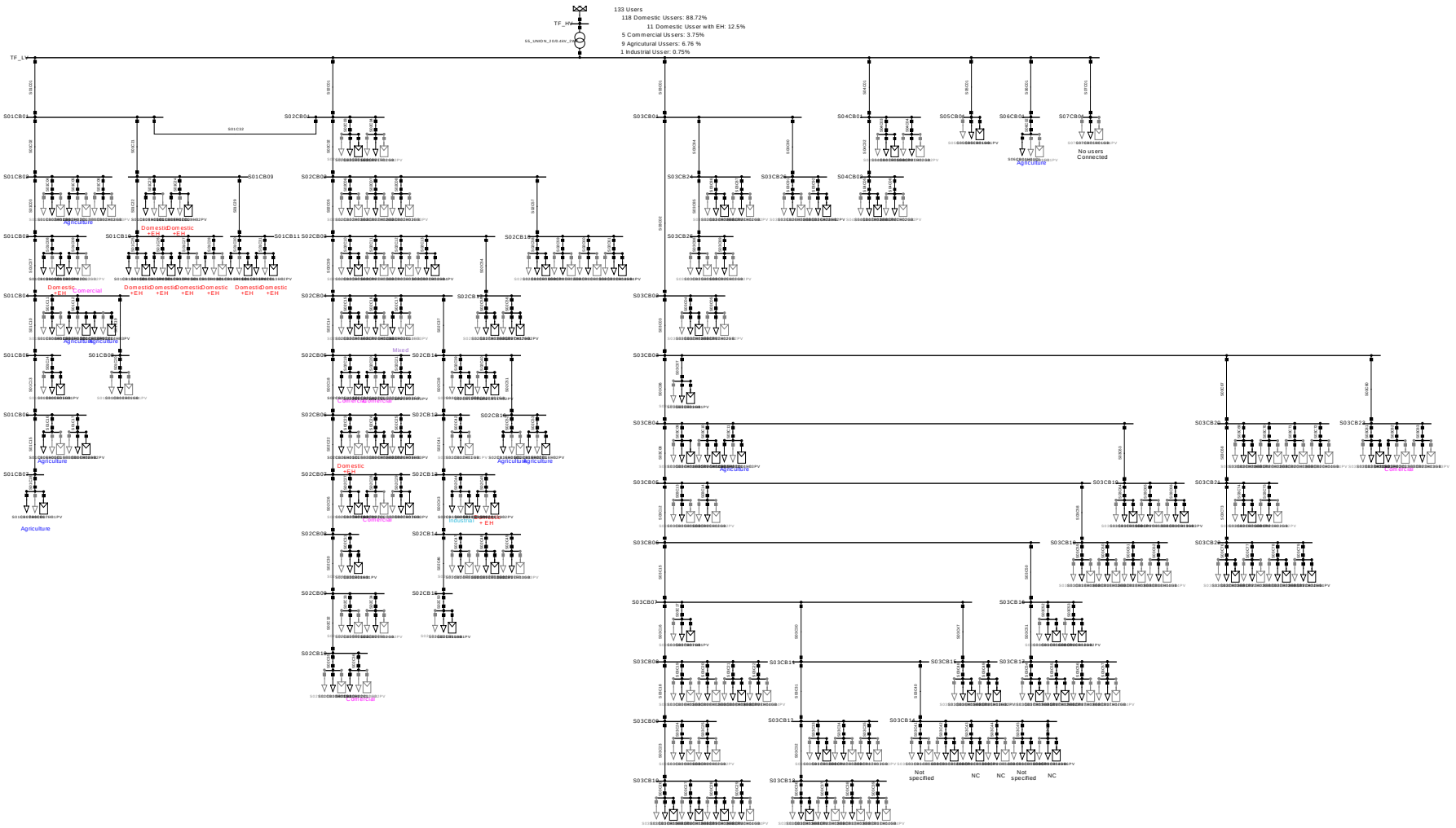


CASE STUDY – SØRUP ST



AALBORG UNIVERSITY
DENMARK

WHAT DO WE EXPECT TO GET FROM THIS MODEL?

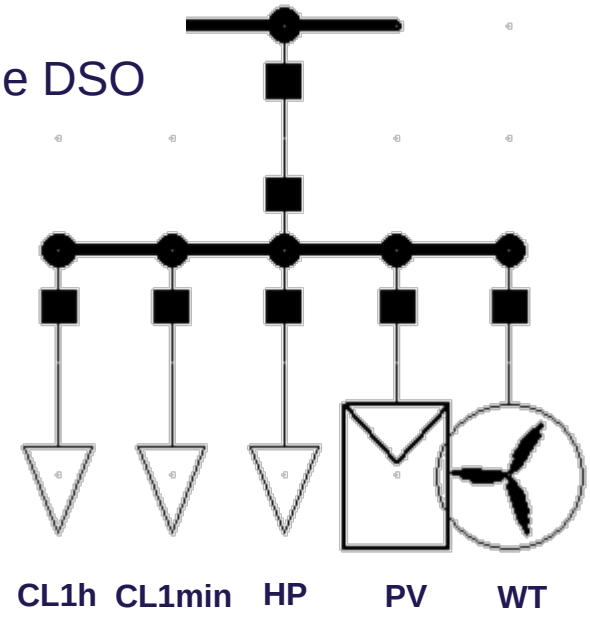


AALBORG UNIVERSITY
DENMARK

POWER GENERATION AND DEMAND MODEL

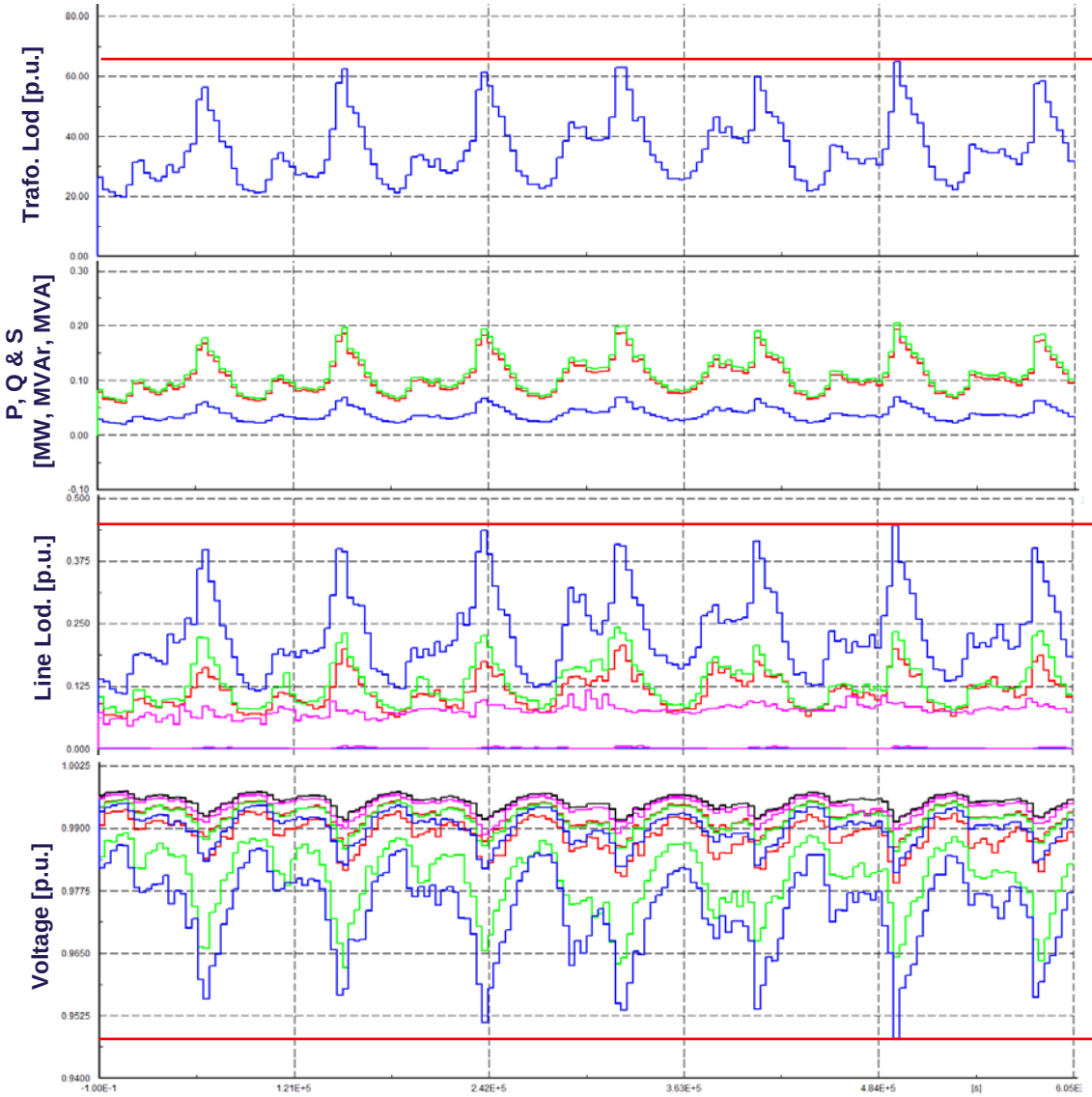
The residential costumers are represented by power consumption and generation profiles with 1 min resolutions:

- Load:
  - CL (1 hour based) – Original provided by the DSO
  - CL (1 min based)
  - HP (1 min based) – No yet
- Generation:
  - PV (1 min based)
  - WP (1 min based) –No yet



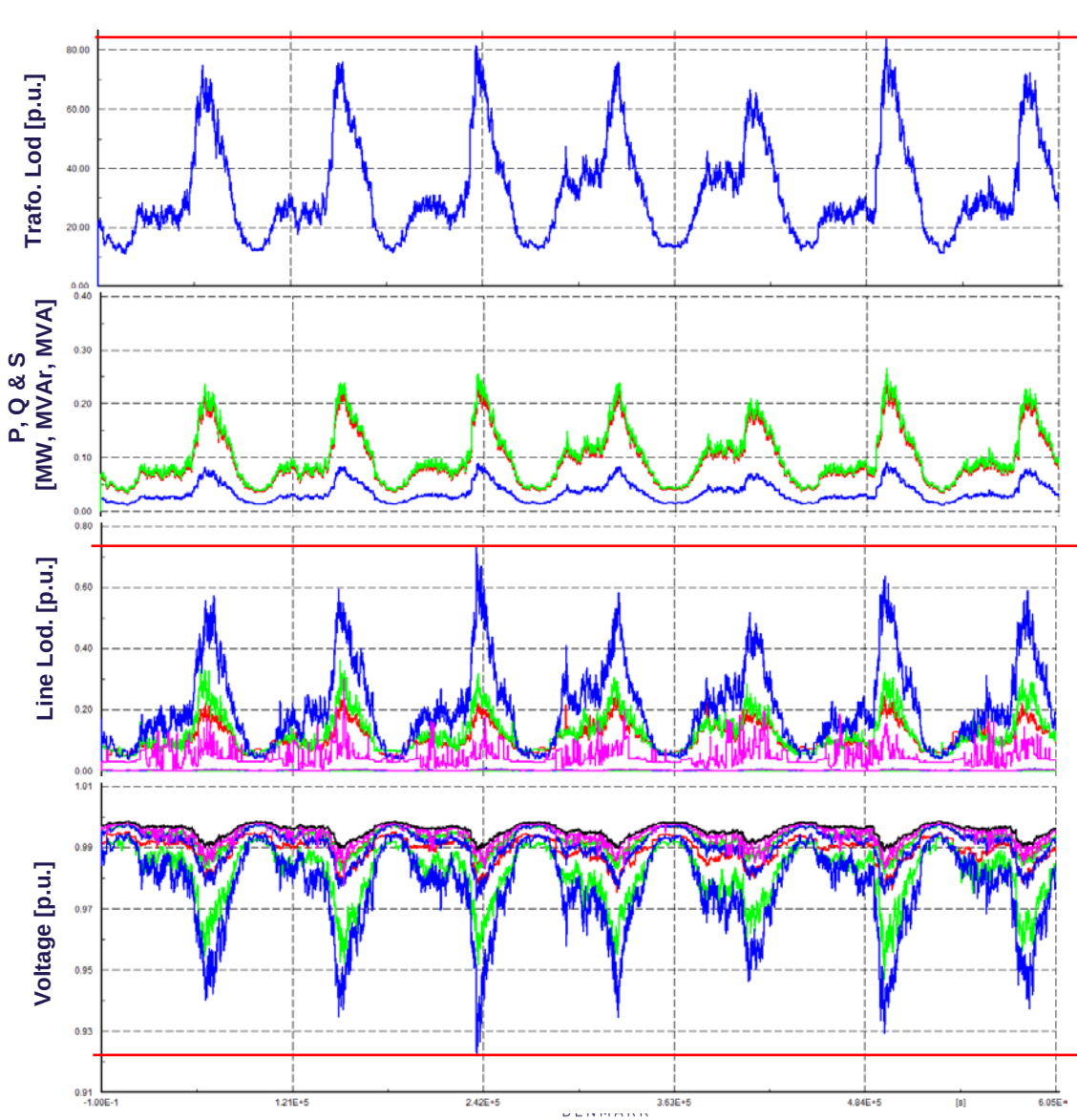
RESOLUTION RESULTS

FIRST WEEK OF FEBRUARY – 1 HOUR BASED PROFILES



RESOLUTION RESULTS

FIRST WEEK OF FEBRUARY – 1 MIN BASED PROFILES



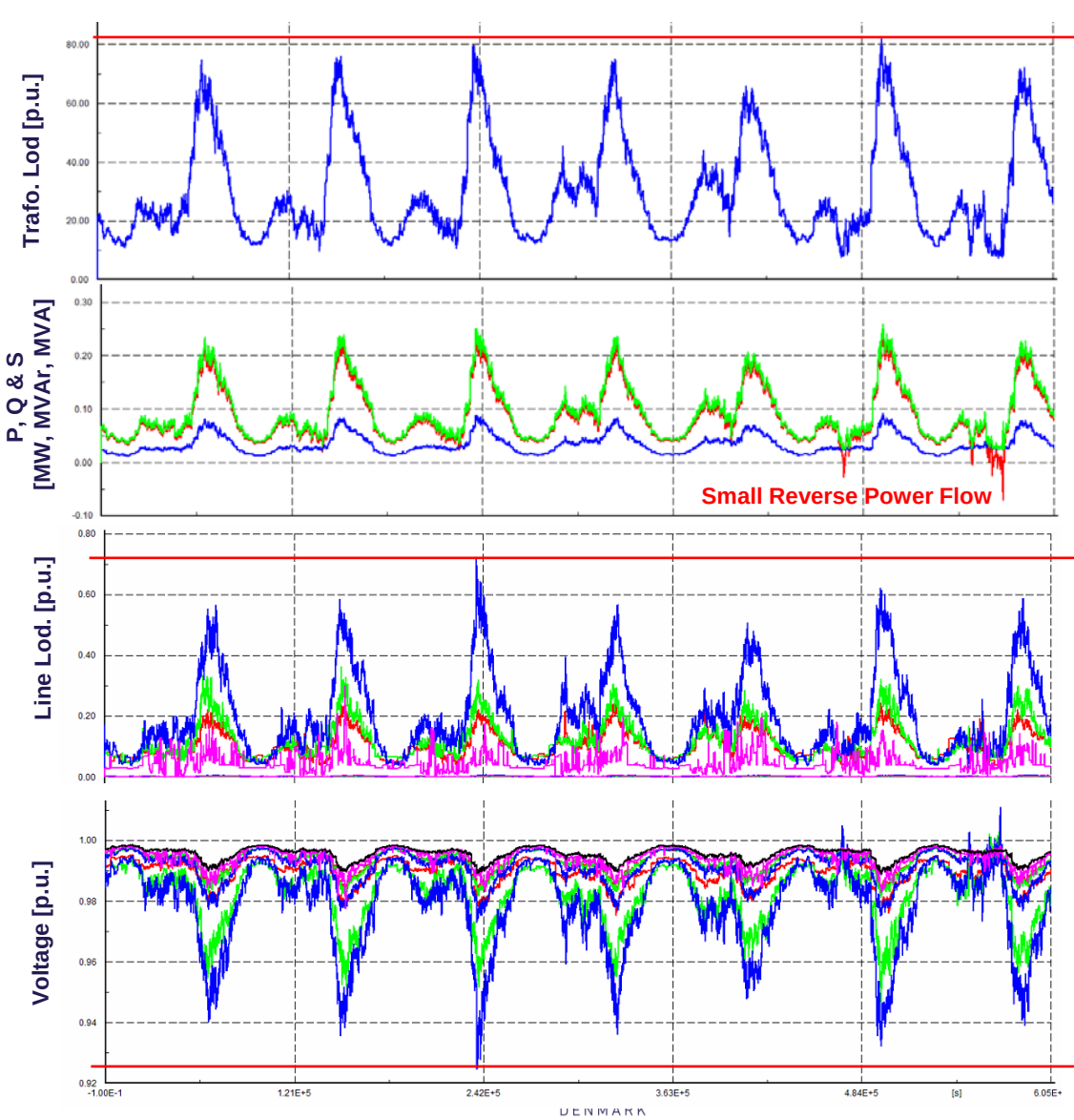
Max 80%

EN 50160: max ± 10 %

DSO experience ± 6 %

RESOLUTION RESULTS

FIRST WEEK OF FEBRUARY – 50% OF PV

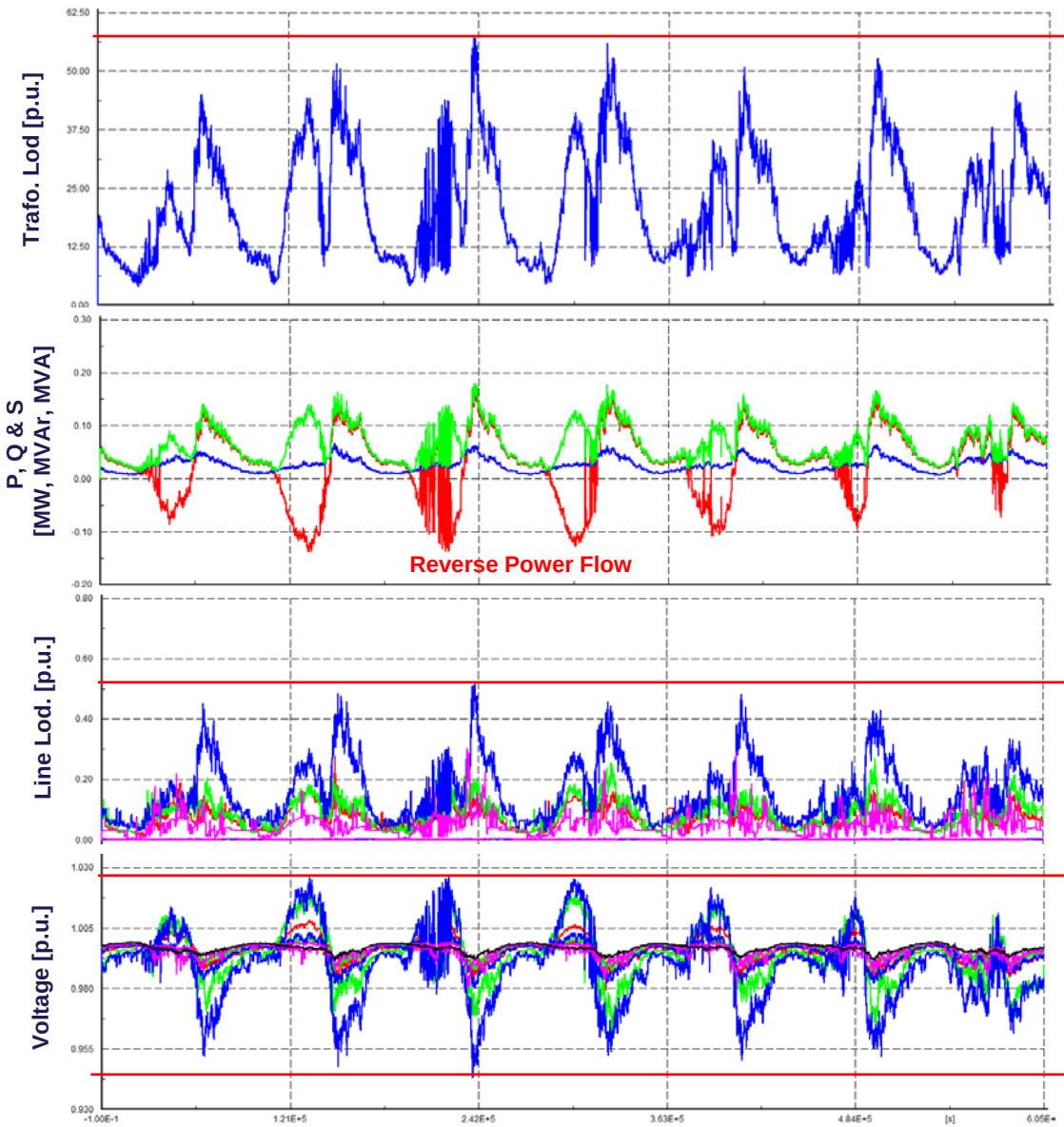


Max 80%

EN 50160: max ± 10 %
DSO experience ± 6 %

RESOLUTION RESULTS

SECOND WEEK OF JULY – 50% OF PV

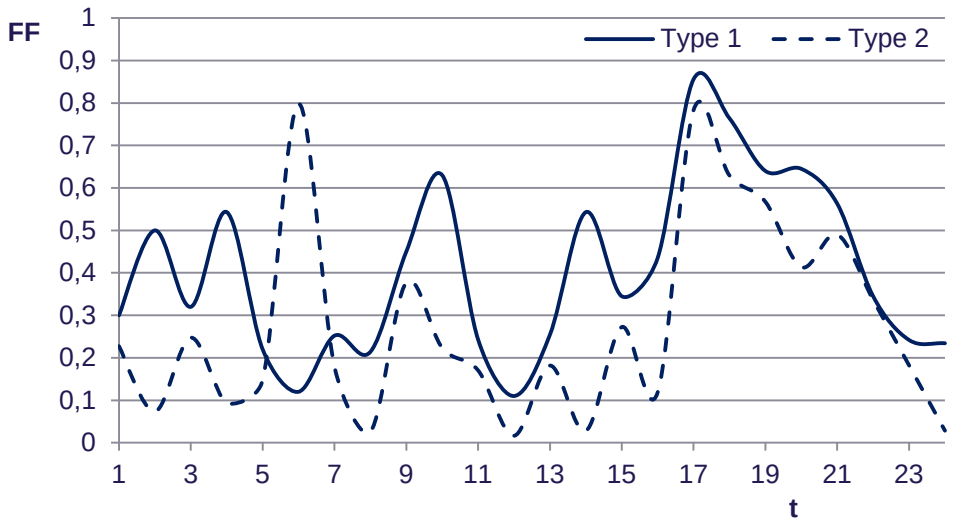


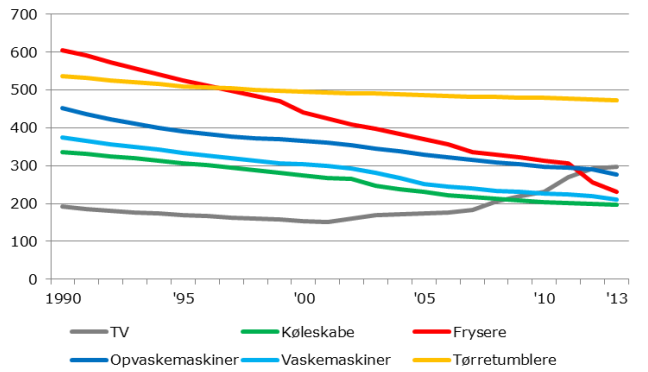
FLEXIBILITY FACTORS

BUILDING LEVEL : FFb = Load Shift Capability / Peak Load [W/W]

Type 1: Construction + HVAC systems

Type 2: Appliances – washing machine, dishwasher, tumble dryer





AALBORG UNIVERSITY
DENMARK

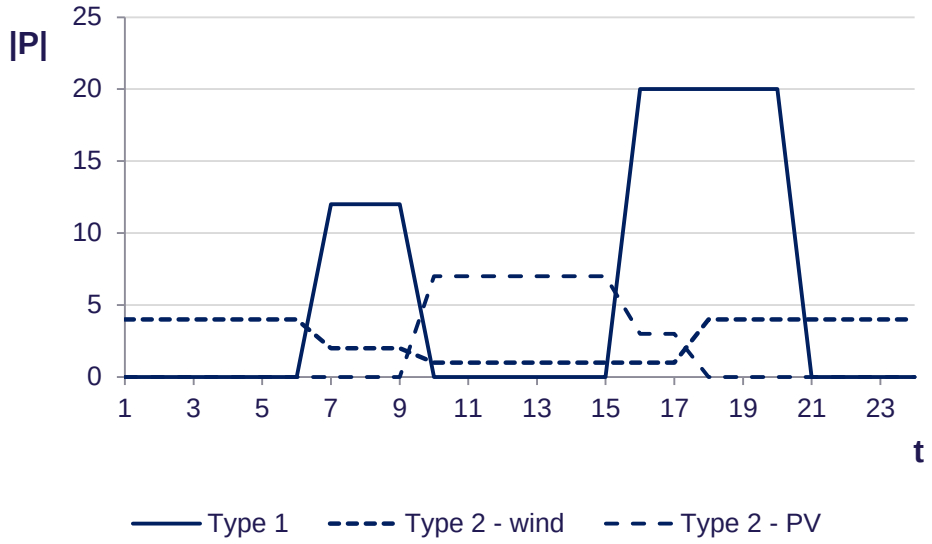
FLEXIBILITY FACTORS

TRANSFORMER LEVEL :

FFt = ∫ (Load Shift Capability) dt / ∫ (Load Shift Need) dt [Wh/Wh]

Type 1: Too low Voltage – too low generation / too big demand

Type 2: Too high Voltage – too big generation / too low demand



Thank you

AALBORG UNIVERSITY
DENMARK