Parallel session Energy

briskr health and high tech generator

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SMB Facilities & Support in Life Sciences

Radboud University

Artificial intelligence and the electrical energy system

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Ballard Asare-Bediako

Current bottlenecks in the energy transition at Alliander

Radboud University

Roel Bouman

District Heat System Optimization

armac industrial automation

Roland Geurts

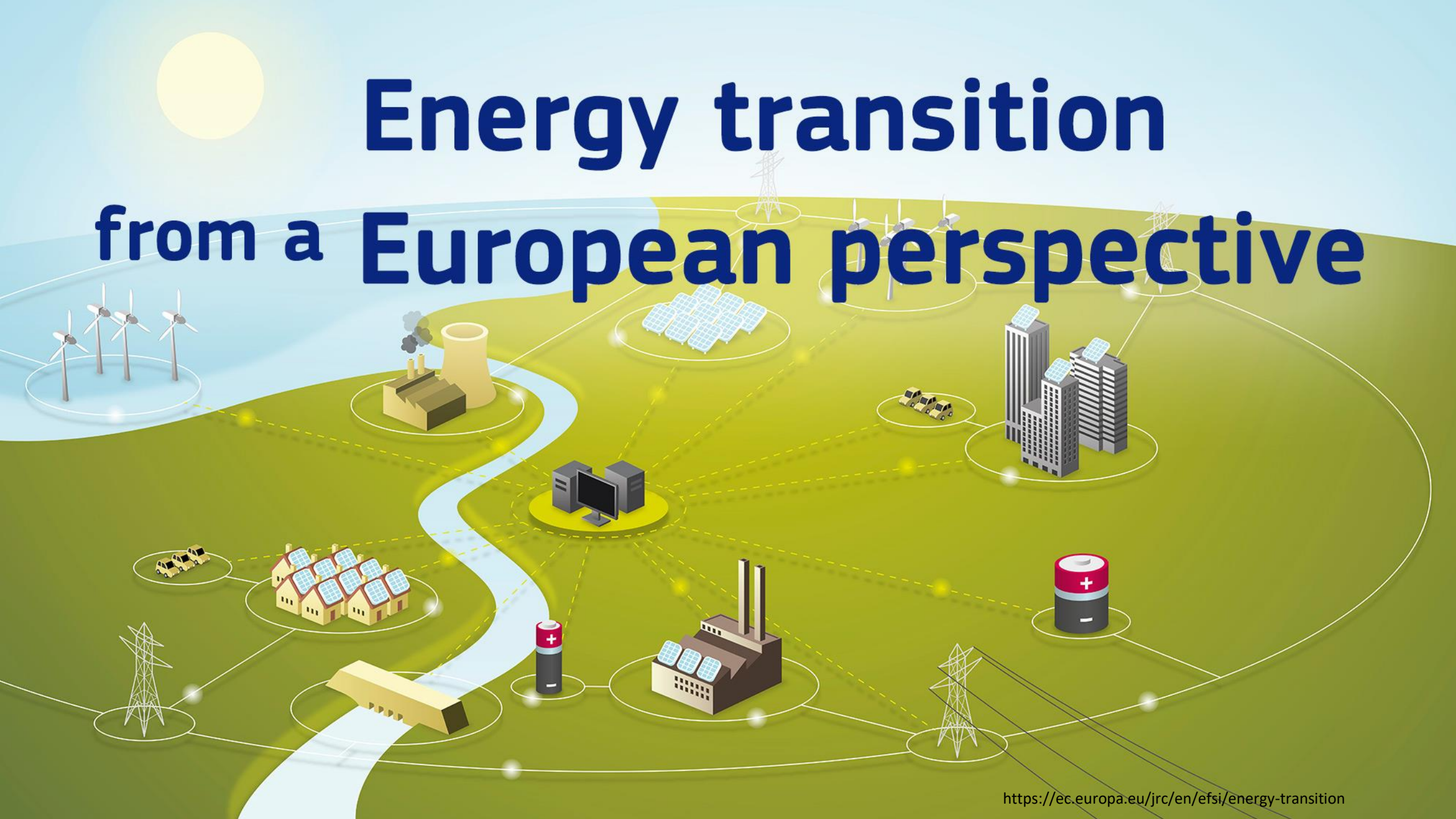
CONNECTR energy innovation

Moderator *Erik Folgering*

dr. ir. Ballard Asare-Bediako

ARTIFICIAL INTELLIGENCE AND THE ELECTRICAL ENERGY SYSTEM

Energy transition from a European perspective

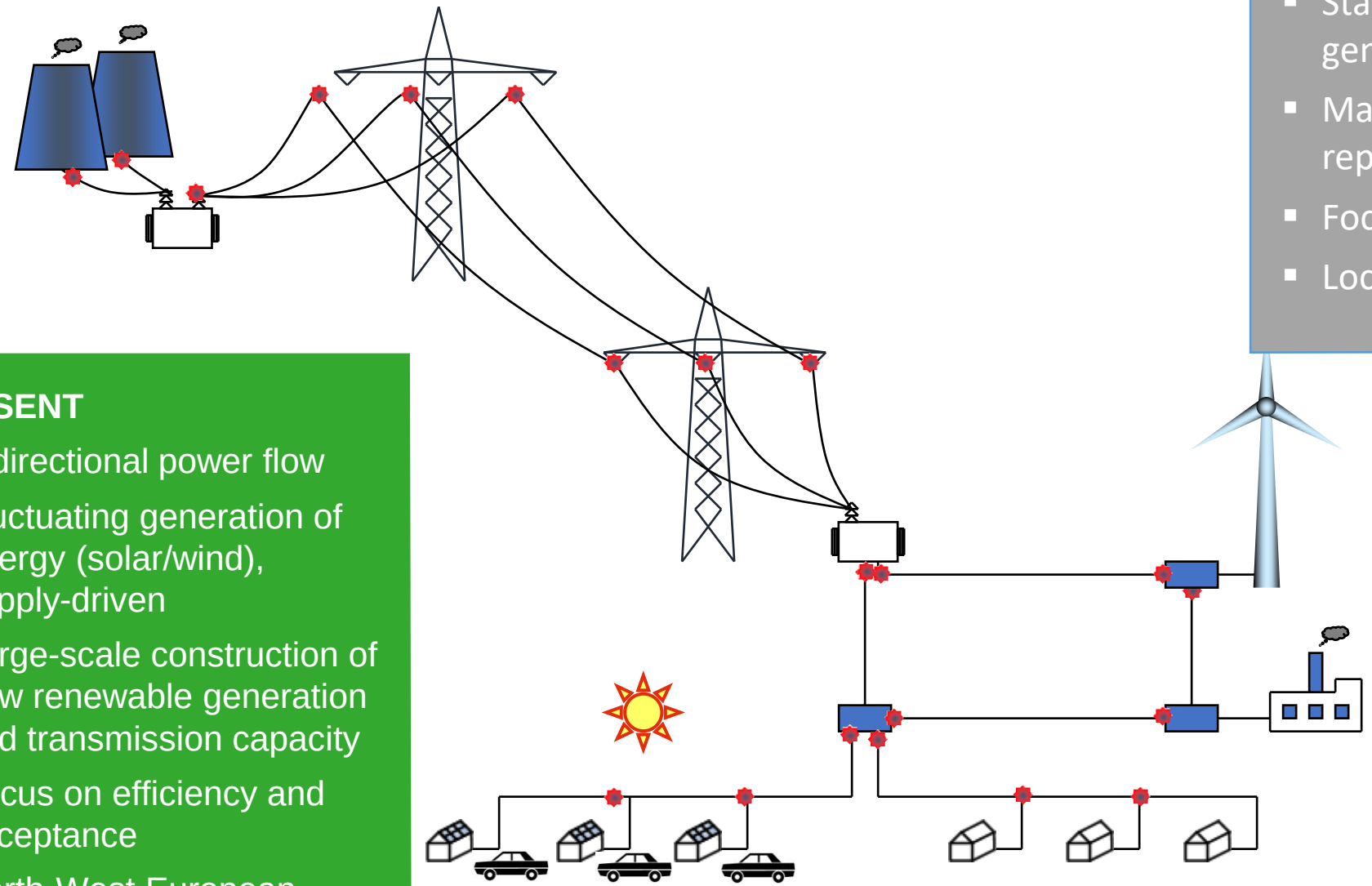


https://ec.europa.eu/jrc/en/efsi/energy-transition

TRANSFORMATION OF THE GRID

PAST

- Unidirectional power flow
- Stable, predictable (price-driven) generation of energy, demand-driven
- Maintenance and (limited) replacement
- Focus on technology
- Local markets, separate price zones.



PRESENT

- Bidirectional power flow
- Fluctuating generation of energy (solar/wind), supply-driven
- Large-scale construction of new renewable generation and transmission capacity
- Focus on efficiency and acceptance
- North-West European market; market coupling

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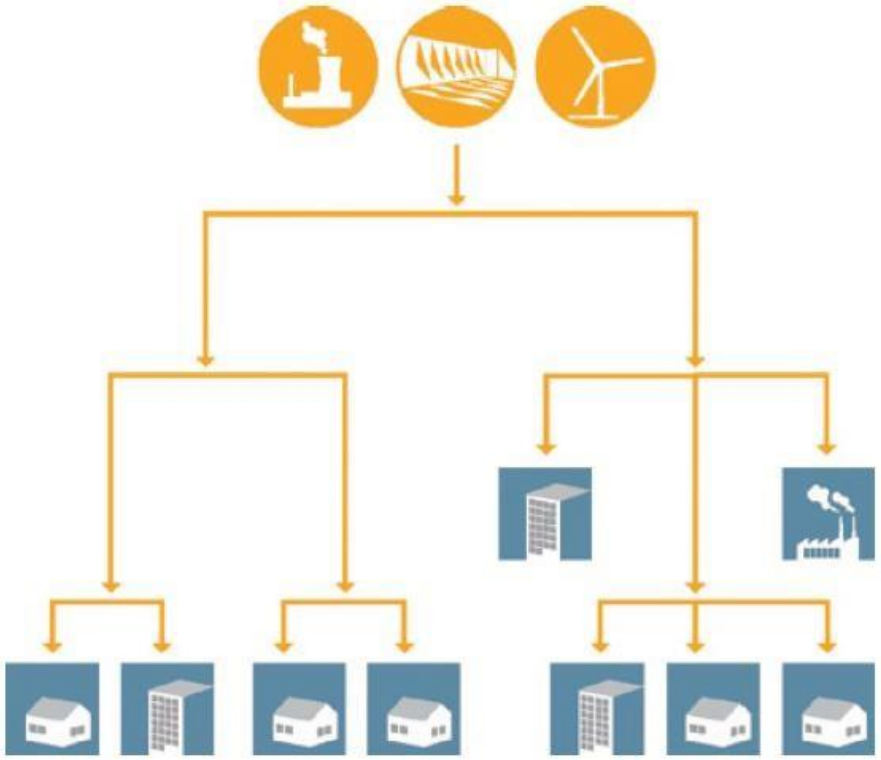
FROM GRID TO NETWORK

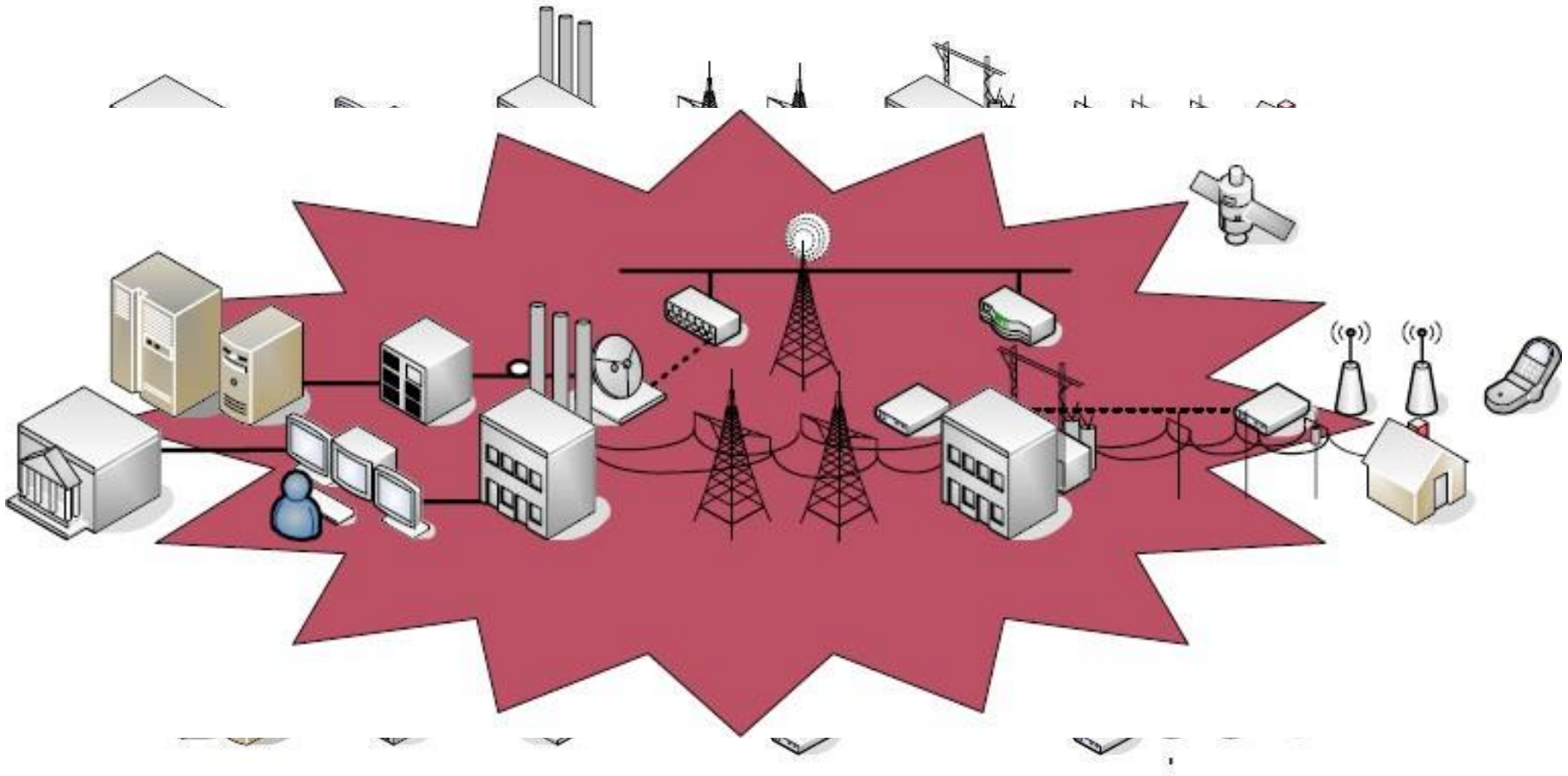
Today's hierarchial power system



Fully realized smart grid

Source: Toward a Smarter Grid ABB's Vision for the Power System of theFuture

Integrating Two Infrastructures



Source: EPRI Smart Grid Technologies and Challenges

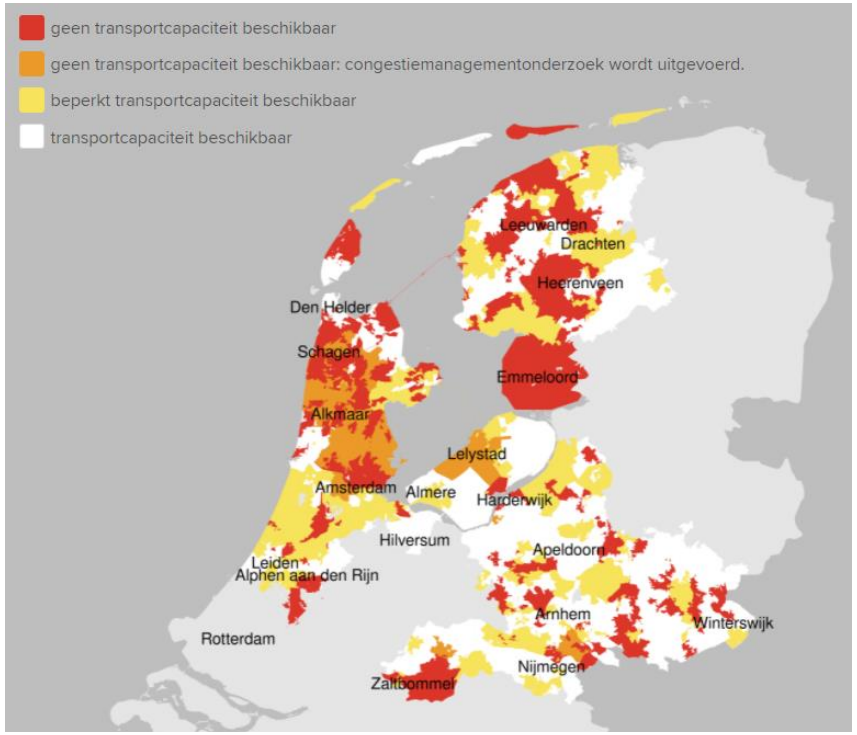
CURRENT BOTTLENECKS IN THE ENERGY TRANSITION AT ALLIANDER

Roel Bouman MSc,

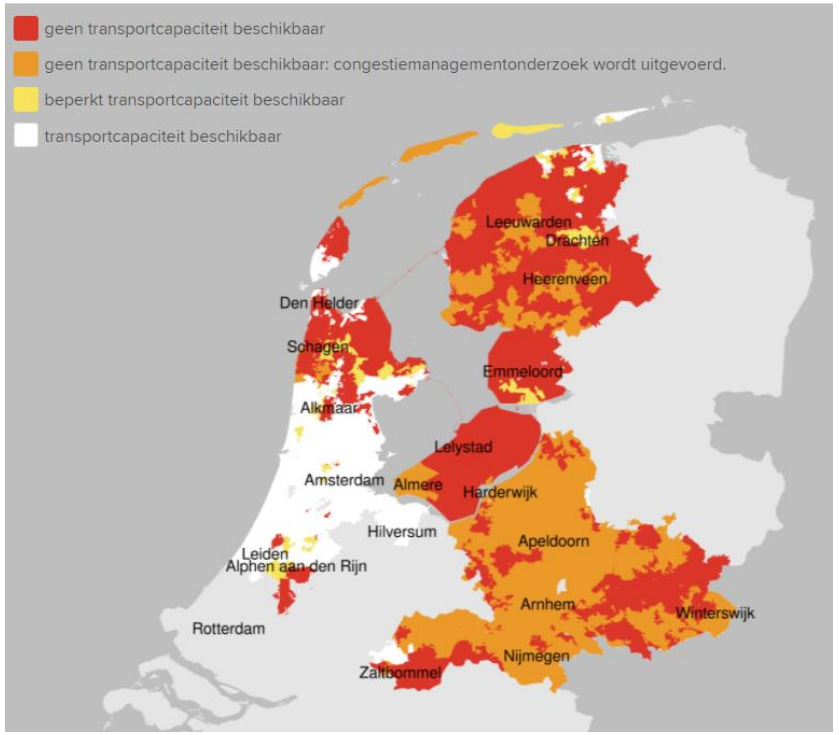
PhD student @Radboud University, Data Science dept.

CURRENT BOTTLENECKS IN THE ENERGY TRANSITION AT ALLIANDER

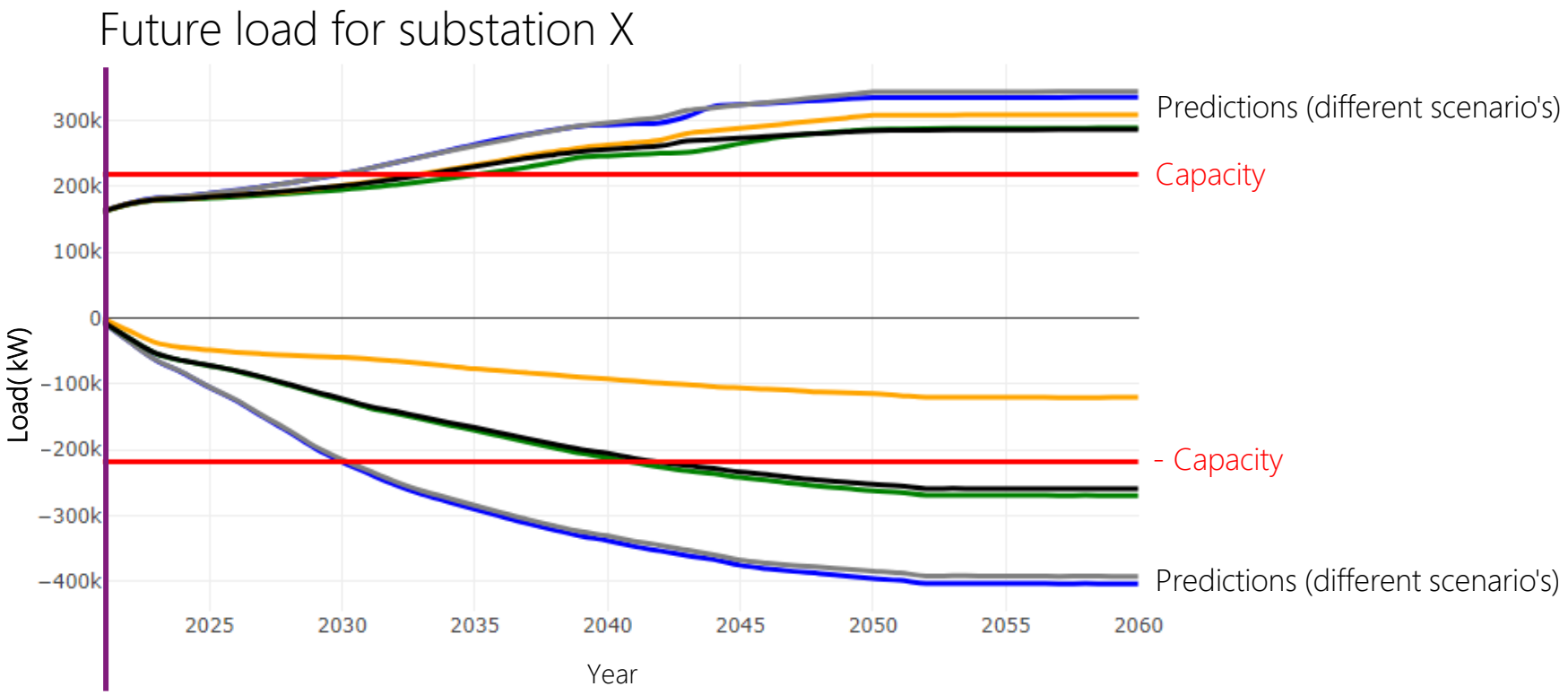
Consumption



Production

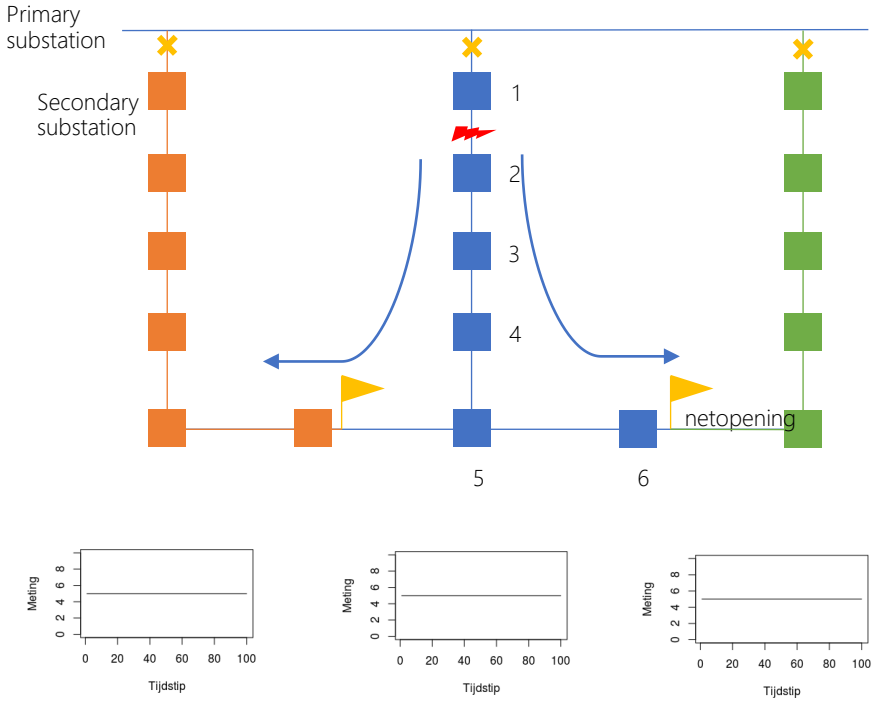


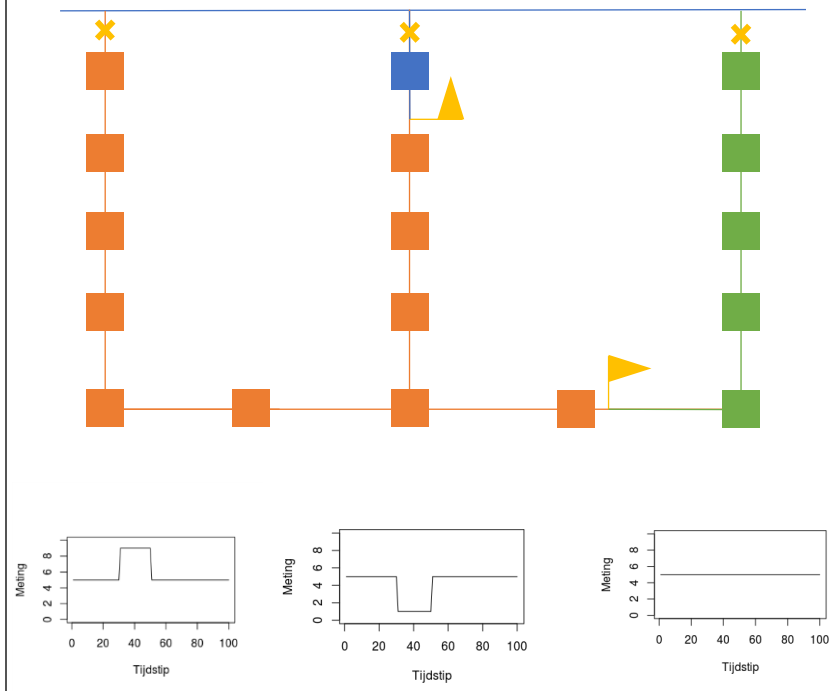
MEASUREMENTS OF MAX/MIN LOAD ARE BASIS FOR PREDICTIONS



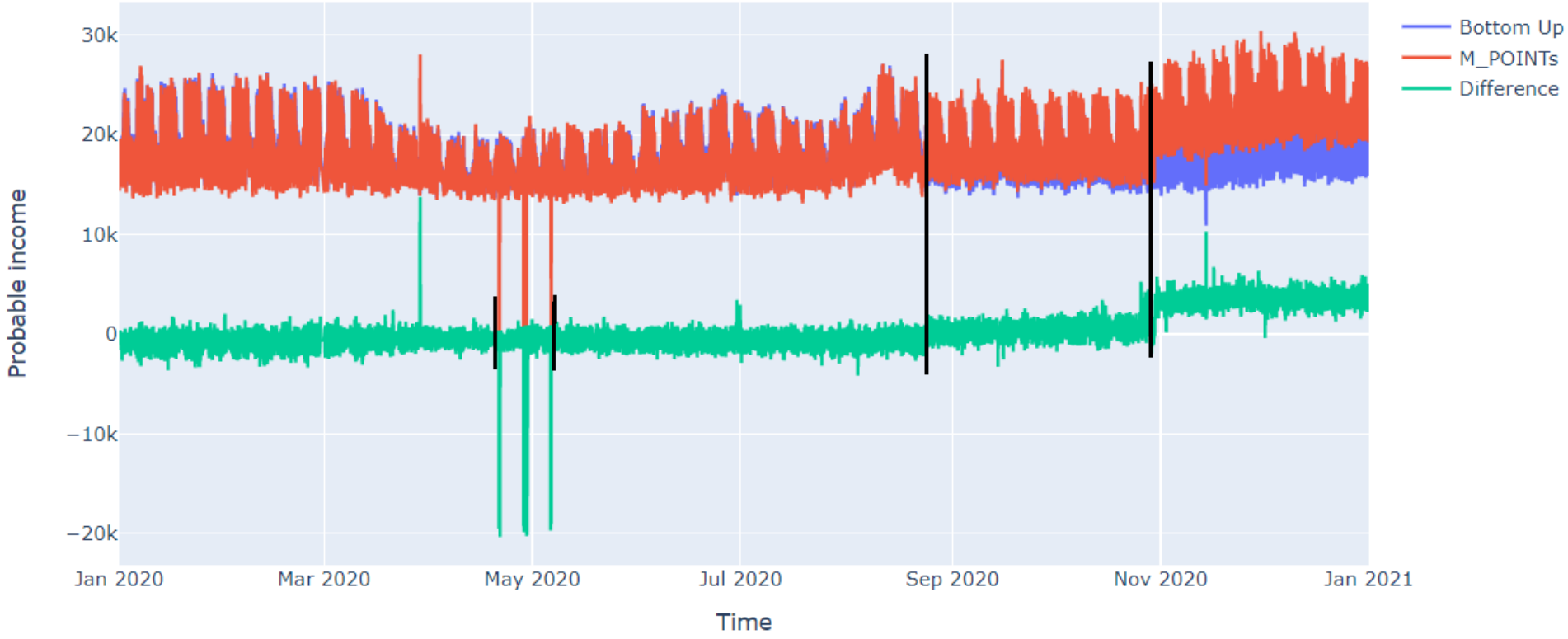
MEASUREMENTS ARE AFFECTED BY SWITCHING EVENTS

Besides that, there are measurement and communication errors





BINARY SEGMENTATION



SO HOW OUR THIS HOLD UP VS. THE EXPERTS?

Binseg and interval:

Evaluation	0-2h	2h-1d	1d-14d	14d-inf	**Average**
f10	0.165	0.425	0.677	0.665	**0.483**
Accuracy	0.966	0.966	0.965	0.960	**0.964**
Recall	0.937	0.662	0.756	0.674	**0.757**

Flags:

Evaluation	0-2h	2h-1d	1d-14d	14d-inf	**Average**
f10	0.280	0.349	0.264	0.020	**0.228**
Accuracy	0.995	0.995	0.993	0.976	**0.990**
Recall	0.464	0.374	0.266	0.020	**0.281**

INNOBOOT 2022

District Heat System Optimization

ARMAC B.V
SVP
Radboud University - Dept. Analytical Chemistry and Chemometrics

19-04-2022

Roland Geurts & Francisco Souza & Geert Postma

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952003.
https://www.airegio-project.eu

Radboud University

District heating company of Purmerend (SVP);

~25000 customers;

89 substations;

Multiple heat sources;

>10 years of data;

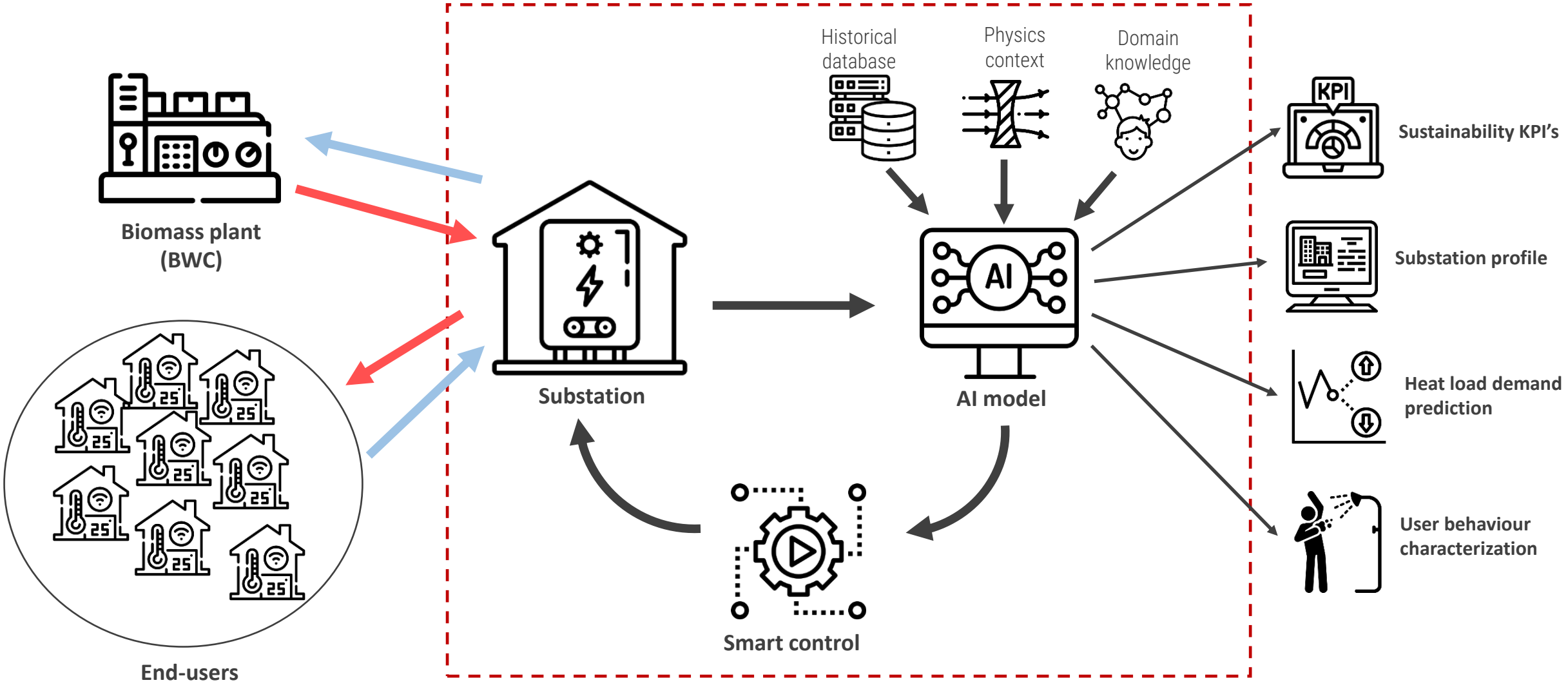
AI-based process control

armac industrial automation

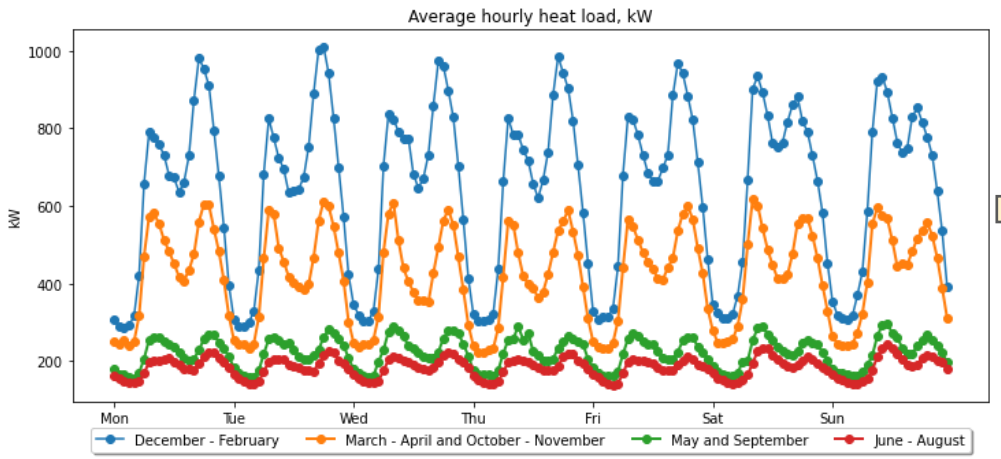
Radboud University

SVP

AI REGIO



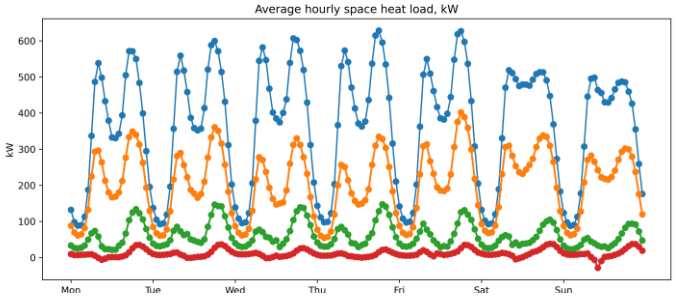
AI based substation profile

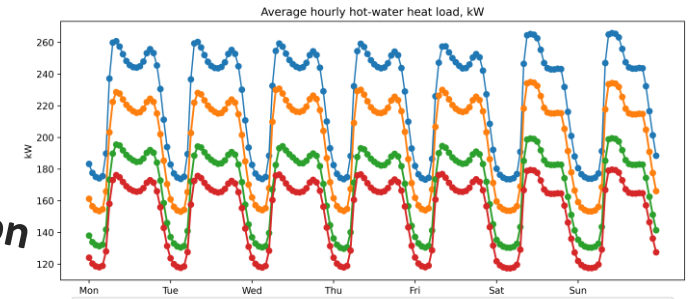


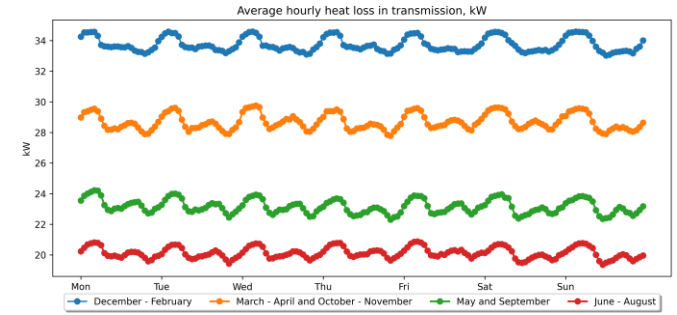
Space Heating

Hot-water

Transmission losses

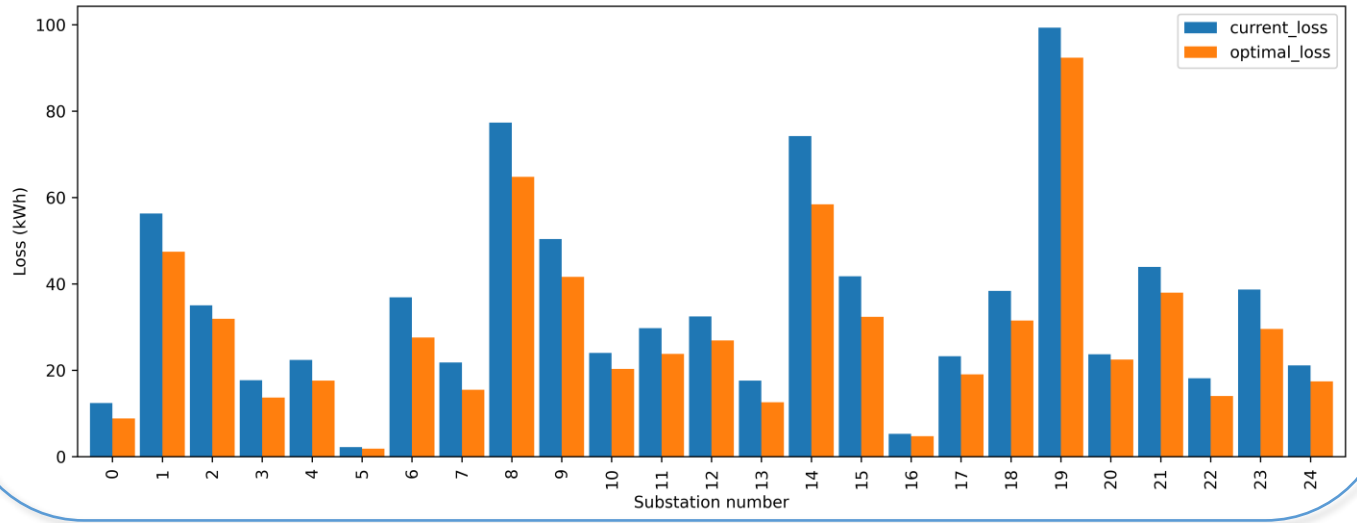




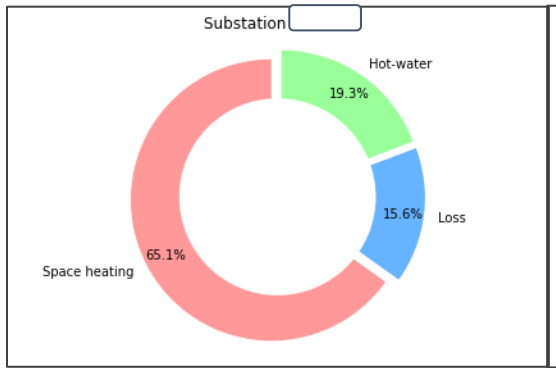


First 25 substations:

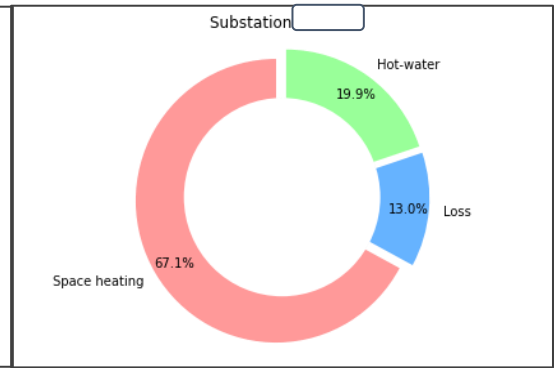
- **AS-IS: 36kWh**
- **TO-BE: 28kWh (27.5% potential decrease)**



AS-IS: 104kWh loss



TO-BE: 84kWh loss



Thank you for your attention!

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