Brug af Data i Fremtidens Intelligente og Integrerede Energisystemer

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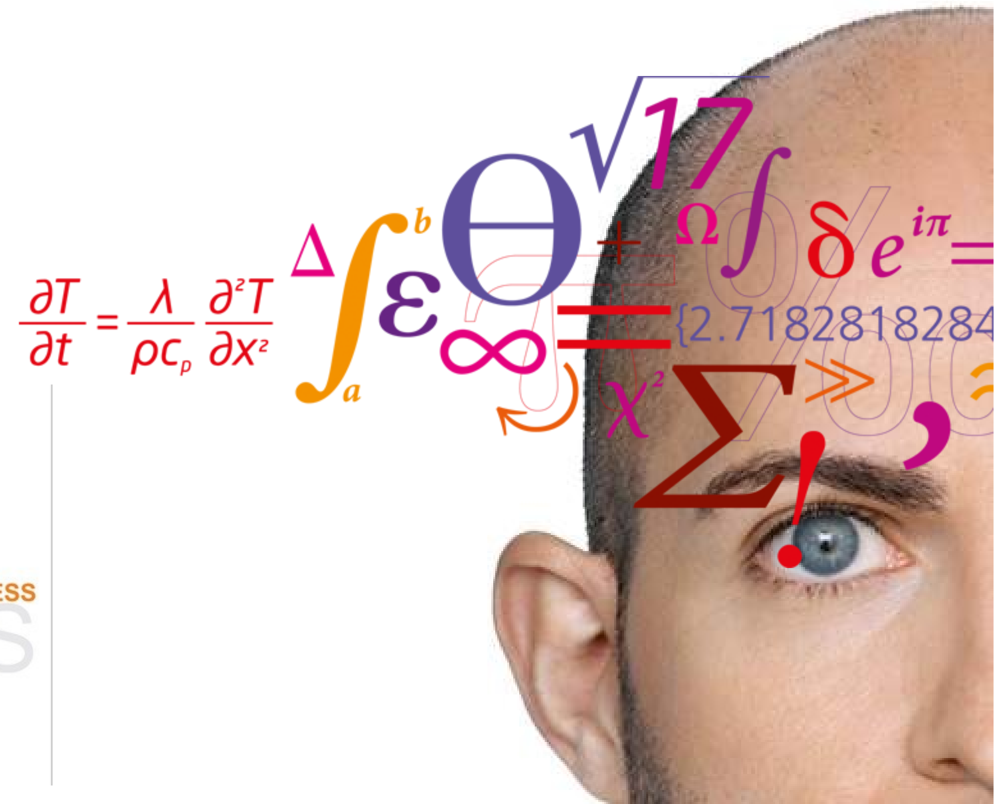

Identification of thermal characteristics (/performance) of buildings

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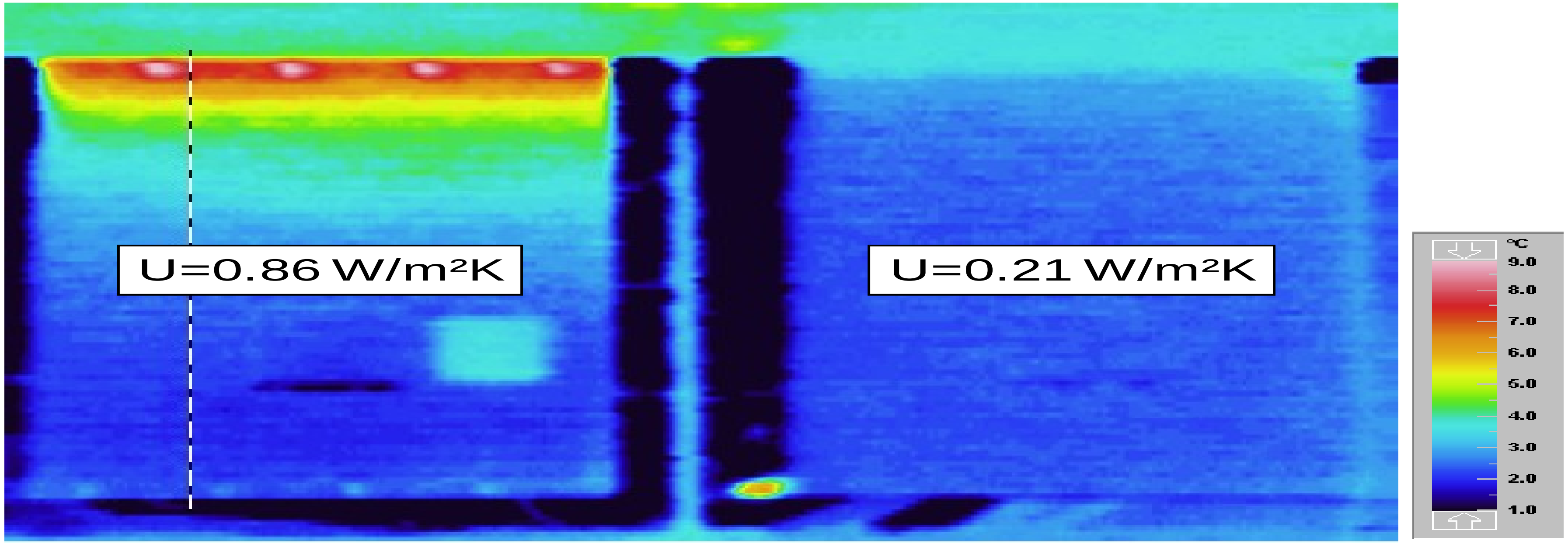
Example



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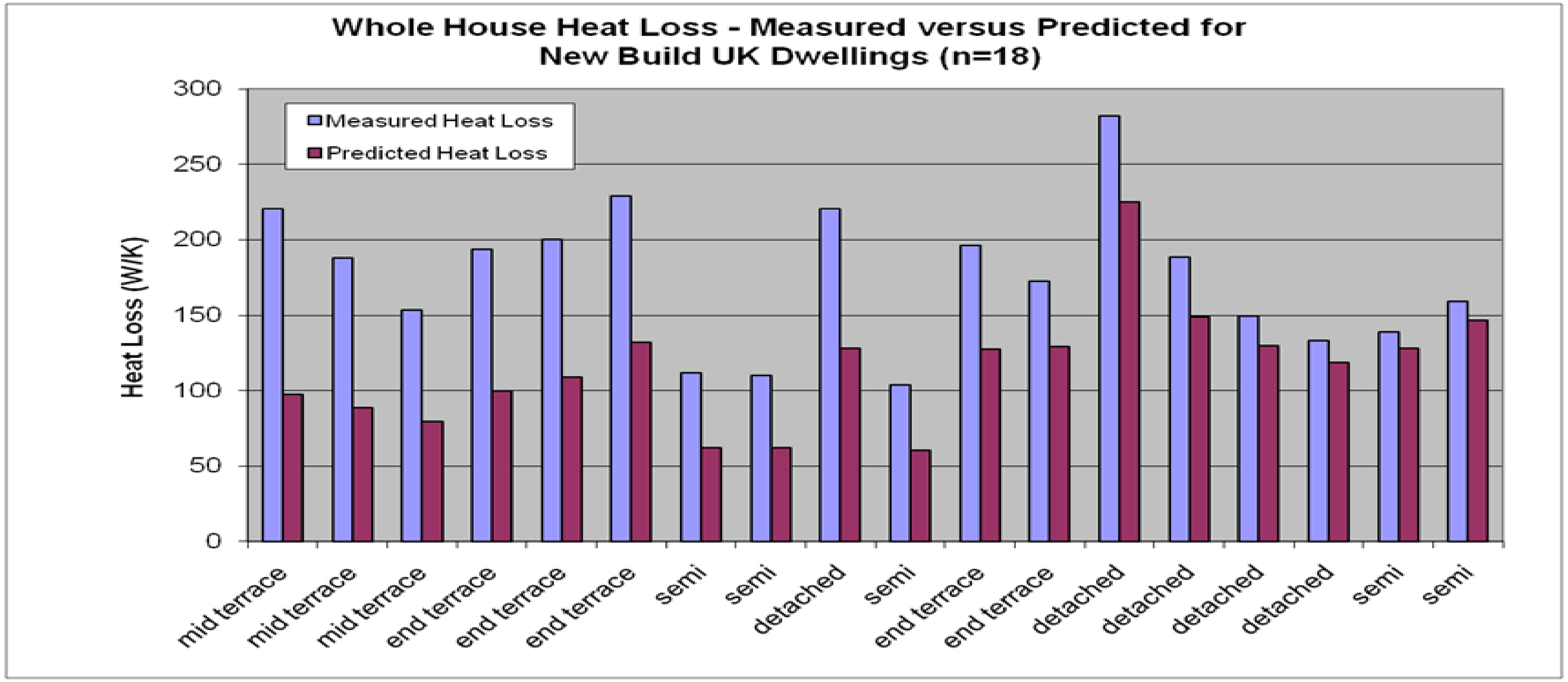
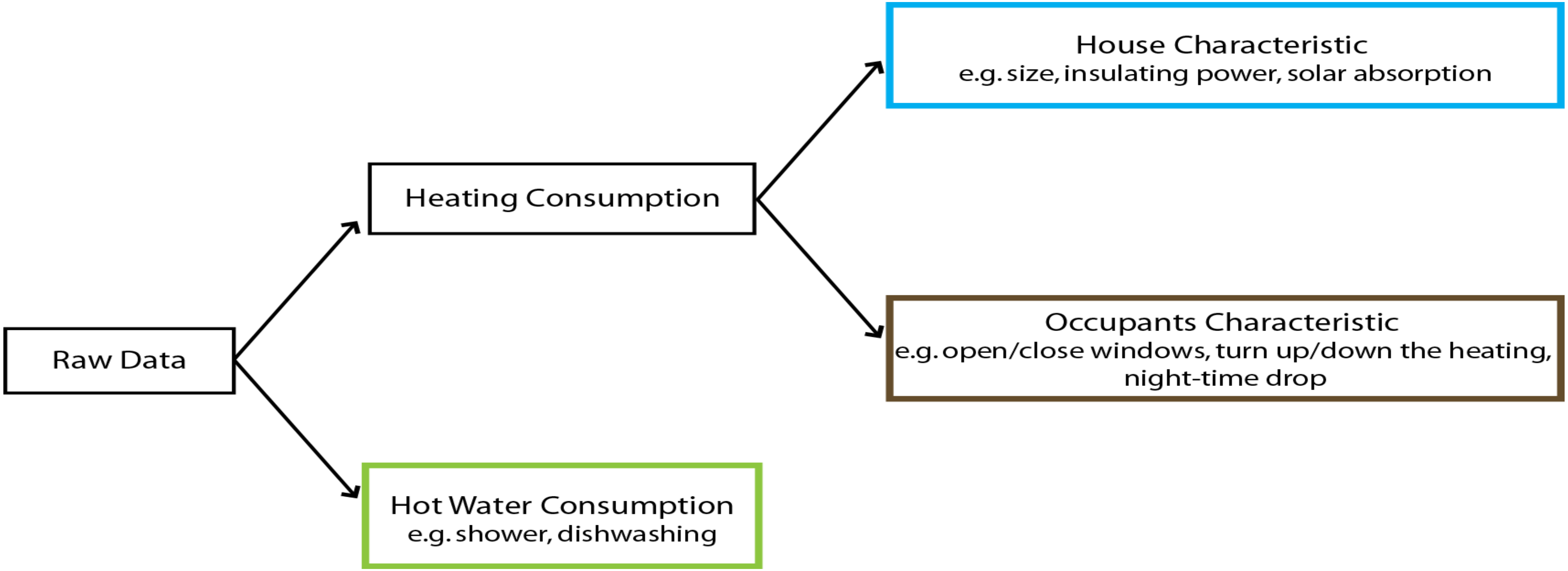
Examples (2)



Measured versus predicted energy consumption for different dwellings

Splitting of total meter readings



Perspectives for using data from (Smart) Meters

- Reliable Energy Signature.
- Energy Labelling (compensates for user behaviour)
- Time Constants (eg for night set-back)
- Proposals for Energy Savings:
  - Replace the windows?
  - Put more insulation on the roof?
  - Is the house too untight?
  - ……
- Optimized Control
- Integration of Solar and Wind Power using DSM

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Data Intelligent Temperature Optimization for DH Systems

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Control of Temperatures in DH Systems

Styring af temperatur rummer kæmpe sparepotentiale

Lesson learned:

- Control using **simulation** of temperature gives **up to 10 pct reduction** of heat loss. (Muligt ift. Energispareordningen)
- Control using **data intelligence** gives **up to 20 pct. reduction** of heat loss. (Har ikke være muligt ift. energispareordning)

Data Intelligent Temperature Optimization for DH Systems

- Able to take advantage of information in data
- Self-calibrating models for the DH network
- Adapts automatically to user behaviour
- Shows where to upgrade the DH network
- Fast (real time) calculations
- Able to use online MET forecasts etc.

Savings:
Heat loss reduc. 18 pct
2.4 mill.dkk. annual

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Data Intelligent Energy Systems Integration

Challenges

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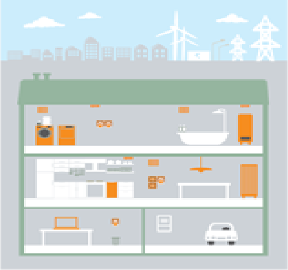

Preparatory study on Smart Appliances

European Commission

Ecodesign Preparatory Study performed for the European Commission

Welcome | Project summary | Planning & Meetings | Documents | Register for website | Register for meeting | Contact & Consortium

Home > Project summary

Project Summary

The Ecodesign Preparatory Study on Smart Appliances (Lot 33) has analysed the technical, economic, market and societal aspects with a view to a broad introduction of smart appliances and to develop adequate policy approaches supporting such uptake.

The study deals with Task 1 to 7 of the Methodology for Energy related products (MEErP) as follows:

- Scope, standards and legislation (Task 1, Chapter 1);
- Market analysis (Task 2, Chapter 2);
- User analysis (Task 3, Chapter 3);
- Technical analysis (Task 4, Chapter 4);
- Definition of Base Cases (Task 5, Chapter 5);
- Design options (Task 6, Chapter 6);
- Policy and Scenario analysis (Task 7, Chapter 7).

An executive summary of the project results can be downloaded here.

Throughout the study, new relevant aspects have come up which will be covered in a second phase of the Preparatory Study:

- Chargers for electric cars: technical potential and other relevant issues in the context of demand response.
- The modelling done in the framework of MEErP Task 6 and 7 will be updated with PRIMES data that recently became available, and with [illegible] EEA-countries.
- The development and assessment of policy options that were identified in the study will be further elaborated and deepened.

Conclusion: Almost no flexibility?!?

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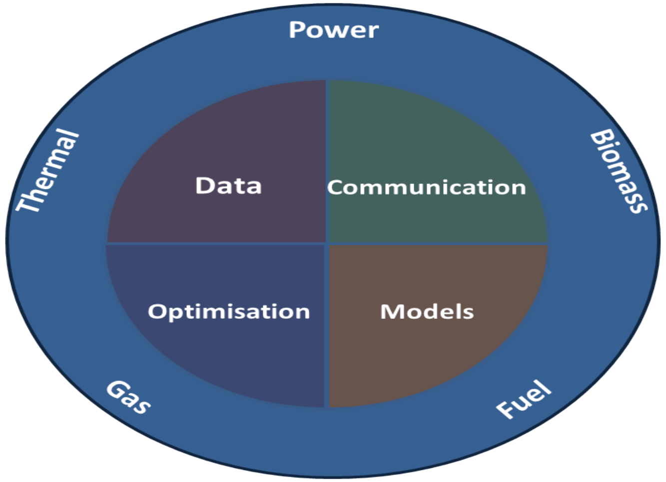
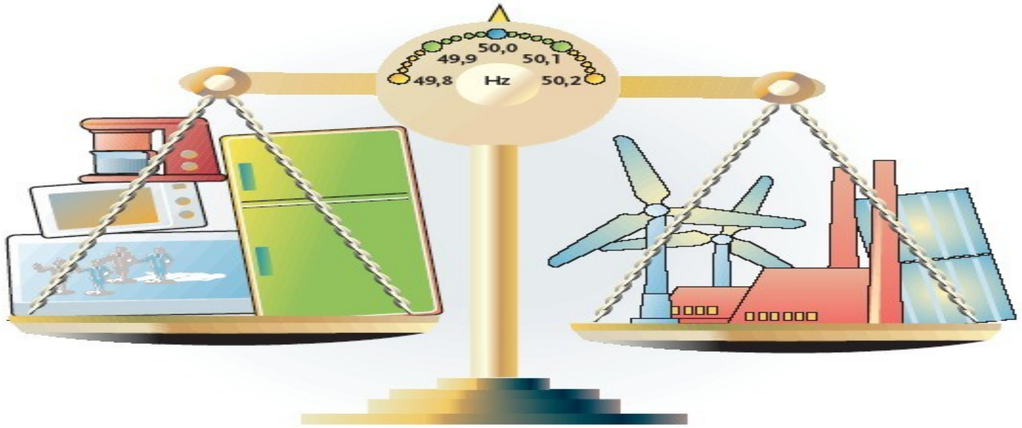
Energy Systems Integration





The **central hypothesis** is that by **intelligently integrating** currently distinct energy flows (heat, power, gas and biomass) using grey-box models we can balance very large shares of renewables, and consequently obtain substantial reductions in CO2 emissions using spatial and temporal information.

Intelligent integration will (for instance) enable lossless ‘virtual’ storage on a number of different time scales.

Forslag til samarbejde i relation til forsyning og data

- Samarbejde med INSPIRE – Infrastructure for Spatial Information in Europe
- Metoder til estimation af bygningers reelle termiske performance
- Metoder til identifikation af bygninger til energirenovering
- Metoder til automatisk energimærkning
- Metode til dynamisk temperaturoptimering i fjernvarmenet (giver store besparelser og letter integration af varmepumper)
- Big Data, ICT, IoT til intelligent integration af energisystemer
- Nyt design af el- og energimarkeder
- Nyt design af afgifter (f.eks. sådan at afgiften modsvarer ‘forureningen’) baseret på spatiel og temporal information
- Metoder til Demand Side Management under intelligent brug af data

For more information ...

See for instance

www.smart-cities-centre.org

...or contact

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Conclusions from meeting with DG Energy – incl. Marie Donelly – 2016

- Intelligent Energy Systems Integration can provide (virtual) storage solution
- Report actual savings (not the theoretical savings ….)
- ICT methods for intelligent coupling of energy systems
- Big Data, ICT, IoT, Data Analytics, and an Energy-System Operating-System (ES-OS) are essential for implementing future low carbon energy systems
- Focus on zero emission buildings – and less on zero energy buildings (the same holds supermarkets, wastewater treatment plants, etc.)
- Intelligent use of sensor (and meter) data is important
- Cloud based solutions for forecasting and control
- A large potential in Demand Side Management using data analytics

Live CO2 emissions of the European electricity consumption

This shows in real-time **where your electricity comes from** and **how much CO2** was emitted to produce it.

We take into account electricity **imports and exports** ▸▸▸ between countries.

Tip: Click on a country to start exploring ⟶

Wind power potential (m/s)

0 2 4 6 8 10 12 14

Solar power potential (W/m²)

0 50 100 150 200 250 300 350 400

Like the visualization? We would love to hear your feedback!
Found bugs or have ideas? Report them here.
This project is Open Source: contribute on GitHub.
All data sources and model explanations can be found here.

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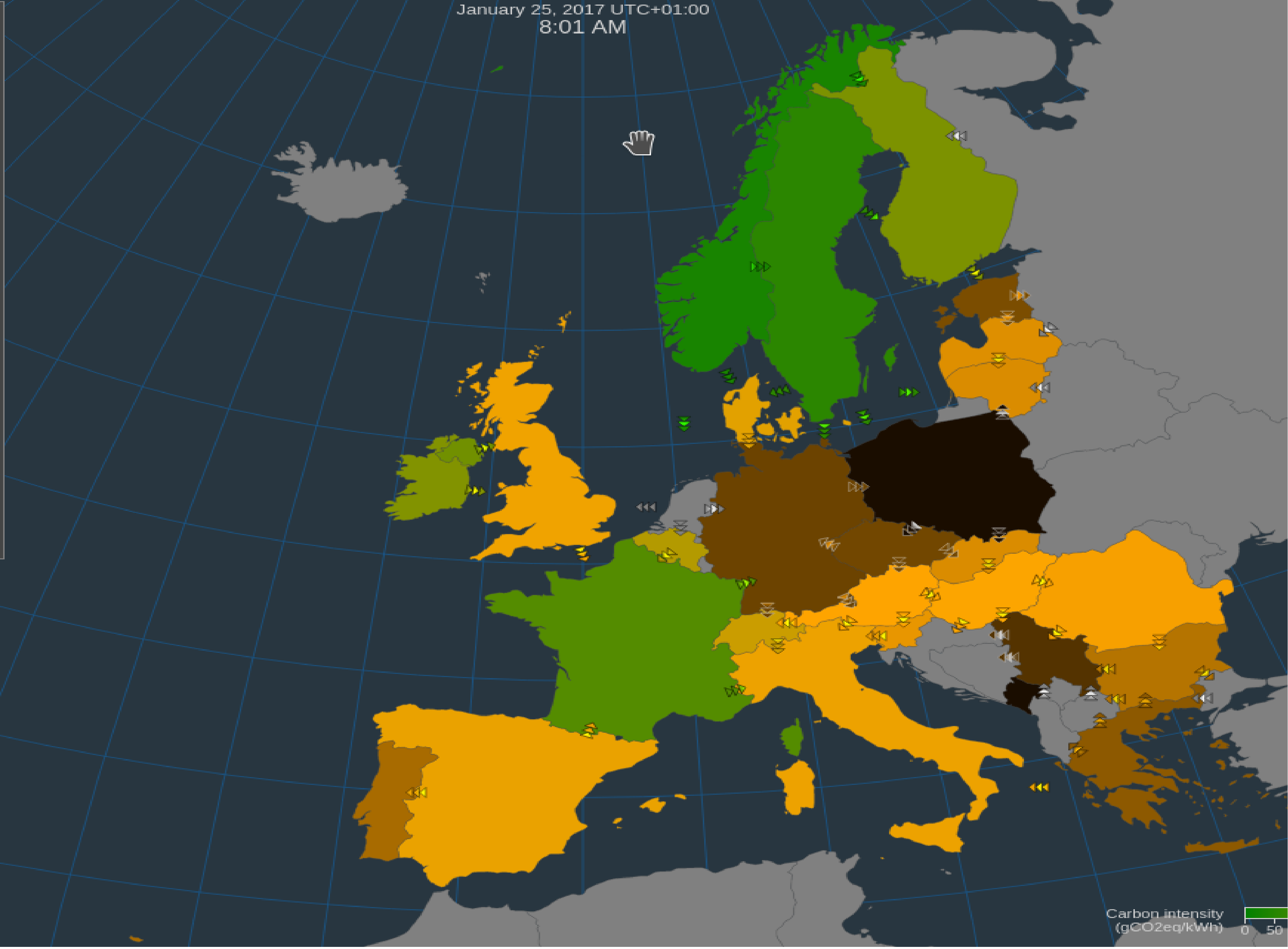

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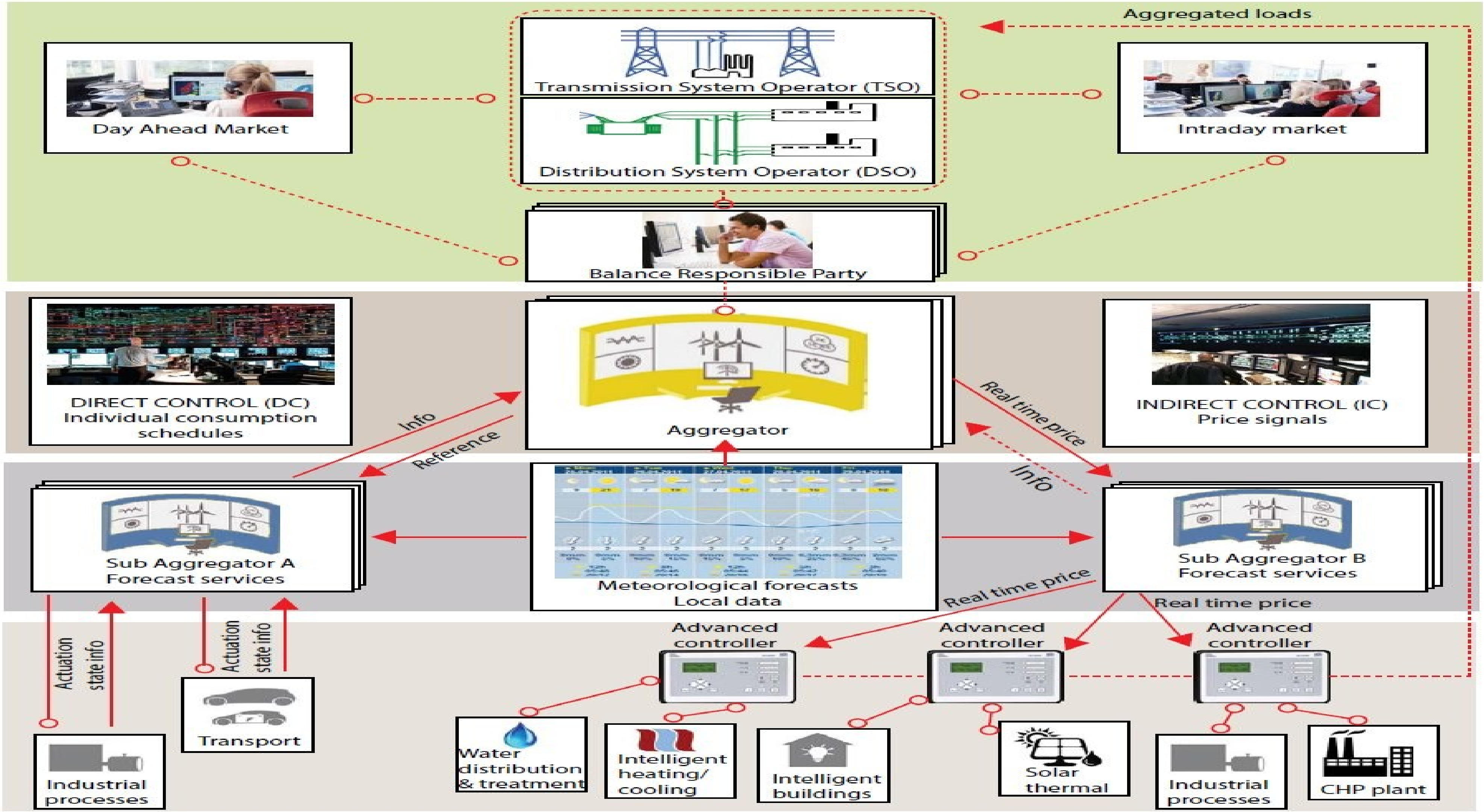
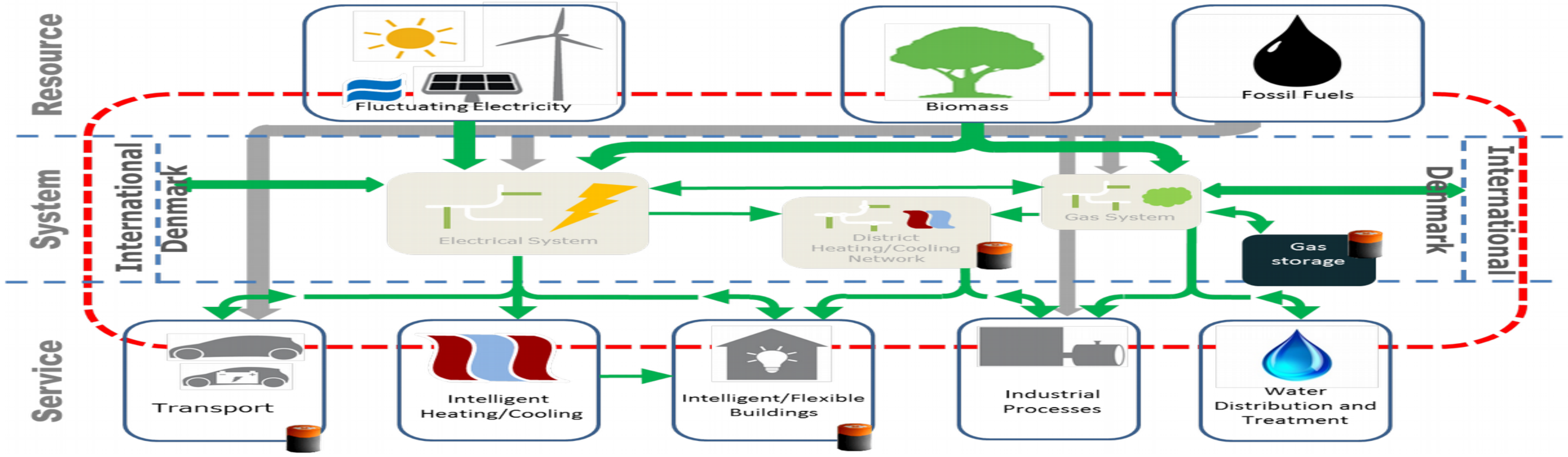


(Virtual) Storage Solutions



- **Flexibility (or virtual storage) characteristics:**
  - Supermarket refrigeration can provide storage 0.5-2 hours ahead
  - Buildings thermal capacity can provide storage up to, say, 5-10 hours ahead
  - Buildings with local water storage can provide storage up to, say, 2-18 hours ahead
  - District heating/cooling systems can provide storage up to 1-3 days ahead
  - DH systems with thermal solar collectors can often provide seasonal storage solutions
  - Gas systems can provide seasonal/long term storage solutions