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iea Energy Technology Network

IEA EBC Annex 67

Energy Flexible Buildings

IEA EBC Annex 67

Operating Agent
Søren Østergaard Jensen
Danish Technological Institute
sdj@teknologisk.dk

IEA Experts' Group on R&D Priority Setting and Evaluation
meeting on System Resiliency and Flexibility
May 13-14, Vienna, Austria

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IEA EBC Annex 67

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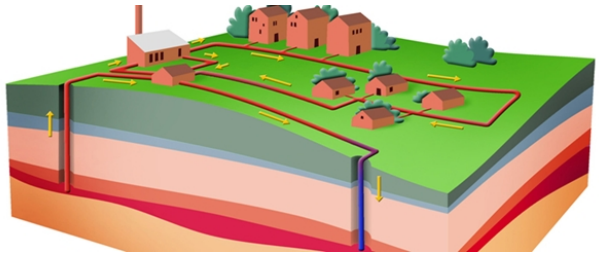
Common understanding that we need to replace fossil fuels with renewable energy



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Example: Demnark
Goal: 50 % wind in power grid by 2020 and only RES in the total energy system by 2050

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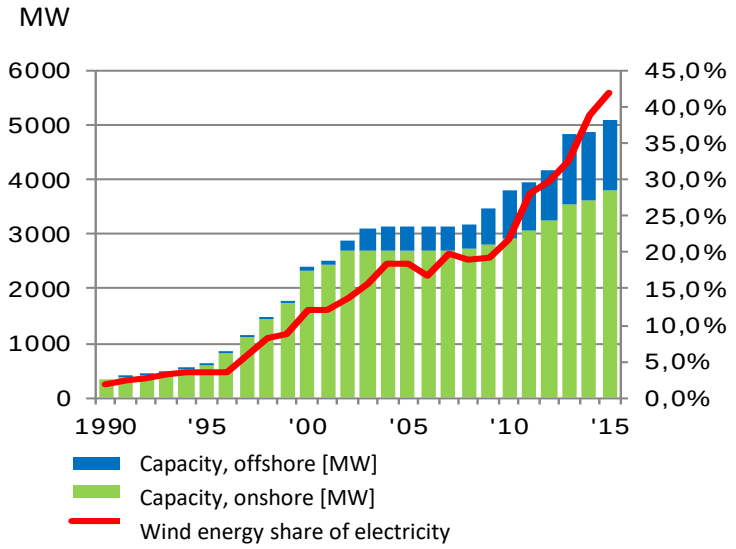

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Solutions

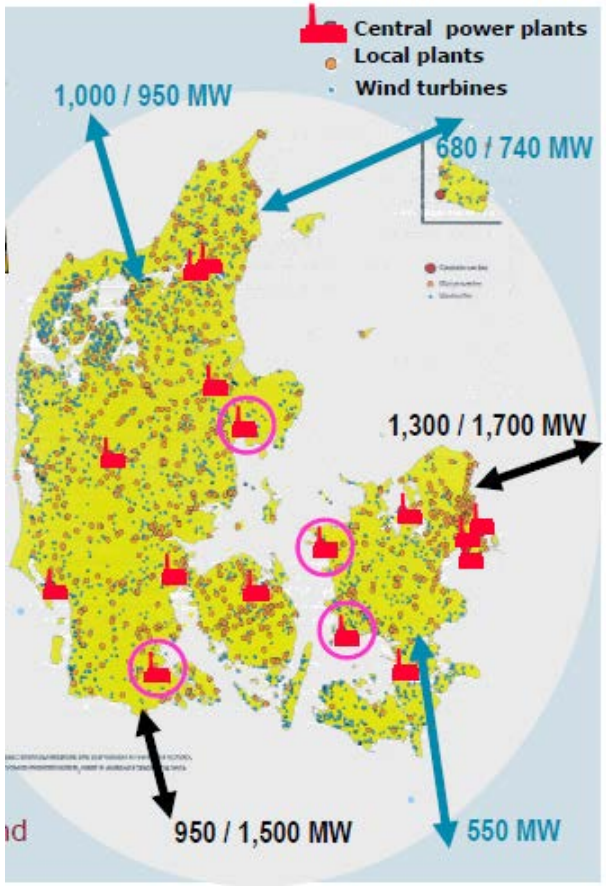
Large interconnectors - export/import

Heat pumps in district heating

Generation of hydrogen and upgrading of biogas

Fuel factories

Demand response – industry and buildings



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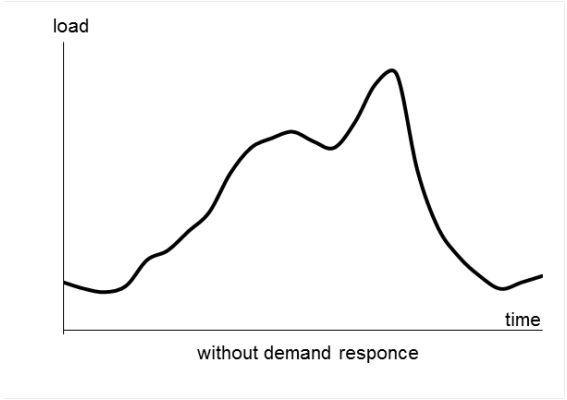
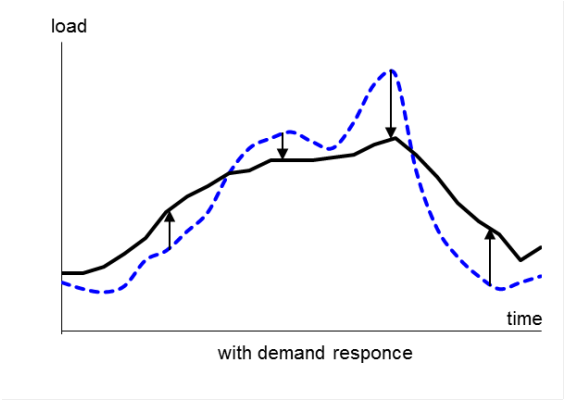
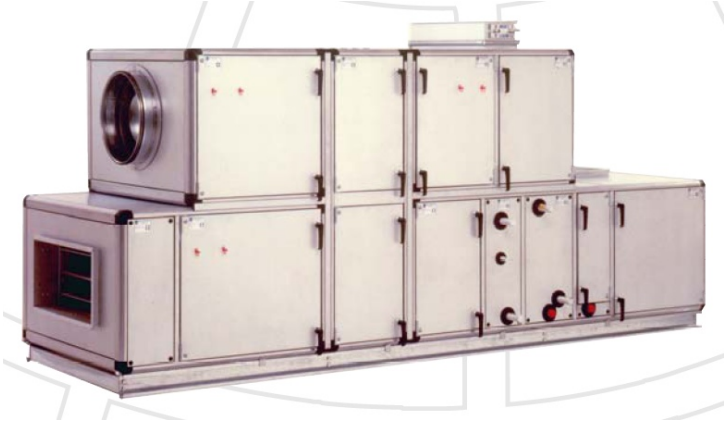
Most buildings have the ability to become energy flexible





Commercial buildings

ventilation systems



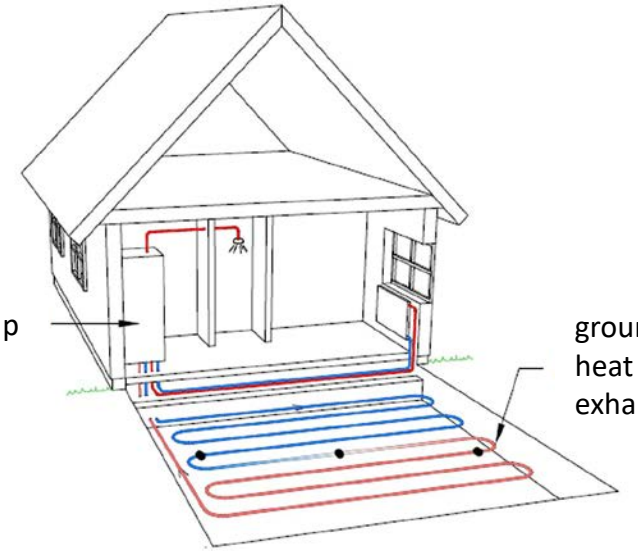
cooling systems

supermarkets

pumps

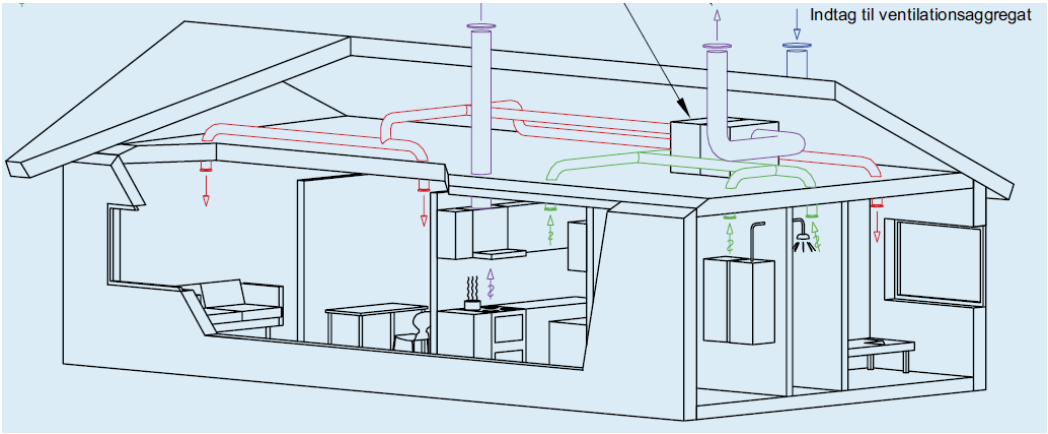
Electricity demand in households

heat pumps (aircondition)



EVs

ventilation systems



white goods

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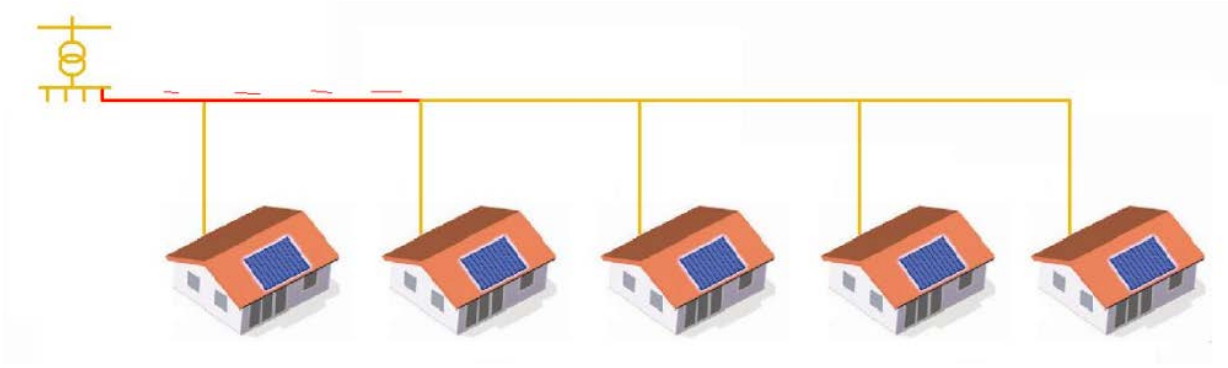
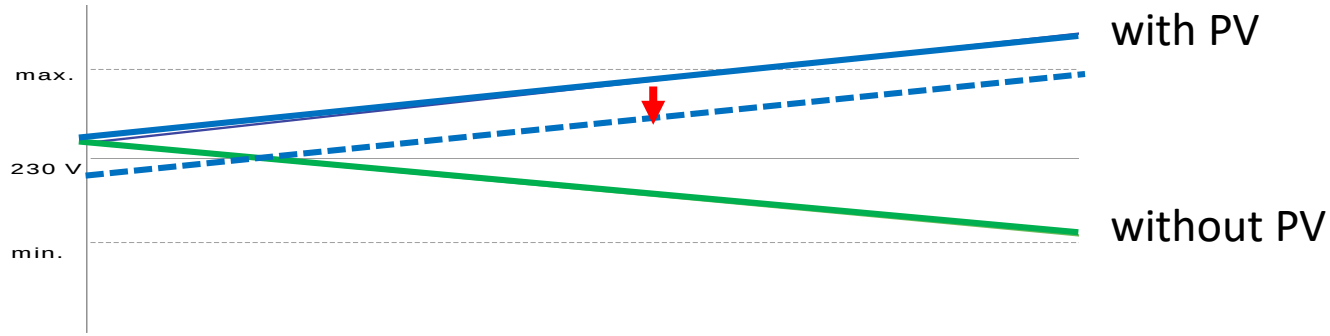
Prosumers

Voltage problems





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Definition of Energy Flexibility in buildings

The Energy Flexibility of a building is the ability to manage its demand and generation according to local climate conditions, user needs and grid requirements.

Energy Flexibility of buildings will thus allow for demand side management/load control and thereby demand response based on the requirements of the surrounding grids.

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Smart Readyness Indicator (SRI) in EBPD (Energy Performance in Buildings Directive)

- The introduction of a smartness indicator rating the readiness of the building to adapt its operation to the needs of the occupant and the grid, and to improve its performance
- The smartness indicator should be used to measure buildings' capacity to use ICT and electronic systems to optimise operation and interact with the grid

Annex 67 Pasition Paper:
http://www.annex67.org/media/1470/position-paper-energy-flexibility-as-a-key-asset-i-a-smart-building-future.pdf

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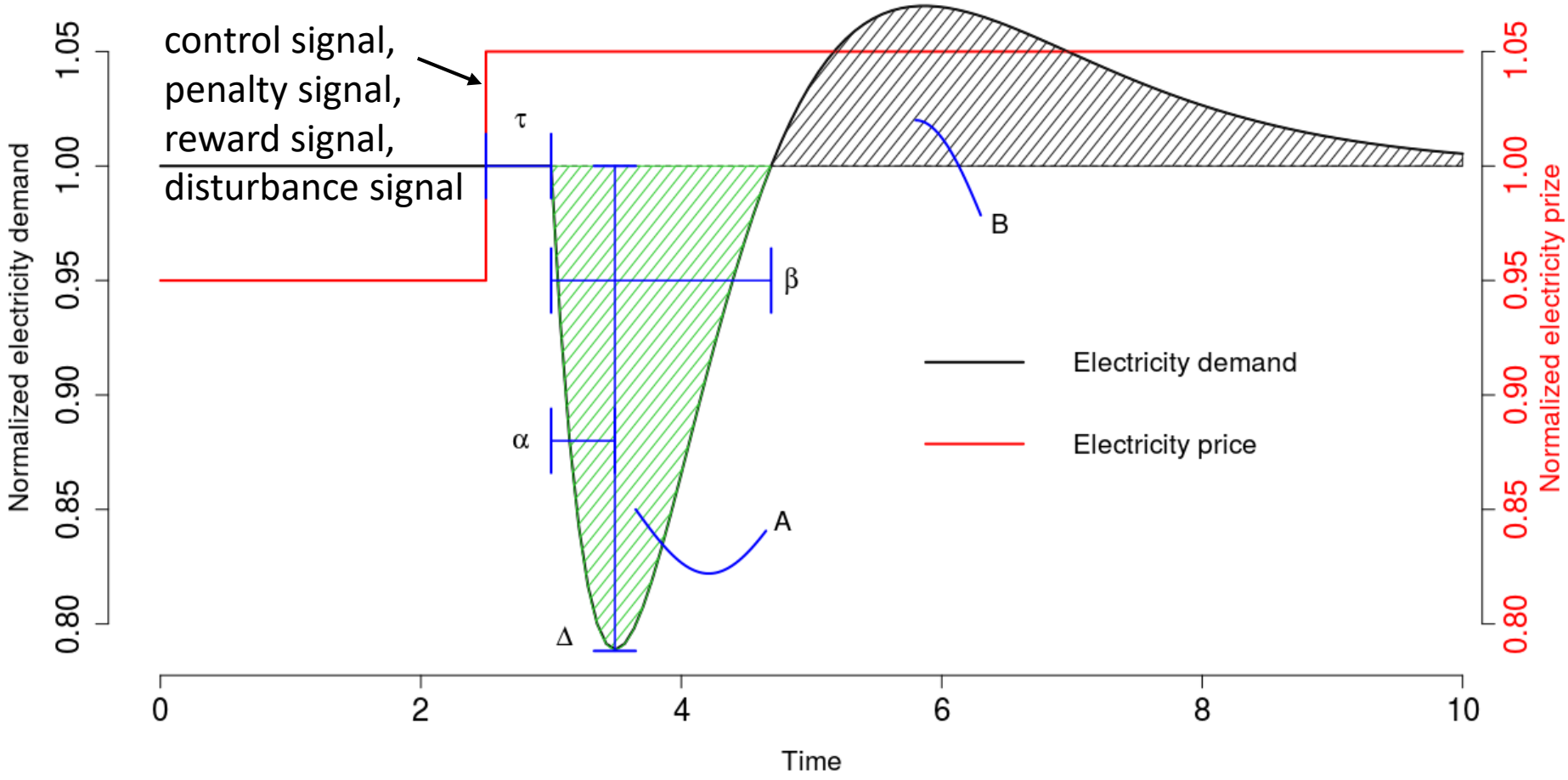
Characterization and labelling of Energy Flexibility in buildings



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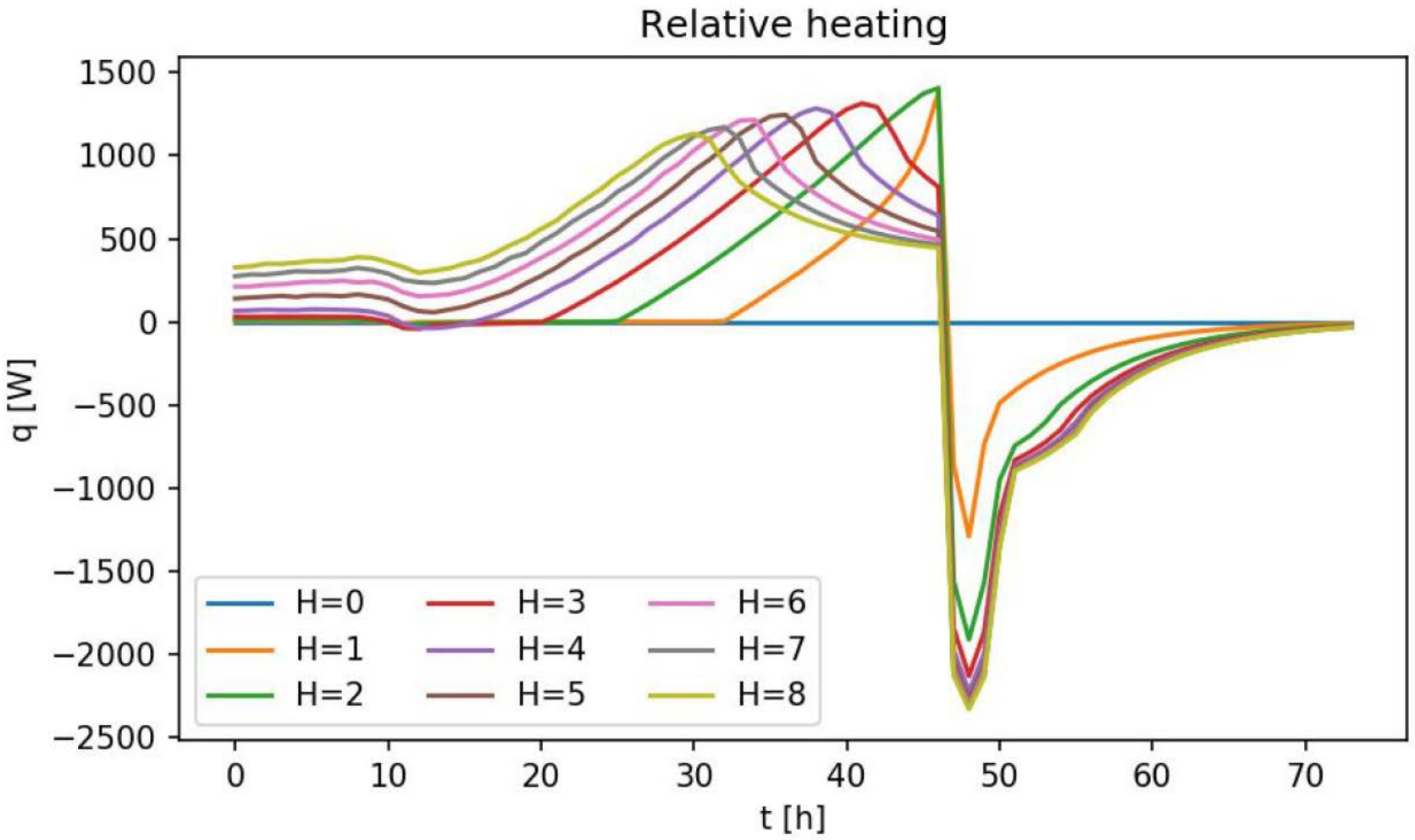
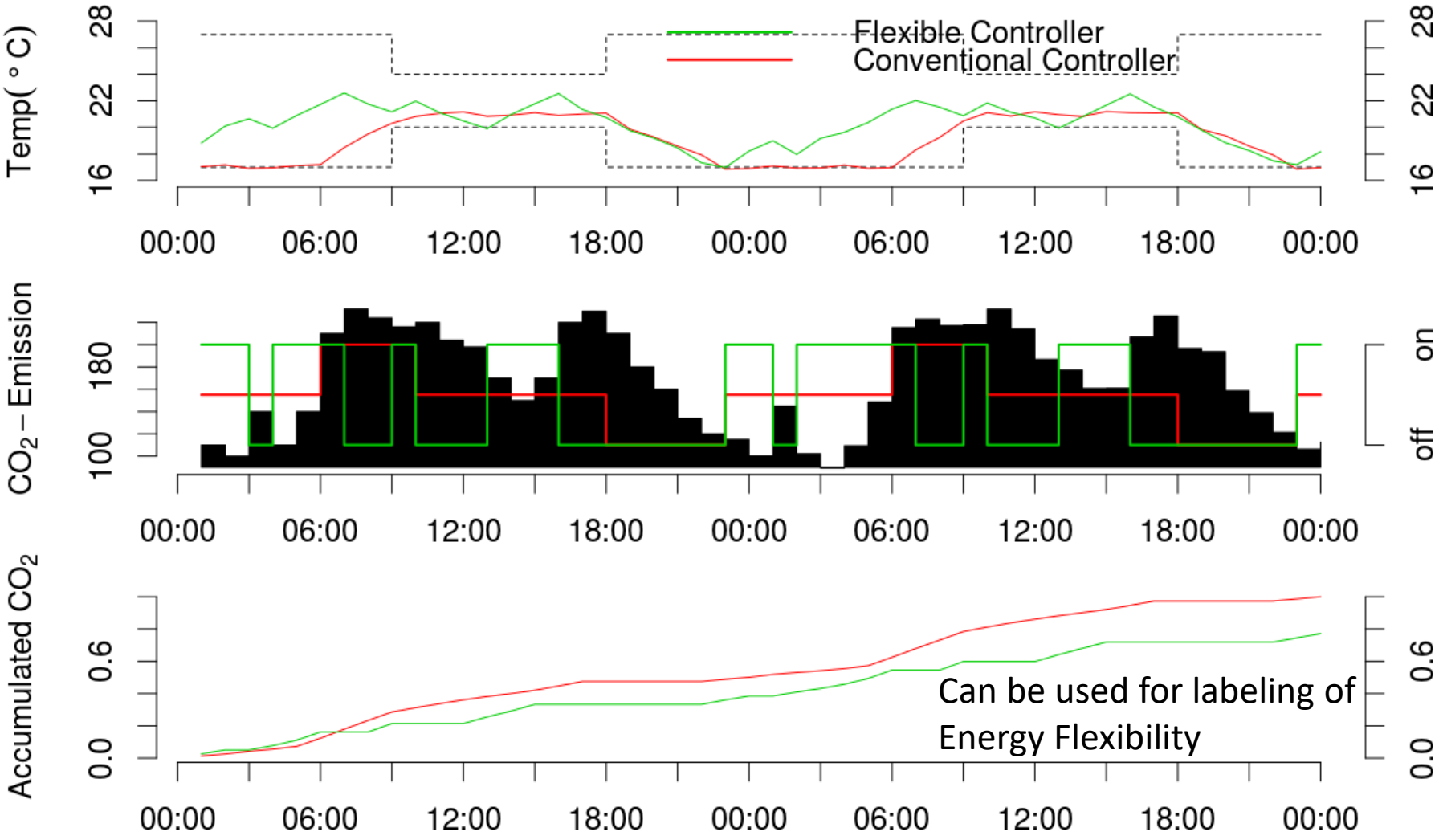
Pre-use of energy



Energy Flexibility in buildings



Characterizing the Energy Flexibility of Buildings and Districts.
https://www.sciencedirect.com/science/article/pii/S030626191830730X

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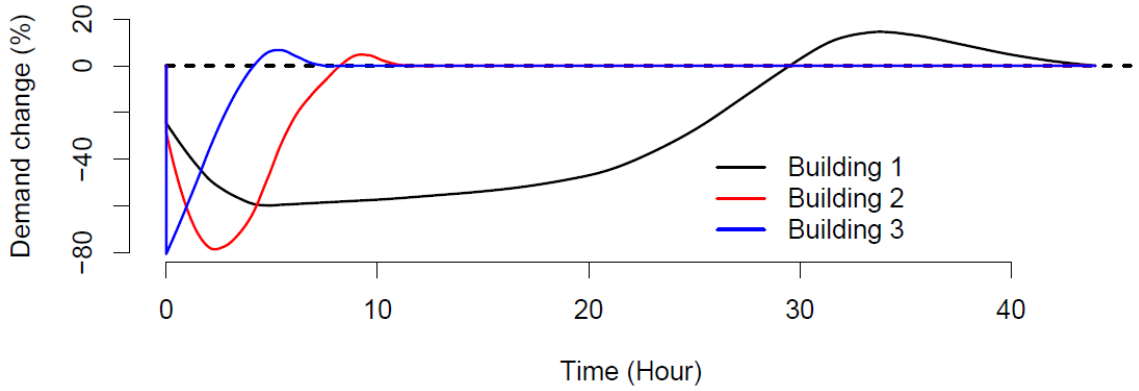
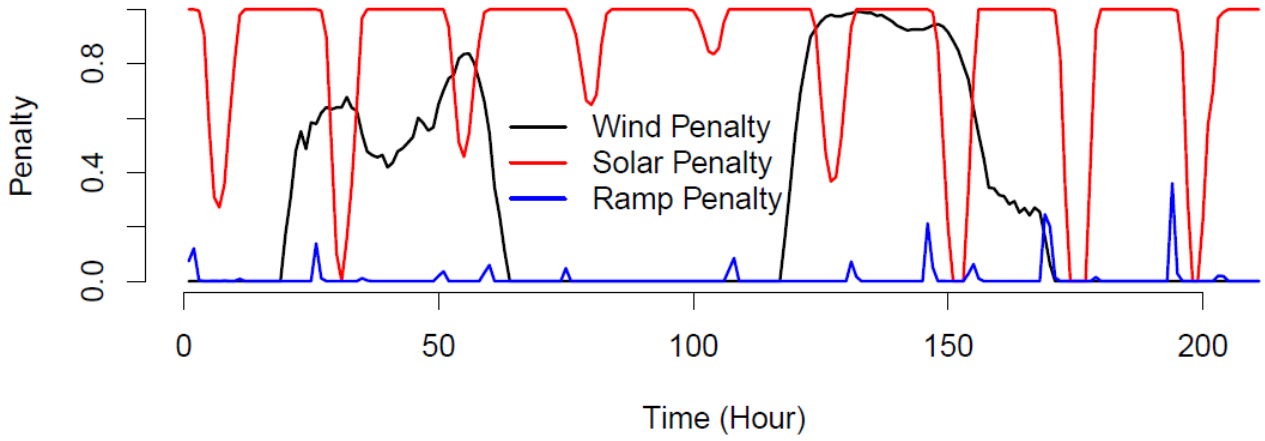
What is the possible Energy Flexibility in buildings?

It depends

- type of building and energy service systems
- use of the building
- climate
- time of the day and the year
- occupants
- control possibilities
- state of storage (constructions, tank, battery, …)
- physical max vs. cost optimal energy flexibility
- surrounding grids
- energy tariffs
- …

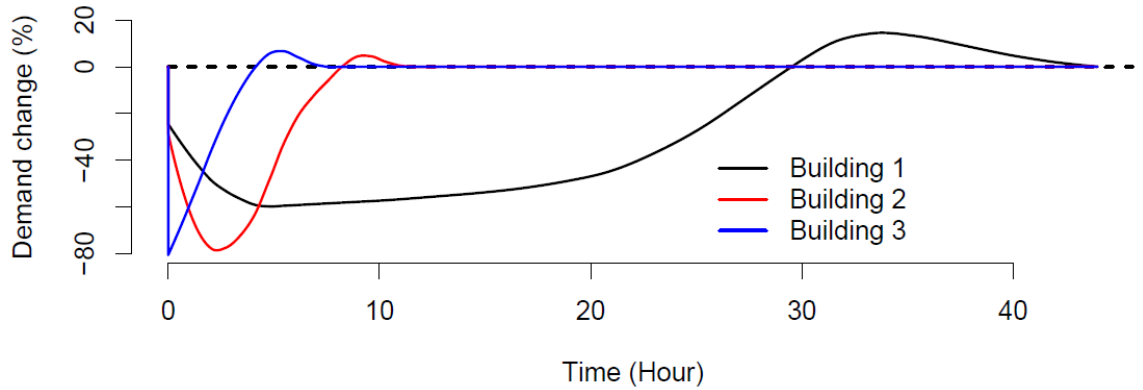
Flexibility Saving Index

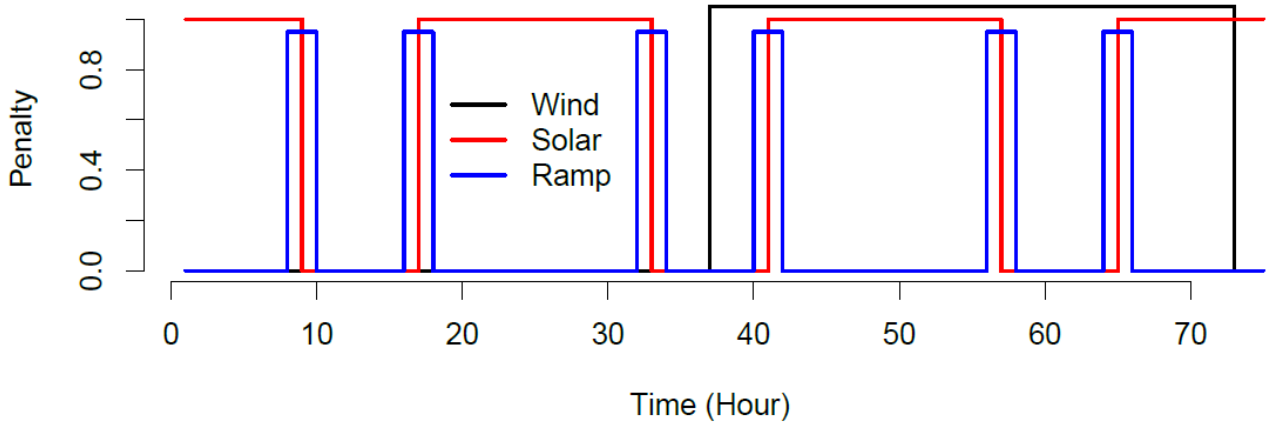




	Wind (%)	Solar (%)	Ramp (%)
Building 1	11.8	3.6	1.0
Building 2	4.4	14.5	5.0
Building 3	6.0	10.0	18.4

Flexibility Index





	Wind (%)	Solar (%)	Ramp (%)
Building 1	36.9	10.9	5.2
Building 2	14.4	47.9	22.3
Building 3	17.9	35.6	67.5

Expected Flexibility Saving Index vs. Flexibility Index

	Wind (%)	Solar (%)	Ramp (%)
Building 1	11.8	3.6	1.0
Building 2	4.4	14.5	5.0
Building 3	6.0	10.0	18.4

	Wind (%)	Solar (%)	Ramp (%)
Building 1	36.9	10.9	5.2
Building 2	14.4	47.9	22.3
Building 3	17.9	35.6	67.5

https://www.sciencedirect.com/science/article/pii/S030626191830730X

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Output from Annex 67

- **Principles of Energy Flexible Buildings** summarizes the main findings of Annex 67 and targets all interested in what Energy Flexibility in buildings is, how it can be controlled, and which services it may provide.
- **Characterization of Energy Flexibility in Buildings** presents the terminology around Energy Flexibility, the existing indicators used to evaluate the flexibility potential and how to characterize and label Energy Flexibility.
- **Stakeholder perspectives on Energy Flexible buildings** displays the view point of different types of stakeholders towards Energy Flexible Buildings.
- **Control strategies and algorithms for obtaining Energy Flexibility in buildings** reviews and evaluates control strategies for Energy Flexibility in buildings.
- **Experimental facilities and methods for assessing Energy Flexibility in buildings** describes several test facilities including experiments related to Energy Flexibility and draws recommendations for future testing activities.
- **Examples of Energy Flexibility in buildings** summarizes different examples on how to obtain Energy Flexible Buildings.
- **Project Summary Report** brief summary of the outcome of Annex 67.

Website

annex67.org

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Participating countries

- Austria
- Belgium
- Canada
- China
- Denmark
- Finland
- France
- Germany
- Ireland
- Italy
- Norway
- Portugal
- Spain
- Switzerland
- The Netherlands
- UK

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Key messages

- Energy flexibility from buildings may help to stabilize the future energy grids based entirely on renewable energy
- The available energy flexibility of buildings is dependent on the building, the users and the conditions in the grids
- Energy flexibility from buildings should be considered at an aggregated level

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Thank you for your attention