




# Energy Flexible Buildings and SRI in EPBD IEA EBC Annex 67



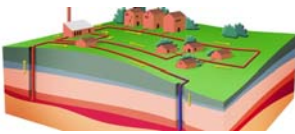




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IEA EBC Technical Day  
Brussels, June 11, 2019

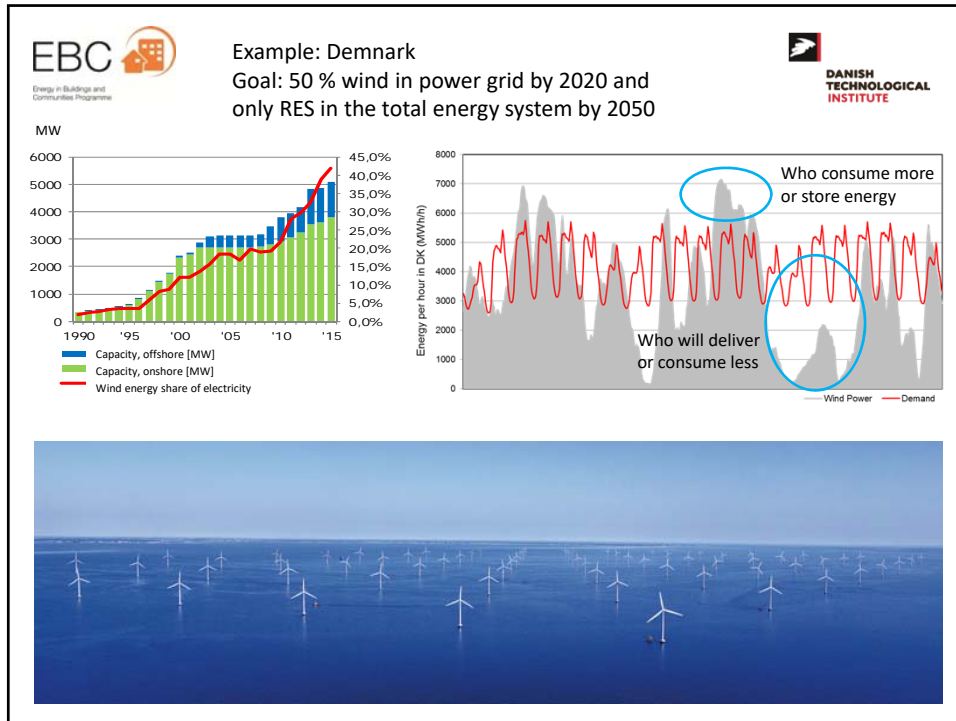
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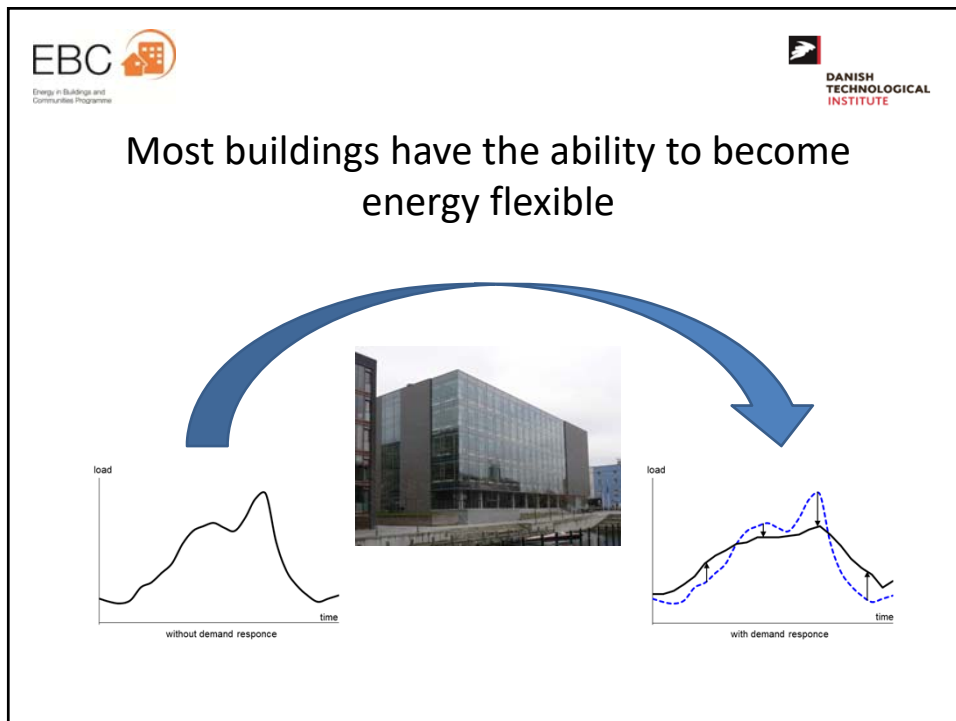
## Common understanding that we need to replace fossil fuels with renewable energy



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**Commercial buildings**

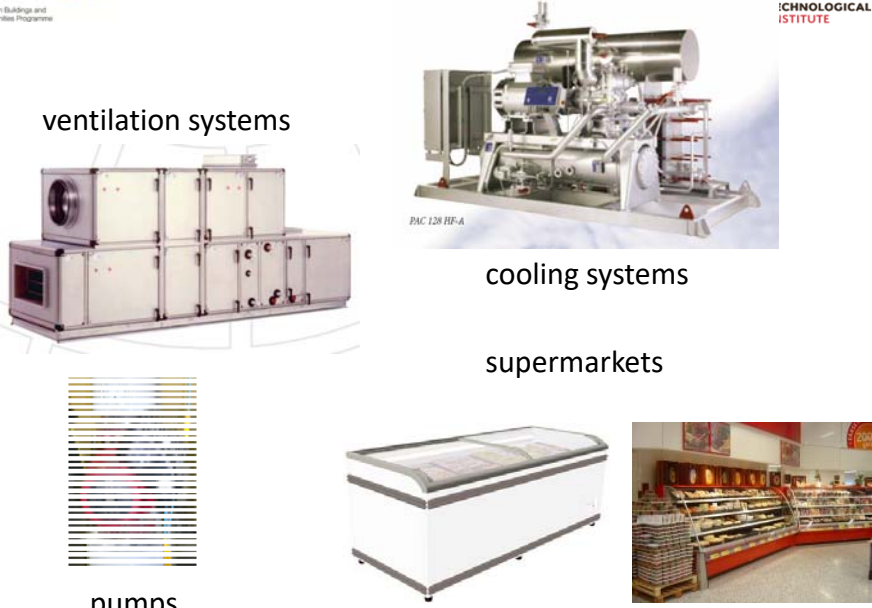
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ventilation systems

cooling systems

supermarkets

pumps



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**Electricity demand in households**

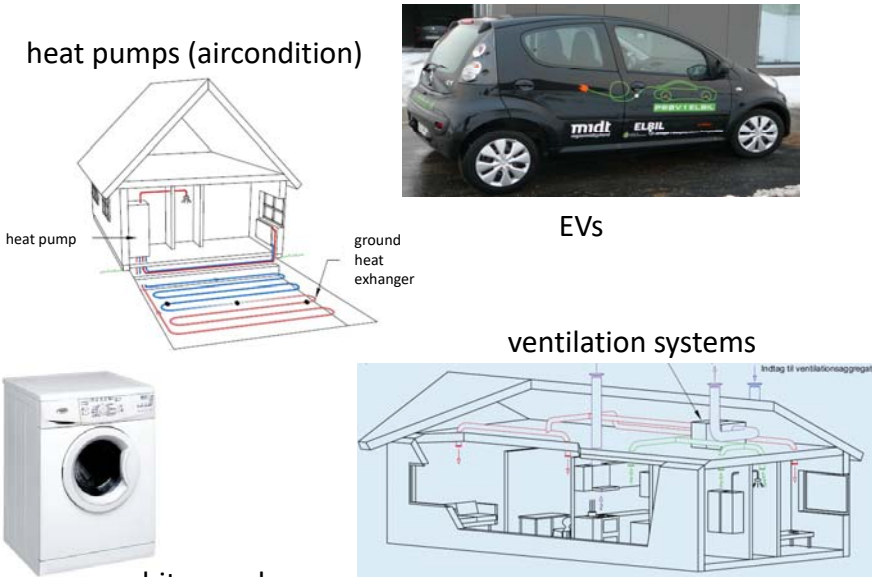
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heat pumps (aircondition)

EVs

ventilation systems

white goods



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## Prosumers



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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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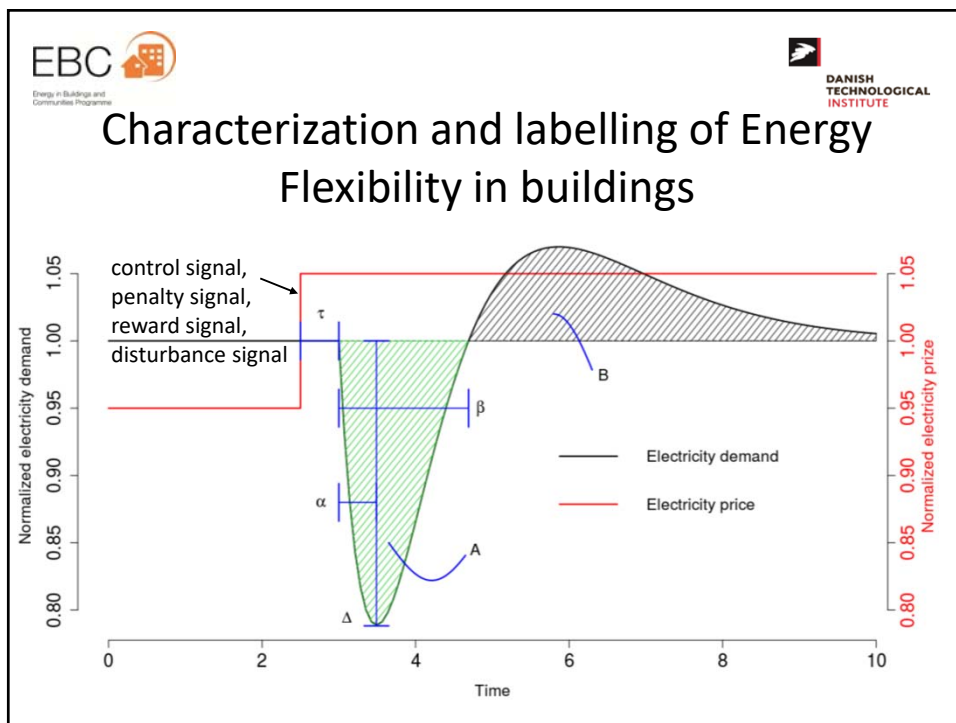
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## What is the possible Energy Flexibility in buildings?

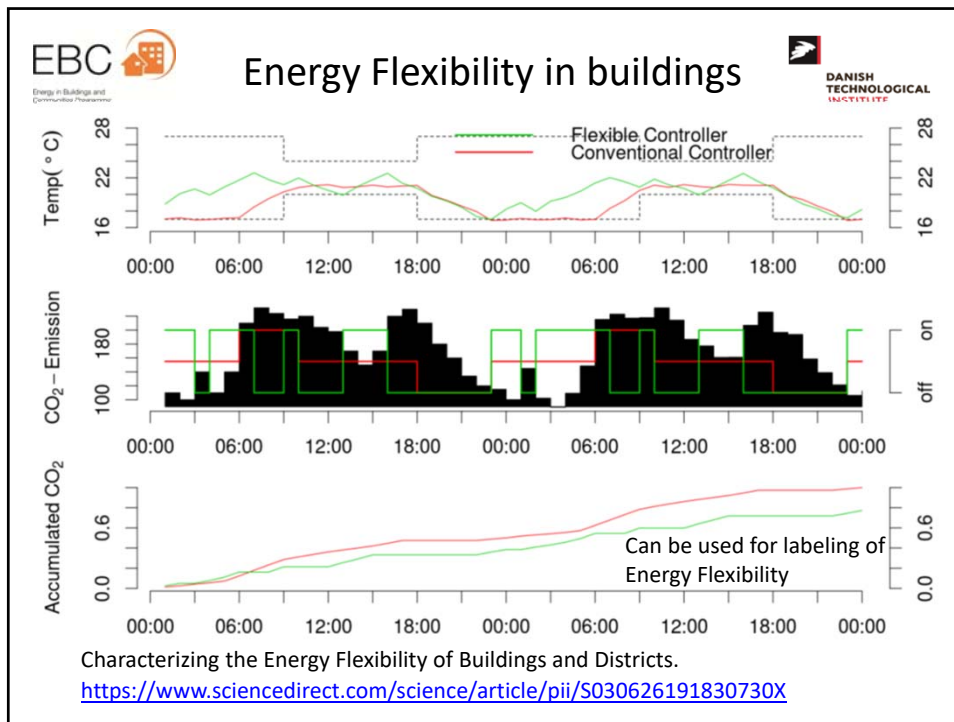
**It depends**

- 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
- ...

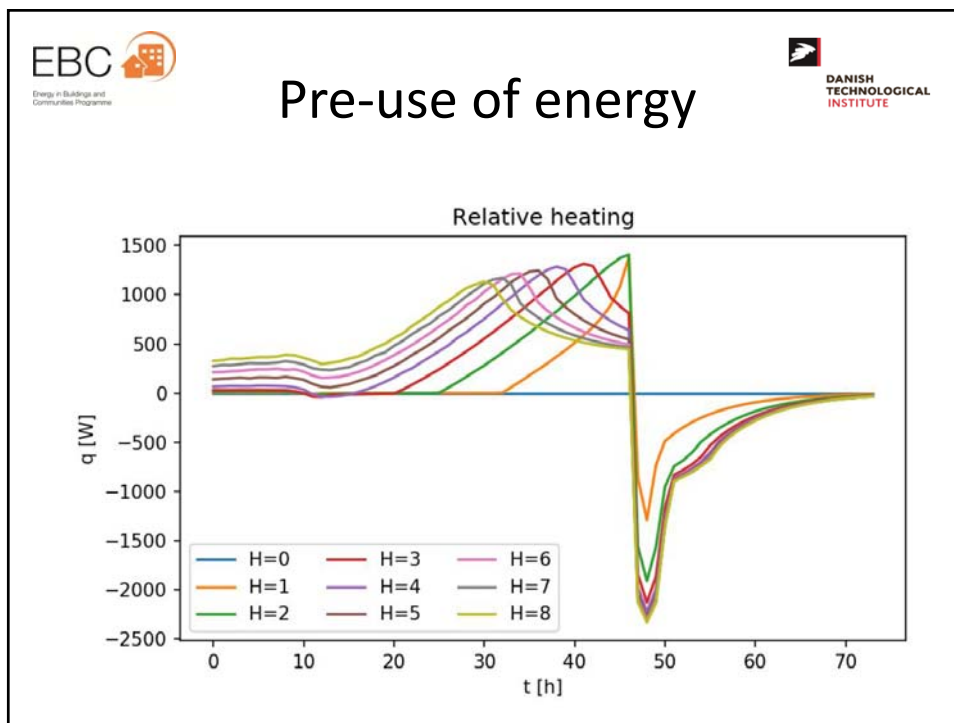
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## Output from Annex 67

- **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.

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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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## Website [annex67.org](http://annex67.org)

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Currently there is no overview or insight into how much Energy Flexibility different building types and their usage may be able to offer to future energy systems. The aim of the Annex is thus to increase knowledge on and demonstrate the Energy Flexibility buildings can provide for the energy grids, and to identify critical aspects and possible solutions to manage this Energy Flexibility.

In-depth knowledge of the Energy Flexibility that buildings may provide is important for the design of future Smart Energy systems and linkages. The knowledge is, however, not only important for the utilities it is also necessary for companies when developing business cases for products and services supporting the roll out of Smart Energy networks. Furthermore, it is important information for policy makers and government entities involved in the shaping of future energy systems.

Read more about Annex 67, [click here](#)

Smart Grid & other energy infrastructure

Smart Grid  
Building  
Flex  
Energy  
Storage  
User

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## Smart Readiness Indicator

Smart Readiness Indicator in EPBD (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

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# SRI methodology



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### 8 IMPACT CRITERIA


energy 	flexibility for the grid 	self-generation 	comfort 	convenience 	wellbeing & health 	maintenance & fault prediction 	information to occupants 
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### 10 DOMAINS

heating 	cooling 	domestic hot water 	controlled ventilation 	lighting 	dynamic building envelope 	on site renewable energy generation 	demand side management 	electric vehicle charging 	monitoring and control 
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### 10 DOMAINS

One impact criterion score is the weighted average of 10 domain scores.


heating 

domain services A B C D E F

Impact score (a) = 2 + 0 + 2 + 2 + / + 1

max. building score (b) = 3 + 3 + 2 + 2 + / + 3

y%

domestic hot water 

y%

### DOMAIN SERVICES

All relevant domain services are scored according to their functionality level.

service A	service B	service C	service D	service E	service F
Functionality 0: 0	Functionality 0: 0	Functionality 0: 0	Functionality 0: 0	Functionality 0: 0	Functionality 0: 0
Functionality 1: 1	Functionality 1: 1	Functionality 1: 0	Functionality 1: 1	Functionality 1: 1	Functionality 1: 1
Functionality 2: 2	Functionality 2: 3	Functionality 2: 1	Functionality 2: 2	Functionality 2: 3	Functionality 2: 3
Functionality 3: 3	Functionality 3: 3	Functionality 3: 2	Functionality 3: 2	Functionality 3: 3	Functionality 3: 3


  

Most of the services will affect also the other impact criteria's as shown in this overview matrix.

Depending on the building type or design some services are not considered relevant.


service A	energy	flexibility for the grid	self-generation	comfort	convenience	wellbeing & health	maintenance & fault prediction	information to occupants
Functionality 0: 0	0	0	0	0	0	0	1	0
Functionality 1: 1	1	1	0	1	1	0	3	1
Functionality 2: 2	2	2	1	2	1	0	3	2
Functionality 3: 3	3	3	1	3	2	0	3	3

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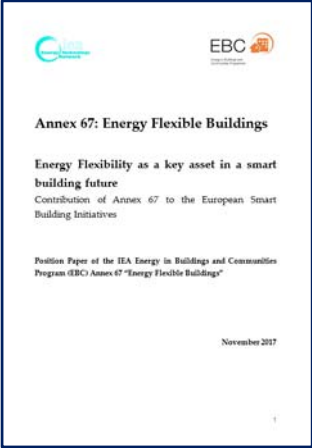
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# Remember the dynamic



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There is a need for an approach that takes in to account the dynamic behavior of buildings rather than a static counting and rating of control devices. It is further important to minimize the CO<sub>2</sub> emission in the overall energy networks rather than optimize the energy efficiency of the single energy components in a building.



**Annex 67: Energy Flexible Buildings**


Energy Flexibility as a key asset in a smart building future  
Contribution of Annex 67 to the European Smart Building Initiatives

Position Paper of the IEA Energy in Buildings and Communities Program (EBC) Annex 67 "Energy Flexible Buildings"

November 2017


<http://www.annex67.org/media/1470/position-paper-energy-flexibility-as-a-key-asset-i-a-smart-building-future.pdf>

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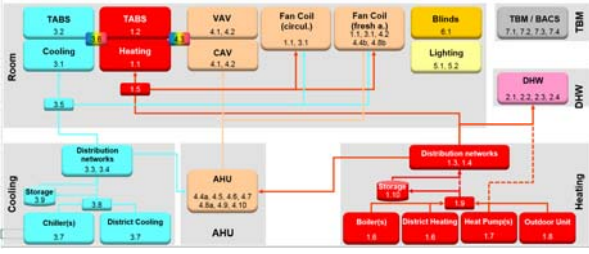


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# eu.bac audit




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**Audit of a BACS installation**

Preparation	Inspection	Registration	Declaration
<ul style="list-style-type: none"> <li>Overview on floor plans</li> <li>Understand flow of heating, cooling, ventilation</li> <li>Prepare Check-list based on BACS documentation</li> </ul>	<ul style="list-style-type: none"> <li>Record building data in eu.bac System Check-list</li> <li>Do partial checks to verify functionality</li> </ul>	<ul style="list-style-type: none"> <li>Review inspection</li> <li>Clarify deviations</li> <li>Audit report</li> <li>Register BACS on eu.bac database</li> </ul>	




System  
eu.bac  
European Building Automation Controls Association



**ENERGY Performance**

**Building Name**



System points (Range 0 ... 100) 91

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## Eu.bac audit in Green Tech House



3,600 m<sup>2</sup> office building with an enhanced Building Energy Manage System. The audit including reporting and following discussion with the building owner and users took roughly a week as it is recommended that two persons carry out the inspection in order to get everything right. However, major insight into the control and the performance of the building was obtained.

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## Thank you for your attention

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