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# DHC and Low Energy Buildings

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# DHC and Low Energy Buildings

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## What is the difference ?

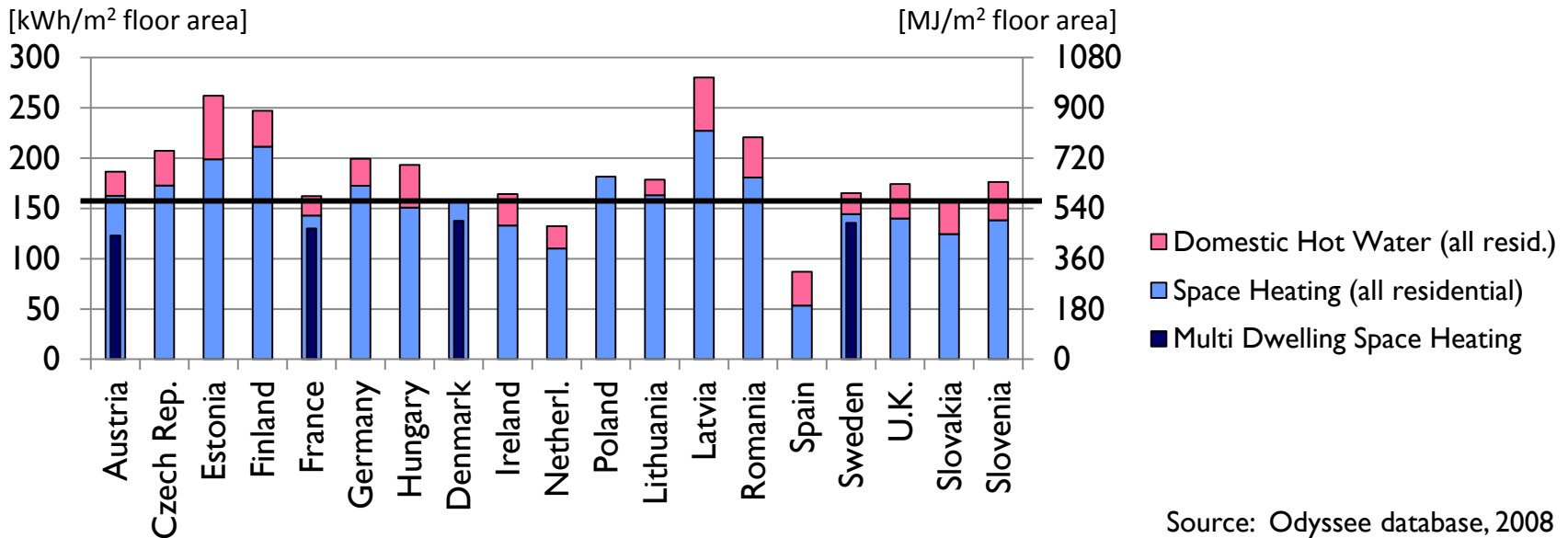
- Change in heat energy demand
- Change of load curve profile
- Temperature requirements

## **New heat driven equipment in low energy buildings and other opportunities for district heating**

I will not go into any technical details regarding distribution or substations!

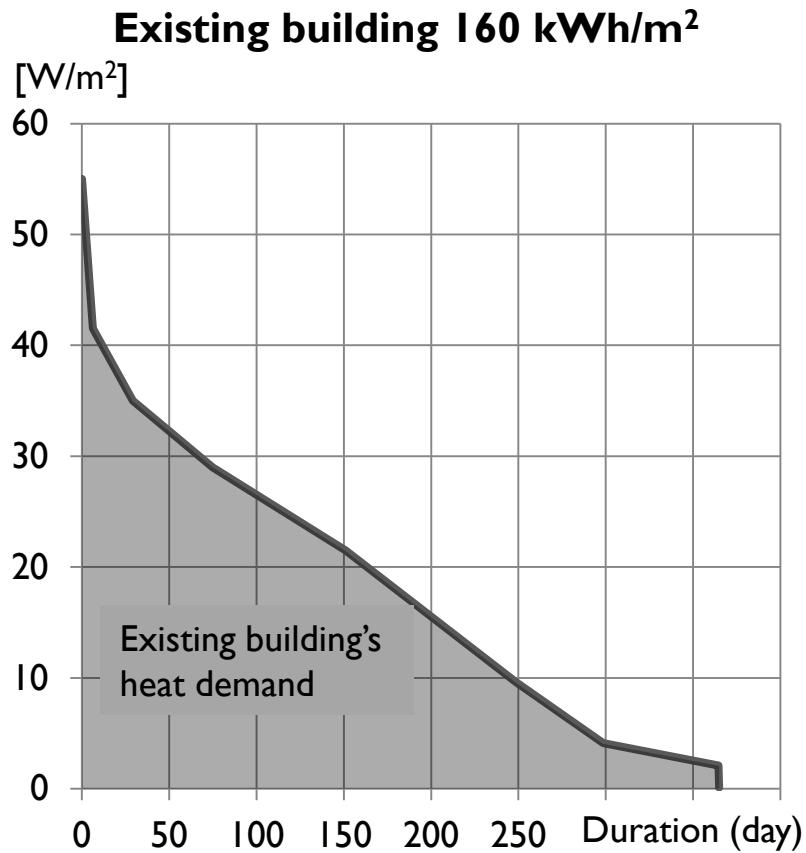
# Existing Building Stock Heat Demand

## Existing residential buildings use of heat

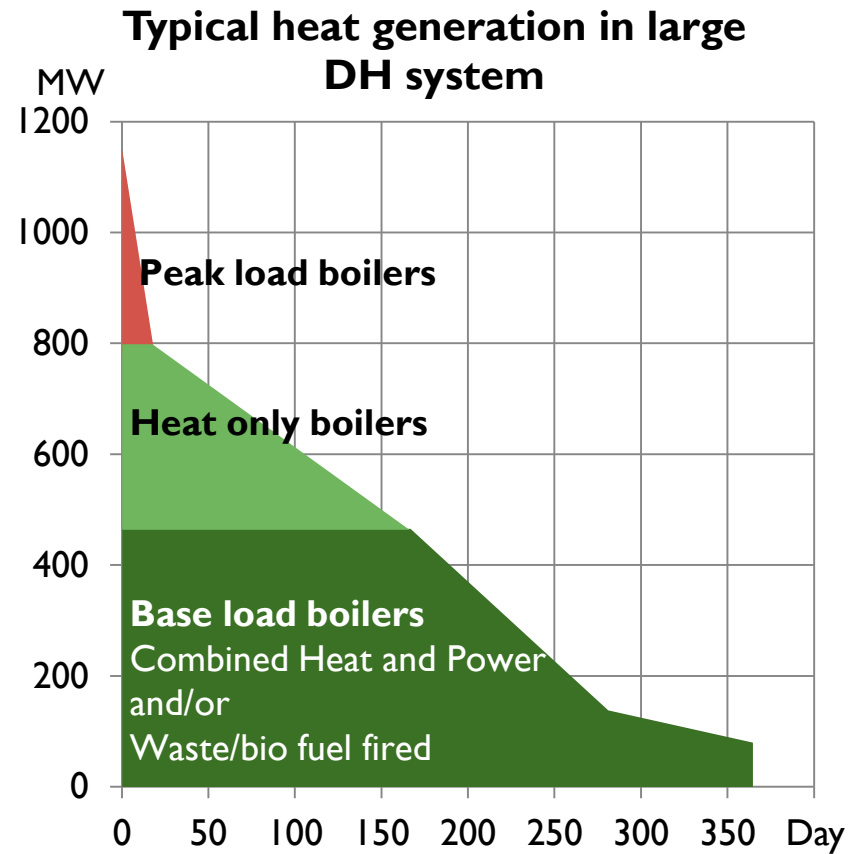
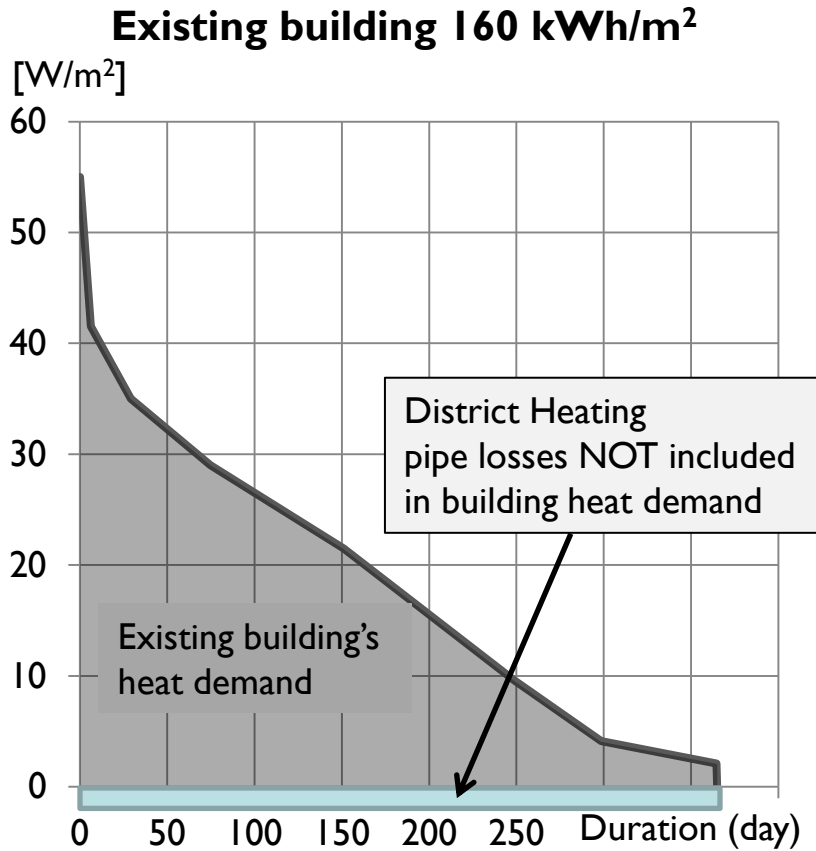


-> In this presentation the reference building use 160 kWh/m², year

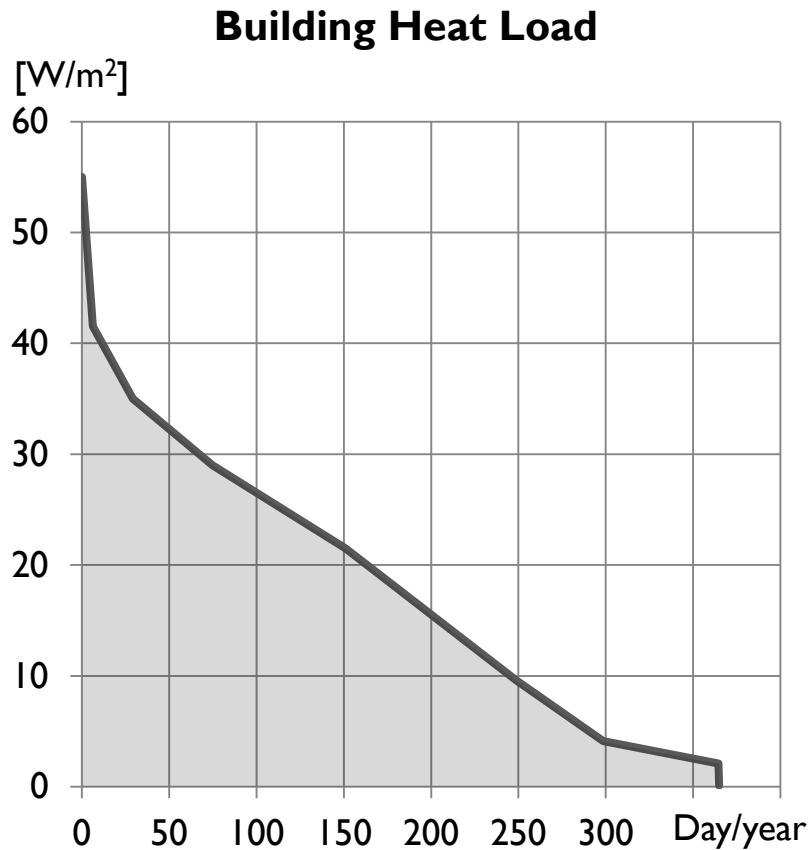
# Existing Multi Dwelling Building Heat Demand



# Existing Multi Dwelling Building vs. Supply



# Comparing buildings



## Multi Dwelling Buildings :

1. Reference building 160 kWh/m<sup>2</sup>
2. New building 95 kWh/m<sup>2</sup>
3. Energy Refurbished 65 kWh/m<sup>2</sup>
4. New Low E Building 50 kWh/m<sup>2</sup>

### Sources:

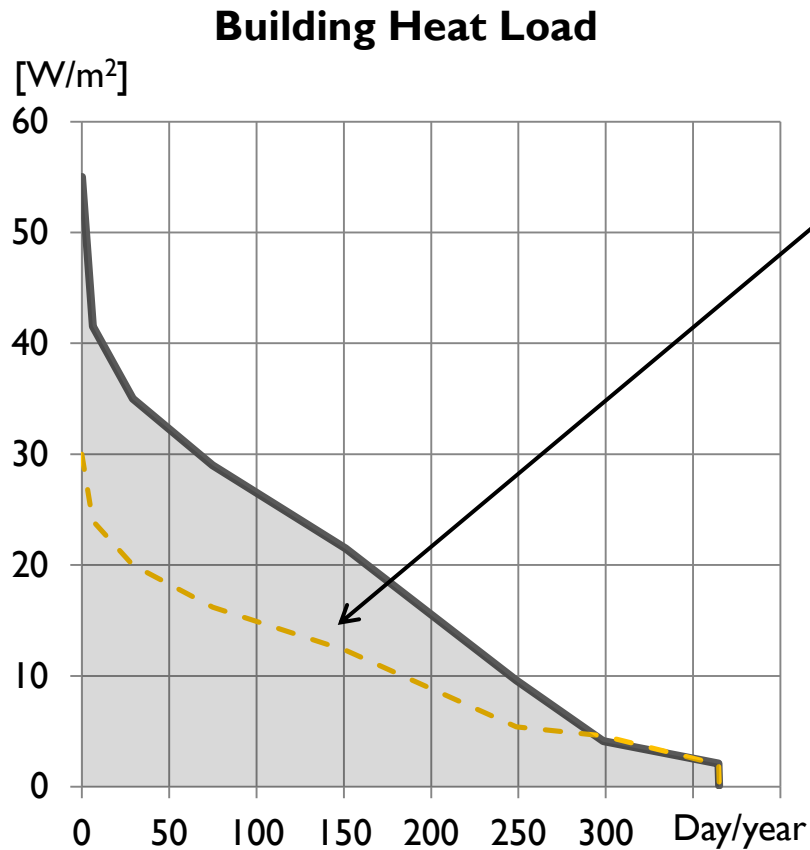
RESURINDEX FÖR ENERGI, M ERLANDSSON, E SANDBERG 2011.

Primary energy implications of end-use energy efficiency measures in district heated buildings, L. Gustavsson A., N.L. Truongb, I. Danielskib.

Energikrav för nära noll energibygnader S Aronsson, B Bergsten, P Filipsson, C Heincke, P-E Nilsson, Å Wahlström

All data and figures has been processed and adopted

# Buildings Compared



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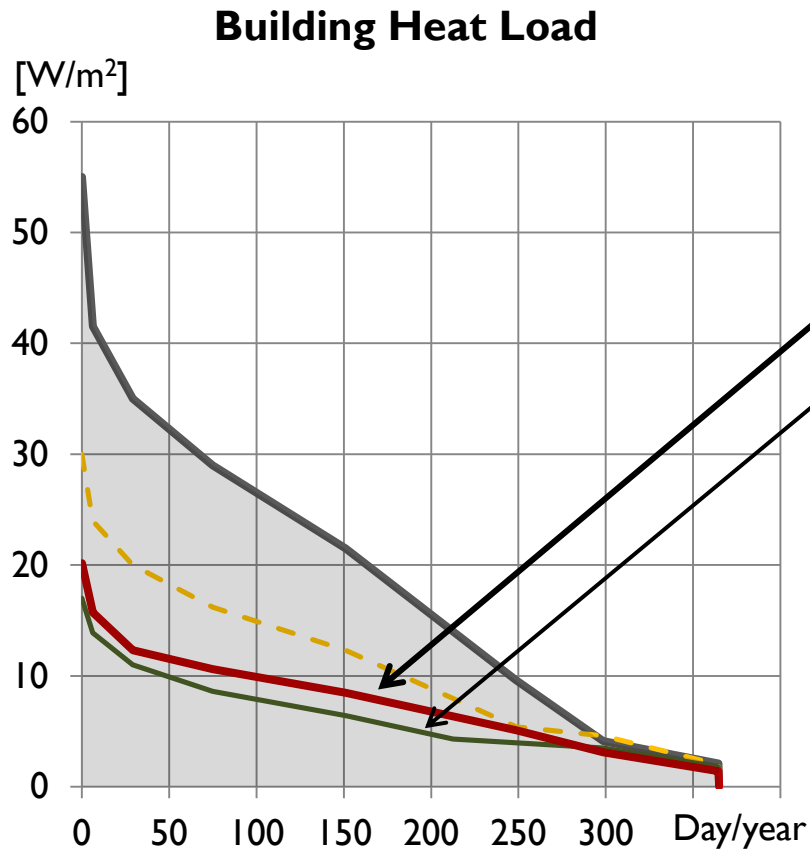
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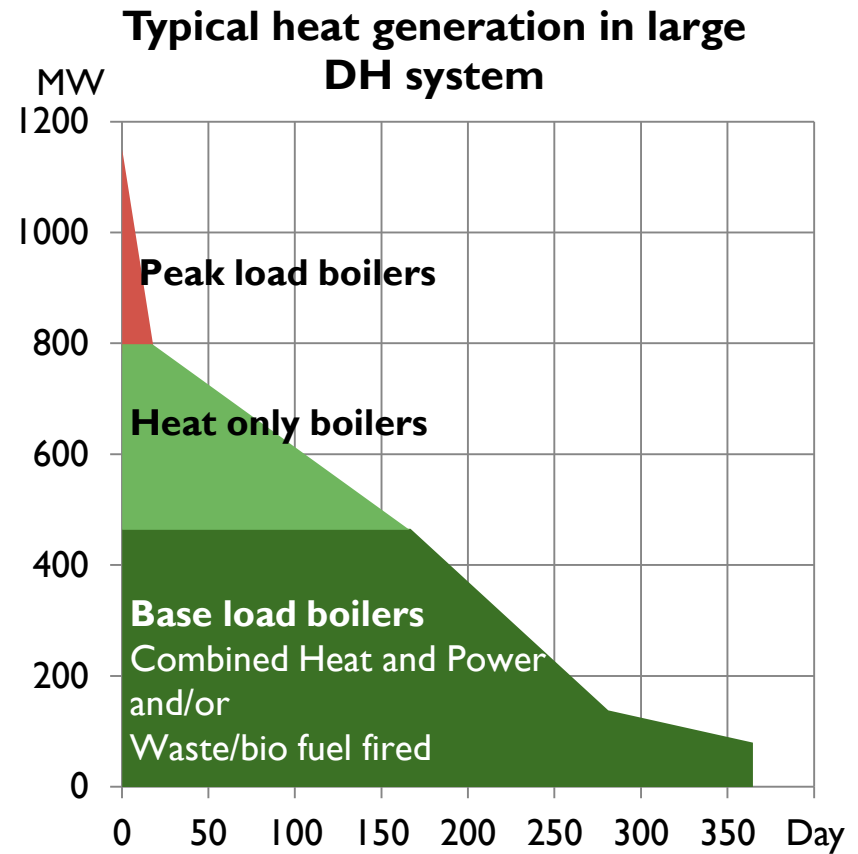
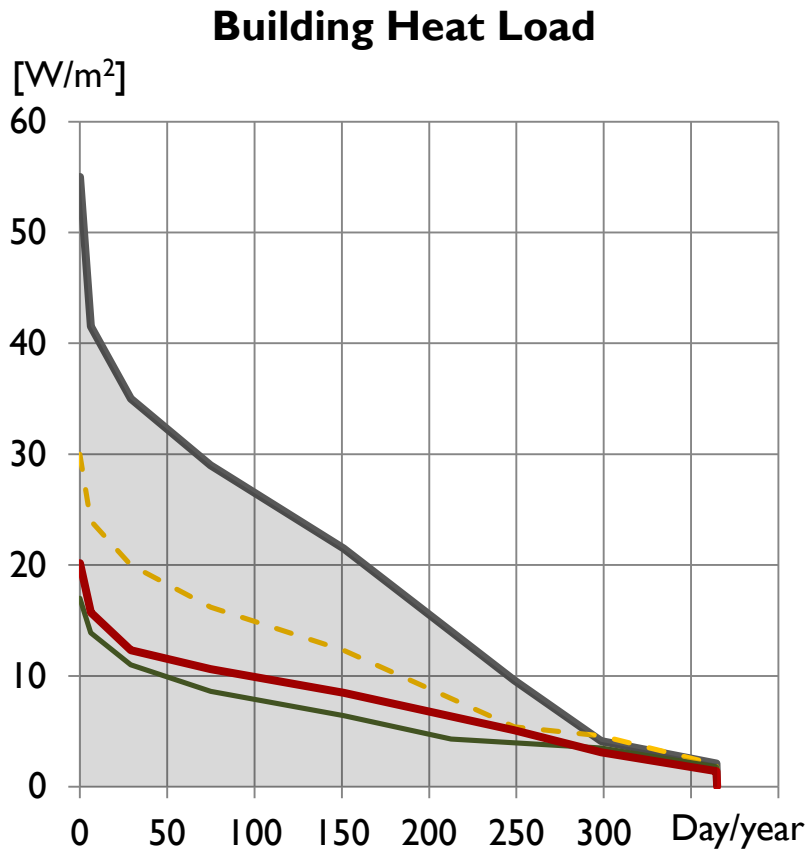
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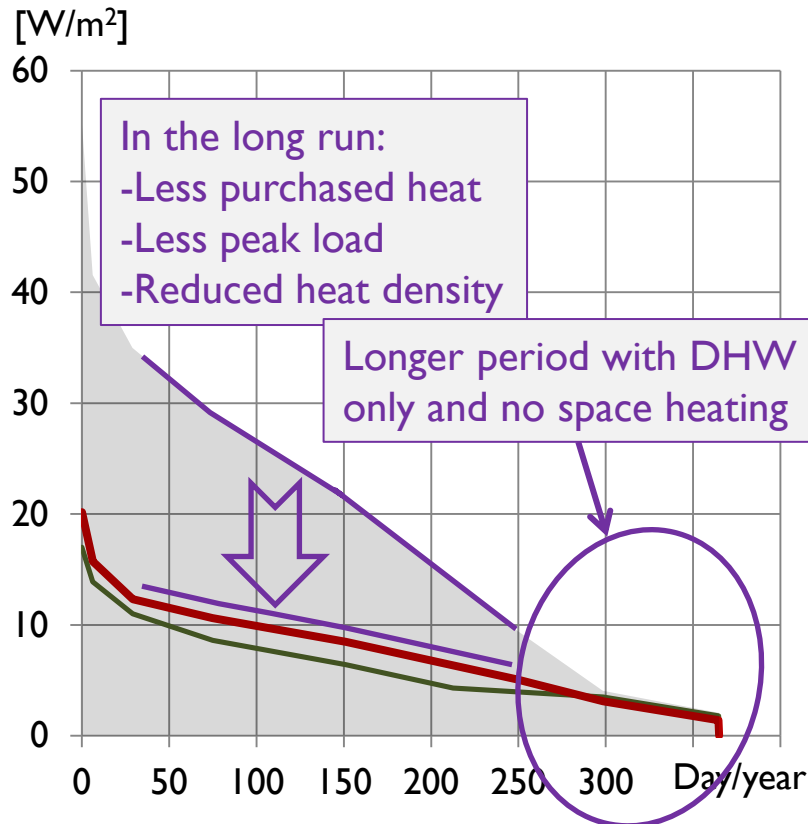


# Building Heat Demand vs. Heat Supply

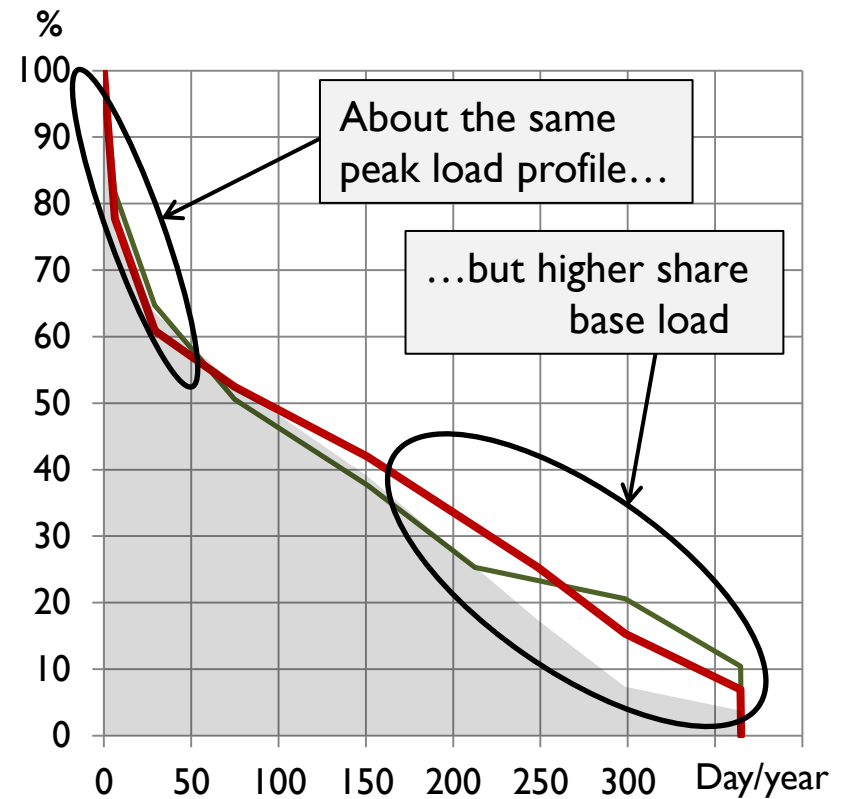


# Change in demand and load profile

## Building Heat Load

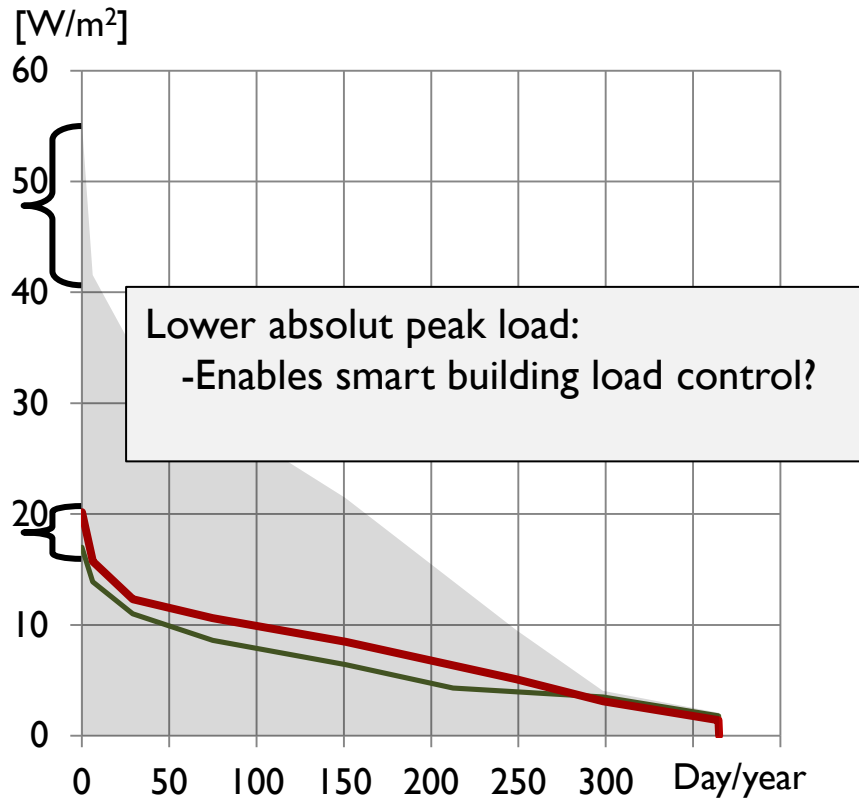


## Building Heat Load Profile

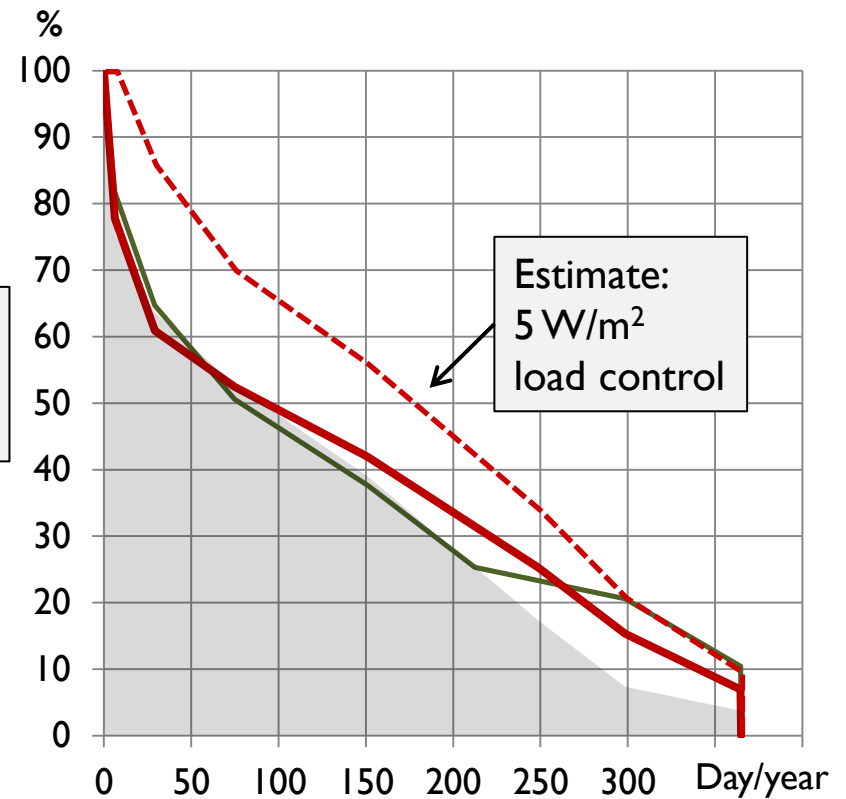


# A basic comparison of Heat Load

## Building Heat Load



## Building Heat Load Profile



# Low Energy Building Temperature requirement

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- **Domestic Hot Water limits supply temperature**
  - Hygienic aspects limit DHW temperature to about 55°C.
- **Comfort heat**
  - New buildings can use a low temperature heating system
  - Energy refurbished buildings:
    - Radiators do not need to be as hot as before renovation (less space heat)
    - Radiators can also be changed to a low-temperature model
- **Air Handling Units with Heat Recovery and pre heating of supply air**
  - Heat recovery saves energy and cut peaks just as insulation do
  - The heat air coil in the AHU can be designed for very low temperature.

Lower temperature requirement can open up for new (cheaper) heat sources and for new (cheaper) distribution.

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# New Heat Driven Equipment in residential buildings

## Heat driven white goods

Dishwasher	~2 kWh/m <sup>2</sup>
Washing machine	~1,5 kWh/m <sup>2</sup>
Clothes dryer	~4,5 kWh/m <sup>2</sup>



Source: Asko

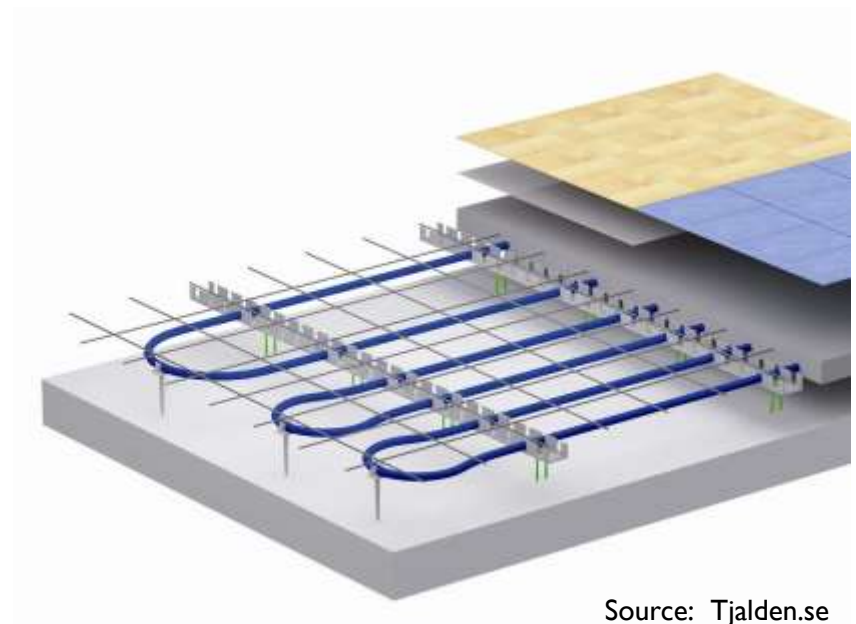


Source: Mälarenergi

# New Heat Driven Equipment in residential buildings

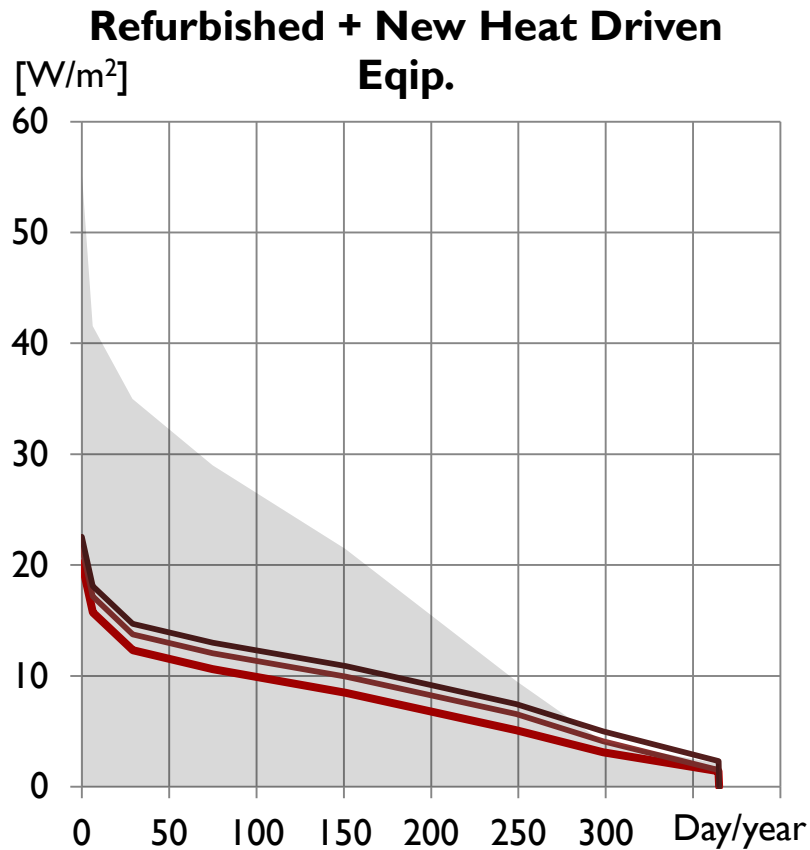
## Increased comfort in bathroom

Towel dryer	~3 kWh/m <sup>2</sup>
Comfort floor heating	~8 kWh/m <sup>2</sup>



Source: Tjalden.se

# Refurbished building with new heat driven equipment



From bottom to top:

- Energy refurbished building (original)
- Comfort floor and towel drier added
- Heat driven white goods added to all above

# CELSIUS SMART CITIES PROJECT

- The City of Gothenburg is lead partner
  - The CELSIUS budget is MEUR 26  
(EU contribution MEUR 14)
  - **32 District Heating and Coling Demonstrators**
    - Heat driven white goods one of them
- ↓
- IMPACT focus: Market, Acceptance, Behavior, Policy, Financing and Technology.
- ↓
- ➔ **Looking for 50 new cities/utilities** committing to CELSIUS Roadmap by 2016.
  - ➔ **Develop Horizon projects** with new cities/utilities around Celsius outcomes





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# Thank you for your attention

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