Developers perspective on classification as a driver towards net zero buildings

REHVA in Tallin 2011 05 20
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The Skanska Group

SKANSKA

Senior Executive Team

Group staff units

Skanska IT Solutions

Skanska Financial Services

Skanska Project Support

Construction

- Skanska Sweden
- Skanska Norway
- Skanska Denmark
- Skanska Finland
- Skanska Poland
- Skanska Czech Republic
- Skanska UK
- Skanska USA Building
- Skanska USA Civil
- Skanska Latin America

Residential Development

- Skanska Residential Development Nordic

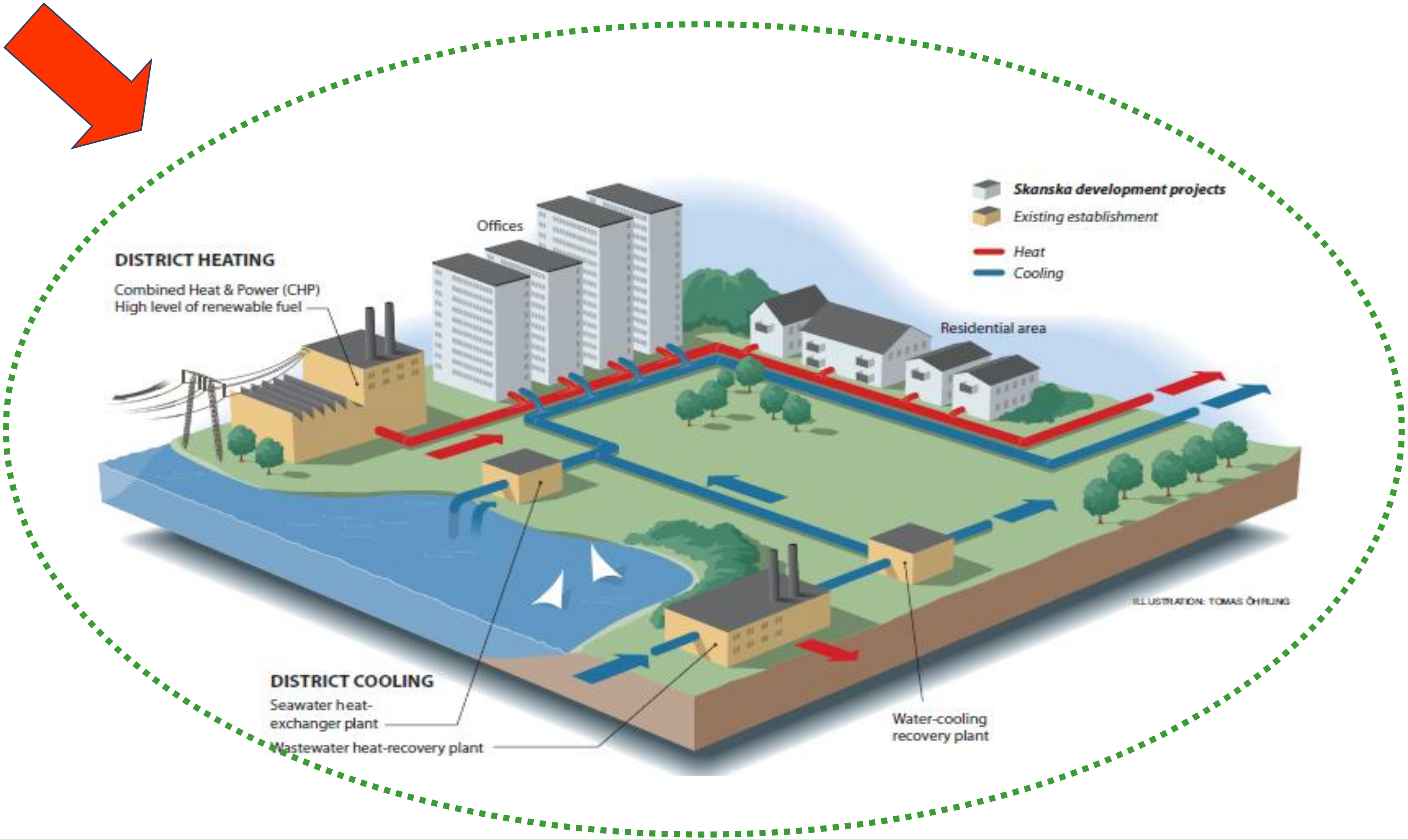
Commercial Development

- Skanska Commercial Development Nordic
- Skanska Commercial Development Europe

Infrastructure Development

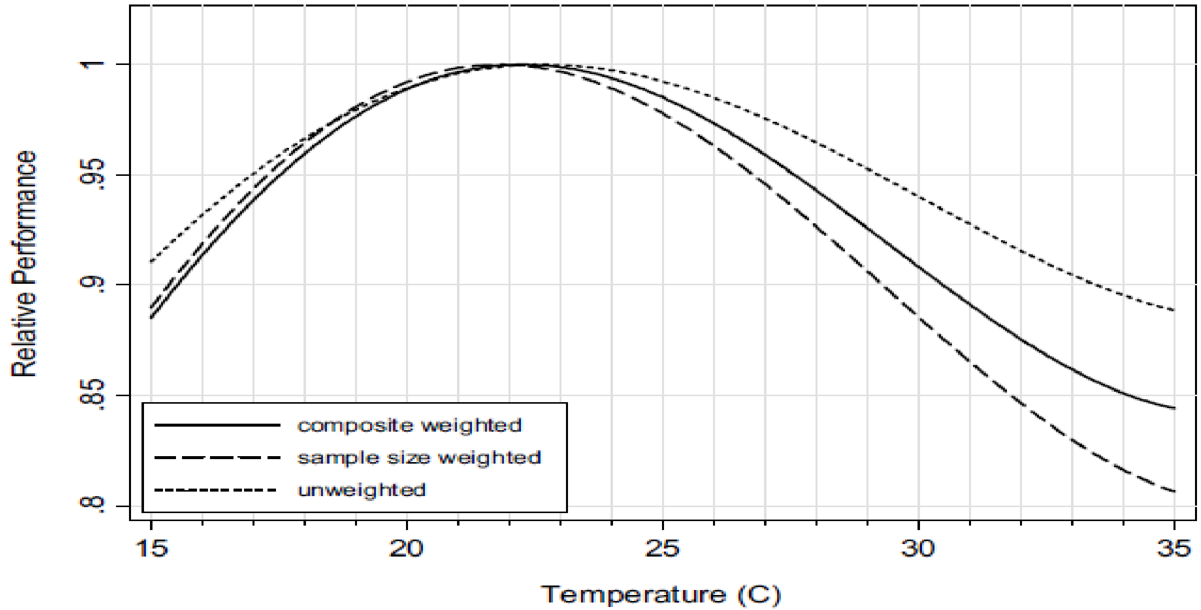
- Skanska Infrastructure Development

Helicopterview on energy consumption



Indoor air quality, and productivity

Indoor climate



Source: Olli Seppänen,,Helsinki University of Technology
William Fisk, Lawrence Berkeley National Laboratory

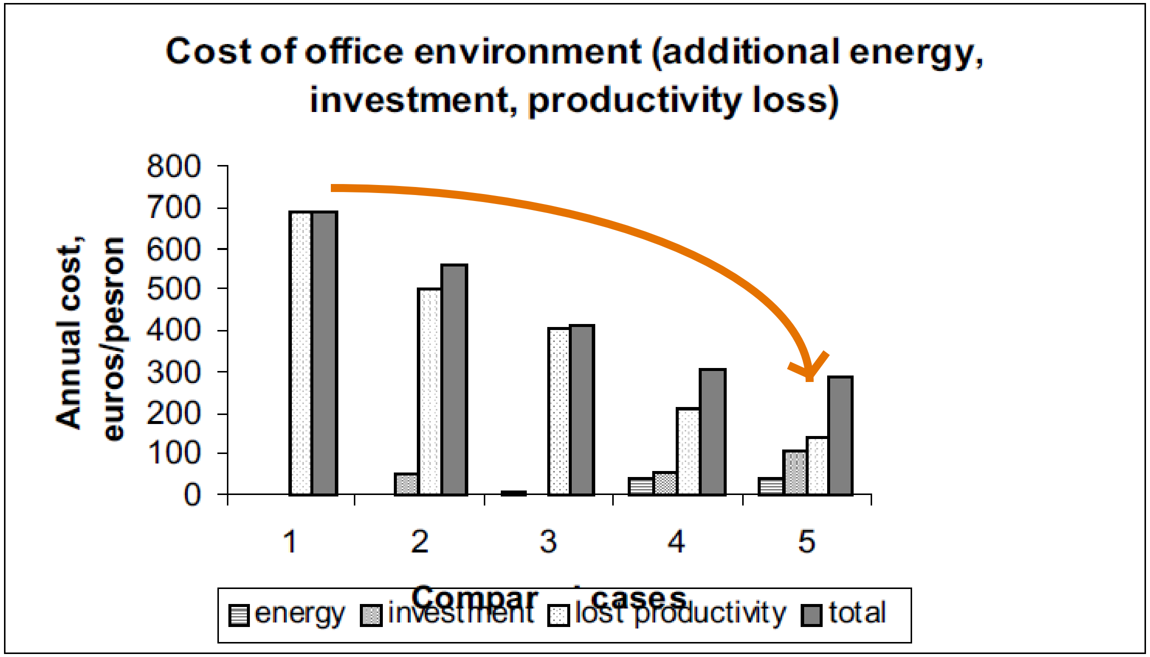


Figure 12. The effect of mechanical cooling (#2) increased operation time (#3), increased outdoor air flow (#4) and all three of them (#5) on the cost items related to room temperature control in a typical Finnish office building (euros per person per year).

Source: Olli Seppänen,,Helsinki University of Technology
William Fisk, Lawrence Berkeley National Laboratory

EU Green Building Certificate

Requirement – the only one:

At least **25%** less energy consumption than required by local standards in a given country.

Slide from Petra Hajna, CDE

LEED

Leadership in Energy & Environmental Design

Slide from Petra Hajna, CDE

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Classification a driver ?

- Leed

  today energy cost instead of primary energy or CO_2 ?

  (primary energy will be implemented in LEED 2012)

  individual demand based components/controls instead of indoor climate ?

- Green Building

  only bought energy instead of primary energy in Sweden

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Skanska Frameprogram a driver

− Classification

is a classification, third party evaluation

- Our own Frameprogram

is a driver, based on property and client value to be future proof

What is Skanska doing ?

Frame Program based on strategy regarding

- Low environmental impact
- Low life cycle cost
- Flexibility
- Non complex solutions

CDN Frame Program Offices today

- Waterbased solutions (= cooling beams)
- AHU without sound attenuators and with Free cooling
- Few AHU and heat recovery from all exhaust (= battery coils)

Why not only do Passive Houses ?

- Residential buildings has continous ventilation

  and therefore Passive Houses uses the ventilation system to heat the building (”passive” while no heating system)

- Commercial buildings has only 1/3 of operation of all hours

  we can´t start the ventilation the other 2/3 just for heating. That would increase the energy consumption

- The facade has less impact for commercial then for residential due to

  commercial are bigger buildings (less facade area compared to building area)

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Skanskas’ Green Map

A part of Skanska's Green Initiative

	Compliance Vanilla	Beyond Compliance Green	Future Proof Deep Green
Energy	local codes, standards and regulations in place		Net Zero Primary Energy ☐
			Near Zero Carbon Construction ☐
Carbon			Zero Unsustainable Materials ☐
Materials			Zero Hazardous Materials ☐
			Zero Waste ☐
Water			Net Zero Water ☐

Strategy regarding energy

First energy efficiency

Then renewable energy

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Road map for Deep Green (energy)

Solution	Heating kWh/m^2A_{Temp}	Cooling* kWh/m^2A_{Temp}	Landlord power** kWh/m^2A_{Temp}	Saving kWh/m^2A_{Temp}
Today standard office	45	26	17	-
Low speed ventilation	-9	-	-2	-11
Passive house-windows	-8	-	-	-8
Ground cooling (Deep Green Cooling)	-5	-26	+1	-30
Seasonal storage Solar heating	-23	-	-	-23
Windpower	-	-	-16	-16
Total	0	0	0	-88

*) Including processcooling 10 kWh/m2
**) Exclusive tenant electricity

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Low speed Air Handling Unit

Air speed 1,0 m/s

Heat recovery efficiency 81 %

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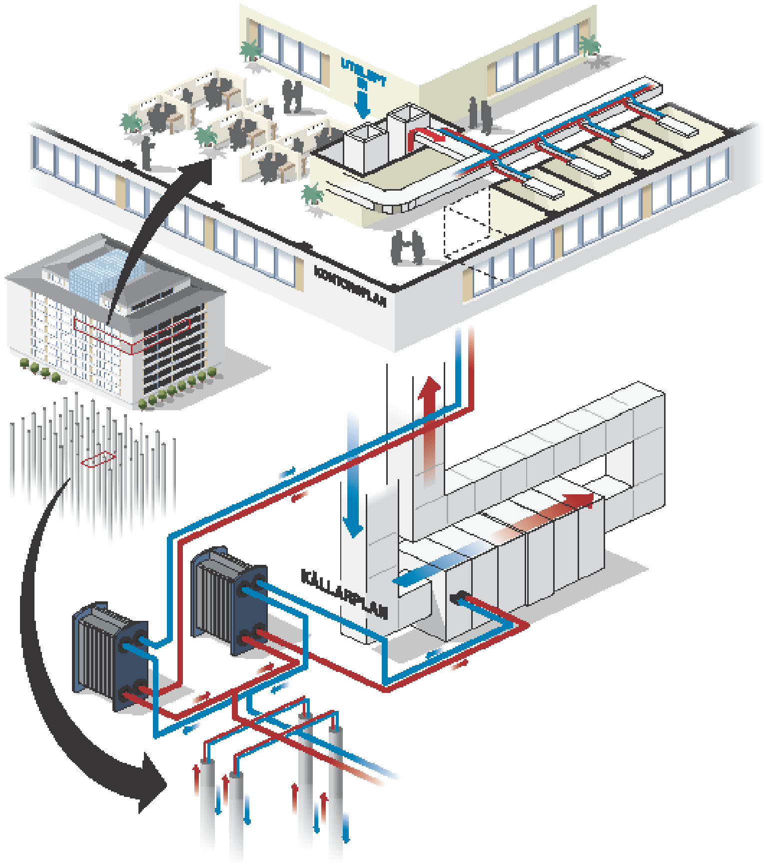
Deep Green Cooling
Pat. pended

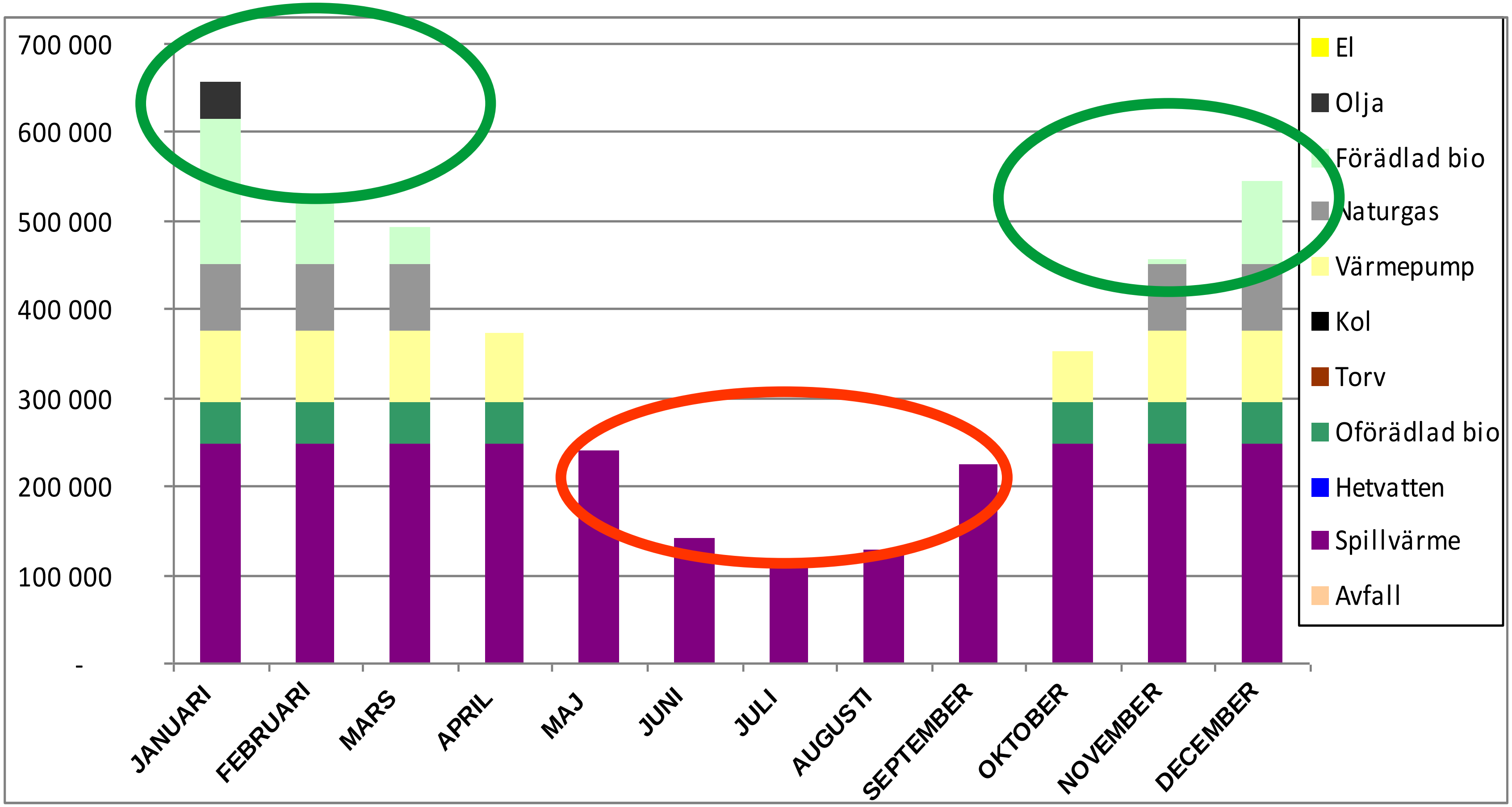
Summertime building is cooled by the storage
Wintertime storage is charged by cold outdoor air
and the building is at the same time preheated by the storage (supply air)

Robust solution,
(no heat pumps or chillers needed between storage and building while using self-regulating cooling beam system)

Ground based bore hole storage
in normal ground temperature level

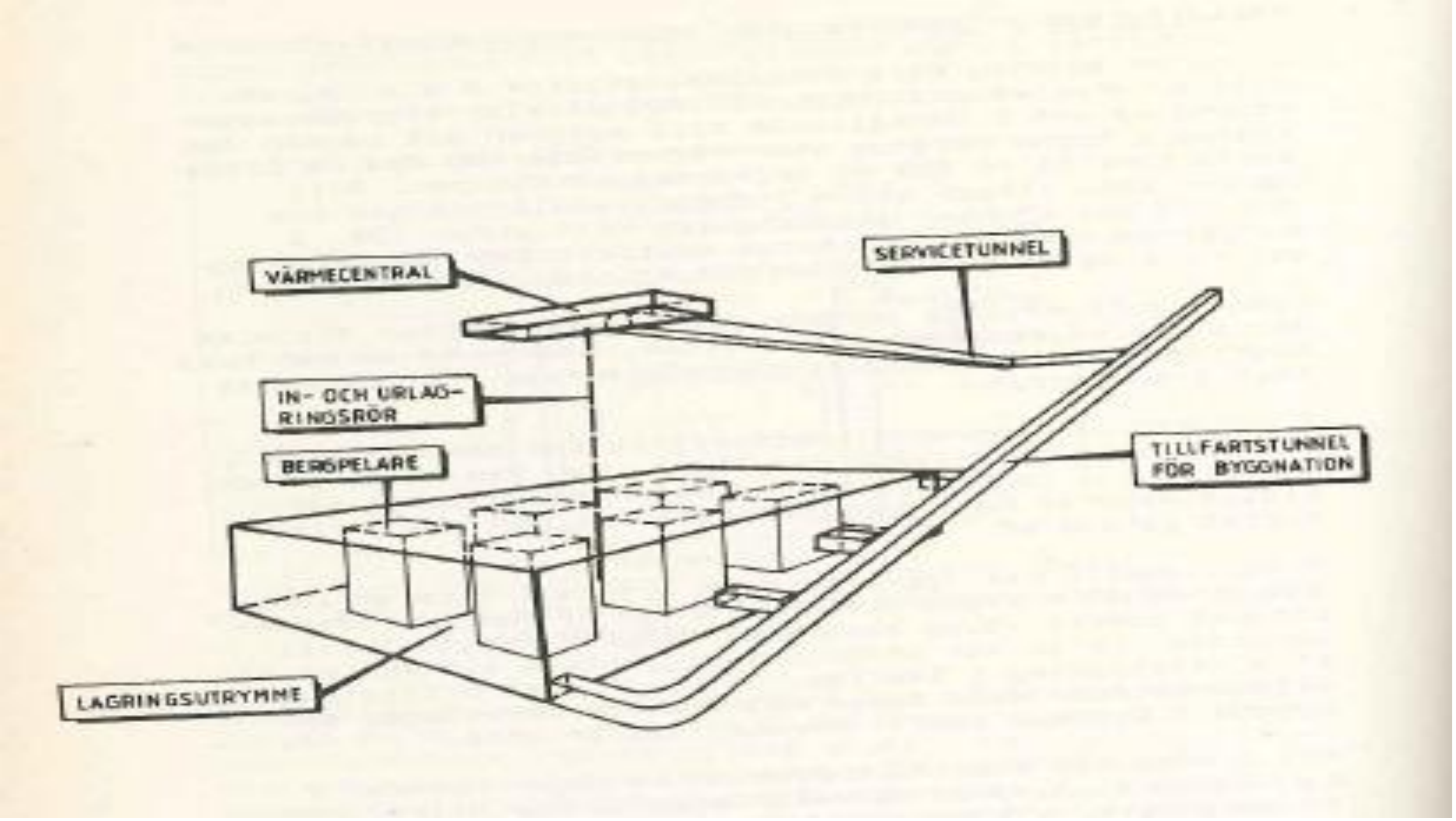


Typical district heating in Sweden, possible solar heating



Solar heating farm for district heating - Kungälv

Seasonal storage



End

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Energy consumption, project

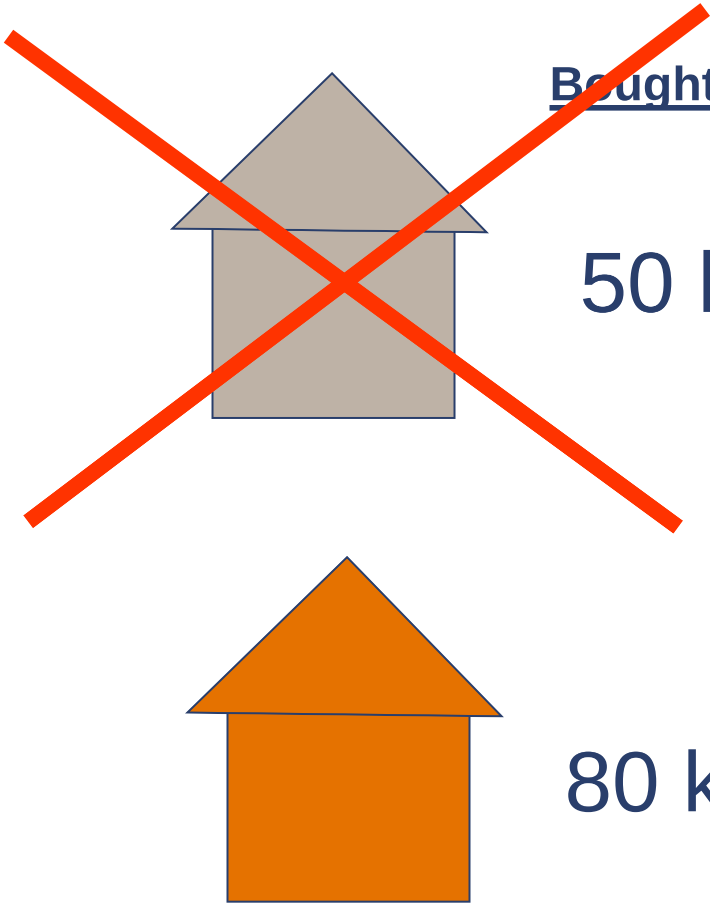
- **What effects on what ?,   Specific energy per year***

Heavier structure	+ 100/150 mm	~ **-1** kWh/sqm
Increase insulation,	+200 mm	~ **- 3** kWh/sqm
Increase insulation,	+1000 mm	~ **- 5** kWh/sqm
Increase glass,	40% - 60%	~ **+7** kWh/sqm
Increase glass,	40% - 100%	~ **+ 22** kWh/sqm
Better glass, U	1,4 – 1,0 W/	~ **- 5** kWh/sqm
Low speed AHU	2,5 – 1,6 m/s	~ **- 7** kWh/sqm
High eff AHU	60% – 85%	~ **- 16** kWh/sqm

*) Base level 85 kWh/kvm GLA

- **Which solution is most energy efficient ?**

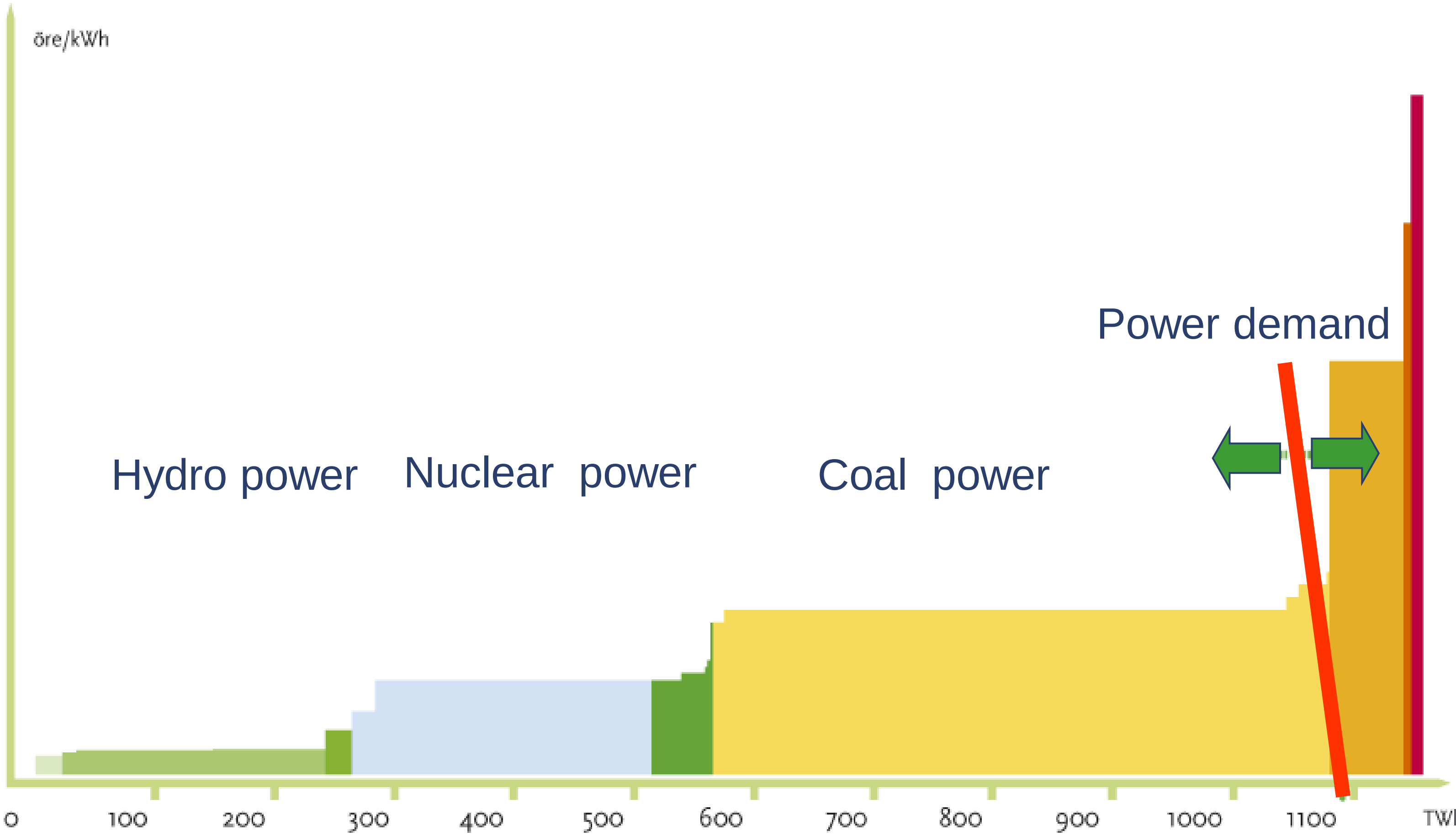
<u>Bought energy</u>



50 kWh/m^2

80 kWh/m2

Power production North Europe



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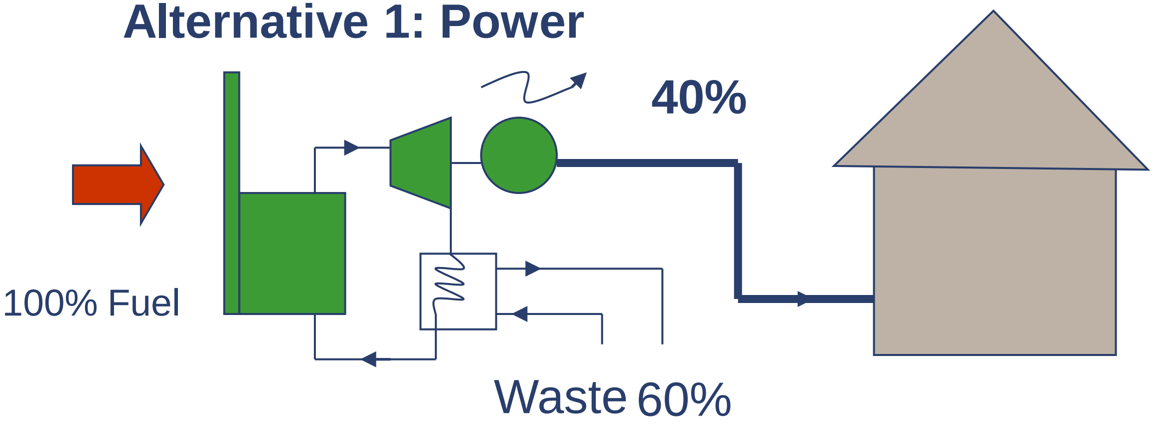
– Which solution is most energy efficient ?

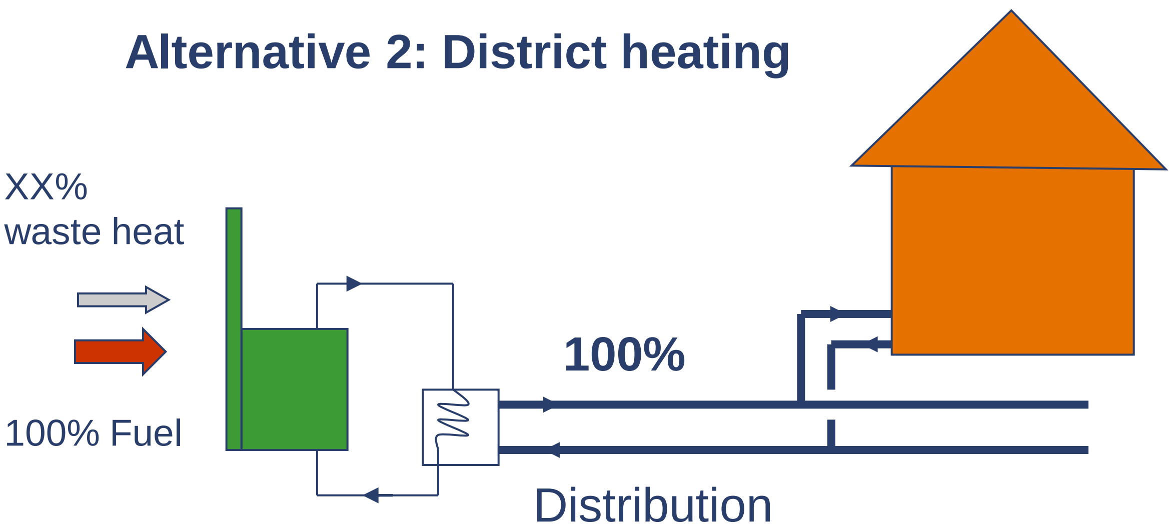
Alternative 1: Power



	Bought energy	Primary energy
Alternative 1: Power	50 kWh/m^2	**125 kWh/m^2**
Alternative 2: District heating	80 kWh/m2	**80 kWh/m^2**

$$\left(\frac{100}{40} \times 50 = 125\right)$$

Alternative 2: District heating



$$\left(\frac{100}{100} \times 80 = 80\right)$$