Training for Renovated Energy Efficient Social housing

Intelligent Energy -Europe programme, contract n° EIE/05/110/SI2.420021

Section 3: Case studies

3.6 Husby Terasse, An example from Norway

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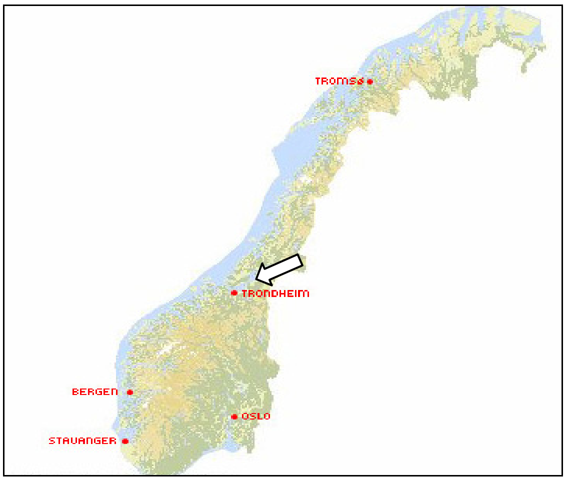
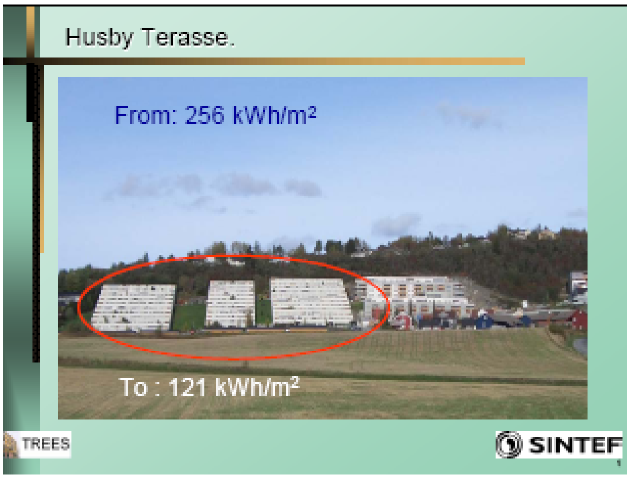
INTRODUCTION

This paper gives additional comment to each slide to give the lecturer insight in the issues that are presented.

Case: Husby Terasse, " from 250 to 120 "



Husby Terrasse is situated approx. 30 km north of Trondheim, Norway.

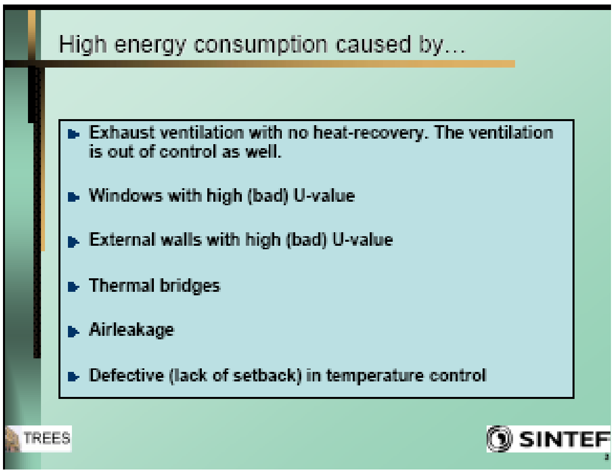


Slide 1

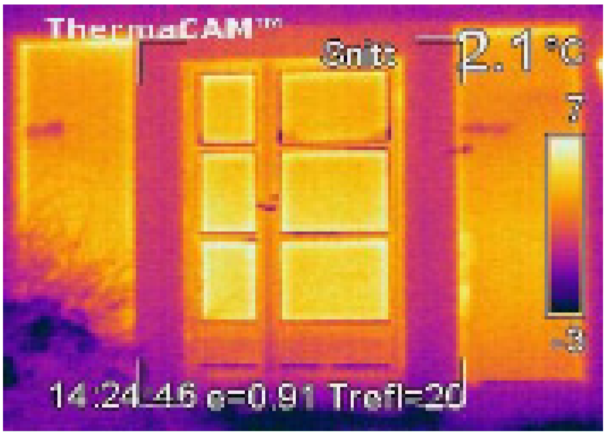
Husby Terasse consist of 110 apartments, erected in the middle of 1970.
Like other domestic buildings in Norway from that decennium, energy efficiency was not given too much attention. Combined with failure in window sealing system, and poor ventilation systems, the energy consumption was measured to approx. 255 kWh/m2 year

In the beginning of year 2000 the owners decided to execute a major rehabilitation. Trough this upgrading the energy target was set to 120 kWh/m^2 year. Approximately half of the measured energy use.

Slide 2
As the name alludes, the buildings are organized as terraces. The facades are faced to south and consist of approx. 50 % glassed area. (balcony door and rather big windows.)



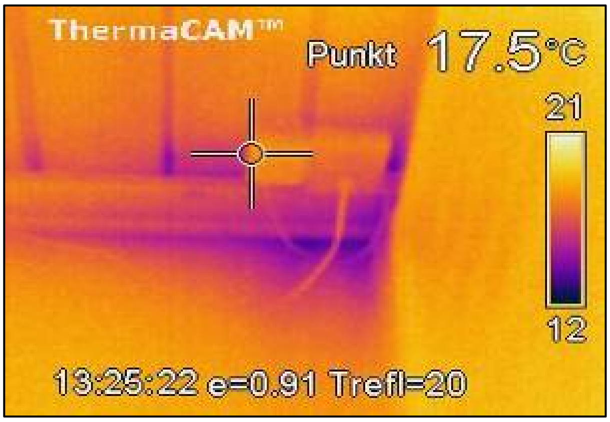
Slide 3
An inspection concluded that the huge energy use where caused by poor insulation in all walls, bad U-value in windows/balcony doors, thermal bridges and poor airtightness particular in the conjunctions. The ventilation system was outdatet and out of functional control as well



Slide 4
The inspection was supported by thermo photographing.

Picture taken from outside.

Average temperature [balconydoor] is 2.1 ^{o}C.
Light/Yellow colour indicate temp.up to + 7 ^{o}C.
Dark/blue colour indicate temp down to – 3 ^{o}C.

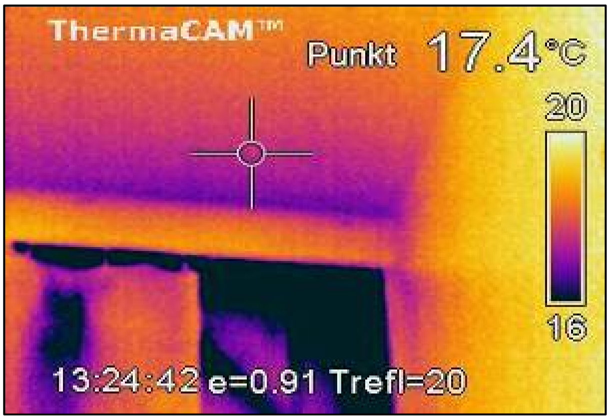


Slide 5
Thermal photo is a useful way to detect thermal bridges.

Picture is taken from inside

The picture is detecting thermal bridges in the joint between external walls and the floor (concrete slab)

The pedestals in the wall is dectected as well

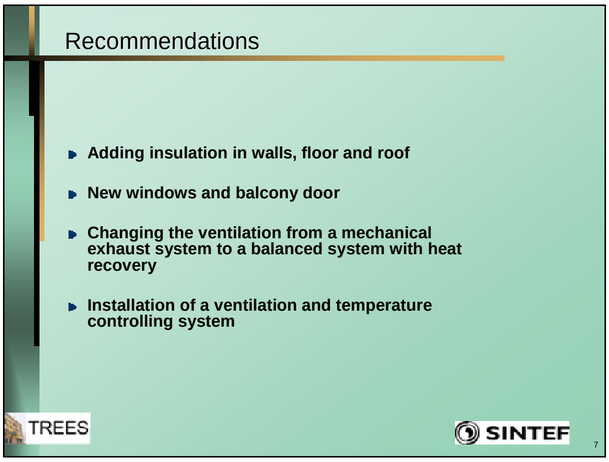


Slide 6
Picture is taken from inside

Thermal bridges in the joint between external walls and the ceiling/floor

Slide 7
Picture is taken from inside

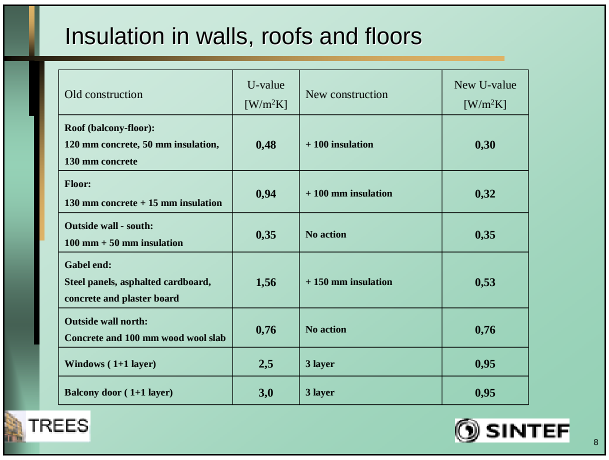
Thermal bridge/air leakage in electrical switches (left)



Slide 8
The recommendations are reflecting what the inspection detected.
In a project like this, the package of energy related measures must be combined and adjusted to the rest of the rehabilitation activities.

An extra challenge is that the habitableness shall remain during rehabilitation period.

Taking these moments into considerations, the recommendations ended up with;
Adding insulations, new windows, new ventilation system and a new centralized temperature controlling systems for every apartment.

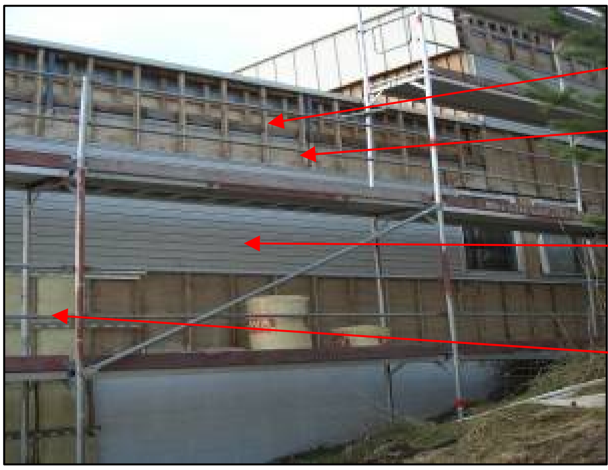


Old construction	U-value [W/m²K]	New construction	New U-value [W/m²K]
Roof (balcony-floor): 120 mm concrete, 50 mm insulation, 130 mm concrete	0,48	+ 100 insulation	0,30
Floor: 130 mm concrete + 15 mm insulation	0,94	+ 100 mm insulation	0,32
Outside wall - south: 100 mm + 50 mm insulation	0,35	No action	0,35
Gabel end: Steel panels, asphalted cardboard, concrete and plaster board	1,56	+ 150 mm insulation	0,53
Outside wall north: Concrete and 100 mm wood wool slab	0,76	No action	0,76
Windows (1+1 layer)	2,5	3 layer	0,95
Balcony door (1+1 layer)	3,0	3 layer	0,95

Slide 9
The table give U-values for old and new constructions and elements.

Slide 10
Picture is taken of outside east wall before adding insulation.

As a first step these steel panels are removed



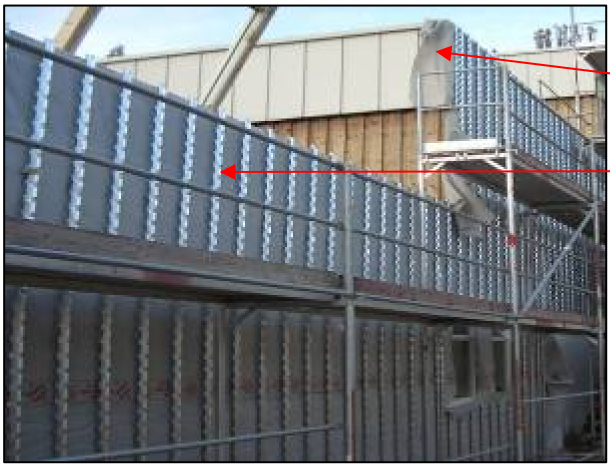
Slide 11
Section with removed steel panels

Section covered with old windbreaker

New steel panels

Section with 1.layer of new insulation

Slide 12
Picture showing the two layers of new insulations (50 + 100 mm), and the steel frame for the panels.



Slide 13
The second layer of insulation is covered with a windbreaker.

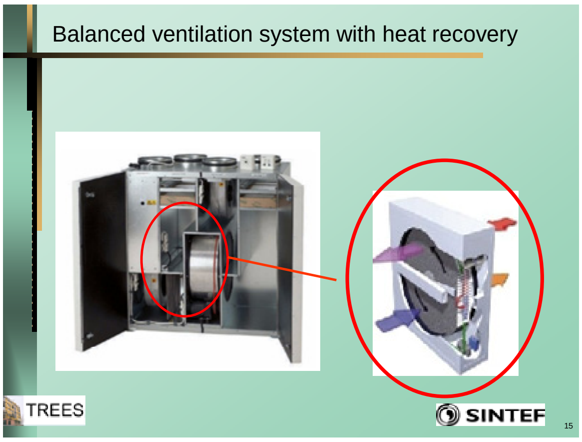
The windbreaker is fixed by the steel frame-work. The frame also act as a support to the new panels

Slide 14
Outside wall finished

Slide 15
Energy efficient windows with triple glazing. 2 low emission coatings, argon gas, superspacers and wooden frame.
This construction gives a U-value of 0.95 W/m²K.

4E – 12Ar – 4 – 12Ar - 4E

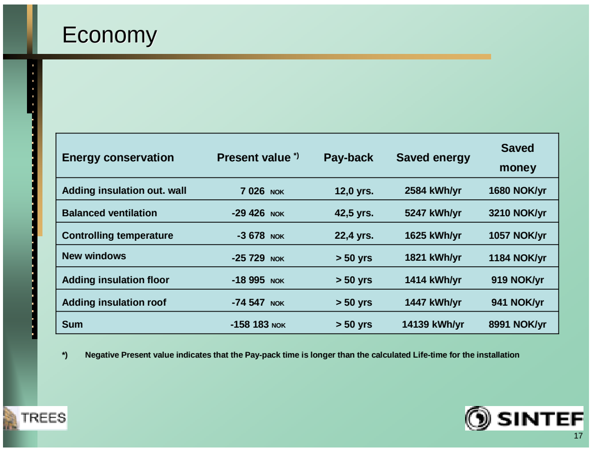
- 4 mm glas with low emission coating
- 12 mm argon filled space
- 4 mm glas
- 12 mm argon filled space
- 4 mm glas with low emission coating



Slide 16
Balanced ventilation system with heat recovery

The heat recovery unit consist of a rotating wheel at (different speed). The heat from the extracted air is warming up a part of the wheel. When the wheel rotates, the stored heat is used to warm up the cold supply air.

About 85-90 % of the energy demand can be transferred from the extracted air.



Slide 17
Different energy measures were calculated via an LCC method, and presented by "Present value", and "Pay-back time" This in addition to the numeric value of yearly saved energy and money.
As shown in table, only "adding insulation outside wall", achieved positive values according to "present value". The rest of the measures achieved rather bad values.
This was communicated to the owners in advance before measures were put into action. They still wanted to implement the job.

In 2006 the first result from an ongoing logging of energy use is terminated.
Feedback from this survey shows a remarkable accordance between calculated and measured energy-values.

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