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Training for Renovated Energy Efficient Social housing

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

Intelligent Energy Europe

Section 3 Case studies

3.6 Husby terasse - an example from Norway

Tore Wigenstad

SINTEF - Byggforsk

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Context Context and and objectives of the project

- **Husby Terasse, Norway, consist of 110 apartments, erected in the middle of 1970.**
- **Outdated technical installations and poor performance in the building envelope**
- **High potentials for improving indoor air quality**
- **Objectives of the project:**
  - Reduce energy demand from by 50 % from 250 kWh/m^2 yr to 125 kWh/m^2 yr
  - Improve indoor air and temperature quality
  - Contribute to a better LCC in a standard renovation project
  - Demonstrate innovation and promote replication
  - Contribute in a municipal sustainability project

Improvement compared to standard renovation

- **Adding insulation in walls, floor and roof**
- **New windows and balcony door**
- **Changing the ventilation from a mechanical exhaust system to a balanced system with heat recovery**
- **Installation of a ventilation and temperature controlling system**

Husby Terasse.

Feedback from this survey shows a remarkable accordance between calculated and measured energy-values.

Husby Terasse.

Renovation of 110 apartments

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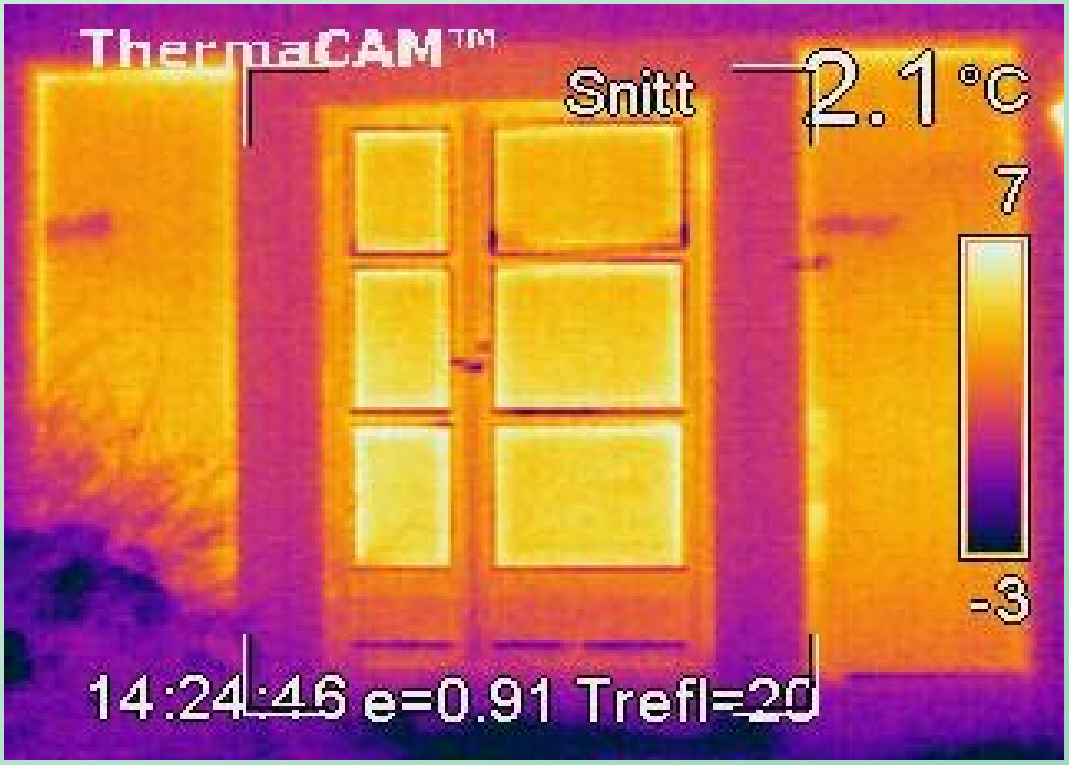
High energy consumption caused by…

- **Exhaust ventilation with no heat-recovery. The ventilation is out of control as well.**
- **Windows with high (bad) U-value**
- **External walls with high (bad) U-value**
- **Thermal bridges**
- **Airleakage**
- **Defective (lack of setback) in temperature control**

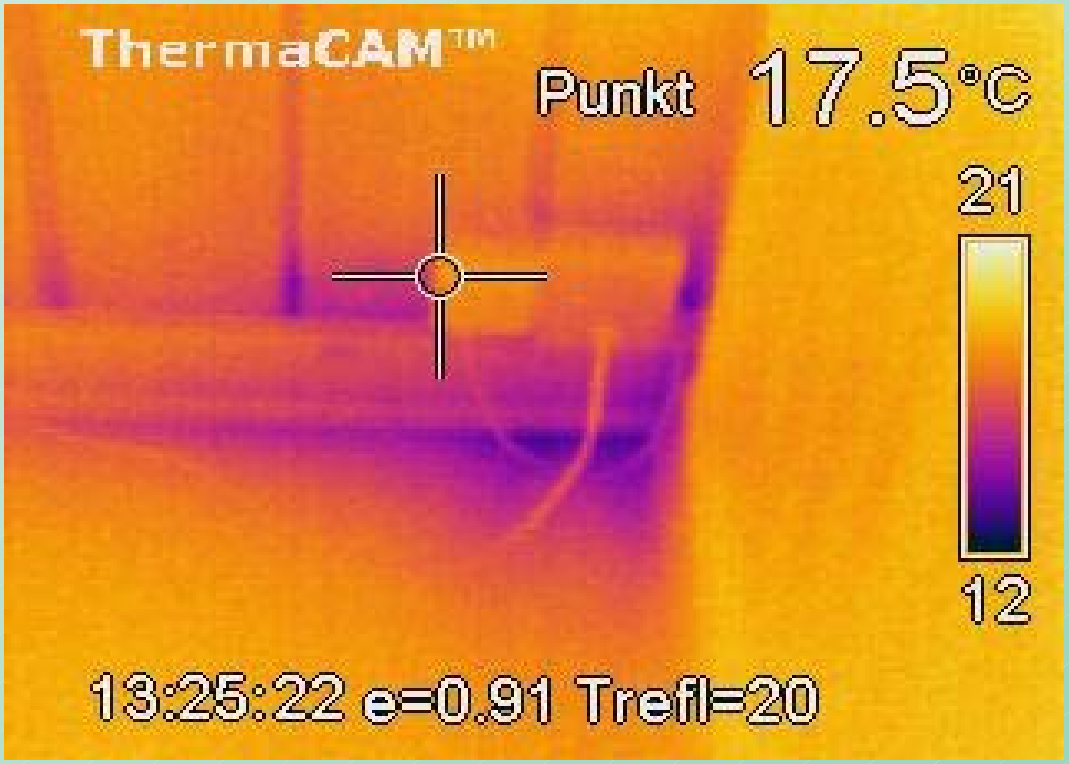
Cause and effect…..



High U-value in windows and balcony door, result in heat lekage from the inside.

(photo is taken from outside)

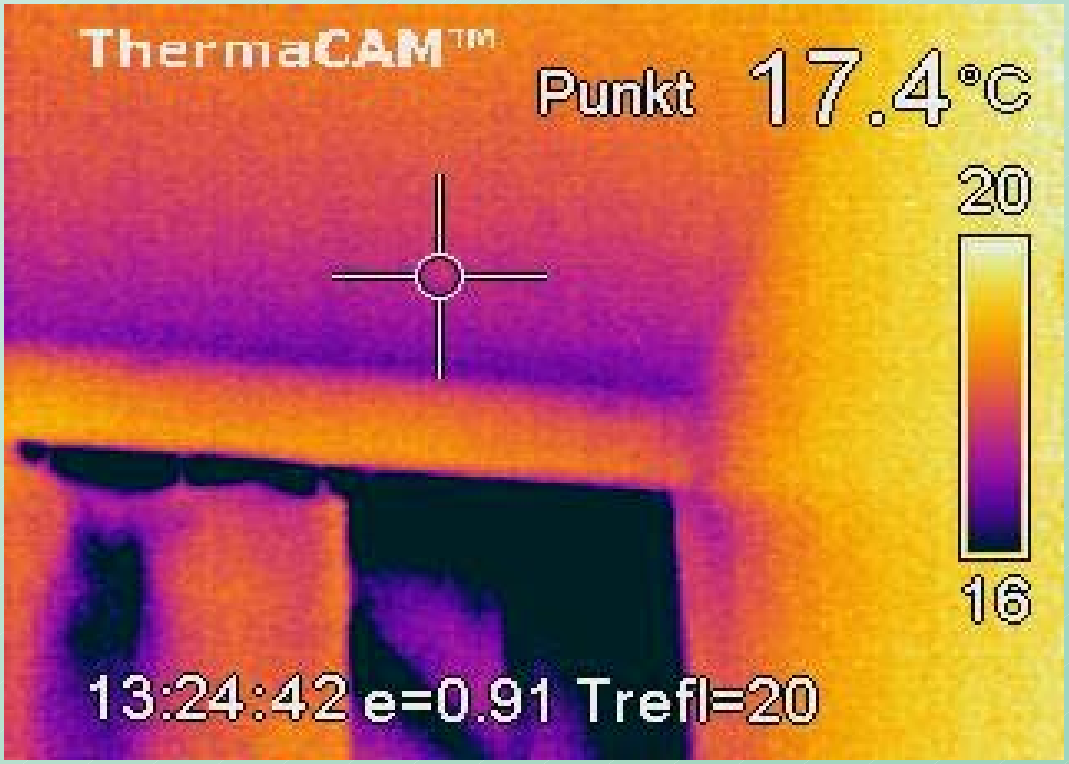
Cause and effect…..



Thermal bridge in the joint between external walls and the floor (concrete slab)

(photo is taken inside)

Cause and effect…..



Thermal bridge in the joint between external walls and the roof (concrete slab)

(photo is taken inside)

Cause and effect…..

Thermal bridge /air leakage in electrical switches

(photo is taken inside)

Recommendations

- **Adding insulation in walls, floor and roof**
- **New windows and balcony door**
- **Changing the ventilation from a mechanical exhaust system to a balanced system with heat recovery**
- **Installation of a ventilation and temperature controlling system**

Insulation in walls, roofs and floors

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**

Outside wall before adding insulation.

Old steel panels. The panels are removed

Section with removed steel panels and the old windbreaker

Section covered with old windbreaker

New steel panels

Section with 1. layer of new insulation

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After removing the panels (and old insulation), 2 layers of insulation is added.

(Second layer)

The insulation is covered with a windbreaker.

Framework to support the new panlels

Outside wall finished

Energy efficient windows with triple glazing, 2 low emission coatings, argon gas, superspacers and wooden frame. Gives U-value of 0.95 W/m²K.

4E – 12Ar – 4 – 12 Ar - 4E

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

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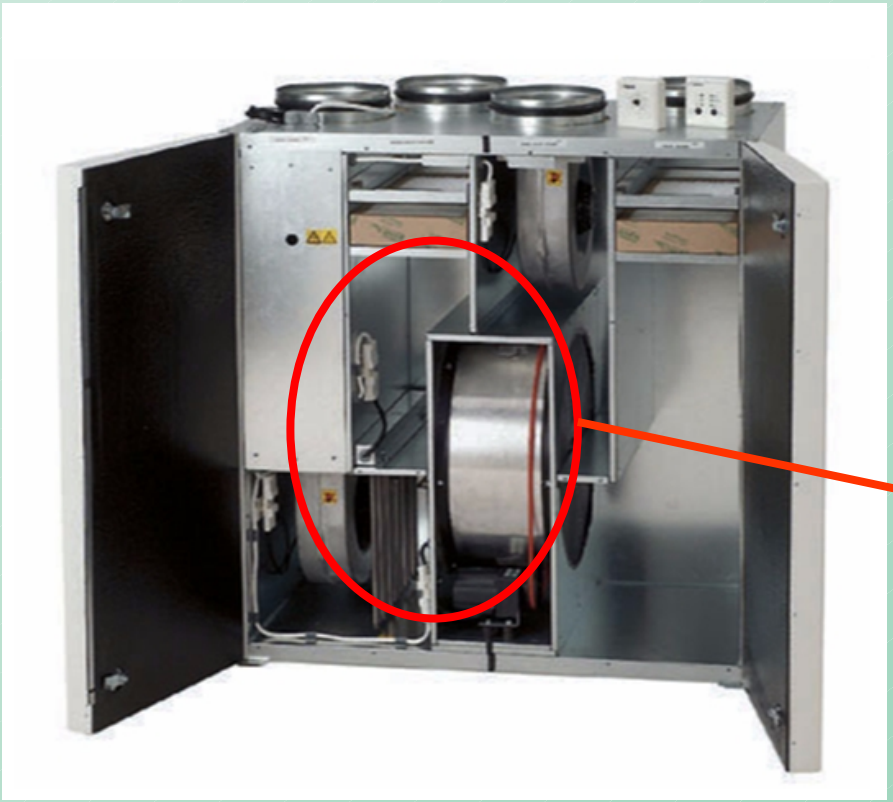
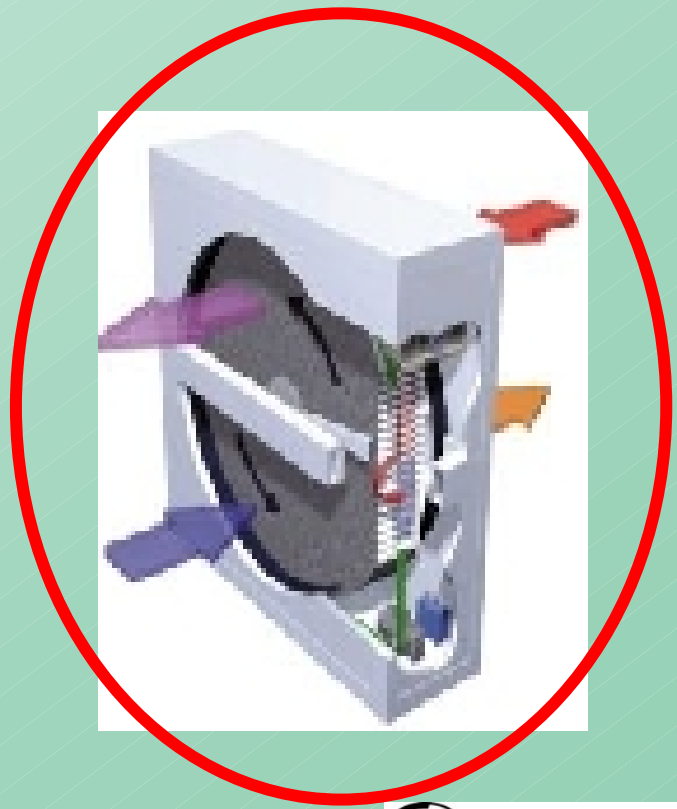
Balanced ventilation system with heat recovery





Economy

Energy conservation	Present value *)	Pay-back	Saved energy	Saved money
Adding insulation out. wall	7 026 NOK	12,0 yrs.	2584 kWh/yr	1680 NOK/yr
Balanced ventilation	-29 426 NOK	42,5 yrs.	5247 kWh/yr	3210 NOK/yr
Controlling temperature	-3 678 NOK	22,4 yrs.	1625 kWh/yr	1057 NOK/yr
New windows	-25 729 NOK	> 50 yrs	1821 kWh/yr	1184 NOK/yr
Adding insulation floor	-18 995 NOK	> 50 yrs	1414 kWh/yr	919 NOK/yr
Adding insulation roof	-74 547 NOK	> 50 yrs	1447 kWh/yr	941 NOK/yr
Sum	-158 183 NOK	> 50 yrs	14139 kWh/yr	8991 NOK/yr

*) Negative Present value indicates that the Pay-pack time is longer than the calculated Life-time for the installation