From Energy audit to real savings.

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Estonia

**Area:** 45 227 km² (the Tartu Peace Treaty of 1920 defined 47 549 km²)

**Coastline:** 3794 km

**Land borders:** 343.0 km with Latvia and 338.6 km with the Russian Federation

**Distance** from Tallinn

- to Helsinki: 85km;
- to Riga: 307km;
- to St. Petersburg: 395km;
- to Stockholm: 405km
Statistics about housing in Estonia

- 98% of all the apartments privatized
- Ca 9900 apartment associations and cooperatives today
- 60% of the housing stock is built between 1960-1990, 30% built before 1960
- 65% of Estonian population (1,3 mil.) lives in apartment associations and cooperatives
Estonian degree days

30 y average degree days

Degree days
Energy - you can see it.
Explanation

• **Specific heat** – space heat only, corrected with weather data – space heat data have been corrected with long term average degree days, internal temperature has been used on +17 C level.
• Heated area (yellow) – definition has been used for consumed heat data comparision.
Windows

Natural ventilation

U = 3

No ventilation

U = 1,7
Walls

U = 0,2

U = 1
Roof

$U = 1$

$U = 0.2$
Heating system
Specific heat consumption, kWh/m².
Examples from implemented energy saving measures (1).

9. floors, 72 flats.

- Roof and end walls insulated on 2004, windows partly replaced, heating system balanced and regulated from thermal sub-station from 2005.
- Regulation on end users level still missing.

Specific heat consumption

<table>
<thead>
<tr>
<th>Year</th>
<th>Specific heat consumption kWh / living area m² annually.</th>
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<tbody>
<tr>
<td>2004</td>
<td>200,0</td>
</tr>
<tr>
<td>2005</td>
<td>180,0</td>
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<tr>
<td>2006</td>
<td>160,0</td>
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</table>
Examples from implemented energy saving measures (2).

5 floors 80 flats.

- External walls insulation and windows replacement until 2004, pipes insulation in basement, heating system balancing and sub-station automatisation afterwards.
Examples from implemented energy saving measures (3).

5 floors 75 flats.

- All external walls insulated, basement and staircases windows replaced until 2005.
- Afterwords heating system regulation, but not on radiator level.
Walls (envelope) insulation

- Without possibility to regulate heating system – mostly for destroying thermal bridges.
Examples from implemented energy saving measures (4).

4 floors 56 flats.

- Total external walls insulation on 2004, after windows replacement on 2005 consumption rised (luck of ventilation or indoor temperature regulation with windows?)
Examples from implemented energy saving measures (5).

9 floors 72 flats.

- All external walls insulated and windows with ventilation system replaced on 2001,
- heating system renovated until the end users level (thermoregulator) on 2002,
- 2003 heat allocation system was installed (saving motivation!).
- Savings 45%
Heating after renovation
Ventilation after renovation

Building based system – heat recovery with heat pump

Appartement based system – heat recovery with heat exchanger.
Complex renovation

- Total envelope insulation (prefabricated panels!)
- Total windows replacement (U max 1.1)
- Heating system renovation, regulation on radiator level (thermostatic valve)
- Ventilation with heat recovery system (80% min).
Economic view.

• To get on the specific heat consumption level about 60 kWh/m² the investment need is about 130 EUR/m².
Thank you for attention!

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