




Factsheet

BEST 6 Limited liability housing company Torinnaapuri


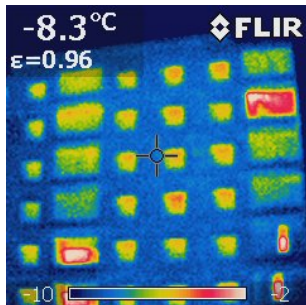


























EU-GUGLE stands for "European cities serving as Green Urban Gate towards Leadership in sustainable Energy" and is funded under the 7th Framework Programme for Research and Technological Innovation. It is co-ordinated by CENER, Spain's National Centre for Renewable Energies.

PROFILE


| | | |
|---------------------|---|----------|
| Name and address | <i>The demonstartion area Tammela district and DEMO 6 Limited liability housing company Torinnaapuri</i> | |
| Map |  <p>Copyright 2016 Lentokuva Vallas Oy</p> | |
| Description | <p><i>Tammela district, where the renovations take place, has around 7000 inhabitants. The age distribution of Tammela is one-sidedly mostly elderly people, young couples and students. 94 % of the inhabitants are between ages 18-over 85 and only 6 % between the ages 0-17. Decision making in the privately owned limited liability housing companies can be challenging because of lack of interest to do big renovations and lack of funds. Tammela district is also demonstration area for infill development. And there are several projects that are trying to help and encourage the limited liability housing companies in the area to use infill development as a means of funding renovations and improve quality of living.</i></p> | |
| Ownership | <i>Owner occupied building</i> | |
| Gross volume | 3024 m2 | |
| Number of dwellings | 42 | |
| Energy performance | BEFORE | <i>E</i> |
| | TARGET/AFTER | <i>C</i> |

1 – Description before refurbishment

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|---|---|--|-----|---|--|--------|---|--|---------|---|--|---------|---|--|---------|--|---|---------|--|--|------|--|--|
| Detailed characteristics of building |  | | | | | | | | | | | | | | | | | | | | | | | |
| Building envelope | Pre-fabricated concrete building U value 0,4 Windows U value 2,1 | | | | | | | | | | | | | | | | | | | | | | | |
| Technical system | District heating; central heating Mechanical exhaust air Renewables in district heat production 17 % Renewables in grid electricity 13 % | | | | | | | | | | | | | | | | | | | | | | | |
| Thermal imaging before refurbishment |  | | | | | | | | | | | | | | | | | | | | | | | |
| Energy performance certificate* | <table><tr><td>-75</td><td></td><td></td></tr><tr><td>76-100</td><td></td><td></td></tr><tr><td>101-130</td><td></td><td></td></tr><tr><td>131-160</td><td></td><td></td></tr><tr><td>161-190</td><td></td><td></td></tr><tr><td>191-240</td><td></td><td></td></tr><tr><td>241-</td><td></td><td></td></tr></table> | | | -75 |  | | 76-100 |  | | 101-130 |  | | 131-160 |  | | 161-190 |  |  | 191-240 |  | | 241- |  | |
| -75 |  | | | | | | | | | | | | | | | | | | | | | | | |
| 76-100 |  | | | | | | | | | | | | | | | | | | | | | | | |
| 101-130 |  | | | | | | | | | | | | | | | | | | | | | | | |
| 131-160 |  | | | | | | | | | | | | | | | | | | | | | | | |
| 161-190 |  |  | | | | | | | | | | | | | | | | | | | | | | |
| 191-240 |  | | | | | | | | | | | | | | | | | | | | | | | |
| 241- |  | | | | | | | | | | | | | | | | | | | | | | | |
| Other relevant technical aspects | | | | | | | | | | | | | | | | | | | | | | | | |

*Not the official energy certificate calculation. Calculation is based on the Finnish 2013 legislation of the buildings' energy certificate 18.1.2013/50 but it takes into account more precisely the technical values of the measures done in the building.

2 – Refurbishment concept

| | |
|--------------------------------|---|
| Concept |  |
| Envelope | <i>Additional insulation and rendering; New windows and doors</i> |
| Technical service systems | <i>District heating; energy efficiency improvement of central heating, ventilation, lighting and water system Renewables in district heat production 38 % Renewables in grid electricity 25 %</i> |
| Mechanical ventilation | <i>Supply air windows</i> |
| Thermal renewable integration | <i>Heat recovery and exhaust air heat pumps</i> |
| Electric renewable integration | <i>no</i> |
| Financing model | <i>Bank loan and EU grant</i> |

3 - Implementation

| Stakeholders involved | |
|---|---|
| Project manager | <i>A-insinöörit Rakennuttaminen Oy</i> |
| Designer (structures) | <i>A-Insinöörit Suunnittelu Oy</i> |
| Designer (building service system) | <i>Rejlers Oy</i> |
| Main Contractor | <i>Pirkanmaan mestarirakentajat Oy</i> |
| Windows | <i>Fenestra Oy (Fenestra As since 2014)</i> |
| Installer | <i>Rakennus J. Pirhonen Oy</i> |
| Heating and ventilation remote monitoring | <i>Enermix Oy</i> |
| Safety supervisor | <i>A-insinöörit Rakennuttaminen Oy</i> |

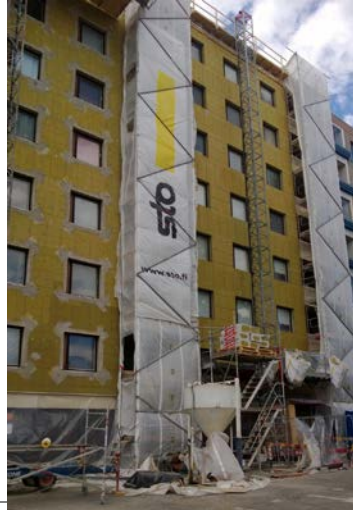
| Costs and financing** | | | |
|-----------------------|-----------------------------------|------------------|------------------|
| Refurbishment costs | <i>Facade, windows and doors</i> | | <i>232 500 €</i> |
| | <i>Ventilation and heating</i> | | <i>73 500 €</i> |
| | <i>Lighting and electricity</i> | | <i>6 000 €</i> |
| | <i>Other building services</i> | | <i>71 200 €</i> |
| | <i>Planning, supervision, etc</i> | | <i>19 160 €</i> |
| | <i>VAT 24 %</i> | | <i>97 000 €</i> |
| | <i>Total €</i> | | <i>499 000 €</i> |
| | <i>Total €/m2</i> | | <i>165 €</i> |
| Financial resources | <i>EU Grant</i> | <i>151 200 €</i> | <i>30 %</i> |
| | <i>Bank loan</i> | <i>347 800 €</i> | <i>70 %</i> |

**Costs are based on different actual and calculated costs shifted to the comparison year 2014-2016 with the construction cost index.

| Implementation planning | |
|--|---------------------------|
| 1 -step | Autumn 2011 |
| Design brief and decision of the general meeting to continue the deep renovation project | |
| 2 - step | Autumn 2012 - summer 2013 |
| Detailed façade upgrading planning, tendering process and implementation of the measures | |
| 3 - step | Autumn 2013- autumn 2014 |
| Detailed building service system upgrading planning and tendering process and implementation of the measures | |

Work progress

Outer skin has been removed.
Additional insulation + rendering
are under construction



Supply air window




New heat water tanks and
insulated pipelines



Real time control and monitoring
unit



4 - Description after refurbishment

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---|--|-----|---|--|--------|---|--|---------|---|---|---------|---|--|---------|---|--|---------|---|--|------|---|--|
| Photo to show architectonic concept |  | | | | | | | | | | | | | | | | | | | | | | | |
| A thermal imaging showing before/after insulation | N/A | | | | | | | | | | | | | | | | | | | | | | | |
| Envelope characteristics | Additional insulation U value 0,23 and rendering Windows U value 0,8 | | | | | | | | | | | | | | | | | | | | | | | |
| Technical system | District heating; central heating; real time remote monitoring | | | | | | | | | | | | | | | | | | | | | | | |
| Renewable energy sources | Exhaust air heat pumps 40 kW In district heat production 38 % In grid electricity 25 % | | | | | | | | | | | | | | | | | | | | | | | |
| Energy consumption (final and primary) | 108 kWh/m²/a | | | | | | | | | | | | | | | | | | | | | | | |
| Energy efficiency certificate* | <table><tr><td>-75</td><td>A</td><td></td></tr><tr><td>76-100</td><td>B</td><td></td></tr><tr><td>101-130</td><td>C</td><td>C</td></tr><tr><td>131-160</td><td>D</td><td></td></tr><tr><td>161-190</td><td>E</td><td></td></tr><tr><td>191-240</td><td>F</td><td></td></tr><tr><td>241-</td><td>G</td><td></td></tr></table> | | | -75 | A | | 76-100 | B | | 101-130 | C | C | 131-160 | D | | 161-190 | E | | 191-240 | F | | 241- | G | |
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| 76-100 | B | | | | | | | | | | | | | | | | | | | | | | | |
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| 241- | G | | | | | | | | | | | | | | | | | | | | | | | |
| Note: weighted by energy form factors | | | | | | | | | | | | | | | | | | | | | | | | |

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5 - Performance monitoring

| | |
|--------------------|--|
| Monitoring System | <i>Remote monitoring system Talotohtori[®]. Smart metering by utility company (district heat and electricity)</i> |
| Monitored variable | <i>District heat to space and water heating Harvested heat to space and water heating Water Electricity</i> |

| Performances *** | | | |
|---|----------|---------|-----------|
| | Existing | Planned | Monitored |
| Electric consumption kWh/m ² /year | 8 | 8 | 8 |
| Thermal consumption kWh/m ² /year (HP electricity) | - | 15 | 15 |
| Thermal consumption kWh/m ² /year (DH) | 158 | 93 | 67 |
| Thermal consumption kWh/m ² /year (own production) | - | -40 | -12 |
| Gross energy consumption in final energy | 166 | 76 | 78 |
| Electric RES contribution kWh/m ² /year | 1 | 6 | 6 |
| Thermal RES contribution kWh/m ² /year | 27 | 76 | 38 |
| Operational costs €/m ² /year | 9 | 5 | 5 |

***Comparison between the calculated original state and the planned as well as monitored values of the completed building after at least one whole year of monitoring.