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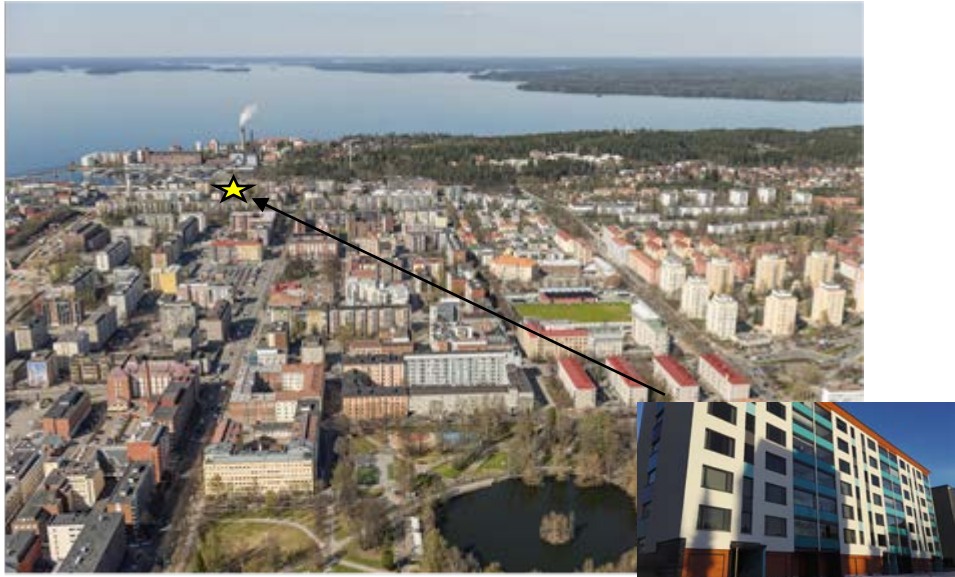
## Fact sheet

BEST 2 Limited liability housing company Kaupinpiiritti

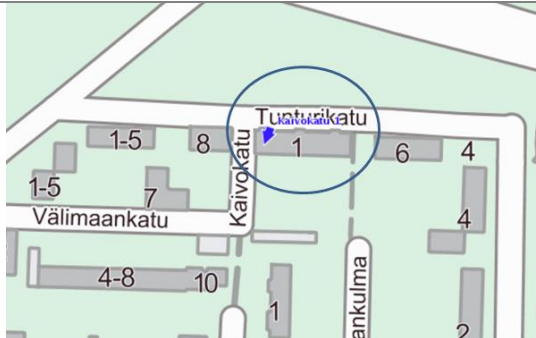

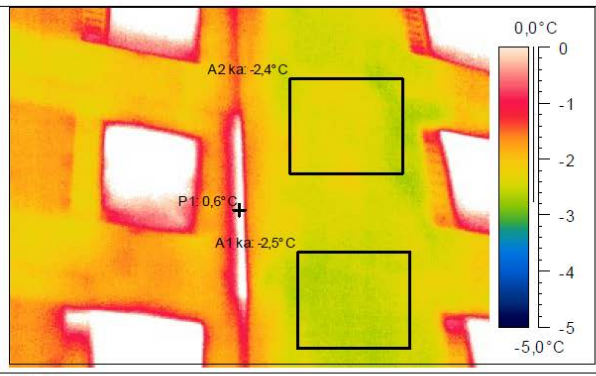


EU-GUGLE stands for “European cities serving as Green Urban Gate towards Leadership in sustainable Energy” and is funded under the 7<sup>th</sup> Framework Programme for Research and Technological Innovation. It is co-ordinated by CENER, Spain’s National Centre for Renewable Energies.

## PROFILE

|                     |  |   |
|---------------------|--|---|
| Name and address    | <i>The demonstration area Tammela district and DEMO 2 Limited liability housing company Kaupinpirtti</i>   |   |
| Map                 |  <p>Copyright 2016 Lentokuva Vallas Oy</p> <p>Copyright Olli Vakkala</p>  |   |
| Description         | <p><i>Tammela district, where the renovations take place, has 6337 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        | 3693 m <sup>2</sup>  |   |
| Number of dwellings | 78   |   |
| Energy performance  | BEFORE   | F |
|                     | TARGET/AFTER   | D |


### 1 – Description before refurbishment

|  |   |   |   |
|--|---|---|---|
| Detailed characteristics of building   |   |   |   |
| Plot map   |   |   |   |
| Building envelope  | Pre-fabricated concrete U value 0,4; windows U value 2,5  |   |   |
| Technical system   | District heating; central heating; mechanical exhaust air<br><i>Renewables in district heat production 17 %</i><br><i>Renewables in grid electricity 13 %</i> |   |   |
| Thermal imaging before refurbishment   |   |   |   |
|  |    |   |   |
| K 17   | K 18  |   |   |
| Energy performance certificate*  | -75   | A |   |
|  | 76-100  | B |   |
|  | 101-130   | C |   |
|  | 131-160   | D |   |
|  | 161-190   | E |   |
|  | 191-240   | F | F |
|  | 241-  | G |   |
|  |   |   |   |
| 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; new outer skin;<br/>new supply air windows <math>U=0,8 \text{ W/m}^2\text{K}</math></i>  |
| Technical service systems      | <i>District heating; central heating;<br/>Remote monitoring;<br/>Energy efficient LED lighting with presence control<br/>Renewables in district heat production 38 %<br/>Renewables in grid electricity 25 %</i> |
| Thermal renewable integration  | <i>Heat recovery by exhaust air heat pump</i>  |
| Electric renewable integration | -  |
| Financing model                | <i>Bank loan; EU Grant</i>   |

### 3 - Implementation



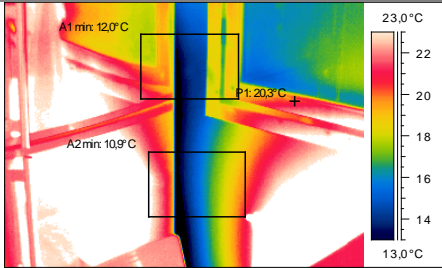
|                           |                             |
|---------------------------|-----------------------------|
| Stakeholders involved     |                             |
| Project manager           |                             |
| Planning                  | A Insinöörit Suunnittelu Oy |
| Envelope designer         | A Insinöörit Suunnittelu Oy |
| Technical system designer |                             |
| Main contractor           | IS-Yhtiö Oy                 |
| Windows supplier          | Pihla Oy                    |
| Sub contractors           | Putkityö KV Oy              |
|                           |                             |

|                       |  |
|-----------------------|--|
| Costs and financing** |  |
| Refurbishment costs   | <i>Breakdown of all costs (work, monitoring, etc) - N/A<br/>the whole budget around 1,6 MEUR</i> |
| Financial resources   | <i>Bank loan 90 %<br/>EU GUGLE GRANT 10%</i>   |

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

|   |      |
|---|------|
| Planning and Implementation   |      |
| 1 - step one  | 2014 |
| <i>Condition assessment; thermographs; design brief</i>             |      |
| 2 - step two  | 2015 |
| <i>Detailed planning</i>  |      |
| 3 - step three  | 2016 |
| <i>Call of bids; procurement; implementation of deep renovation</i> |      |

## 4 - Description after refurbishment

|   |  |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
|---|--|--------------|--------------|--|--------|--------------|--|---------|--------------|--|---------|--------------|--------------|---------|--------------|--|---------|--------------|--|------|--------------|--|
| Photo to show<br>architectonic concept  | <div></div> <div>Copyright Olli Vakkala</div>  |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| A thermal imaging<br>showing before insulation  | <div></div> <div></div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| Envelope characteristics  | <i>Additional insulation; new skin; new supply air windows U value 0,8 W/m2K; façade U=0,21 W/m2K</i>  |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| Technical system  | <i>District heating; central heating; LED lighting with presence control</i>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| Renewable energy sources  | <i>Exhaust air heat pump 40kW<br/>Renewables in district heat production 38 %<br/>Renewables in grid electricity 25 %</i>  |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| Energy consumption<br>(final)   | <i>119 kWh/m²/a</i>  |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| Enery efficiency<br>certificate**<br><br><i>Note: weightned by<br/>energy form factor</i> | <table><tr><td>-75</td><td><div>A</div></td><td></td></tr><tr><td>76-100</td><td><div>B</div></td><td></td></tr><tr><td>101-130</td><td><div>C</div></td><td></td></tr><tr><td>131-160</td><td><div>D</div></td><td><div>D</div></td></tr><tr><td>161-190</td><td><div>E</div></td><td></td></tr><tr><td>191-240</td><td><div>F</div></td><td></td></tr><tr><td>241-</td><td><div>G</div></td><td></td></tr></table> | -75          | <div>A</div> |  | 76-100 | <div>B</div> |  | 101-130 | <div>C</div> |  | 131-160 | <div>D</div> | <div>D</div> | 161-190 | <div>E</div> |  | 191-240 | <div>F</div> |  | 241- | <div>G</div> |  |
| -75   | <div>A</div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| 76-100  | <div>B</div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| 101-130   | <div>C</div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| 131-160   | <div>D</div>   | <div>D</div> |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| 161-190   | <div>E</div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| 191-240   | <div>F</div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |
| 241-  | <div>G</div>   |              |              |  |        |              |  |         |              |  |         |              |              |         |              |  |         |              |  |      |              |  |

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## 5 - Performance monitoring

|                    |  |
|--------------------|--|
| Monitoring System  | <i>Remote monitoring system. Smart metering by utility company</i>                         |
| Monitored variable | <i>District heat to space heating and DHW<br/>Harvested heat<br/>Water<br/>Electricity</i> |

| Performances***                                  |          |         |           |
|--|----------|---------|-----------|
|  | Existing | Planned | Monitored |
| Electric consumption kWh/m2/year                 | 7        | 27      | N/A       |
| Thermal consumption kWh/m2/year (HP electricity) | -        | 20      | N/A       |
| Thermal consumption kWh/m2/year (DH)             | 186      | 114     | N/A       |
| Thermal consumption kWh/m2/year (Own production) | -        | -49     | N/A       |
| Gross energy consumption in final energy         | 193      | 92      | N/A       |
| Electric RES contribution kWh/m2/year            | 1        | 7       | N/A       |
| Thermal RES contribution kWh/m2/year             | 32       | 92      | N/A       |
| Operational costs €/m2/year                      | 10       | 6       | N/A       |

\*\*\*The first monitored year will be 2017. 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.