




Factsheet

Fennerstraße 4,6,8,10,12,14
Oswald-Redlichstraße 7,9,11
6020 Innsbruck, Austria



SINFONIA stands for "Smart INitiative of cities Fully cOmitted to iNvest In Advanced large-scaled energy". This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 609019.

PROFILE

Name and address	<p>Name of the demo site: <i>NHT IN28</i></p> <p>Address of the demo site: Fennerstraße & Oswald-Redlich-Straße/ IN 28, 6020 Innsbruck, Austria</p>		
Map	<p>City map highlighting the surface occupied by the demo site</p>  <p>Source: http://city-map.innsbruck.gv.at</p>		
Description	<p>NHT already finished the innovative overall building renovation, consisting of the process innovation (e.g. tenants involvement process, implementation of ventilation system etc.) and the technical components of the refurbishment (e.g. insulation, PV on the rooftop, etc.). Issues such as apartment entrance doors and a new locking system have been completed. NHT is fully satisfied with the completed refurbishment of IN 28. NHT convinced the tenants of the meaningfulness and the positive aspects of the ventilation system during the refurbishment of IN 28.</p>		
Ownership	<p><i>NEUE HEIMAT TIROL (NHT)</i></p>		
Gross conditioned floor area	<p>7,359 m²</p>	Treated floor area (TFA) (PHPP²)	<p>5919 m²</p>
Number of dwellings	<p>84</p>		




Heating demand (EPC¹)	<i>BEFORE RENOVATION</i>	60,9 kWh/m²*a
	TARGET/AFTER RENOVATION	23,8 kWh/m²*a
Heating demand (PHPP²)	<i>BEFORE RENOVATION</i>	112,3 kWh/m²*a
	TARGET/CURRENT STATE	40,9 kWh/m²*a
	<i>TARGET/AFTER RENOVATION</i>	17,9 kWh/m²*a
Overall savings	Current state (before completion of ventilation & heating system)	> 60%
	After completion of ventilation & heating system	> 80%

¹ Energy Performance Certificate according to the Austrian Institute of Construction Engineering

² Passive House Planning Package




1 - DESCRIPTION BEFORE REFURBISHMENT

<p>Detailed characteristics of building</p>	<p>All objects are patched via 1 long complex of buildings and 1 small one.</p>
<p>Plot map</p>	 <p>Source: Google</p>
<p>Building envelope</p>	 <p>IN28 is typical building block constructed in the second half of the 20th century with related challenges in regards to insulation, electric cables, low performing windows, uninsulated roofs and cellars, etc.</p>
<p>Technical system</p>	<p>Decentralised heating system</p>



Energy performance certificate	Category C
Other relevant technical aspects	Not applicable

2 - REFURBISHMENT CONCEPT

Concept	 <p>Thermal renovation of the walls, the ceiling, the roof and the windows with triple-glazing. The thermal bridges of the balconies were minimized through insulation of the floor of the balconies.</p>
Energy solutions	<ul style="list-style-type: none"> • The attics are insulated with a 30 cm layer of EPS • The facade is additionally insulated with 16 cm of EPS • The walls & ceilings to the stairway and basement are equipped with 10 cm of Tektalan (mineral wool). New de-centralised gas boilers will also be partly installed. • A VAV-controlled central ventilation system is placed in the cold attic • DHW via electric de-central water heater • New LED in all public spaces <p>The PV system will be installed as a full feed system so that the generated energy will feed the public grid while the Austrian agency for green electricity compensates the missing power.</p>
Performances targets	<p>Target is to achieve a calculated energy consumption per m² of total used conditioned floor area of about 24 kWh/m²*a (EPC). In addition electricity savings between 30 – 40% should be achieved.</p>
Financing model	<p>The refurbishment is financed via a mix of reserves as well as local/ regional/ national/ EU funding and includes an increase of the monthly rent from 4.38 €/m²*month to 4.71 €/m²*month whilst reducing the average charge for operation, maintenance</p>



	and other running costs from 1.25 €/m ² *month down to 0.85 €/m ² *month.
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Envelope details	
Roof to wall insertion section (thermal bridge)	<ul style="list-style-type: none"> Insulation of the attic floor by using 20 cm EPS in addition to the existing 10cm
Ground to wall section (thermal bridge)	<ul style="list-style-type: none"> Additional thermal insulation of the lowest storey ceiling of 17.5cm Tektalan
Wall to fenestration section (thermal bridge)	<ul style="list-style-type: none"> Thermal insulation of façade (22cm EPS) Thermal insulation of inner yard (12cm Polyurethan) Perimeter Insulation between 6 -14 cm Replacing windows to reach app. 70 % better thermal performance

Technical system																											
Mechanical ventilation	3 centralised ventilation systems are implemented and connected to 31% of the building users. All other apartments will be upgraded on long-term.																										
Thermal renewable integration	None																										
Electric renewable integration	<table> <tr> <td>Nominal power of PV IN 28:</td> <td>41,08 kWp</td> </tr> <tr> <td>Mounting type:</td> <td>Roof mounted parallel</td> </tr> <tr> <td>Elevation:</td> <td>574 m a.s.l.</td> </tr> <tr> <td>Tilt:</td> <td>25°</td> </tr> <tr> <td>Azimuth angle:</td> <td>248 °/126°</td> </tr> <tr> <td>Financial model:</td> <td>Feed-in-tariff</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td>Nominal power of Fennerstraße:</td> <td>27,82 kWp</td> </tr> <tr> <td>PV array area:</td> <td>178 m²</td> </tr> <tr> <td>Module type:</td> <td>Solarwatt Blue 60 P, 260 W</td> </tr> <tr> <td>Inverter type:</td> <td>1 x Fronius Symo 20.0-3-M 1 x Fronius Symo 8.2-3-M</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td>Nominal power of Oswald-Redlich-Str.</td> <td>13,26 kWp</td> </tr> </table>	Nominal power of PV IN 28:	41,08 kWp	Mounting type:	Roof mounted parallel	Elevation:	574 m a.s.l.	Tilt:	25°	Azimuth angle:	248 °/126°	Financial model:	Feed-in-tariff			Nominal power of Fennerstraße:	27,82 kWp	PV array area:	178 m ²	Module type:	Solarwatt Blue 60 P, 260 W	Inverter type:	1 x Fronius Symo 20.0-3-M 1 x Fronius Symo 8.2-3-M			Nominal power of Oswald-Redlich-Str.	13,26 kWp
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	PV array area	84,8 m ²
	Module type	Solarwatt Blue 60 P, 260 W
	Inverter type	1 x Fronius Symo 12.5-3-M

3 - IMPLEMENTATION

Stakeholders involved	
Contracting authority	NHT Neue Heimat Tirol
Project manager	Gerda Maria Embacher
Architect	Arch. Hanno Vogl-Fernheim
Envelope designer	Arch. Hanno Vogl-Fernheim
Technical system designer	Fa. Klimatherm, Zirl (HKSL) Fa. Obwieser, Absam (ELO)
Construction company	Fa. Bodner
Windows supplier	Fa. Alutherm, Innsbruck
Safety supervisor	Kopecky Karin
Carpenter	Hutter und Söhne, Innsbruck
Energy consultant, scientific support	University of Innsbruck and Passive House Institute – Department Innsbruck




Costs and financing	
Refurbishment costs	Total investment of app. € 2,5 Mio.
Financial resources	See financing model above

Work progress	
Important points of refurbishment process and short description	The challenges in the course of the refurbishment of residential buildings are complex and multi-layered. Financial and social aspects and challenges need to be considered, because the tenant has to co-finance some parts of the renovation, which requires the implementation of persuasion and tenant engagement activities. Furthermore, legal challenges also have to be solved. The most intensive persuasion is to be done in the field of nearly zero energy house renovation and especially in cases where tenants are living in the flats during the time of ventilation system installations and other intrusive renovation activities



4 - DESCRIPTION AFTER REFURBISHMENT

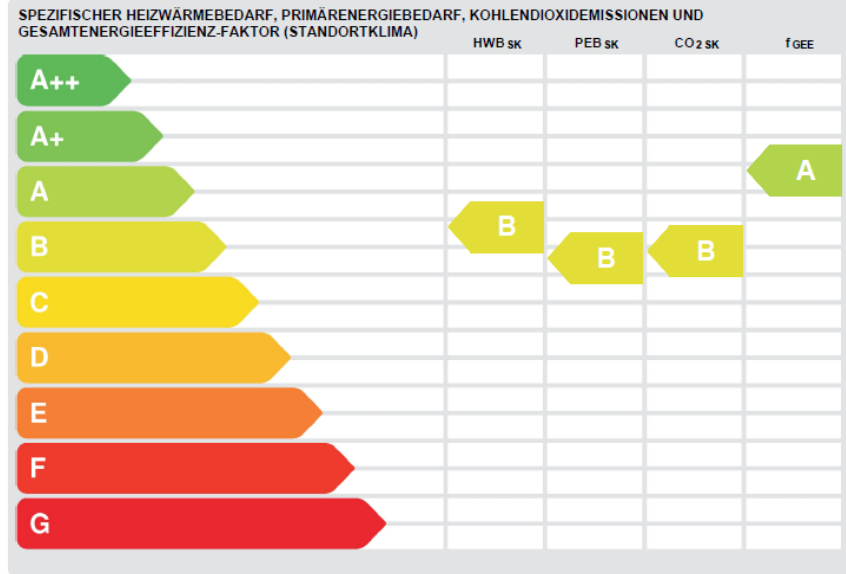
<p>Photo to show architectural concept</p>	
<p>Envelope characteristics</p>	<p>See above</p>
<p>Technical system</p>	<p>See above</p>
<p>Renewable energy sources</p>	<p>Prognosis of the yearly yield: 43,755 kWh/a</p>
<p>End-Energy use (EPC³)</p>	<p>See calculated values above 72,38 kWh/m²a</p>

³ Energy Performance Certificate according to the Austrian Institute of Construction Engineering



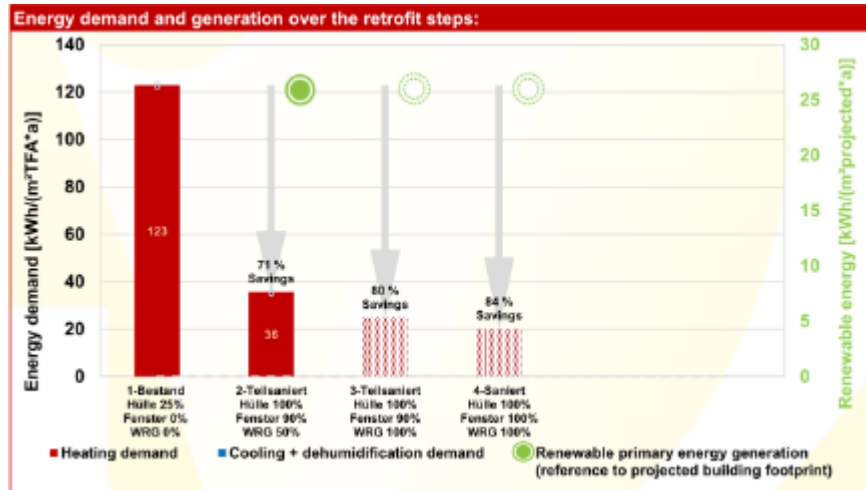
Energy efficiency certificate

(EPC⁴)



EnerPHit pre-certificate for stepwise refurbishment

(PHI⁵)



⁴ Energy Performance Certificate according to the Austrian Institute of Construction Engineering

⁵ According to the rules of the international Passive House Institute

