




Factsheet

Reichenauerstraße 94 a,b,c,d
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 IN43</i></p> <p>Address of the demo site: Reichenauerstraße 94 a,b,c,d / IN 43, 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 thermal renovation of walls (incl. loggias), ceiling, roof and windows with triple-glazing. The central ventilation system is also equipped with supply risers which distribute the air to the apartments.</p>



The fresh air is only provided to the hallway. The extended cascade-ventilation principle was monitored and measured in a fully equipped prototype-flat by UIBK. Results were positive for low CO₂, VOC and humidity concentration.

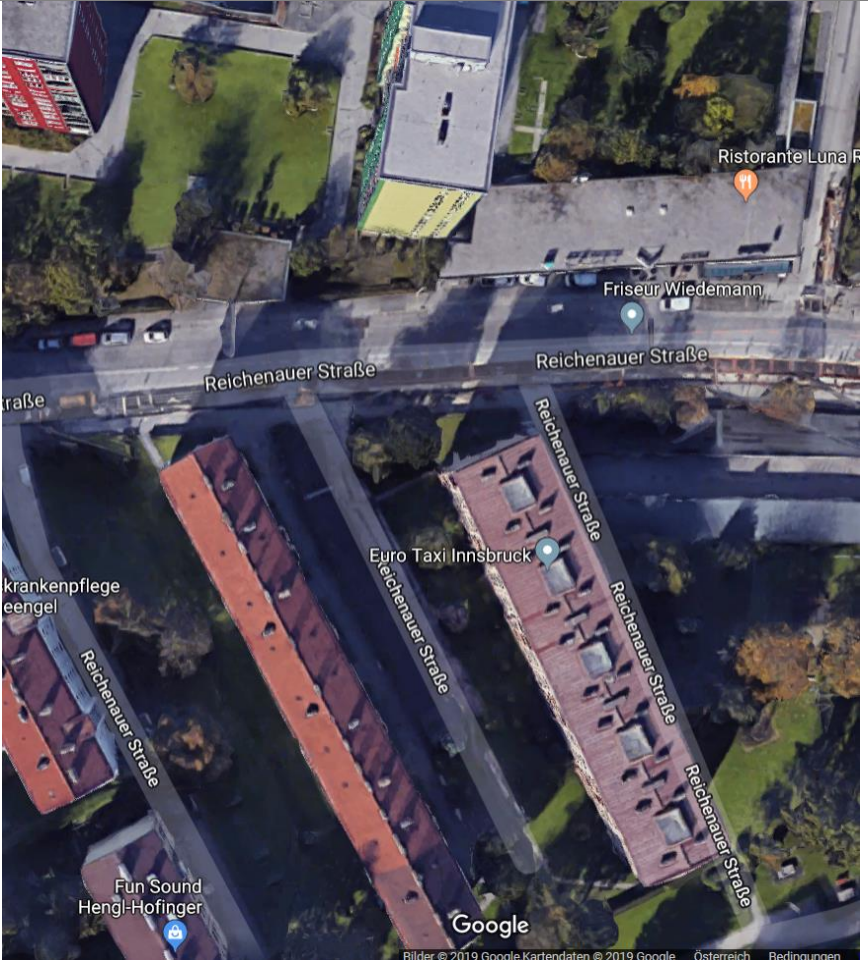
Ownership	NEUE HEIMAT TIROL (NHT)		
Gross conditioned floor area (EPC¹)	5.484 m ²	Treated floor area (TFA) (PHPP²)	3,893 m ²
Number of dwellings	60		
Heating demand (EPC¹)	BEFORE RENOVATION	63,82 kWh/m²*a	
	TARGET/AFTER RENOVATION	23,8 kWh/m²*a	
	BEFORE RENOVATION	167 kWh/m²*a	

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



Heating demand (PHPP²)	TARGET/AFTER RENOVATION	25 kWh/m²*a
Overall savings	Current state (before completion of ventilation & heating system)	> 60 %
	After completion of ventilation & heating system	84 %


1 - DESCRIPTION BEFORE REFURBISHMENT

Detailed characteristics of building	All objects are patched via 1 long complex of buildings.
Plot map	

² Passive House Planning Package

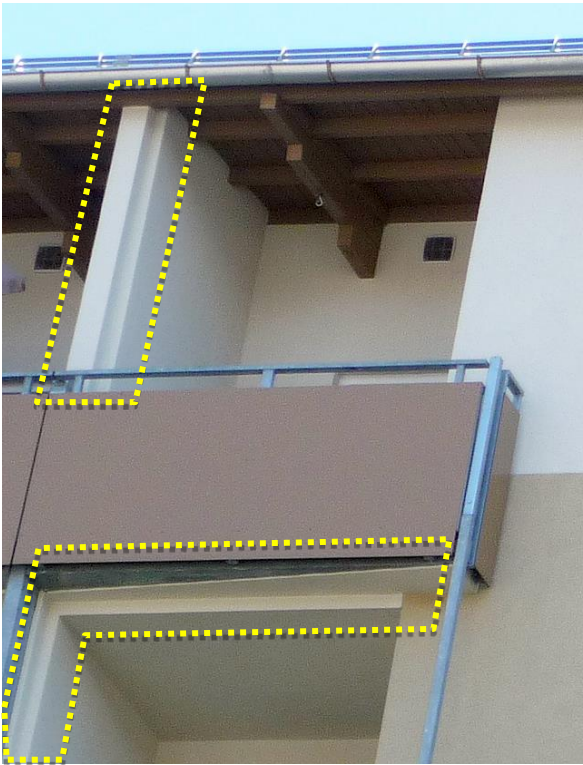


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	Source: Google
Building envelope	 <p>IN43 stock is a building block constructed in the second half of the 20th century with related challenges in regards to insulation, electric cables, low-performing windows, uninsulated roofs and cellars, etc.</p>
Technical system	Decentralised heating system
Energy performance certificate	Category C
Other relevant technical aspects	Not applicable

2 - REFURBISHMENT CONCEPT



<p>Concept</p>	 <p>Thermal renovation of the walls, the ceiling, the roof and the windows with triple-glazing. The principle of “thermal bridge minimized design” was used to minimise the thermal bridges of the balconies.</p>
<p>Energy solutions</p>	<ul style="list-style-type: none"> • The attics are insulated with a 32cm layer of highly effective glass wool • The facade is additionally insulated with 18 cm of EPS • The ceiling to the unheated basement is equipped with an additional 10cm layer of mineral wool • Walls & ceilings to the stairway and basement are equipped with 16 cm of XPS • DHW and space heating are equipped with efficient, modern bio-gas driven gas-fired boilers with a condensing technology • There is LED lighting in all public spaces • The PV-system was installed as a full feed system, so that the generated energy feeds the public grid while the Austrian agency for green electricity complements the missing energy
<p>Performances targets</p>	<p>The goal is to achieve a calculated energy consumption per m² of total used energy per conditioned floor area of about 28,8 kWh/m²*a (Space heating and DHW).</p>



Financing model	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.
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Envelope details	
Roof to wall insertion section (thermal bridge)	<ul style="list-style-type: none"> Insulation of the attic floor, U-value= 0.11 W/(m²K)
Ground to wall section (thermal bridge)	<ul style="list-style-type: none"> Additional thermal insulation of the lowest storey ceiling, U-value= 0.29 W/(m²K)
Wall to fenestration section (thermal bridge)	<ul style="list-style-type: none"> Main exterior wall: additional 18cm EPS insulation to the already existing 6cm cork insulation, U-value= 0.13 W/(m²K) Exterior wall to loggias: due to space restriction, additional 8cm highly effective PUR ($\lambda= 0,026[W/(mK)]$) insulation, U-value= 0.27 W/(m²K) Replacement of windows to achieve a thermal performance that is 70 % better

Technical system							
Mechanical ventilation	The distribution of air from the central ventilation system to the apartments is achieved via supply risers. The fresh air is only provided to the hallway. The extended cascade-ventilation principle was monitored and measured in a fully equipped prototype-flat prior by UIBK. Results were positive for low CO ₂ , VOC and humidity concentration. 24 of the 60 apartments are already equipped with this ventilation system.						
Thermal renewable integration	None						
Electric renewable integration	<p>Based on a roofing contract with IKB the PV system has been integrated into the building:</p> <table> <tr> <td>Nominal power of PV IN 43:</td> <td>21 kWp; 140 m²</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> </table>	Nominal power of PV IN 43:	21 kWp; 140 m ²	Mounting type:	Roof mounted parallel	Elevation:	574 m a.s.l.
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	Tilt:	25°
	Azimuth angle:	243°
	Financial model:	full feed system with feed-in-tariff

3 - IMPLEMENTATION

Stakeholders involved	
Contracting authority	NEUE HEIMAT TIROL Gemeinnützige WohnungsGmbH
Project manager	Gerda Maria Embacher
Architect	Arch. DI Gerald Gaigg, Innsbruck
Envelope designer	Arch. DI Gerald Gaigg, Innsbruck
Technical system designer	Alpsolar Klimadesign OG, Innsbruck Ing. Obwieser GmbH, Absam
Construction company	KPS Ötztalputz GmbH, Ötztal Bahnhof
Windows supplier	Akutherm Bauelemente GmbH, Innsbruck
Safety supervisor	Arch. DI Karin Kopecky, Rum
Carpenter	Huter & Söhne GmbH, Innsbruck
Energy consultant, scientific support	University of Innsbruck and Passive House Institute – Department Innsbruck



Costs and financing	
Refurbishment costs	Total investment of € 2,6 Mio.
Financial resources	See financing model above

Work progress	
Important points of refurbishment process and short description	<p>The challenges during 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.</p> <p>Within SINFONIA, NHT has pushed the installation of controlled ventilation with heat recovery as extended cascade-ventilation principle in IN43. For the time being 40% of the building users have agreed to implement this measure. Further extension is expected according to the fluctuations of the building users and corresponding rental contracts with new tenants.</p>



4 - DESCRIPTION AFTER REFURBISHMENT

**Photo to show
architectonic concept**



**Envelope
characteristics**

See above

Technical system

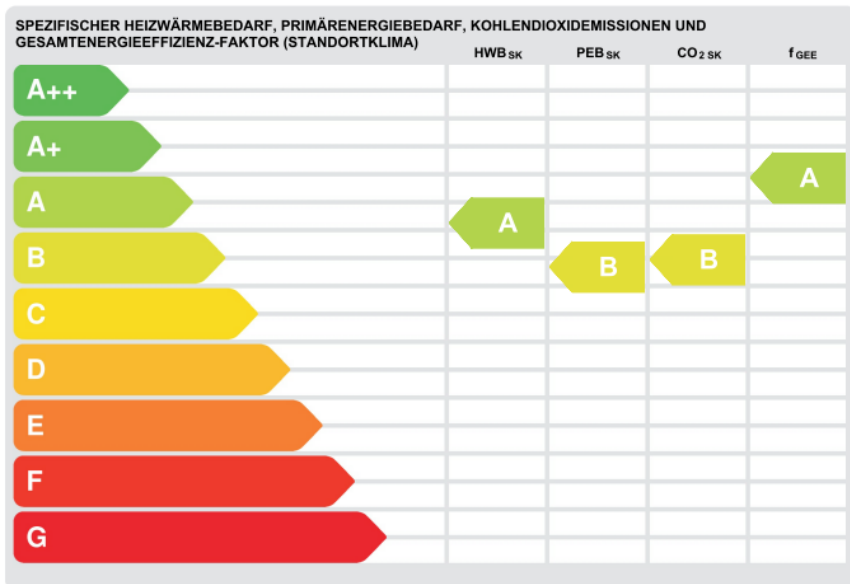
See above

**Renewable energy
sources**

Prognosis of the yearly yield:
21,806 kWh/a



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End-Energy use (EPC³)	Calculated with 68,9 kWh/m ² *a																																																		
Energy efficiency certificate (EPC³)	 <p>SPEZIFISCHER HEIZWÄRMEBEDARF, PRIMÄRENERGIEBEDARF, KOHLEN-DIOXIDEMISSIONEN UND GESAMTENERGIEEFFIZIENZ-FAKTOR (STANDORTKLIMA)</p> <table border="1"> <thead> <tr> <th></th> <th>HWB_{sk}</th> <th>PEB_{sk}</th> <th>CO₂_{sk}</th> <th>f_{GEE}</th> </tr> </thead> <tbody> <tr><td>A+++</td><td></td><td></td><td></td><td></td></tr> <tr><td>A+</td><td></td><td></td><td></td><td></td></tr> <tr><td>A</td><td></td><td></td><td></td><td>A</td></tr> <tr><td>B</td><td>A</td><td>B</td><td>B</td><td></td></tr> <tr><td>C</td><td></td><td></td><td></td><td></td></tr> <tr><td>D</td><td></td><td></td><td></td><td></td></tr> <tr><td>E</td><td></td><td></td><td></td><td></td></tr> <tr><td>F</td><td></td><td></td><td></td><td></td></tr> <tr><td>G</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		HWB _{sk}	PEB _{sk}	CO ₂ _{sk}	f _{GEE}	A+++					A+					A				A	B	A	B	B		C					D					E					F					G				
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EnerPHit pre-certificate for stepwise refurbishment (PHI⁴)	EnerPHiT certification is foreseen shortly																																																		

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

⁴ According to the rules of the international Passive House Institute

