



Factsheet

Housing complex - Via Aslago,
Bolzano



SINFONIA stands for "Smart INitiative of cities Fully cOmmitted 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	Aslago-Oltrisarco District Via Aslago 25, 27, 29, 31, 33, 35
Map	 <p>Images ©2017 Google, Cartographic Data ©2017 Google</p>



Description	Aslago Area is located in the east side of the city of Bolzano, close to the mountain called Colle di Bolzano/Kohlern and to the historical unit in Via Claudia Augusta. The buildings were built in the 50's.	
Ownership	Municipality of Bolzano	
Gross heated volume	18.330 m ³	
Net surface	5.524 m ²	
Number of dwellings	70	
Energy performance		
	Final energy consumption for heating	
	BEFORE	263,1 kWh/m ² year
	AFTER	26,0 kWh/m ² year
	Renewable energy	
	BEFORE	-
	AFTER	33 kWp of photovoltaic plan 440kW Biomass boiler

1 - DESCRIPTION BEFORE REFURBISHMENT

Detailed characteristics of building	The group of buildings in Via Aslago Street dating back to the 1950s was built at a time when no attention was paid to energy aspects. Moreover, the buildings had never been subject to renovation and/or extraordinary maintenance. From an energy point of view they were also positioned in class G of CasaClima certification. For the buildings in Via Aslago there were big problems regarding energy efficiency, and in this case thermal bridges, airtightness of the windows and doors, presence of mould and interstitial humidity inside the housing and heat dispersion of the external walls and roof. In addition to the above conditions, the buildings had no lift and no terraces.
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<p>Plot map</p>	 <p>Images ©2017 Google, Cartographic Data ©2017 Google</p>
<p>Building envelope</p>	<p>The structure has a reinforced concrete frame and inter-storey slabs with a brick-concrete type structure.</p> <p>Technical features:</p> <p>U= 1,36, façade / wall</p> <p>U = 1,33 W/m²K, insulated brick roof</p> <p>U = 1,33 W/m²K, basement ceiling to cellars with predalles type structure</p> <p>Windows:</p> <p>Double glazing: U_g = 3,3 W/m²K</p>
<p>Technical system</p>	<p>The existing hydronic system is centralized and the energy for heating and DHW is provided by two thermal power stations:</p>

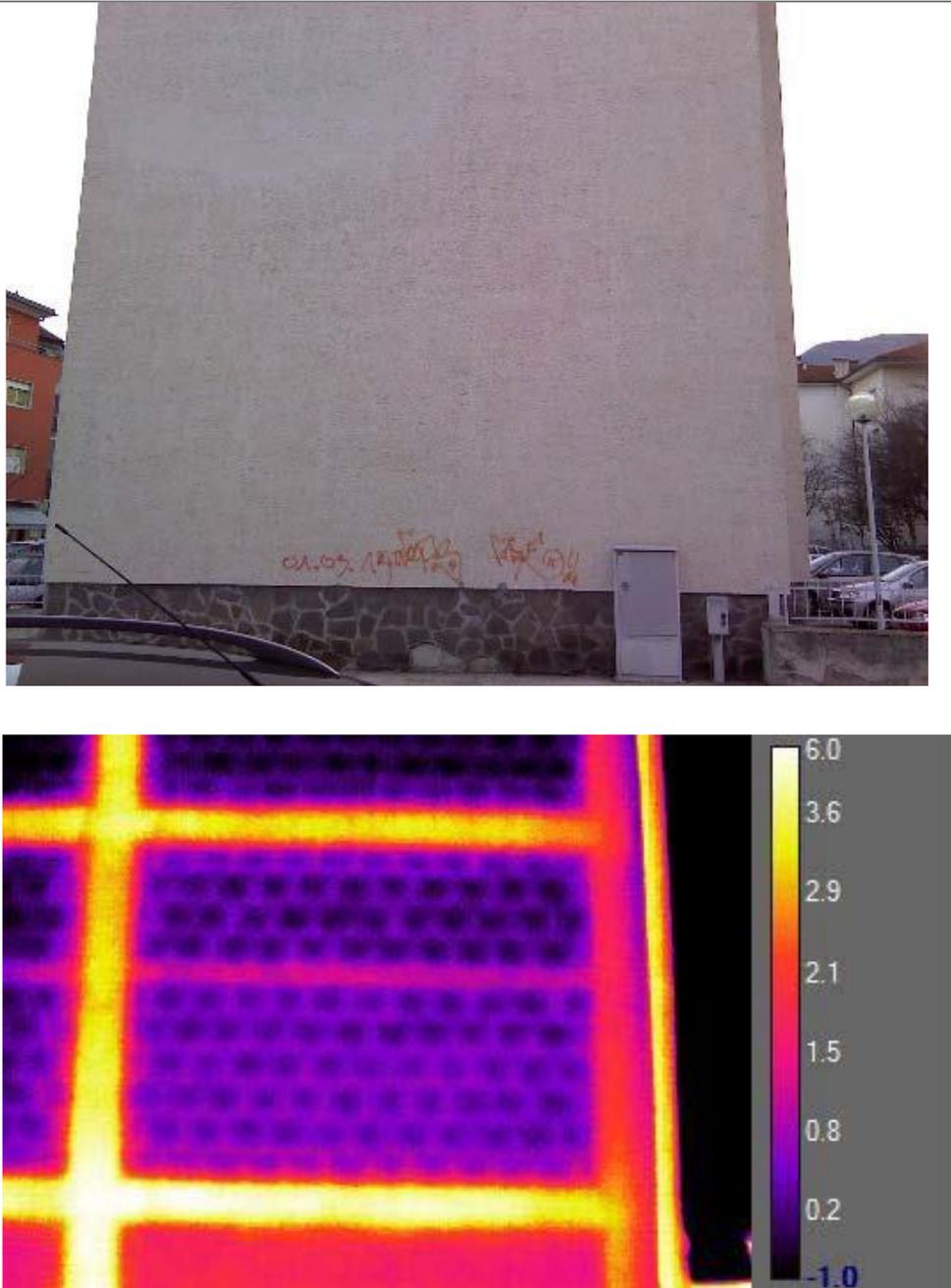


- One power station for the numbers 27, 29, 31, 33, 35;
- Another one for the numbers 19, 21, 23, 25.

Gas fired thermal power plants have been built in 1983 and boilers were installed to that date, as part of the circulation pumps. These have been progressively replaced with more efficient models during extraordinary maintenance works.

The water is distributed through columns rising from below. Every room has its own radiators.



<p>Thermal image before refurbishment</p>	 <p>Images ©2017 Eurac Research</p>
<p>Other relevant technical aspects</p>	<p>Some buildings, specifically building under number 27, had static issues and needed measurements to check the availability of additional storey.</p>



2 – REFURBISHMENT CONCEPT

Concept

The architectural aspect of existing bodies did not have documentary features or historical value that necessarily justified its maintenance. The new "skin" is characterized by a design with homogeneous aesthetic qualities, which, without distinction, covers existing and added bodies. This allows, by adding and subtracting (projections and reentrances) to the last added plane, a radical change of the overall volumetric perception, at the same time more homogeneous and more dynamic.

The volumetric articulation along with the effects of the façade diversification obtained with rectangular breaks results in a remarkable improvement in overall aesthetics.

In the façade, the shadow and diversification effects are obtained through slight increases in thickness of the insulating material as well as chromatic differences and granulometry differences in the plaster.

Addition of the elevator involves the introduction of landing plans to all stairwell mezzanines. This has been solved with an externally reinforced and statically autonomous concrete structure, duly anchored to the building.

By extending the elevator structure on both sides without interfering with the existing one, it has been possible to make balconies (or loggias) for two of the three accommodations of each existing plane.

As for the elevation, a total of 14 new housing units, 3 housing units (29-31-33-35) and two housing units in civic 25 have been designed. Civic 27 was not raised due to static reasons. The elevation involved the demolition of the existing roof in concrete and bricks, the cut of the perimeter curb in concrete and the insertion of an X-lam wood separating structure for both walls and new floors. The exterior walls got a thermal insulation like existing masonry. The top of the building was covered with a flat roof with extensive green roofing.





North-East view civ. 31-27-29



South-West view, civ. 29-31



Aerial view

Images: © Area Architetti Associati

Energy Solutions

The horizontal roof was insulated through XPS panels (20cm thick), the external walls were insulated with EPS panels (15 – 20 cm thick);

The floor toward the cellar was insulated with rock wool panels (10 cm thick);

New windows wood /alu with triple glass, improved airtightness with Blower door test 1,50 vol/h n 50.

External walls: $U = 0,13 \text{ W/m}^2\text{K}$

Ceiling to cellar/garage: $U = 0,3 \text{ W/m}^2\text{K}$

Roof: $U = 0,13 \text{ W/m}^2\text{K}$

Windows:

Triple glas $U_g = 0,5 \text{ W/m}^2\text{K}$

Aluminium wood frame: $U_f = 0,97 \text{ W/m}^2\text{K}$

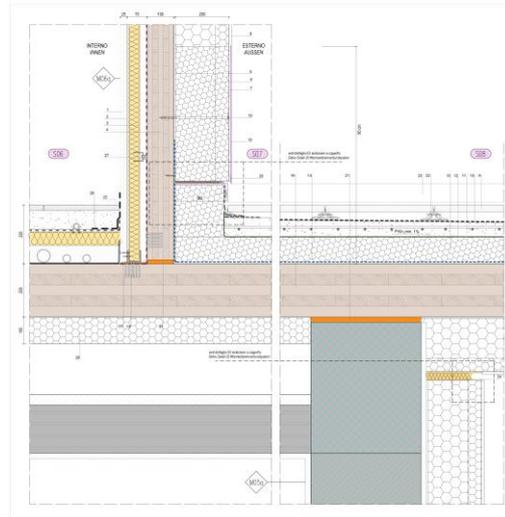
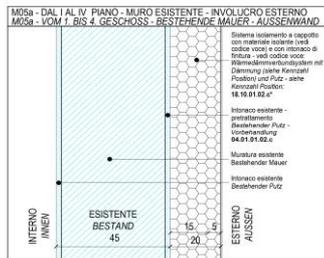
Heating and domestic water generation subsystem:
decommissioning of existing gas boilers and installation of a



	<p>centralized system fed by two pellets boilers</p> <p>Emission subsystem: maintenance of radiators in existing apartments</p> <p>Integration in all apartments of a decentralized / not canalized system for controlled mechanical ventilation</p> <p>Renewable sources:</p> <p>Installation of a 33.0 kW photovoltaic system on the roof</p>
<p>Financing Model</p>	<p>Sinfonia covered the part of costs which allowed to bring the energy performance level above the legal requirements, the rest of the renovation costs were covered with the national contribution called conto termico and the funds of the Autonomous Province of Bolzano (L.P. 13/98).</p>

Envelope details

Wall section



Images: © Area Architetti Associati



Technical system	
Mechanical ventilation	Decentralized / not canalized system for controlled mechanical ventilation
Heating system and Hot water distribution	Heating and domestic water generation subsystem: decommissioning of existing gas boilers and installation of a centralized system fed by two pellets boilers. Emission subsystem: maintenance of radiators in existing apartments

3 - IMPLEMENTATION

Stakeholders involved	
Architectural project	AREA ARCHITETTI ASSOCIATI Roberto Pauro – Andrea Fregoni
Plant engineering project	Ing. Norbert Klammsteiner – Energytech (BZ)
Responsible for the Procedure (RUP)	Geom. Diego Andreotta
Project Co-ordinator:	Dott. Emanuele Sascor
Construction company	Raggruppamento Temporaneo di Imprese made up by the firms Nerobutto Tiziano e Francesco S.n.c , Ediltione S.p.a. , Termoidraulica Parotto Vittorino S.r.l. , A.P. Elettrica di Alberto Pecoraro & C. S.n.c. Metallbau Glurns S.r.l.
Energy consultant, scientific	Agenzia Casa Clima, Eurac



support	
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Costs and financing

Refurbishment costs

- Renovation works: € 5,338,330.15
- Monitoring: € 167,463.16
- Monitoring system: € 6,897.95
- Feasibility study: € 9,410.00
- DL (Works' supervision): € 26.906.58€

Financial resources

- Renovation works:
- Sinfonia (50%): € 867,540.00€
 - Conto termico (65%): € 3,067,906.75
 - Autonomous Province of Bolzano (for architectural barrier-free design implementation, 30%) € 486,000
- Monitoring:
- Sinfonia € 247,000.00
 - DL (Works' supervision): € 72,800.00
 - Monitoring system: € 7,795.00
 - Feasibility study: € 9,410.00



Implementation planning	
1 - Signature consortium agreement	2014
Approval of the European Community; the City Council of Bolzano approved the participation at the project, start of the Sinfonia project.	
2 - Planning of the energy pilot district	2014
3- Tender procedure for the energy refurbishment project	December 2015
A design competition was chosen.	
4 - Approval of the preliminary, the final and the detail project	July-December 2016
5 - Tender procedure for the energy refurbishment works	September 2017
6 - Start of the energy refurbishment	October 2017
7 - End of the energy refurbishment	July 2019
8 - 60 days for the refinement works	July 2019-September 2019
9 - Administrative and technical validation	July 2019-January 2020



Work progress

Installation of the new added floor



PHOTO: Geom. Diego Andreotta

Building envelope-façade



PHOTO: Arch. Rosita Izzo



PV Panel system



PHOTO: Arch. Rosita Izzo

VMC decentralized mechanical ventilation system



PHOTO: Arch. Rosita Izzo



4 - Description after refurbishment

**Photo to show
architectonic concept**



PHOTO: © Area Architetti Associati

**Envelope
characteristics**

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Energy efficiency certificate

Gültig bis / valido fino al: 22.10.2029

Datum / data: 22.10.2019

S-2019-06325

KlimaHaus Energieausweis Certificato Energetico CasaClima



Bezeichnung Denominazione	Gemeinde Bozen Comune di Bolzano	Katastralgemeinde Comune catastale	Zwölftalgelein Dodicielle
Standort Gebäude Ubicazione edificio	Haidelschule 25 Via Aslago 25		
Gemeinde Comune	39100 Bozen	Bauparcelle Particella edificabile	1515
Projektant Progettista	Area Architeti Associati	Gebäudeart Parte dell'edificio	
Bemerkungen Osservazioni			



Agentur für Energie Südtirol - KlimaHaus
 Agenzia per l'Energia Alto Adige - CasaClima
 Der Direktor / il Direttore
 Ulrich Santa

KlimaHaus Klasse Classe CasaClima	Effizienz Gebäudehülle Efficienza involucro	Gesamteffizienz Efficienza complessiva	Nachhaltigkeit Sostenibilità
GOLD			
A	A	19 kWh/m ² a	4 kg CO ₂ /m ² a
B			
C			
D			
E			
F			
G			

Klimazone Zona climatica	E	Heizgradtage [hGT] Gradi/Giorno di riscaldamento [GG]	2736
Beheiztes Bruttovolumen [V] Volume lordo riscaldato [V]	3805 m ³	Nettogeschossfläche [NGF] Superficie nella nicchia [SNC]	671 m ²
Fläche der wärmeabgebenden Gebäudehülle [A] Superficie lorda dipendente dell'involucro [S]	1649 m ²	Verhältnis Gebäudehülle / Volumen [AV] Fattore di forma [S/V]	0,43
Mittlerer U-Wert der Gebäudehülle [U] Trasparenza media dell'involucro [U]	0,21 W/m ² K	Gebäudeart Destinazione d'uso	E 1 Mehrfamiliengebäude Edif. Plurifamiliare

AUTONOME PROVINZ BOZEN - SÜDTIROL PROVINCIA AUTONOMA DI BOLZANO - ALTO ADIGE
 PROVINCIA AUTONOMA DE BALSAN - SÜDTIROL



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KlimaHaus Energieausweis Certificato Energetico CasaClima



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S-2019-06325

Effizienz der Gebäudehülle – Efficienza dell'involucro

Standort des Gebäudes Ubicazione dell'edificio	Standard KlimaHaus Standard CasaClima	Gemeinde Comune
Heizlast des Gebäudes [P _H] Fabbisogno di potenza di riscaldamento dell'edificio [P _H]	21 kW	Bozen Bolzano
Heizwärmebedarf bezogen auf die Nettogeschosshöhe [HWB _{net}] Fabbisogno di calore per il riscaldamento riferito alla superficie nella [PDR] _{net}	19 kWh/m ² a	19 kWh/m ² a
Energieeffizienzklasse der Gebäudehülle Classe di efficienza energetica dell'involucro dell'edificio	A	

Gesamtenergieeffizienz – Efficienza energetica complessiva

Primärenergiebedarf Heizung – Fabbisogno di energia primaria per riscaldamento	4904 kWh/a
Primärenergiebedarf Warmwasser – Fabbisogno di energia primaria per acqua calda	4328 kWh/a
Primärenergiebedarf Kühlung – Fabbisogno di energia primaria per raffrescamento	- kWh/a
Primärenergiebedarf Beleuchtung – Fabbisogno di energia primaria per illuminazione	1867 kWh/a
Primärenergiebedarf Hilfsenergie – Fabbisogno di energia primaria per energia ausiliaria	4748 kWh/a
Gesamprimärenergiebedarf – Fabbisogno di energia primaria globale	15537 kWh/a
Gesamtenergieeffizienz – Efficienza complessiva	16 kWh/m ² a
Spezifische CO ₂ Emissionen – Emissioni specifiche di CO ₂	4 kg/m ² a
Spezifischer Primärenergiebedarf Heizung – Fabbisogno specifico di energia primaria per il riscaldamento	5 kWh/m ² a
Gesamtenergieeffizienzklasse des Gebäudes Classe di efficienza complessiva dell'edificio	Gold

Regenerative Energien – Fonti rinnovabili

Abdeckung Warmwasserbedarf aus erneuerbaren Energiequellen – Quota da fonti rinnovabili per acqua calda sanitaria	80 %
Abdeckung Gesamprimärenergiebedarf aus erneuerbaren Energiequellen – Quota da fonti rinnovabili per il fabbisogno globale	77 %

Anlagendaten – Specifiche degli impianti

Anlagentyp Tipologia impianto	Energieerzeugung Produzione di energia	Thermische Leistung Potenza termica (kW)	Energieträger Vettore energetico	Abgabesystem Sistema di emissione
Heizung - Riscaldamento	Heizkessel Caldaia	74	Pellets Pellets	Radiatoren Radiatori
Kühlung - Raffrescamento				
Warmwasser - Acqua calda sanitaria	Mit Heizsystem Con sistema di risc.			
Lüftung - Ventilazione	Wohnraumlüftung Ventilazione meccanica controllata			
Jahresnutzungsgrad der Anlagen Rendimento globale medio stagionale degli impianti				387 %

Energetische Verbesserungsempfehlungen – Raccomandazioni per il miglioramento energetico

Optimierung der Gebäudetechnik (Heizung, Kühlung, Lüftung, Warmwasser- oder Stromerzeugung) durch regelmäßige Wartung der Anlagen.	Optimizzazione impiantistica (riscaldamento, raffrescamento, produzione acqua calda o corrente) mediante la manutenzione periodica degli impianti.
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Rechtliche Hinweise und weitere Informationen finden Sie auf
Riferimenti normativi e ulteriori informazioni si trovano su:

www.klimahausaagentur.it
www.agenziacasaclima.it

AUTONOME PROVINZ BOZEN – SÜDTIROL  PROVINCIA AUTONOMA DI BOLZANO - ALTO ADIGE
PROVINCIA AUTONOMA DE BULSAN - SÜDTIROL

S-5376



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5 - PERFORMANCE MONITORING

Monitoring System

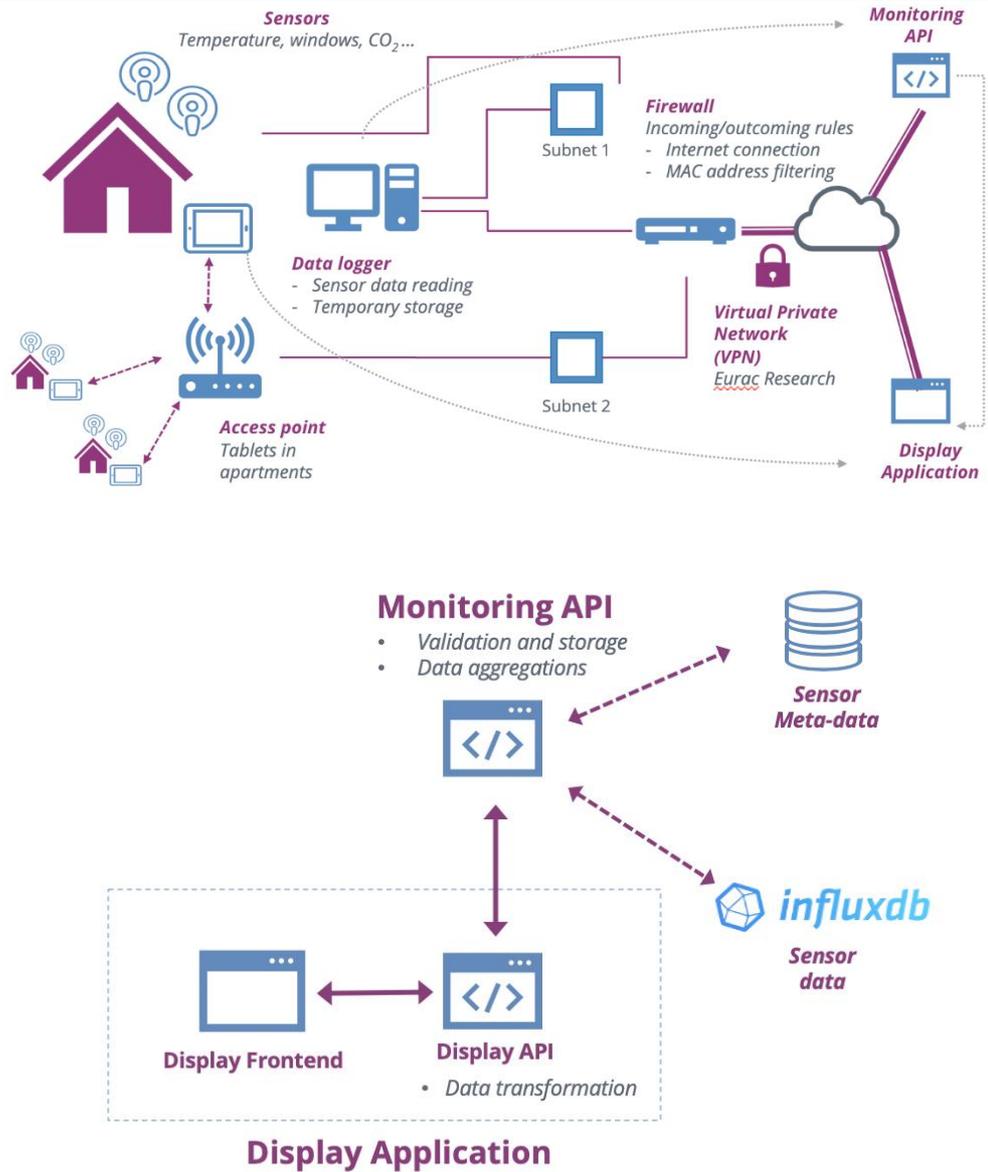
Sometimes refurbishment works alone are not enough to reach high goals in terms of energy savings. Monitoring systems can help boost the effectiveness of retrofit interventions by assessing the performance of specific technologies while encouraging tenants to reduce their energy consumption. The monitoring system installed in the housing complex of via Aslago collects data produced by existing appliances, measures conditions from internal areas, and at the same time, stores such data for further assessment and future improvements.

The monitoring system is made up of different sensors that collect data from different signal inputs. All sensors are connected to the same network, making it possible to collect data through a data logger; which can also store data on a temporary basis. The data logger transfers the collected data to Eurac Research servers via an Application Programming Interface (API) to be validated and stored in a time-series database. Once data are transferred, they are erased from the data logger.

The interface that stores data in Eurac Research servers allows researchers to retrieve data and perform calculations that are used to provide other services. Specifically, a web application was developed to provide feedback to tenants. It allows to visualize energy consumption and environmental conditions on a real-time basis and sends messages to raise the awareness of tenants of possible consumption misbehaviors, suggesting how to solve them. Such application is displayed on a mobile device as an in-home display. The interface also allows to retrieve collected data in order to assess the performance of specific technologies.



Architecture from Monitoring and Feedback systems



Images © Eurac Research



Feedback to tenants



Images © Eurac Research

Monitored measures

The monitoring system collects data every 5 minutes and stores the following measures:

(A) Measures from buildings

- Energy consumption
 - Photovoltaics
 - Solar thermal
 - Elevators
 - Central heating
 - External lightning



- External temperature (where available)

(B) Measures from apartments

- Energy consumption
 - Electricity
 - Domestic hot water and Heating
 - Ventilation system (where available)
- Environmental conditions
 - Temperature
 - Relative humidity
 - Carbon dioxide concentration
 - Windows status (open or close)
 - Water consumptions (hot and cold)

(C) Measures from appliances in some apartments

- Energy consumption
 - Fridge
 - Washing machine
 - Oven
 - Hob
 - Dishwasher

