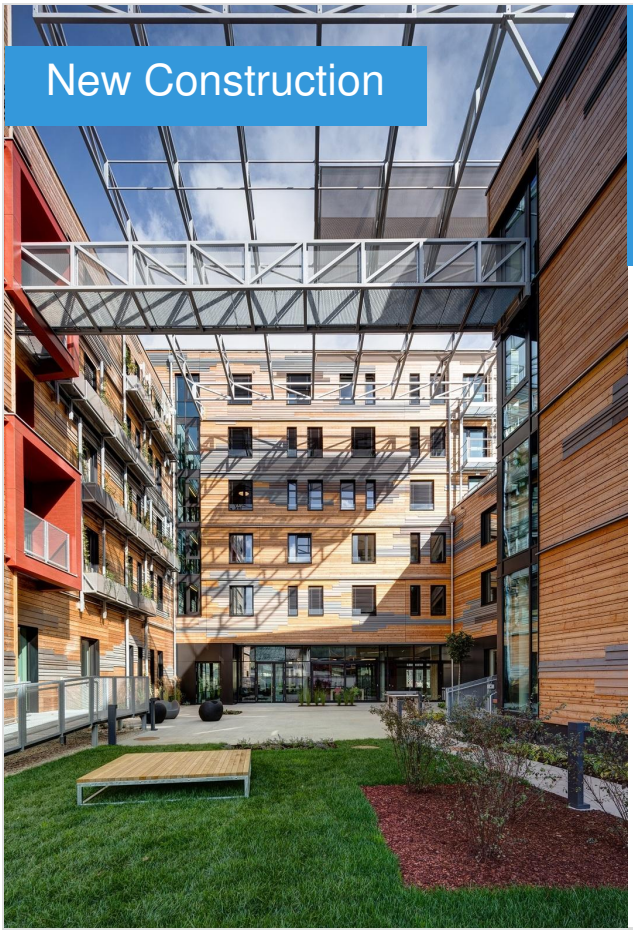
# Mineroom Student Residence Leoben

by Martina Feirer / 2018-06-13 11:43:14 / Deutschland / 11352 / DE




**Primary energy need :**

**80.69 kWhpe/m².year**

**(Calculation method : Other )**

**ENERGY CONSUMPTION**

*Economical building* *Building*

- *< 50* **A**
- *51 à 90* **B**
- *91 à 150* **C**
- *151 à 230* **D**
- *231 à 330* **E**
- *331 à 450* **F**
- *> 450* **G**

*Energy-intensive building*

**Building Type** : Student residence
**Construction Year** : 2016
**Delivery year** : 2016
**Address 1 - street** : 2700 LEOBEN, Österreich
**Climate zone** : [Dfb] Humid Continental Mild Summer, Wet All Year

**Net Floor Area** : 5 900 m²

**Construction/refurbishment cost** : 12 500 000 €
**Number of Dwelling** : 139 Dwelling
**Cost/m2** : 2118.64 €/$m^2$

**Certifications :**

**Proposed by :**

## General information

The mineroom Leoben student dormitory was opened on October 1, 2016 after only 11 months of construction. With the Montan University, Leoben accommodates over 4,000 students. The hostel will be a contemporary home for 201 international students during their time in Leoben. The close connection of the region and the university to nature and its resources should be reflected in the building. Also quotes from the mining, with which the city and the university have been connected for generations, can be found in the building again.

**Urban design concept and building structure.** The structure was developed from a perimeter block development, which opens to the lower development in the west. This protects courtyard and garden from street noise. The components are staggered at the height of EG + 5 to EG + 3 and thus adapted to the smaller-scale development of the neighboring plots. By lowering the southern connecting tract, the tanning of the inner courtyard is optimized. On the southern facades, "green walls" of plant troughs were provided, which positively influenced the microclimate in the street and courtyard. The recessed and transparent ground floor zone provides an insight into the student life and views into the courtyard and creates a weather-protected meeting zone in front of the building.

**Change as a design element.** Inspired by the liveliness and the play of colors of the ore stone, the formally clear structures were covered with plastic, multi-colored wooden formwork. The pre-grayed shuttered formwork, which repeatedly bursts out of the smooth, untreated larch wood formwork, runs vein-like over the building and will gradually discolour irregularly in various grays, browns and reds.

**Stuben for buddy.** Stollen lead through the building as irregularly wide corridors, break through the building skin again and again and open out in the form of generally used rooms and apartment common areas. As a result, all aisles are naturally exposed. In order to further emphasize the bond with Montan University, large-format photo wallpapers with motifs from

mining and technology were etched in the rooms and hallways.

**Construction.** With the exception of the entrance area, the basement and the two staircases, the entire building was built in timber construction. The outer walls consist of a prefabricated, with mineral wool-finished timber frame construction. They mostly have no supporting function. Horizontal bracing is provided by partition walls made of cross laminated timber wall elements in conjunction with BSH ceiling panels. In the building about 1,900 $m^3$ of wood were used for the supporting structure and the façade, thereby binding approx. 2,000 tonnes of CO2. Partition walls and ceilings are fitted with plasterboard liners to meet the fire and sound insulation requirements. Beams and columns were over-dimensioned to burnup and could therefore be left visible.

**Upcycling.** The door cut-outs of the KLH interior walls were turned into mobile furniture. Tables, benches, stools and sideboards bring the wood character back into the living and common areas. The use of 250 $m^2$ glulam instead of chipboard, which could save some 25 tons of CO2.

The house offers a wide range of residential and common areas. Single apartments, double rooms as well as shared apartments for 2-5 residents enable the students a differentiated housing offer. On each floor, so-called parlors offer individual retreat areas. On the ground floor are common areas such as the extended living room, a laundrette, music practice room, meeting and study rooms, gym and a multi-purpose room for chilling out and celebrating. In the courtyard there is seating and table tennis, in the garden wooden decks for lounging.

The **mineroom** is designed as a passive house. In **addition to** a highly efficient ventilation system with heat and moisture recovery, an optimized building envelope and the largest possible PV system, power-consuming components have also been optimized and standby functions avoided. The entire object was equipped with LED lighting. A space or empty piping for a possible battery storage have already been provided.

By means of water saving valves with an extended cold water range (cold water in the middle position), the hot water consumption, which is above average in the houses of the OeAD-WV from experience, should be reduced.

**Certification.** The building is klima: aktiv GOLD certified. Certification by the Passive House Institute Darmstadt has also been carried out. Passive House Plus Standard was achieved.

## Data reliability

3rd part certified

# Stakeholders

## Contractor

Name : ARGE Swietelsky Baugesellschaft m. b. H. & Weissenseer Holz-System-Bau GmbH - Totalübernehmer

## Construction Manager

Name : ARGE Swietelsky Baugesellschaft m. b. H. & Weissenseer Holz-System-Bau GmbH - Totalübernehmer

## Owner approach of sustainability

The OeAD-WohnraumverwaltungsGmbH as a dormitory operator offers annually about **12,000 students** accommodation in Austrian university towns.

A cornerstone of the OeAD is: " **Successive generations are close to our hearts:** through an ecologically-oriented design, we actively reduce the ecological footprint of our guesthouses, giving students an insight into the benefits of this form of responsible building and thus help raise awareness of the next generation."

Since 2005, the guest houses are only built in the minimum standard passive house.

Due to the increasing number of students, especially from abroad, the Montanuniversität turned to OeAD-WV with the wish to build a dormitory in Leoben. Together with the Wohnungs- und Siedlungsgenossenschaft Ennstal as the client, a detailed description of the construction and equipment was prepared and a loaded competition was praised. The goal of mineroom Leoben was the optimization of the Passive House standard towards positive energy and the use of ecological, sustainable building materials.

## Architectural description

The student dormitory mineroom Leoben was opened on 1 October 2016 after only 11 months of construction. Leoben is the only non-state capital to have a world-renowned university with more than 4,000 students from all continents. Since there was a great need for accommodation for students, the Gemeinnützige Wohn- und Siedlungsgenossenschaft Ennstal in cooperation with the city of Leoben and the Austrian Exchange Service Housing Administration (OeAD-WV) developed a concept for the competition for a dormitory for 200 students in passive house and timber construction. The building site is located in the south-west of Leoben. The main square of Leoben is at a walking distance of 1.5 km, the university is 1.8 km away. Various local utilities and a small shopping center can be reached within a 2-minute walk.The surrounding area character is characterized by residential development, in the east with four to five-storey, in the south with up to three storey residential buildings, in the east leads a busy street. On the almost level plot was still the former indoor pool of Leoben, which was completely demolished. The dormitory will be for 201 international students during their time in Leoben, one-time home. The close connection of the region and the university to nature and its resources should be reflected in the building. Also quotes from the mining, with which the city and the university have been connected for generations, can be found in the

building. Urban concept and building structure. The structure was developed from a block edge development, which opens to the lower development in the west. This protects the courtyard and garden from the street noise. The components are graded in the amount of EG + 5 to EG + 3 and thus adapted to the smaller-scale development of the neighboring plots. The property was designated as a building land of the core area excluding shopping centers. In the competition, a building density of up to max. 2.5 from the point of view of the municipalityLeoben allows, but a density of approximately 2.0 should be sought. The density of student dorm mineroom is 2.12. By lowering the southern connection tract, the tanning of the inner courtyard is optimized. On parts of the southern façades "green walls" of plant troughs were provided which positively influence the microclimate in the street and courtyard. The recessed and partially transparent ground floor zone provides insights into the student life and views into the courtyard and creates a weather-protected meeting zone in front of the building. Change as a design element. Inspired by the liveliness and the play of colors of the eruptive stone, the formally clear structures were covered with plastic, multi-colored wooden formwork. The pre-grained forge formwork, which repeatedly breaks out of the smooth untreated larch wood formwork, runs vein-like over the building and over time will discolour irregularly in various grays, browns and reds. Stuben für Kumpel. Stollen lead through the building as irregularly wide corridors, always breaking through the building skin and opening out to the outside in the form of generally used living rooms and apartment common areas. This will naturally expose all the aisle and stairwell area. In order to further emphasize the bond with the Montanuniversíget, large-scale photo wallpapers with motifs of mining and engineering were identified in the rooms and hallways. The photos were taken by the Rector of the Montanuniversität Mr. Univ.-Prof. Dr. WilfriedEichlseder provided.Construction. With the exception of the entrance area, the basement and the two staircases, the entire building was built in timber construction. The exterior walls are made of a prefabricated, wood wool-finished timber frame construction. They have predominantly no supporting function. Horizontal bracing is provided by the partition walls made of laminated plywood wall elements in conjunction with BSH ceiling panels. In the building approx. 1,900 m³ of wood were used for the support structure and the façade, thus binding approx. 2,000 tonnesCO2. Partition walls and ceilings are fitted with plasterboard liners to meet the fire and sound insulation requirements. Beams and columns were oversized for burnup and could therefore be left visible.

## Energy

### Energy consumption

Primary energy need : 80,69 kWhpe/$m^2$.year

Primary energy need for standard building : 153,00 kWhpe/$m^2$.year

Calculation method : Other

Final Energy : 50,12 kWhfe/$m^2$.year

Breakdown for energy consumption :

HEB (heating energy demand): 14.13 kWh / m2a
HHSB (Household Electricity Demand): 16.43 kWh / m2a
And PEB (primary energy demand): 80.69 kWh / m2a

## Envelope performance

Envelope U-Value : 0,22 $W.m^{-2}.K^{-1}$

More information :
Checking the tightness by means of a blower door test n50 = 0.27 l / h in accordance with Ö standard EN 13829, method A

Building Compactness Coefficient : 0,06

Indicator : EN 13829 - n50 » (en 1/h-1)

Air Tightness Value : 0,27

# Renewables & systems

## Systems

Heating system :

- Urban network
- Water radiator
- Low temperature floor heating

Hot water system :

- Urban network

Cooling system :

- No cooling system

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 50,00 %

Other information on HVAC :
Yield PV 2017 92367kWh

PV system on the roof

388 PV modules in east-west orientation
Total rated power 116kWp
Total savings CO2 per year: 12,600 kg

# Environment

## GHG emissions

GHG in use : 14,26 $KgCO_2/m^2$/year

## Water management

Use of water saving valves with extended cold water area to reduce the disproportionately high hot water area in dormitories.

## Indoor Air quality

Use of a chemical management to avoid air pollutants by building materials and materials used. Air pollutant measurement prior to occupancy of the building.

# Products

## Product

Trox Cube ventilation unit

BPS Engeneering in Zusammenarbeit mit der Fa. Trox


office@bps.co.at

http://www.bps.co.at/content/bps/

Product category :

The ventilation unit is located in component B on the first floor in the building services room. The regulation takes place via the control system in the ventilation center. The ventilation unit was split into the ventilation center via a mounting opening in the north of the building and

assembled in the building services room.
The ventilation unit is a central ventilation unit with 2 parallel rotary heat exchangers with heat and moisture recovery. The parallel rotating heat exchangers and the use of special pocket and pleated filters (F9) reduce the flow resistance of the ventilation system and thus reduce the energy consumption of the system. The device was developed by the BPS-Engineering building technology office.

- Air handling unit Trox Cube with 2 rotary heat exchangers
- Air flow 4,500m³ / h per rotation exchanger
- Reverse heat number (EN308) 90.58%
- moisture content 73.14%.

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Post-tie facade

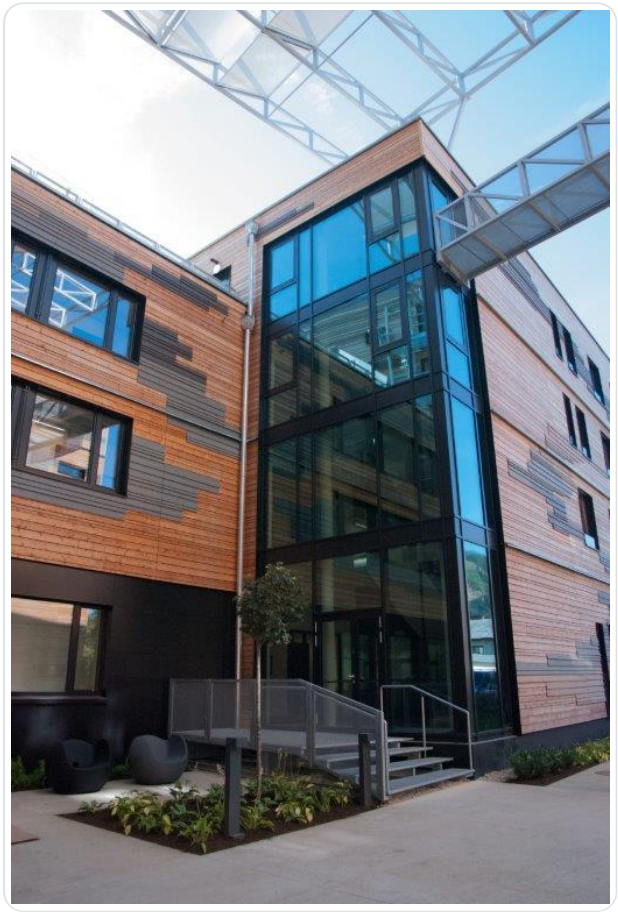
Schüco

https://www.schueco.com/web2/de

Product category :

Alu-Post Bolt façade system Schüco Facade FW 50 + .SI
The Schüco post and rail façade FW 50 + .SI achieves today's climate targets - Passive House certified.

Schüco FW 50 + .SI is today the thermal insulation standard in the field of mullion-transom facades. The use of highly heat-insulating materials also limit freedom of design and simple and efficient processing.



Uf value (> =)
0.7
Min. View width
50 mm
Max. Glass thickness
64 mm
Max. mass
700 kg
statics
7160.6 cm4
surfaces
powder

Air permeability
AE900
Water tightness

RE1200
burglary
RC3
shock resistance
I5 / E5
crash safety
fully crash-proof

## Costs

## Urban environment

The site is located in the south-west of the regional center of gravity of Leoben at the intersection of the busy LandesstraßeL101 / Josef Heißl-Straße and the Anzengrubergasse. The area is designated as a residential area without a central function. According to the regional development program for the planning region Leoben, the planning area is within the public transport quality. The permissible building density was set by the municipality with a maximum of 2.5. The railway line of the ÖBB is 250m west of the property, but is only used more for the traffic of the Gösser beer brewery. The city's main square is at a walking distance of 1.5 km, and Montan University is approximately 1.8 km. Immediately adjacent to the property are bus stops for the bus line Göss-Donauwitz.

On the almost level plot was the former indoor pool of Leoben, a building from the 70s, which was a landmark point at this intersection. The building followed the street alignment in the course of Josef Heißl-Strasse and Anzengrubergasse and despite the amorphous shape at this corner of the street. It was completely demolished in the course of the construction work.

The surrounding character of the area is characterized by three residential areas, most of which define the street area as a perimeter block. To the east is a five-storeyU-shaped residential complex. The south-western corner of this development is opposite the site. The courtyard of this building opens onto the street space. On this green space there is a one-storey commercial building. To the south and west along the Josef-Heißl and Anzengrubergasse are three- and four-storey residential buildings.

In the north, in the direction of the center, there are some supermarkets and specialty stores, the building structure is disorderly here, the street space is characterized by advertising signs and adjacent parking lots.

The building of the student dormitory was developed from a block edge development, which

opens to the lower development in the west. This protects the courtyard and garden from the street noise and sums up the street space.

The building is located on Josef Heißl-Straße at a height of ground floor + 5 and set off to the north by one floor. Smooth facades form a clearly defined counterpoint to the subsequent demolished development structure. The façades are accentuated by colored frames around the large windows of the common rooms and by loggia-like recesses in front of the living areas of the residential communities in which plant troughs with kitchen herbs are arranged. Dernorthliche building body does not run parallel to the basic boundary but is aligned at right angles to the tract at the Josef Heißl road. This opens the yard to the garden. The location of the covered bicycle storage area in the north creates a semi-public space at the north-eastern corner of the building on Josef Heißl-Straße. This forms the transition to the side entrance and the bicycle parking spaces. In the middle of this square is a "house tree" and benches invite you to linger. In close proximity to this square is the bus stop so that this space can be used by both students and waiting people.

The recessed and partially transparent ground floor zone, in the area of the common areas of the home, provides insights into the student life and views into the courtyard and creates a weather-protected meeting zone in front of the building. An information screen informs here about news from the student dorm and weather-protected Fahrradbügelermöglichen visitors parking their "bike". This return makes the building's internal structure visible, also from a constructive point of view: the general area on the ground floor, which is indented, is solid in steel, and the study areas are timbered.

At the southern facade in Anzengrubergasse, the buildings are graded at the level of EC + 5, EG + 3 and EG + 2, and thus adapted to the smaller-scale development of the neighboring plots. By lowering the southern connecting tract, the tanning of the inner courtyard is optimized and the building in the Anzengrubergasse, also by a return of the lower building part, structured in smaller pieces. Parts of the south façades on Anzengrubergasse and in the courtyard have been provided with "green walls" of plant troughs, which positively influence the microclimate through evaporation, filtering of fine dust, release of oxygen and the sound-absorbing property of the vegetation. In the Anzengrubergasse, this green wall on the connection section fills the volume up to the building line and "completes" the building with it.

At the end of the south wing, a driveway leads to the parking spaces on the property. Under a cantilever there are 6 covered parking spaces two with an e-gas station. There are international students in the home

## Land plot area

Land plot area : 3 214,00 $m^2$

## Built-up area

Built-up area : 1 440,00 %

## Parking spaces

Projected 100 covered bicycle parking spaces directly at the entrance, possibility of housing 40 parking spaces on the property demonstrated, built 20PKW parking spaces. Since the dormitory is inhabited by international students, the Stzellplatzbedarf is small, therefore, the area of 14 parking spaces was provided with sports field markings and is available to the students for activities. Charging facilities for e-bikes and e-cars are available.

# Building Environnemental Quality

## Building Environmental Quality

- indoor air quality and health
- consultation - cooperation
- acoustics
- comfort (visual, olfactive, thermal)
- energy efficiency
- renewable energies
- mobility
- building process
- products and materials

# Contest

## Reasons for participating in the competition(s)

**ARCHITEKTUR**

- **Bezug** der Stadt Leoben und der Universität **zur Natur und ihren Ressourcen** spiegelt sich im Gebäude wider
- **Veränderung als Gestaltungselement,** vorgegraute Stulpschalung zieht sich aderförmig über die unbehandelten Lärchenholzschalung, Fassade wird sich im Laufe der Zeit **unregelmäßig verfärben**
- **Durchgehende raumbildende Kanten** erhalten **den geschlossenen Straßenraum** in der Anzengrubergasse und **verlängern den Straßenraum** in der Josef Heißl-Straße Richtung Stadt
- **Blockrandbebauung schützt** den Innenhof und den Garten **vor Straßenlärm**

+ Durch Absenken eines südlichen Gebäudeteils **Sonnenfenster zum Hof**

**+ „Grüne Wand“** vor südseitigen Fassadenteilen im Innenhof und in der Anzengrubergasse, **positive Wirkung** auf das Mikroklima

- Zurückgesetzte **Erdgeschoßzone** entlang der Josef Heißl-Straße und an der Ecke zur Anzengrubergasse ermöglicht **Einblicke**ins studentische Leben und **Durchblicke** in den Innenhof
- **Natürliche Belichtung** der Erschließungszonen, Reduktion Strombedarf für Beleuchtung
- **gedeckte Fahrradstellplätze**unmittelbar neben dem Eingang

**KOOPERATIVES BAUEN**

- **Architekturwettbewerb**mit Generalübernehmer und Preisgarantie als Basis
- **Einbindung**des **ausführenden Unternehmens** und der **Fachplaner** bereits in der Wettbewerbsphase
- **ambitionierter Zeitplan** mit insgesamt 18 Monaten Planungs- und Bauzeit erfordert hohes Maß an **Reaktionsschnelligkeit** bei Entscheidungen, **Flexibilität** und **lösungsorientiertem Handeln** bei allen Beteiligten
- **Örtliche Bauaufsicht (ÖBA)** durch den Bauherren, jedoch **Unterstützung**durch das **Architektenteam** zur Sicherung der architektonischen Qualität im Einvernehmen mit dem Generalübernehmer (Architekten sind Subunternehmer des Generalübernehmers!)
- durchgehendes **partnerschaftliches Arbeiten aller Beteiligten** mit dem Focus, das Gebäude in bestmöglicher Qualität in der vorgegebenen Zeit fertigzustellen, **Begegnung auf Augenhöhe**
- Eröffnung von mineroom termingerecht nach **nur 11 Monaten Bauzeit**

**NACHHALTIGKEIT**

- **Holzbauweise**mit Ausnahme von Eingangsbereich, Keller und Stiegenhäuser
- 1**.900 m³** verbautes **Holz** binden **2.000 t CO2**
- **Upcycling,** Türausschnitte der KLH-Wände werden zu mobilen Möbel, 250 m² Spanplatten werden eingespart und **nochmals 25 t CO2 gebunden**
- **Passivhaus Plus Standard** mit hochenergieeffizienter Lüftungsanlage

+ Nutzung aller Dachflächen für eine größtmögliche **Photovoltaikanlage**

- **Optimierung der stromverbrauchenden Komponenten** und Vermeidung der Standby-Funktionen
- **Internationale Studierende** werden zu **Multiplikatoren**und tragen die Idee des Passivhauses und energieeffizienten Bauens in ihre Heimatländer

**KONZEPT** Haustechnik

- Gebäudehülle **Passivhausstandard** lt. PHI Darmstadt
- **Photovoltaikanlage**388 PV-Module in Ost-West Ausrichtung belegt, Module monokristallin á 300Wp mit 3 Wechselrichtern.
  Gesamtnennleistung: 116 kWp

Gesamtproduktion pro Jahr: 105.000 kWh
Gesamtersparnis CO2 pro Jahr: 12.600 kg/a

- Aufstellfläche und Verrohrung für Stromspeicher bereits vorgesehen.
- Einsatz von **LED Beleuchtung** im gesamten Gebäude
- Bewegungsmelder und Dämmerungsschaltung in den Allgemeinbereichen
- **Komfortlüftungsanlage**mit parallel laufendem Rotationswärmetauscher und Einsatz spezieller Taschen- und Plisseefilter zur Reduktion des Strömungswiderstandes der Lüftungsanlage

Lüftungsgerät Trox Cube mit 2 Rotationswärmetauschern
Luftvolumenstrom 4.500m³/h pro Rotationstauscher
Rückwärmezahl (EN308) 90,58%
Rückfeuchtezahl 73,14%.

- Aufzüge mit Rückgewinnung der Bremsenergie
- Verwendung von **Wasserspararmaturen** mit erweitertem Kaltwasserbereich zur Reduzierung des Warmwasserverbrauches
- Deckung des Restwärmebedarfs und Warmwasseraufbereitung mit Fernwärme (Prozessabwärme der VOEST Alpine Stahl)
- **Lademöglichkeit für E-Bikes und Elektroautos**

**GEBÄUDEDATEN**

- Grundstücksfläche 3.214 m2
- Bebaute Fläche 1.449 m2
- Bruttogeschossfläche 7.196 m2
- Nutzfläche Heim 5.900 m2
- Heimplätze gesamt 201
- **Wohneinheiten gesamt 139**

**DATEN BAUPHYSIK**

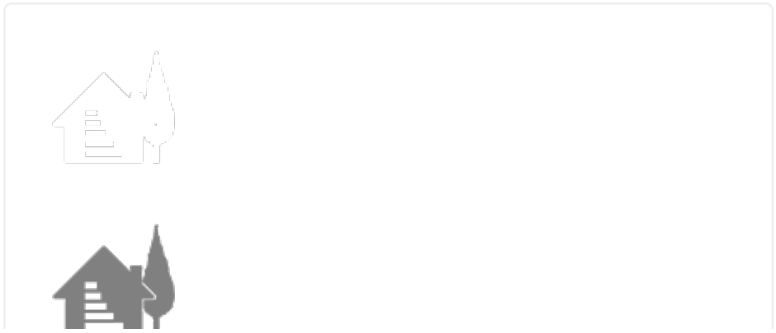
Außenwand 0,104 W/m2K

Dach 0,067 W/m2K

Decke gegen unbeheizt 0,091 W/m2K

Fenster/Uw

## Building candidate in the category



Energie & gemäßigtes Klima



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