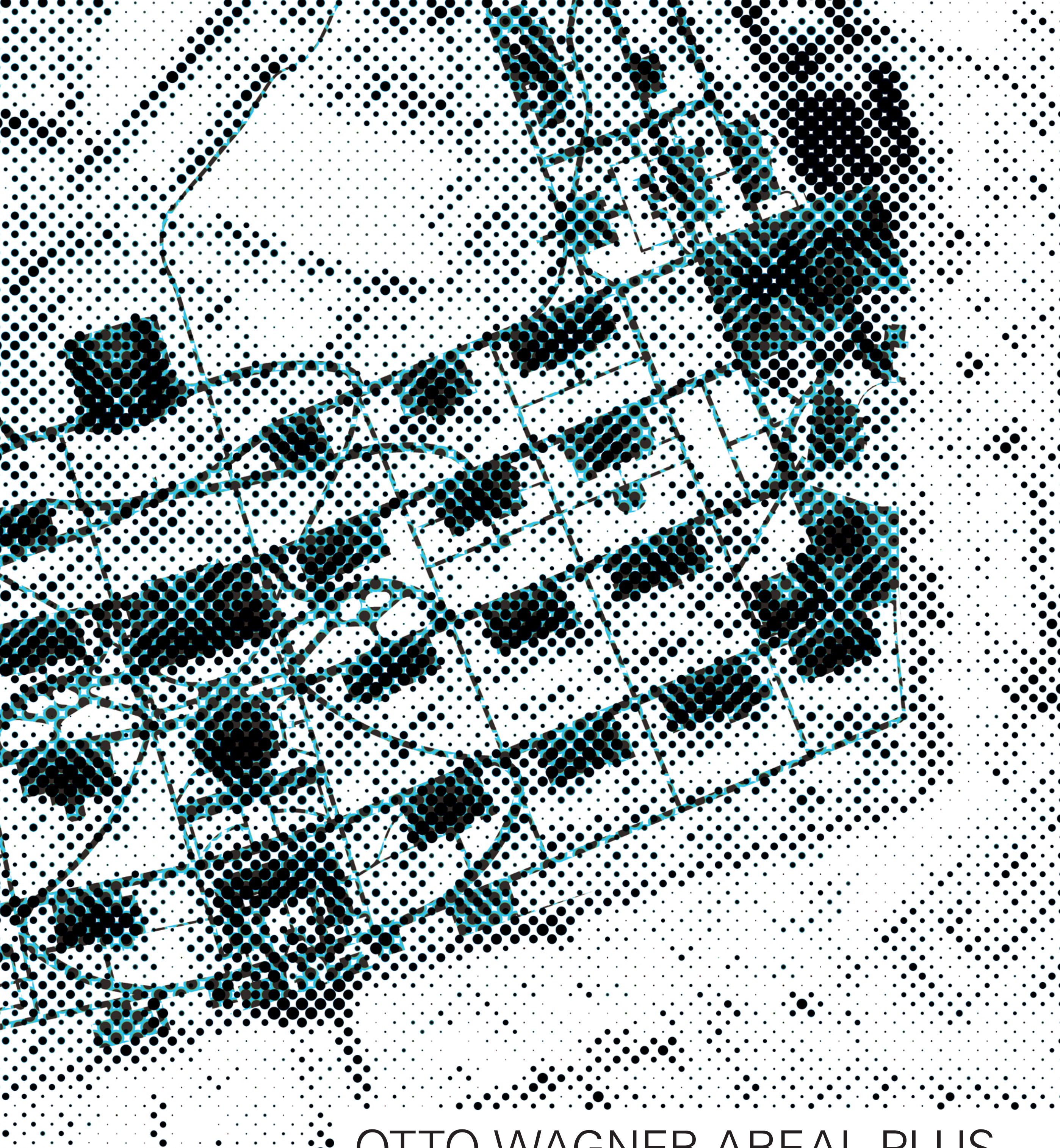

OTTO WAGNER AREAL PLUS

Green.Building.Solutions. 2020. Design Projects.

Green.
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Summer University

OTTO WAGNER AREAL PLUS

Green.Building.Solutions. 2020. Design Projects.

Contents

Foreword

OeAD student housing and its CEO Günther Jedliczka live and breathe sustainability. The pioneering non-profit organization stays tuned into the latest innovations in the building sector, and has built several award-winning student guesthouses that achieve or exceed stringent passive house construction standards since 2005. A particular source of pride is the PopUp dorms, which opened their doors in 2015, demonstrating best practice for flexible wooden container constructions. This was recognized by peers, winning the 2019 FIABCI World Prix d'Excellence Awards in the affordable housing category. OeAD student housing also built the first ever high-volume wooden student residence in passive house standards: the OeAD guesthouse mineroom is a one of a kind 6-floor timber frame structure providing accommodation for 201 students and guest professors. Another highlight is the GreenHouse, the very first EnergyPLUS-student residence worldwide, located in Vienna's Urban Lakeside. The organization is proud to host as many as 2,500 students and guest lecturers in 8 high quality, energy efficient and innovative student residences across Austria on a yearly basis.

As frontrunners in sustainable buildings, OeAD student housing, under the leadership of Günther Jedliczka, saw how important it is to share knowledge and best practices in the passive house sector, and to create a toolbox for the fight against climate change. This is the driving force that led to the creation of the Green.Building.Solutions. Summer University in 2011 (GBS, 7 ECTS). GBS is an intensive training program encompassing the ecological, economic, technical and social aspects of the built environment. The original concept for GBS was created by Günther Jedliczka and developed with the International Network for Educational Exchange (INEX). The academic curriculum was designed with guidance from Karin Stieldorf, professor at TU Wien and main lecturer for the GBS program. Within a transdisciplinary and intercultural setting, international participants acquire hands-on knowledge in the fields of Passive House technology, energy efficient design and sustainable urban planning guided by both Austrian and international experts. As of today, GBS has engaged more than 300 alumni from over 70 nations. For its 10th anniversary, the 2020 edition of GBS hosted 28 participants from 20 different nations spread across 9 time zones. Due to these special circumstances, GBS was held entirely online for the first time ever. The quality of the projects produced by the participants during GBS 2020 was so high, that it inspired the publication of this booklet to showcase the results. Following the success of GBS, and to approach the fight against climate change from the economical perspective, OeAD student housing also created the Alternative Economic and Monetary Systems Summer University (AEMS, 5 ECTS), which is taking place yearly since 2014.

Introduction to Otto Wagner Areal

Karin Stieldorf

The planned settlement of the Central European University (CEU) at the globally unique Art Nouveau jewel of the Otto Wagner Areal, provides an excellent opportunity to preserve the area's cultural heritage in its entirety, to update the building's standards for the future and to increase its comfort and value.

The church and hospital at Steinhof were built according to plans by Otto Wagner. With an area of around 50 hectares, the area (OWA) consists of 55 pavilions (dating back to 1907) of various sizes with a total usable area of around 173,100 m GFA, in addition to the church at Steinhof. According to the current plan, the first step will be for the CEU to make use of 17 pavilions with around 47,000 m GFA. The other pavilions are to be used for a wide range of purposes, such as student residences, assisted living, rehabilitation centers, theater and art, therapeutic horse riding, communal gardening, kindergarten, cafés, cafeteria and restaurants, FutureEnergyLab, administration, church - while always preserving the aspects of cultural heritage.

As a part of this summer school, participants considered the feasibility of a „historical plus energy quarter for the entire Otto Wagner Areal" and worked to develop a proposal for subsequent use by the CEU as a climate-neutral, "decarbonised" and listed area.

It has been decades since the Club of Rome set out the limits to growth and the consequences of unrestrained growth. It has also been many years since the first studies dealing with the efficiency and energy requirements of the construction sector were conducted. We have to ask ourselves today whether enough has happened in the area of sustainable building, and if the transition is achievable or new strategies are needed to counter climate change. Can exemplary projects and committed planners contribute to this „change" as role models?

The Otto Wagner Areal is intended as a „lighthouse project" for the renovation of historically valuable buildings in the creation of a plus-energy district, showing how efficient and targeted integral planning can work. The choice of procedure for planning and implementation is decisive as to whether these goals can be achieved. The participants of the Green. Building.Solutions. summer school were invited to work on the topics which are most relevant for the OWA - energy efficiency and monument protection - based on the findings of the Otto Wagner Areal Plus research project and were thus prepared for the use of integral methods.

In order to do justice to the overall holistic approach, at first a methodical approach was adopted and initially a „big picture" was created, as the

first step towards a „big picture“ for the future of the area. In this way, the focus could be directed away from the usual individual consideration towards an overall view. Diverse parameters, such as the connection to the city, the type of use/s, the external and internal development, as well as the supply of renewable energy, naturally in balance with the building substance worth protecting, the surrounding nature and the social environment, were all included in the proposed concepts. A guiding principle of the task was the orientation towards the internationally well-accepted Sustainable Development Goals (SDGs), which also work as the basis for a general, comprehensive and holistic assessment. Nine of the 17 goals are relevant for the construction sector, but specifically Goal 11, Sustainable Cities & Communities, was important for the project work of GBS.
In addition to design and monument conservation approaches, energy concepts for the historic buildings on the Otto Wagner site had to be developed in an integrated design process. The area in the south-west of Vienna not only houses and one of the most beautiful Art Nouveau churches in Vienna, but also the pavilions of the former „Lower Austrian State Sanatorium and Nursing Home for the Nervous and Mentally Ill“. The artistically and historically valuable buildings of this former hospital were to be adapted for future uses. This required careful planning of the building fabric and at the same time a great deal of knowledge about the use of new technologies. A large part of the ensemble was to be used as a location for a university in the future. Besides the spatial program, strategies for sustainable and energy-efficient construction for historical buildings were developed and their functionality evaluated. In addition to being accompanied by experts in the preservation of monuments and building services, another focus was placed on the planning of the area's open space. The aim was the integrated and simultaneous use of planning tools and the development of strategies for coping with complex construction tasks.

The history of the „insane asylums“, the genesis of the Otto Wagner Hospital and the current use of the Otto Wagner Areal (OWA) at Steinhof

The rapid growth of Vienna's population in the late 19th century made it necessary to adapt the city's infrastructure, also with regard to the „mentally ill“. From the end of the 18th century, the „mentally ill“ were no longer locked in penitentiaries, but kept in the new „Narrenturm“, which was built under Emperor Josef II as a closed cell-corridor system with the character of a fortress. When there was no longer enough space, the Lower Austrian „insane asylum“ in Vienna's 9th district was built in the style of a middle 19th century palace. Its spatial organization was ideally suited for the hierarchical and controlled accommodation of many people. Since this building quickly became too small and an expansion in a central location was neither possible nor desired, the decision to build the new institution at Steinhof was made in 1901.

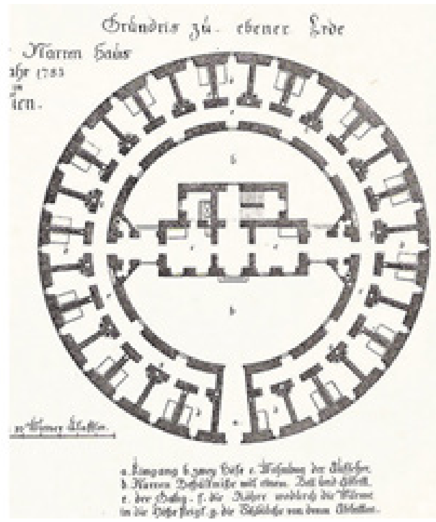


Fig. 1 and 2: Tower of the Fools, built by the Habsburg emperor Josef II

The concept of the Lower Austrian state „insane asylum" at Steinhof followed the efforts to centralize the infrastructure in Vienna and was the largest and most modern institution in the world when it was completed in 1907. It was built in a pavilion system and divided into several areas: the sanatorium, a nursing home of about the same size and a boarding school (sanatorium). The pavilion system was cheaper to build because connecting corridors and wings were not required. The location outside of the city center at Steinhof was chosen very deliberately. The sloping, south-facing area offered expansion opportunities, could be easily connected to the urban infrastructure and, as a „climatic health resort", offered ideal conditions for successfully implementing the intended therapeutic and nursing qualities of the institution: „A friendly and rural environment increases the value of the insane asylum" because „the location and the general appearance of the place [...] has a very noticeable effect on (the sick)" says G.M. Burrow as early as 1822 in his „Investigations into certain errors concerning the mental disruption and their influences on the physical, moral and civic conditions of man". The mentally ill were isolated from society, but as a balance they should live in an appealing landscape where they could enjoy nature and thus heal.
The „white city" at Steinhof, built outside of the city's public life and therefore invisible to the curious public eye, was planned as a self-sufficient enclave and furnished with the insignia of the metropolis of Vienna: an administration building in the entrance area with farm buildings on the northeastern edge and a central large kitchen, a theater, a prison

and a church. The new institution was built in the pavilion system, which enabled the desired social differentiation. The structure thus follows the requirements of class society: while sick people from the hospital were employed in the workshops, the sanitorium offered rooms for painting, smoking, billiards and music. Long walks in and around the area were an intended part of the therapy for wealthy patients. As early as 1892/93 Otto Wagner proposed in his overall regulatory plan for the city of Vienna that an asylum should be built at Steinhof. In 1901 - 1902 the first preparatory work of a committee made up of members of the state government and directors of „insane asylums" took place. The area at Steinhof covering more than 1 million m^2 was bought for the hospital by Josef Steiner, who later became Governor of Lower Austria, and the „civil servant" planning of the entire facility (Carlo von Boog, Franz Berger) was carried out by Otto Wagner in line with a „modern", strictly geometrical architectural system. The English park landscape is transformed into a Baroque-style, well composed architectural landscape with the dominant cultural axis in the middle. The route and the outdoor facilities had already been included in Otto Wagner's site plan. Garden architect Johann Müller was commissioned to implement the outdoor facilities in the English style in the area of the sanatorium with large lawn parterres and wide walking paths. Many other details were implemented differently from Otto Wagner's plan.

Fig. 3: Zoning plan (regulatory plan) of the City of Vienna 1904

Construction site and site management at Steinhof

The establishment and organization of the Steinhof construction site was a great challenge and a management success for Carlo von Boog and his successor Franz Berger.

Fig. 4: Carlo von Boog's first project (1902/1903)

Fig. 5: Aerial photo (1923).

The experience that the team had gained during the construction of the institution in Mauer-Öhling, such as the use of railway systems on the site and the use of Portland cement rammed concrete to span large, column-free spaces, was to be used and further developed. The area north of the village of Baumgarten was a traditional wine-growing area with long, narrow strips of vineyards. As early as 1902, a quarry was set up on the site to produce crushed stone to be used for the erection of massive retaining walls and foundations. The on-site extraction of material was much cheaper than it would have been to purchase and deliver it. The transport from the quarry, which was located higher up on the site, took place by using gravity with a narrow-gauge railway. At the same time the main aqueduct was built. Other building materials like the 32 million bricks from Wienerberger company were delivered by the state railways via Ottakring station, where they were reloaded onto a railway line set up for construction. The construction site ran around the clock, at peak times 1,200 bricklayers worked at Steinhof, 12 hours a day in summer and 9 hours in winter. The foundation stone was laid after the plans of Carlo von Boog and Otto Wagner had been agreed and the preliminary work had been completed in 1905. Half of the building structures was completed within a few months. Construction management and implementation took place under the direction of Franz Berger alongside the construction of the church under the direction of Otto Wagner. The opening by the heir to the throne Franz Ferdinand took place in 1907. The completed complex of the „white city" was impressive and received the highest praise from the press and visitors alike.

Fortunately, a few years ago an extensive pool of original historical plans from the planning period was discovered, digitized and made accessible for research. The plans were inventoried and handed over to the City of Vienna and the State Archives. Therefore, the planning process of the individual pavilions can now be understood very well and a much better basis of information for renovations is available.

The former state sanatoriums and nursing homes for the mentally ill at Steinhof in Vienna

The over 1 million m^2 facility is divided into three parts and enclosed by a 4.36 km long, massive, 2.5 - 3 m high wall made of rubble, bricks and stamped concrete bricks.

The sanatoriums and nursing homes

The sanatoriums and nursing homes were the medical and therapeutic center of the terraced buildings on the southern slope of the Gallitzinberg. They are separated by a wide green strip - to the west from the sanatorium and to the east from the farm buildings. The strictly orthogonal and vertically structured system of order was laid over the first design by Carlo von Boogs by Otto Wagner. The imperial approach and driveway is on the central axis of the area and continues into the „cultural axis": Administration, a theater and a large kitchen are located on this axis, which is crowned by the highly visible central building of the St. Leopold Institution Church, designed and built by Otto Wagner. Behind it there is an extensive forest and meadow area that was used for agricultural purposes and as a recreational and leisure area for the sick. The richly decorated entrance lies between two porter's houses, each next to a civil servant's house.

To the left and right of the U-shaped administration building there was a reception building, where the patients were first examined and then assigned to a pavilion. The pavilions to the left of the main axis were intended for the female patients and to the right of the main axis for the male patients. Curable patients were housed in the pavilions near the entrance, and behind them the patients who were incurable and in need of constant care. Behind it are the villas for the tuberculosis sufferers - separately situated because of the risk of infection. In the furthest rows of pavilions, the „restless" sick people were housed, whose gardens were bordered by concrete walls, thus preventing access to the area. In the middle the „semi-calm" sick people were housed, whose gardens were limited by fences. The easternmost pavilion (8) of the row was intended for „quiet" patients and formed the link to the farm buildings in the east. The meadow strips along the 2.5 m high enclosing walls were parceled out for allotment gardens for servants. All hospital wards face the sun and face south; all entrances are to the north of the pavilions. All transportation into the area came via the 9.5 km long railway system, and communication was via a telephone system comprising of 235 devices.

The first representative building on the central axis is the general administration, the administrative center for the sanatoriums and nursing homes, and the residences of the director and the doctors. The registry, an archive, the library, meeting rooms and a pharmacy were also situated here.

Fig. 6: Administration

Behind the administration building is the „Society House", known as the „Art Nouveau Theater". The integration of a theater pursued therapeutic goals. It was believed that the sick could escape the „ideas of madness" through theater performances. The completed building is made up of several nested cubes. The height development of the building is representative of the use of the building; the director and doctors were able to observe what was happening in the ballroom from a gallery and intervene quickly if anything unforeseen occured. The very suitable layout and traffic controls made it possible to use the building without conflict between spectators, patients, actors, supervisors and kitchen staff. The interior is spanned by a reinforced concrete ceiling, which at 16 m was the widest ceiling of the Monier system and whose design and implementation were based on the knowledge and innovative spirit of Carlo von Boog. The ballroom offered enough space for 1,200 spectators and was initially used intensively for theater, cinema, lectures, variety shows, concerts, balls and celebrations. Until 2009, theater groups held performances accessible to the public for little money.

In 2003, the memorial for the victims of the medical crimes of the Spiegelgrund was positioned between the theater and the kitchen – 772 monumental pillars that glow at night to commemorate the children and young people who were murdered here during National Socialism. From the central kitchen building, all patients and employees of the sanatoriums and nursing homes were catered for via the institutional railway. The center of the kitchen is a 352 m², two-storey room lit from above, which is surrounded by preparation and cleaning rooms, as well as dining rooms and a café. In the basement there were storage and cooling rooms, ice and soda production, and living rooms for the staff on the upper floor. During the fundamental renovation and modernization of the kitchen, significant technical renovations were carried out, while the historical concept of the floor plan was largely retained.

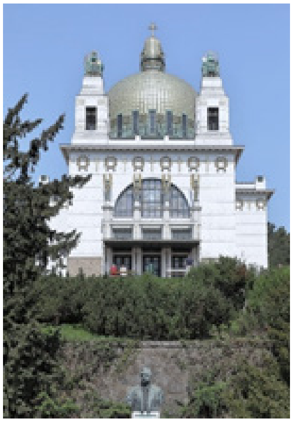


Fig. 7: St.Leopold, church

Fig. 8: Memorial and Art Nouveau theater

Due to its design and panoramic view point, the St. Leopold Institution Church is the highlight of the central axis - a domed central building, resting on the quarry stone masonry from the stone courtyards of the Ottakring quarry and wrapped in marble slabs, which are fixed with copper nails. The clarity of the church interior is achieved through the use of few colors: white plaster, white marble, light stone, gold and Koloman Moser's glass windows. The church was extensively renovated by the Treberspurg architectural office a few years ago.

Different types of pavilions were developed for the areal:

Type A - Reception pavilion (1, 2)
Type B - Pavilion for the 'quiet' (13, 16)
Type C - Pavilion for the 'semi-calm' (3, 4, 8, 9, 12)
Type D - Pavilion for the 'restless' (5, 6, 11, 14)
Type E - Open pavilion for 'quiet' people (13, 16)
Type F - Open pavilion for people in need of care and bedridden people (15, 18, 20, 21)
Type G - Closed pavilion for 'restless' people in need of care and 'semi-calm' sick people (17, 24)
Type H - Pavilion for tuberculous and infectious patients (19, 22)
Type I - Closed pavilion for 'insane' criminals and particularly dangerous 'insane' people (23)

Structure. All pavilion types are accessed vertically via a two-flight staircase with an intermediate landing, from which the individual floors can be accessed. To the north is the staircase and ancillary rooms such as bathroom and toilet facilities, and the scullery. A west to east running corridor forms the main access to the floors, in the west and east wings there are individual rooms and doctor's rooms. All the large hospital rooms and day rooms are in the south. The floor plans of the lower floors are almost identical. On the top floor, nurses and staff were accommodated in the middle wing. Most of the pavilions have 3 floors; only the pavilions for „quiet people" (type B and E) have an additional floor and the reception pavilions are two-story.

The consistently horizontal structure of the façades with emphasis on the central and corner projections comes from the tradition of the Austrian and South German baroque palaces. However, the smaller structures of the campus area with E, U, H floor plans are characteristic of the area. The gaps between the pavilions are generous in order to guarantee the buildings' access to light, air and sun (b = 60-70, t = 32-54).

The basement floors are made of quarry stone and have a gray plastered base on the outside. The storeys above are made of exposed brick and structured by horizontal plaster cornices. The top floors are designed as cornices, with eaves above and finished with egg bar friezes. The weather fronts were protected with an oil paint. The hipped flat roofs consist of a reinforced concrete structure that is waterproofed with wood cement and protected by a gravel covering.

All pavilions have two side wings and a higher central wing. The staircase from the main entrance is placed in the north of the central building in all pavilion types and protrudes prominently from the facade level. The double-leaf wooden entrance doors with barred glass lights are protected everywhere by small iron and glass canopies.

The windows of the buildings are surrounded by decorative frames and in some cases by friezes; in the basement they are made of metal, on the upper floors they are made of wood. Other decorative elements are simple plastered rectangles, on the top floor or between 2 window elements. In order to meet the safety regulations, different window types were developed.

For the floors of the dormitories, corridors, bathrooms and kitchenettes, paving made of dry-pressed „Mettlach tiles" from the Wienerberger company was used. Day rooms were equipped with oak parquet flooring, and rooms with high hygiene requirements with terrazzo or glazed bricks. The corridors also had a rounded base in the corners for better maintenance, and the walls were coated with a dirt-repellent enamel paint.

Outdoor areas. Each pavilion has a garden with lawn and trees. The gardens along the central axis are smaller as a paved road runs through them. Here, however, were the pavilions of the „quiet", who were able to move freely in the area anyway. The pavilions of the sanatorium have small verandas in front of the facades. For pavilion type B these lie on the east and west facades, for types C and D on the southeast. The pavilions of the nursing home have a completely barred veranda on the south side, which also allows bedridden patients to take in the fresh air.

The Sanatorium

As customary at the time, Carlo von Boog envisaged a „boarding house" in the west side of the area, which was available to upper classes and therefore had more elaborate architecture and dignified interior design for this wealthy clientele. Its location, the comfort and the therapy options were unique in Europe. The area was supplied by the farm buildings in the east and accessed via the small internal train. The patients of the sanatorium could use the theater and the church. Here, too, the „quiet" patients were accommodated near the entrance, „restless", „unclean" and sick patients on the northern edge. The route through the middle section moves in a curved shape around the central building. Most of the gardens designed by garden architect Ferdinand Müller had no boundaries and were designed with multiples variations. The facade of the pavilions was plastered and painted light yellow and white, and decorated with green glazed bricks. The pavilions were given identifying names: Rosenvilla, Wienerwald, Leopold, Hermann, Vindobona, Austria. The tennis court, bowling alley and water basin were used for relaxation and entertainment in the summer. In the winter a toboggan run and ice rink were also used for this purpose. The Kurhaus was the medical and therapeutic center of the sanatorium, placed dominantly on the edge of the site and equipped with a representative facade. Although the ballroom of the Kurhaus is significantly smaller than that of the theater (society house), similar design elements were used. To the south of the ballroom is the originally preserved, currently unusable winter swimming pool, enclosed by glass windows from the Tyrolean glass factory. The windows are decorated with a lakeside landscape, birds, water lilies and lotus blossoms (Koloman Moser).

Since the aim was to offer the patients of the sanatorium high-quality catering and avoid the laborious transport of food, the sanatorium was equipped with its own kitchen, very similar to the kitchen in the main area but smaller. The room layout is replicated but slightly more compact. Due to insufficient occupancy, the sanatorium was closed in 1920 and a lung sanatorium was set up. Several structural extensions were carried out, the largest of which was the well-integrated new orthopedic building known as the Felix Pavilion. In 2004 the Austria Pavilion was completely renovated.

The economic area

In addition to medical care, self-sufficiency was a key aspect of the development. The farm buildings of the complex are located on sloping terrain on the east side of the area and secured with retaining walls.
The main buildings were

- the employment building with workshops for occupational therapy
- accommodation for the workers
- a disinfection and bath house for the hygiene of the institution
- the laundry
- a boiler house for the supply of hot water and superheated steam
- an incinerator for waste
- a water purification system
- a butcher shop
- a pigsty
- a horse stable
- a carriage shed with a smithy and tool shed
- glass houses, gardeners' houses and greenhouses

This is also where the pavilion 23, which previously housed serious criminals, is located, surrounded by a 4 m high wall.
More detailed plans on how the east of the area should be developed and used are not yet available.

The time after the opening until modern day use

The sanatorium and nursing home at Steinhof became the center of a series of medical crimes during the National Socialist era. Between 1940 and 1945, 800 children perished in the „children's department" of the Spiegelgrund, 3200 patients were transported away from the site and murdered, and 3500 patients fell victim to malnutrition and neglect. Only in the last 20 years has a systematic investigation and recording of these crimes been carried out.
Although the institution at Steinhof was equipped with comparatively little technical and medical infrastructure, due to its use and the fact that the buildings were very solidly constructed, the original structure remains relatively undamaged. It was not until the end of the 20th century that major technical improvements, and therefore coordination with monument protection efforts, became necessary. The 5+ project was initiated in 1995 and continued until 2002. A „guiding concept" was drawn up for the renovation and adaptation of the pavilions, which made pavilions 3, 5, 9, 11, 13, 16 available for renovation in coordination with the monument protection authorities. The offices of Beneder / Fischer (Pav. 3, 5, 11), Prantl / Runser (Pav. 9) and Sarnitz-Soyka / Silber / Soyka (Pav. 16) emerged as the winners following an expert review. For the implementation of the planning, they prescribed „disposition criteria" in line with the Venice Charter: the dominance of the image-bearing central

axis was to be retained, and other additions were to be lined up under the pavilions. The additions were to be visible as an „addendum", whilst retaining the historical building structure. The team of architects integrated the new criteria of the guiding concept (Article 6 of the Venice Charter - „Preservation of a framework that corresponds to its scale") with the aim of achieving „harmony in the structure, design language and material", whilst continuing to take into account the specifics of the historical complex, such as including the topography of the contour lines and the typology of the buildings. Additions should have characteristics of „transparency, independence, [and] homogeneous surfaces". With the sensitive implementation of the measures, the teams anticipated the content of the Vienna Memorandum on Dealing with Historic Urban Landscapes from 2005, which stated that „contemporary architecture includes all interventions in the structural and cultural heritage, including open spaces, new buildings, additions and extensions to monuments and ensembles as well as conversions" and „should adjust the proportions and design of the historical structure and architecture, as well as the gutting of buildings worthy of protection". This measure was necessary for two of the five converted pavilions, where the central wall had to be removed in order to be able to implement the infrastructure required for modern hospital operations.

The new zoning plan

The goal of the City of Vienna is to maintain and develop the historically unique Otto Wagner Areal following its current use by the Vienna Health Association. This cultural asset, which is so important for Vienna, is to be transformed in the long term into a location for science, culture and education, also encompassing social and health-related uses. Future uses of the area should follow the results of the mediation process with neighboring parties and thus also meet the needs of the population and the two neighboring districts.

The City of Vienna is committed to:

· develop the Otto Wagner Areal in its entirety;
· preserve the historical fabric of the building;
· leave the area permanently in the ownership of the City of Vienna;
· give priority to university, social and cultural uses;
· ensure public accessibility; and
· obtain a permanent opportunity for the public to participate in the use of certain buildings (for example theaters).

Attractive, long-term „anchor tenants" such as the Central European University (CEU), which announced its intention to relocate its university operations from Budapest to Vienna, can provide the driving force for the overall development of the area and, in the long term, an element of attraction for similar uses in the remaining area. At a strategic level, the

project coordination set up in the building department is responsible for the development of the entire area and the creation of the conditions to facilitate use of the area. The establishment of the Central European University (CEU) on the site is a sub-project that the Vienna Business Agency has been entrusted with operationally.
Green areas and public paths of the cultural gem are secured.
The historical building stock has already been secured by the monument protection and the protection zone that has been in place for the historical ensemble since 2006. The City of Vienna has commissioned the Urban District Planning and Zoning department to incorporate the results of input from citizens and expert committees alike, regarding the future use of the area, into a new zoning plan.

The new zoning contains the following principles:

· There will be no buildings erected between the pavilions. All green areas in the central zone and in the western sanatorium area must remain untouched.

· Only minimal changes are allowed to the buildings themselves - such as barrier-free access. All changes must be made in close cooperation with the Federal Monuments Office.

· The green areas between the sanatorium area and the main area, and in the eastern area will remain and will be converted from building land to grassland. The central line of sight to the church is also kept free. Construction here is therefore excluded.

· The extent of any constructions in the former business area in the east will kept at the minimum recommended by the planning of the expert commission, and which enable the area to be integrated into the overall ensemble.

· The entire Steinhof recreation area will be retained.

Sources and references

With the consent of the editors and authors Caroline Jäger-Klein and Sabine Plakolm-Forsthuber, the book „**The city outside. On the architecture of the former Lower Austrian state sanatoriums and nursing homes for the insane and mentally ill at Steinhof in Vienna**“ (Birkhäuser, 2015) was used as a source for this booklet.
In their book the former and further development of the area and of similar institutions is described very comprehensively and richly illustrated by the architecture photographer Wolfgang Thaler.
Additionally, the book contains scientific articles by Maria Auböck, Herwig Czech, Mathias Groisböck, Caroline Jäger-Klein, Monika Keplinger, Richard Kurdiovsky, Franziska Leeb, Stefan Melwisch, Sabine Plakolm-Forsthuber and Gustav Schäfer, who together present an overview of the history of the area. There is significant discussion surrounding the emergence of the Otto Wagner Hospital and comparable institutions,

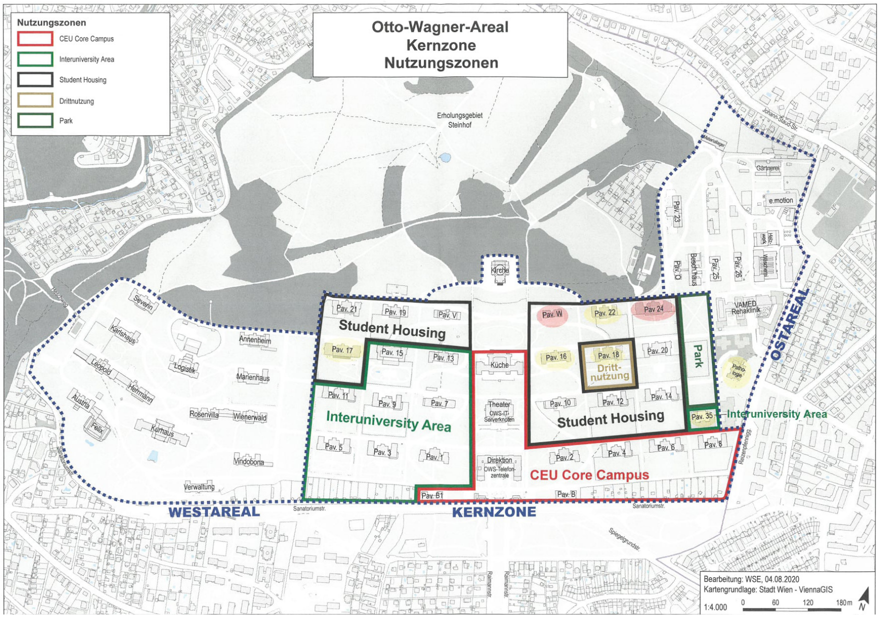


Fig. 9: The new zoning plan. From „Bürgerinitiative Steinhof“

its planners, implementers and outfitters and the time after its completion, which is wonderfully worked through and described.

At this point we would like to express our sincere thanks to the editors for making the book and other available planning documents.

The consistent and, from today's perspective, sustainable and well-considered approach to the concept, for example the choice of the plot of land, the planning and the construction of the hospital, was particularly surprising. It shows in an exemplary way how much care and foresight „pay off". The atmosphere and architectural design of the ensemble still cast a spell over visitors today. Many of its current residents and employees would like to remain in situ. The idea that a university campus is now to be built there is encouraging, as the existing pavilion system is very suitable as a university campus structure. The large-scale generosity of the plans by Carlo von Boogs, Otto Wagner and Franz Bergers make the transformation easy and prove that good buildings have a long life if their quality is recognized, valued and protected.

We also refer to the brochure „**The White City. Steinhof in Vienna - Architecture as a Reflection of Attitudes to Mental Illness**", an earlier publication (and later revision) by Peter Haiko, Harald Leupold-Löwenthal and Maria Reissberger (Vienna, 2018, publisher: Verein Steinhof preserved and designed as commons), who had worked on the conception of the Otto Wagner Areal for the first time in an interdisciplinary scientific manner, were already committed to the maintenance and redesign of the area and probably contributed significantly to its preservation. It is expressly pointed out in the extensive bibliography of „The city outside“ and the comments of „The white city. The Steinhof in Vienna“.

The campus university as a model

A campus is a coherent complex of buildings that belong to the same university, college or research institute.

Originally, the Latin term for a „field“ in the USA since the 18th century was the name of the campus for a university building outside of the city, which is usually surrounded by park-like structures. The term was first used at the College of New Jersey, founded in 1746 (now Princeton University). In the 1960s, the term was borrowed from the American in Germany. Since then, „campus universities“ have been understood as universities where teaching and research facilities and often other university-related infrastructure such as living space for professors and students, as well as green spaces, are combined in one area instead of being spread across the city. In contrast to the classic European universities, German university establishments were now often no longer integrated in a central location in the city, but instead formed their own small districts on the edge or immediately outside the city. This development began in 1946 with the Free University of Berlin (FU Berlin) and its campus in Berlin-Dahlem. Famous campus universities include Yale, Stanford, Oxford, Cambridge, Berkeley, Imperial College, King's College, Princeton, and MIT. The Otto Wagner Areal offers ideal conditions for the establishment of a campus university in the classic sense.

Projects

Earthketeers

Simran Munde (Canada), Essam Elangar (Egypt), Karina Rafailov (Australia)

eur-ECO

Julia Flaszynska (Austria), Rebecca Jacob (Canada), Ana Sofia Gallegos (Mexico), Chahinez Djermouni (Algeria)

Green Globe Creators

Qëndresa Bresa (kosovo), Michael Mazurkiewicz (Canada), Mikolt Piller (Hungary), Nazanin Shakoori (Iran)

Greenmakers

Rama Alhammami (Syria), Sahana Doravari (India), Tereza Jandaskova (Czech Republic), Thomas Kelz (Austria)

Kindagreen

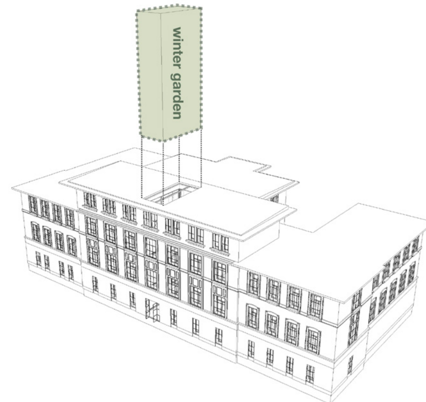
Natana Char (Brasil), Alejandro Tangassi (Mexico), Olivia Daschill (Austria), Visie Solo (India)

Spaced

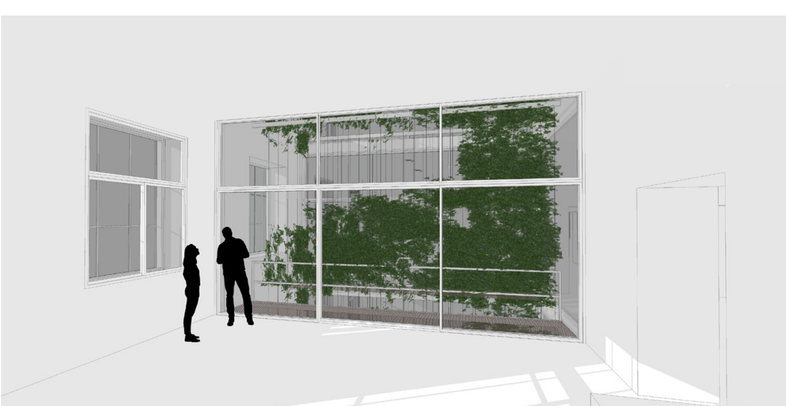
Christine Dalmund (Denmark), Marija Cvetovic (Serbia), Edwin Espino (Panama), Nuria Roig (Mexico), Sonja Morzycki (Poland)

Earthketeers

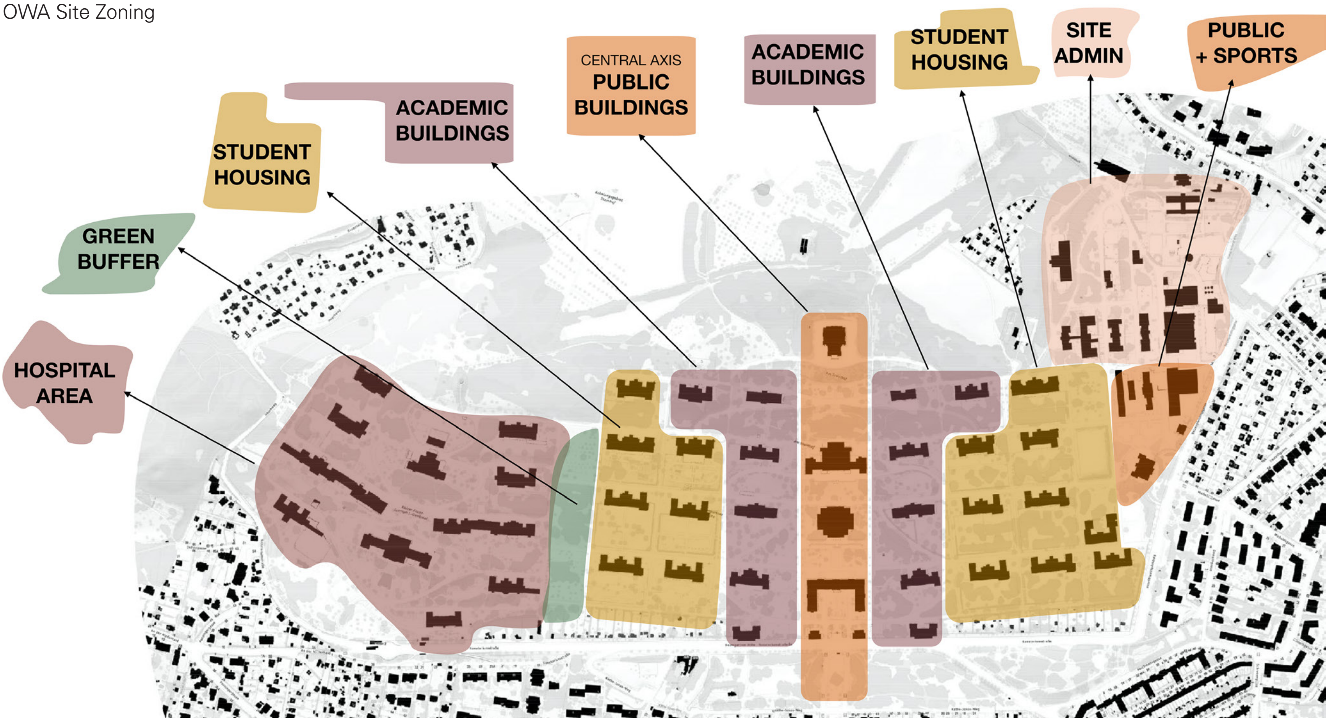
Simran Munde, Essam Elangar, Karina Rafailov



The objective of this project is to design a positive energy district for the Central European University campus in the Otto Wagner Areal. The great historical importance of this area to the city of Vienna is a key factor to be considered during the design process. Pavilion 8 was selected for student housing and was selected to be the focus of the project. The driving forces of design in this project were economy, sustainability and low emissions, high quality of life, comfort, livelihood, and ecology. The spaces are planned to locate common areas on the lower ground floor and on the south side of the building while the student dorms would be located in the remaining areas. With the integration of a south facing wintergarden with a covered skylight, greater interior comfort, and air quality, rainwater filtration, and other elements can be achieved. We wanted to maintain the existing building as much as possible, based on its construction and visual appearance. This consideration can be seen in the details of the building, for example, the maintenance of existing tiles and roofs elongation. The position of the solar panels was planned to cause minimal visual disruption to the existing view of the building, as seen in the elevations.



OWA Site Zoning



Positive Energy District Goal:

Sustainability
- Follow the pillars of the PED
- Sustainable Development Goals

Energy
- Passive approaches

E-Vehicles
- E-Vehicles + onsite PV charging stations
- Second life cycle of batteries
- Swapping batteries station for E-Schooters

Water
- Low flow water fixtures
- Grey water - exterior gardening use & laundry

Infrastructure
- Lighting on the pathways
- Interior gardens (wintergarden in the university and residential buildings)
- Any infrastructure should be energy efficient + use renewable energy

Social and Spatial Goals:

Accessibility
- Wheelchair accessibility
- Public and semi-public spaces
- More entry points for a more accessible site

Art and Educational
- Museum, site tours, art exhibitions, university, community workshops
- Sports centrum
- Public (co-working spaces)
- Local artists to showcase their work in the grounds of the campus
- Green focus points - for meet ups, study, small gatherings
- Community gardens

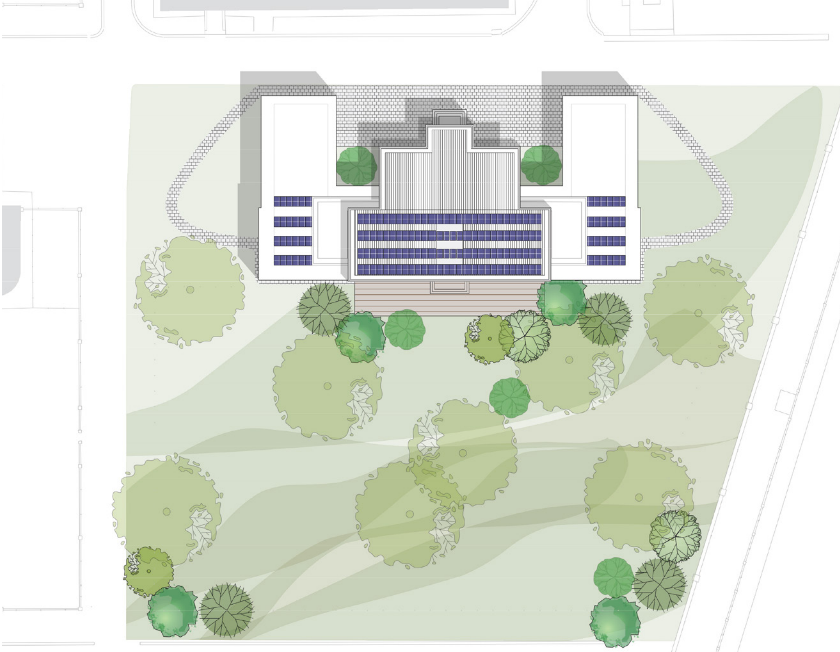
Engaging community and services
- Promoting social equality and inclusion programs
- Farmers market (local farmers and small crafts)
- Promote collaboration between university and small business (food trucks)

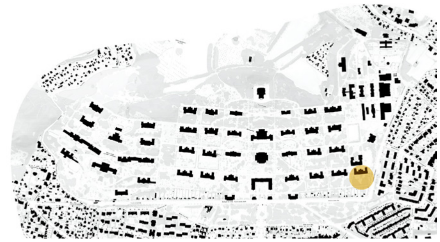
Attraction - Heritage vs. Modern
- New underground library
- New parking house
- Importance of heritage and maintenance of the past

North Elevation

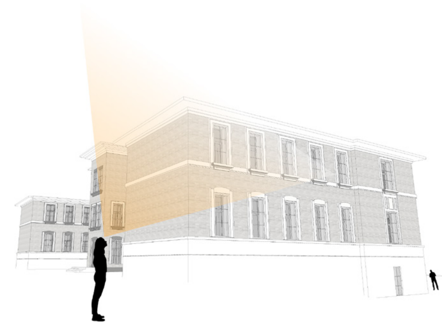
West Elevation

Pavillon 8. Site Plan

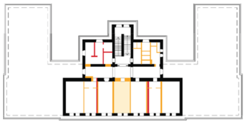




Visibility of the PV Panels

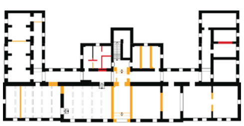


Second Floor

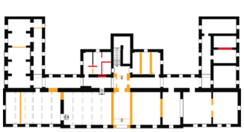


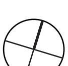

First Floor


Ground Floor

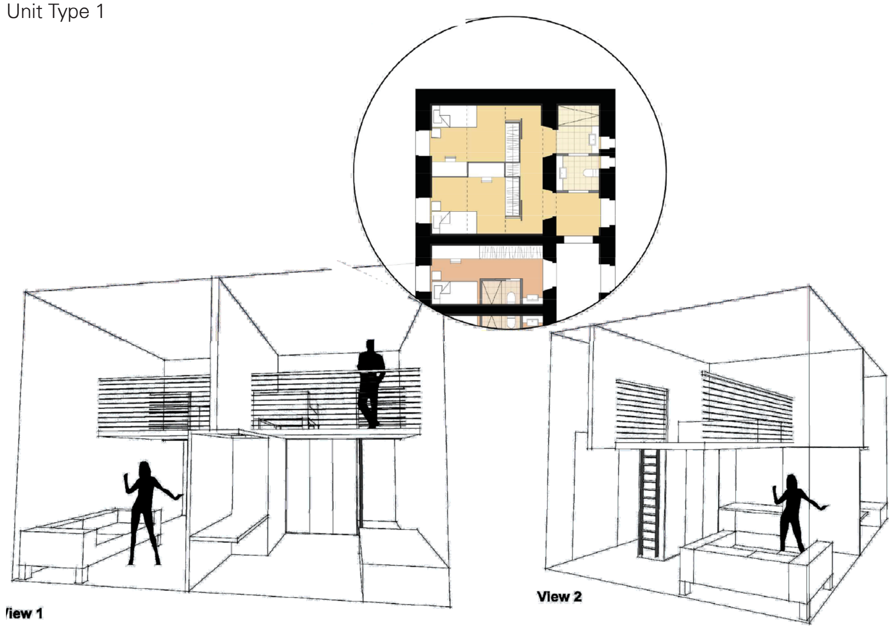


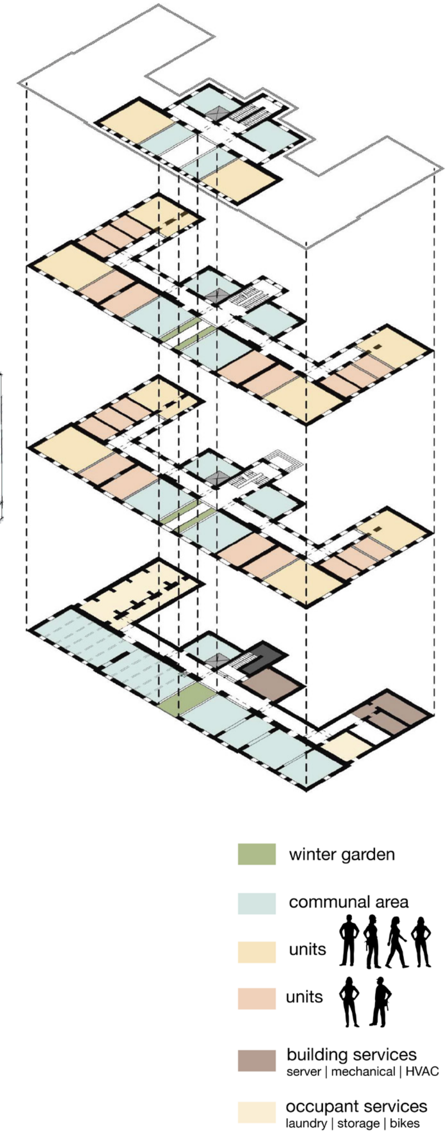

Basement



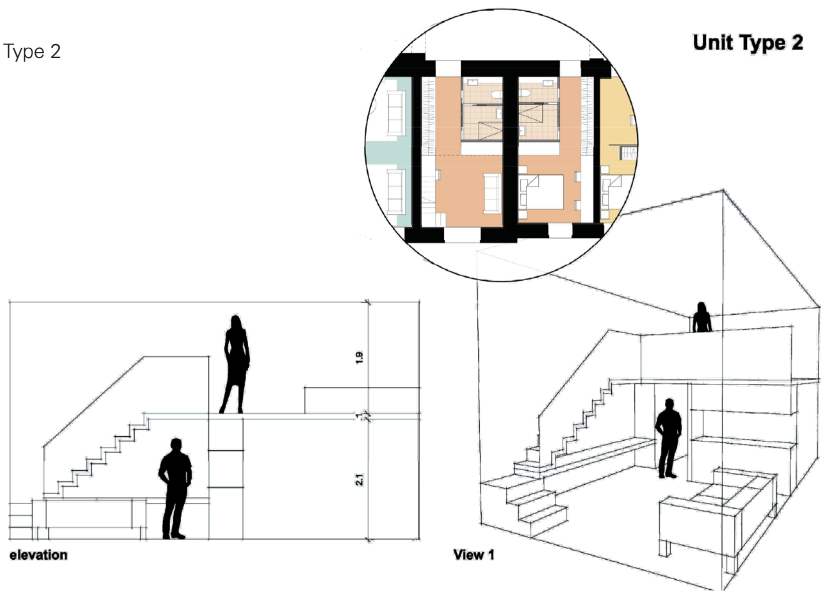



Unit Type 1





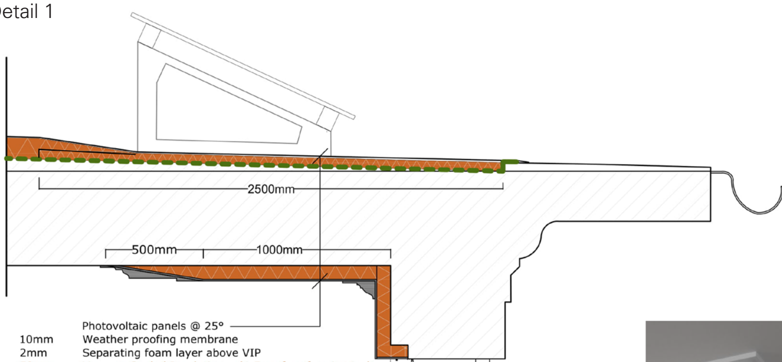
Unit Type 2



Longitudinal section

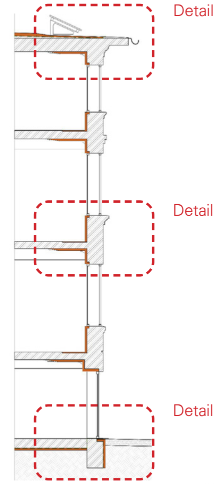

Cross section

Detail 1

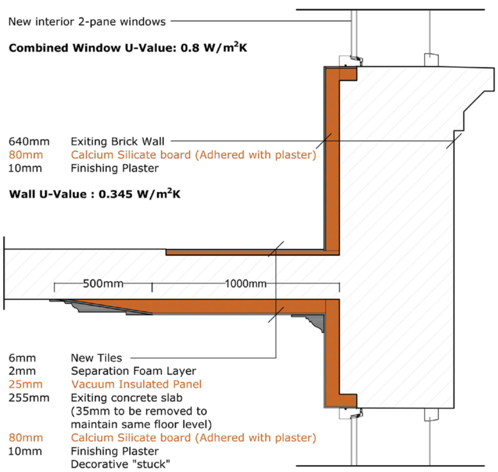


Photovoltaic panels @ 25°
10mm Weather proofing membrane
2mm Separating foam layer above VIP
50mm Vacuum Sealed Insulation (1.5m of roof perimeter)
120mm Cellulose Rigid Insulation (Interior roof surface)
Vapour barrier
545mm Existing concrete roof to be sloped for drainage
80mm Calcium Silicate board (Adhered with plaster)
10mm Finishing Plaster
Decorative "stuck"

Roof U-Value : 0.175 W/m²K



Detail 2



New interior 2-pane windows

Combined Window U-Value: 0.8 W/m²K

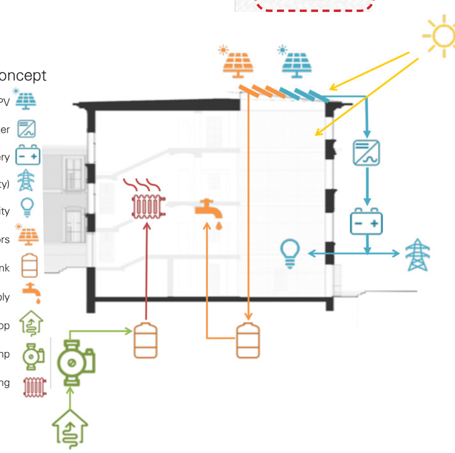
640mm Exiting Brick Wall
80mm Calcium Silicate board (Adhered with plaster)
10mm Finishing Plaster

Wall U-Value : 0.345 W/m²K

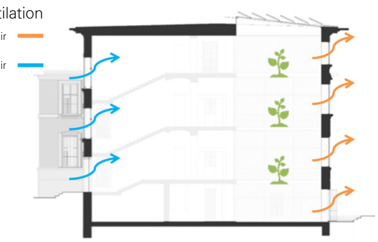
6mm New Tiles
2mm Separation Foam Layer
25mm Vacuum Insulated Panel
255mm Exiting concrete slab (35mm to be removed to maintain same floor level)
80mm Calcium Silicate board (Adhered with plaster)
10mm Finishing Plaster
Decorative "stuck"

Floor U-Value : 0.320 W/m²K

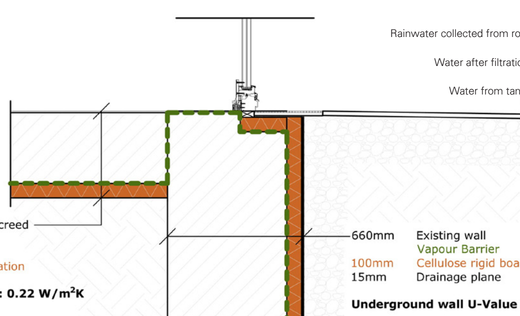
Energy concept



Natural ventilation



Detail 3



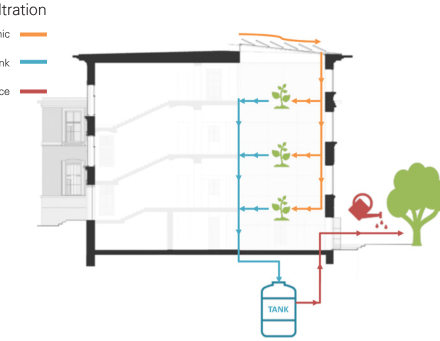
6mm New Tiles on floor screed
365mm New concrete slab
Vapour Barrier
100mm Cellulose rigid insulation

Underground Floor U-Value : 0.22 W/m²K

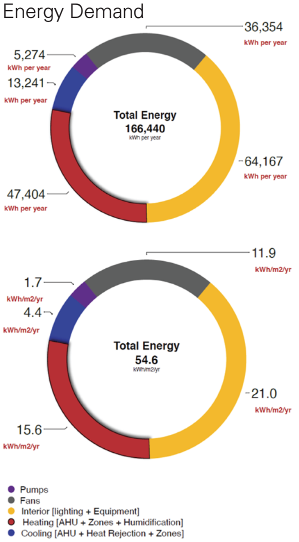
660mm Existing wall
Vapour Barrier
100mm Cellulose rigid board insulation
15mm Drainage plane

Underground wall U-Value : 0.191 W/m²K

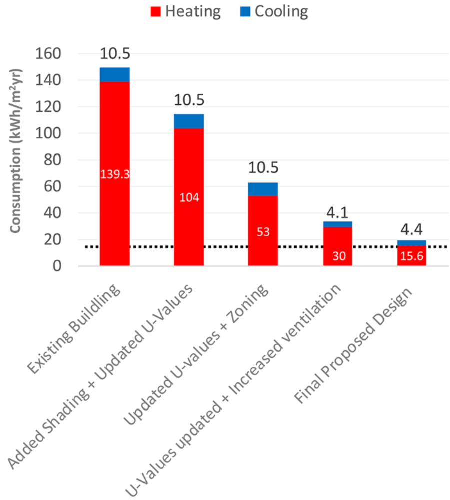
Rainwater filtration

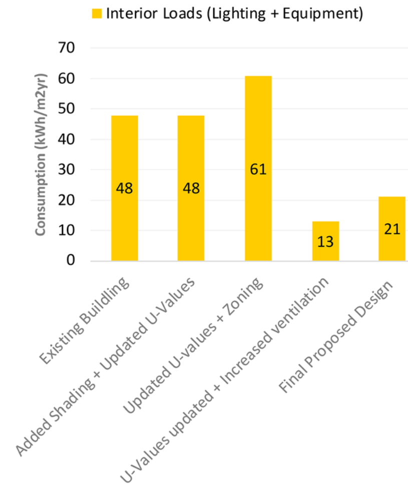


Energy Demand

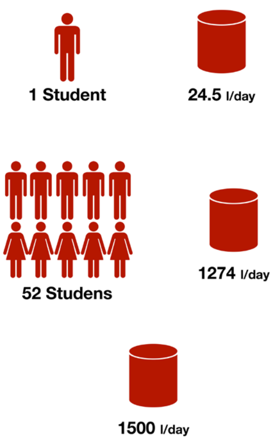


Energy Consumption Reduction Process

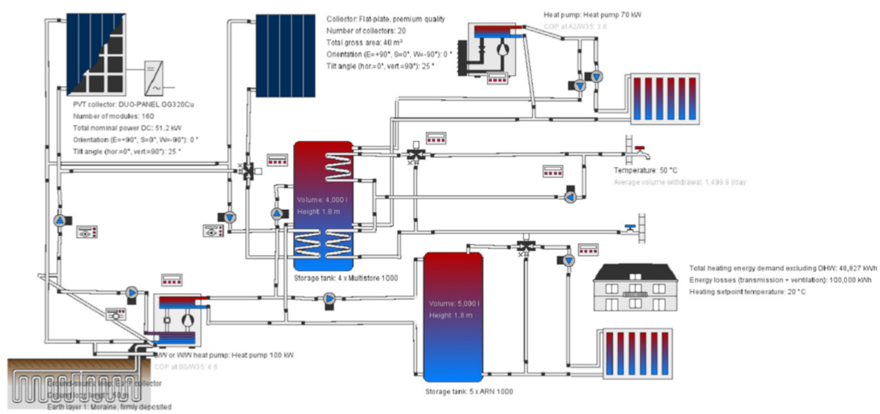




Hot Water Demand



Energy System



Geothermal Withdrawn Energy

36,509kWh

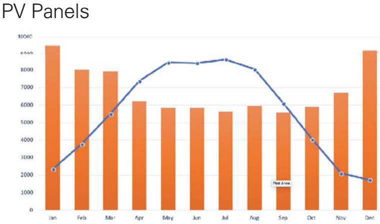
Inflow Temperature : 10.4 °C

Outflow Temperature : 9.3 °C

Total Electricity Consumption 82,410kWh

Total Energy Consumption 65,956kWh

PV Panels



31%

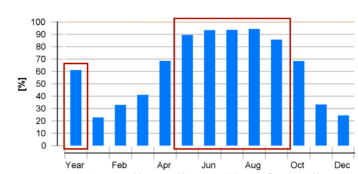
160 PV Modules

60% In Winter

90% In Summer

32 kWh Battery

Solar Thermal Collectors



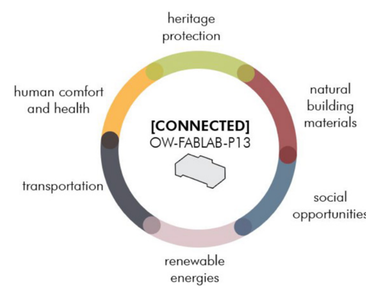
61%

20 Collector

eur-ECO

Julia Flaszynska, Rebecca Jacob, Ana Sofia Gallegos,
Chahinez Djermouni

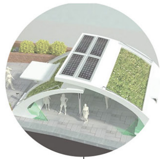
Pavilion 13, which our team selected for processing, is located on the connecting islet between the central axis of the complex, where all the facilities frequented by the general public (administration, restaurant, theater, church, etc.), and the pavilions which will serve as departments for the Central European University, are situated. In order to facilitate this public to private transition in a progressive manner, a fabrication laboratory („fab lab") project has been planned to meet the future needs of students without excluding the general public. The fab lab will include all the equipment necessary for the manufacture of various objects such as models and furniture, which will be used for landscaping the various outdoor green spaces within the complex. Through this, the fab lab will serve as a place for ideas to unfold, exchange of knowledge and to broaden the mind. This so-called think-tank is intended to contribute to the lighthouse-character of the energy-plus-campus and lead the way to a productive and efficient city.



Axonometric Site Map

Parking Garage with Solar PV

A solar PV hub to produce electricity for the campus



Bus Stop with Solar PV

Use of an area otherwise unused, for greenery and solar electricity production

Pavillions and Social Space

Installations on site designed and built in the fab lab act as social spaces for students and visitors

Bike Station with Solar PV

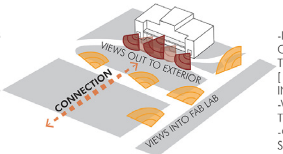
A charging station for electric bikes for students and visitors to access the site more easily

LOCATION

-PAVILION 13 IS LOCATED ON THE MAIN AXIS OF THE OTTO WAGNER AREAL
-HAS EASY CONNECTION TO THE MAIN STREET
-INVITES PUBLIC IN TO THE CAMPUS
-INVITES STUDENTS OUT IN TO THE COMMUNITY

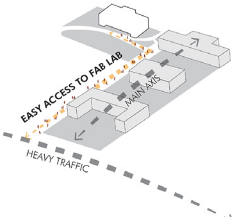
INTRIGUE

-VISITORS CAN VIEW INTO THE FAB LAB FROM SURROUNDING PATHS
-CURIOSITY ABOUT FAB LAB FROM VIEWING THE WORKSPACE
-EXTERIOR PROGRAM FOR LOUNGING AND WORKING AVAILABLE TO ANYONE
-CONNECTING THE INSIDE PROGRAM TO THE OUTSIDE COMMUNITY

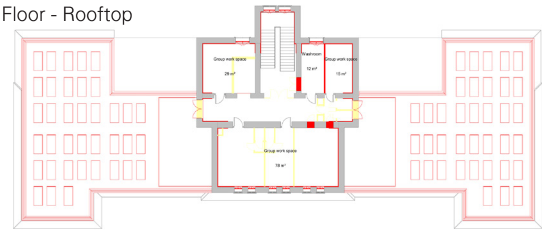


FABRICATION

-IDEAS OF THE STUDENTS AND COMMUNITY WILL COME ALIVE THROUGH
[DESIGN- FABRICATION- INSTALLATION]
-WHERE PAVILION 13 GIVES TO THE SITE TO ADD AND IMPROVE IT
-OVER TIME CONNECTING THE STUDENTS AND THE CAMPUS TO THE HISTORICAL SITE

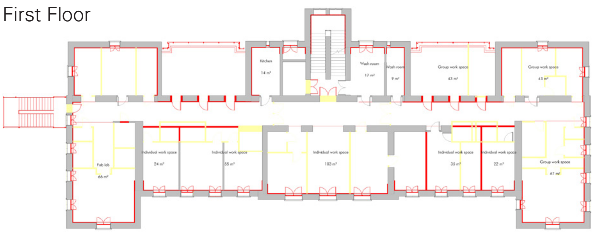


Third Floor - Rooftop

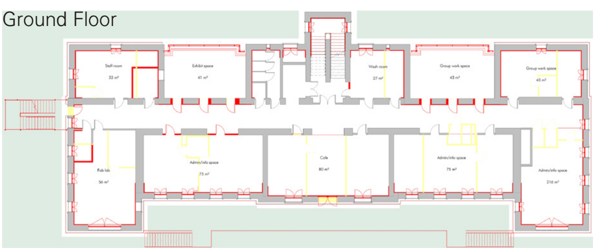


Second Floor

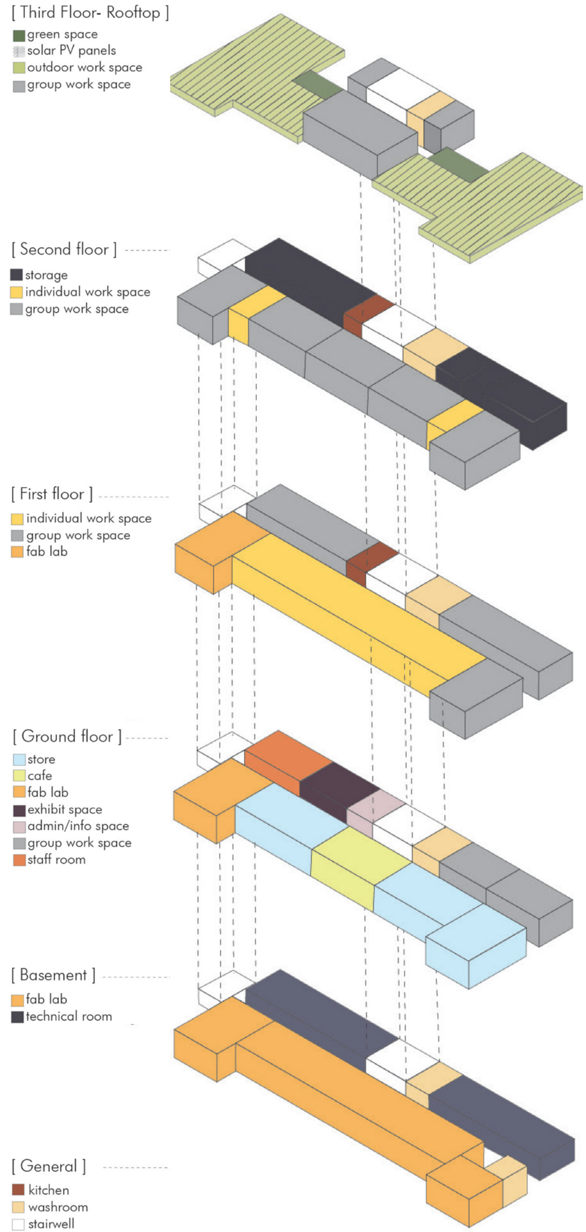
First Floor

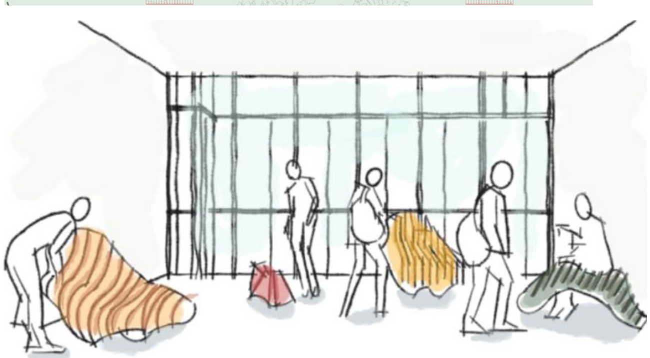


Ground Floor

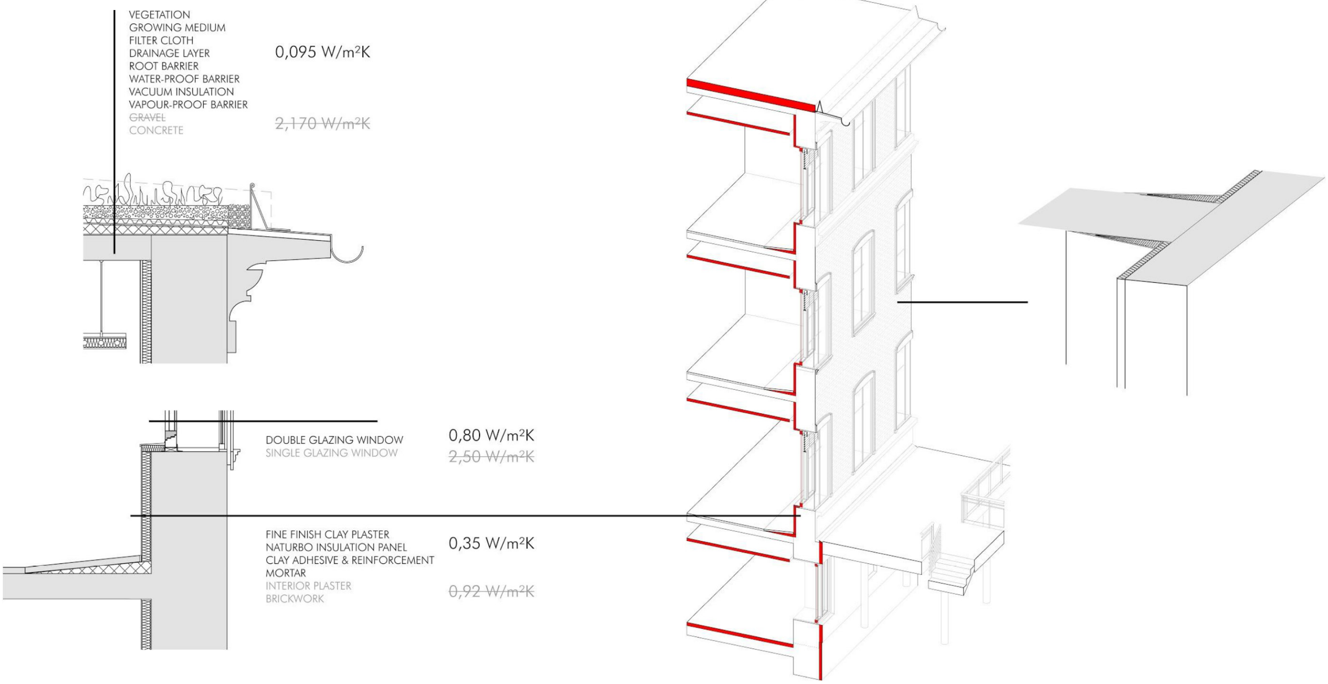


Basement

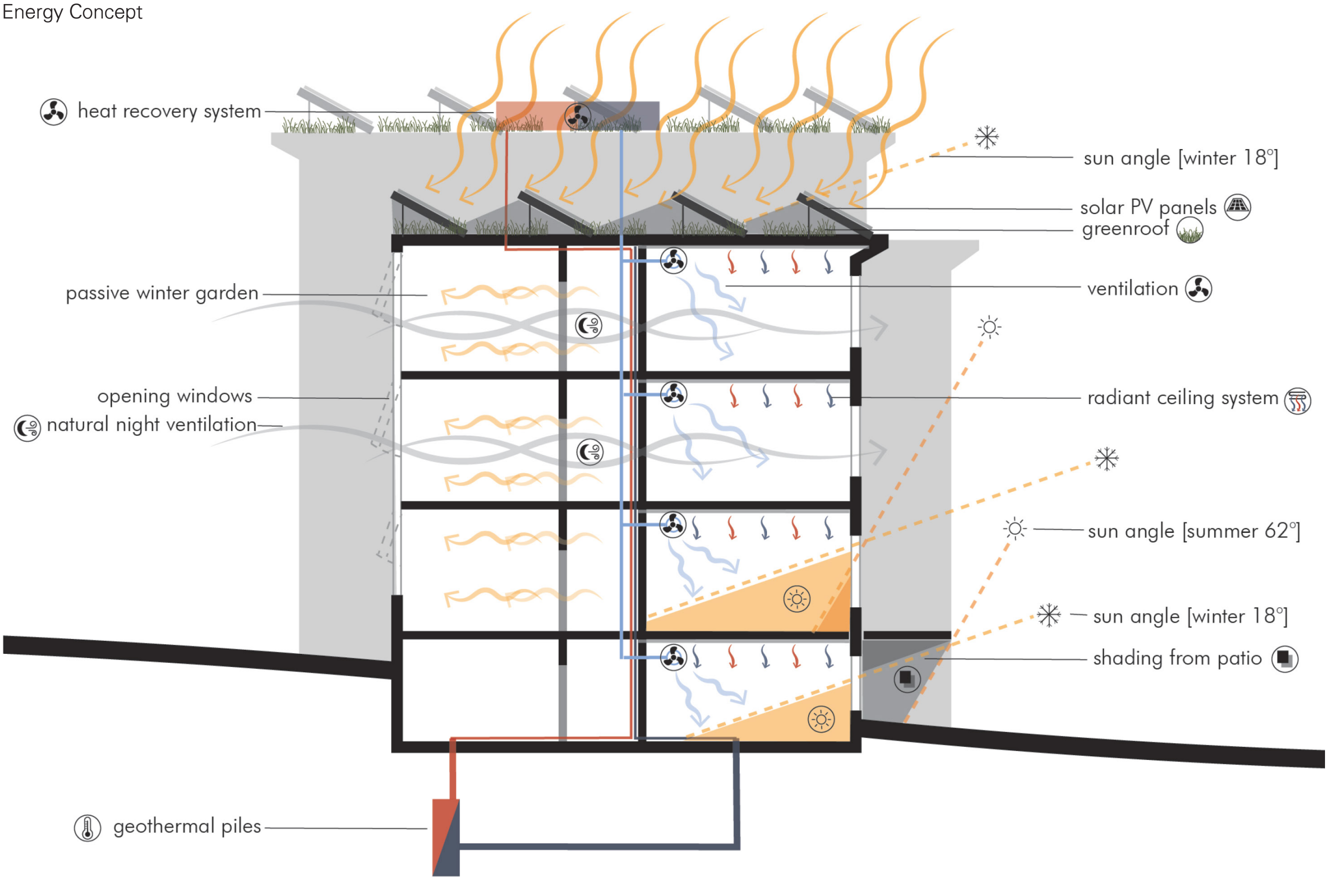




Details of the Facade

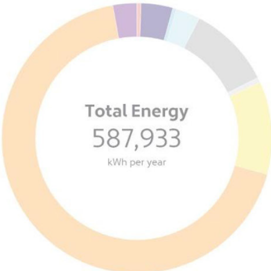


Energy Concept



Equipment power density 22W/m²

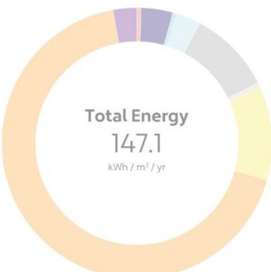
Annual Energy Use



Segment	kWh per year	% of total use
Heating	2,797	0 %
AHU	155	0 %
Zones	2,642	0 %
Humidification	0	0 %
Cooling	42,059	7 %
AHU	22,368	4 %
Heat Rejection	2,660	0 %
Zones	17,031	3 %
Fans	62,303	11 %
AHU	58,672	10 %
Zones	3,631	1 %
Interior	463,931	79 %
Lighting	65,149	11 %
Equipment	398,782	68 %
Pumps	16,843	3 %

FAB LAB NEW GROUP 2 - Baseline Concept. Produced by undefined from Green Building Solutions Summer University, 6 Aug 2020 @ 21:57:05

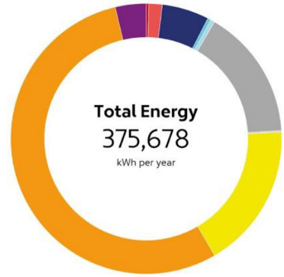
Annual Energy Use



Segment	kWh / m² / yr	% of total use
Heating	0.7	0 %
AHU	0.0	0 %
Zones	0.7	0 %
Humidification	0.0	0 %
Cooling	10.6	7 %
AHU	5.6	4 %
Heat Rejection	0.7	0 %
Zones	4.3	3 %
Fans	15.6	11 %
AHU	14.7	10 %
Zones	0.9	1 %
Interior	116.0	79 %
Lighting	16.3	11 %
Equipment	99.7	68 %
Pumps	4.2	3 %

Equipment power density 11W/m²

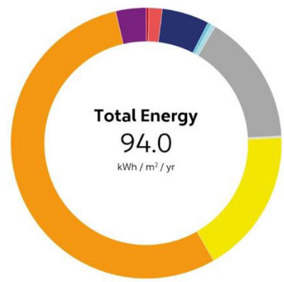
Annual Energy Use



Segment	kWh per year	% of total use
Heating	7,199	2 %
AHU	1,128	0 %
Zones	6,071	2 %
Humidification	0	0 %
Cooling	24,377	6 %
AHU	21,028	6 %
Heat Rejection	1,469	0 %
Zones	1,880	1 %
Fans	59,426	16 %
AHU	58,672	16 %
Zones	754	0 %
Interior	270,892	72 %
Lighting	65,149	17 %
Equipment	205,743	55 %
Pumps	13,784	4 %

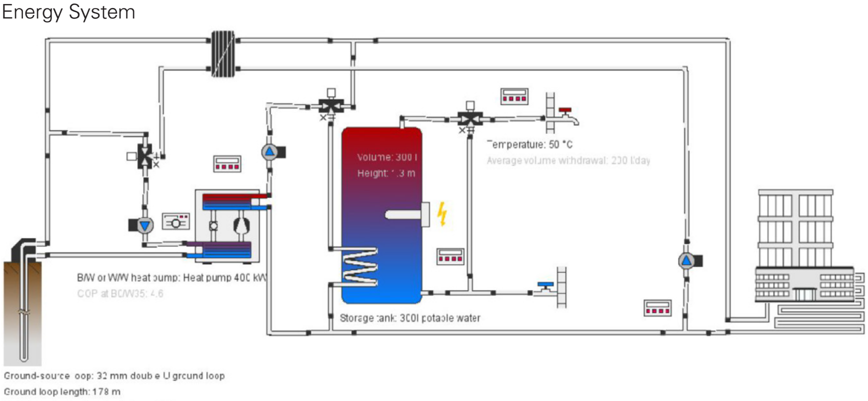
FAB LAB NEW GROUP 2 - Baseline Concept. Produced by undefined from Green Building Solutions Summer University, 7 Aug 2020 @ 16:12:20

Annual Energy Use

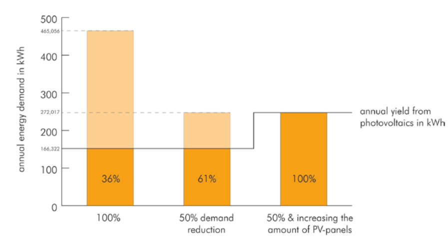


Segment	kWh / m² / yr	% of total use
Heating	1.8	2 %
AHU	0.3	0 %
Zones	1.5	2 %
Humidification	0.0	0 %
Cooling	6.2	7 %
AHU	5.3	6 %
Heat Rejection	0.4	0 %
Zones	0.5	1 %
Fans	14.9	16 %
AHU	14.7	16 %
Zones	0.2	0 %
Interior	67.7	72 %
Lighting	16.3	17 %
Equipment	51.4	55 %
Pumps	3.4	4 %

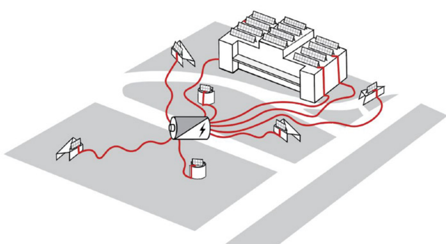
Energy System



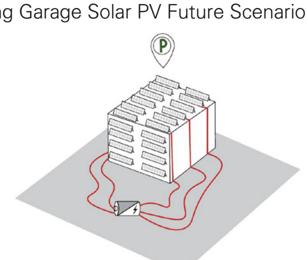
Future scenarios & suggestion for improvement

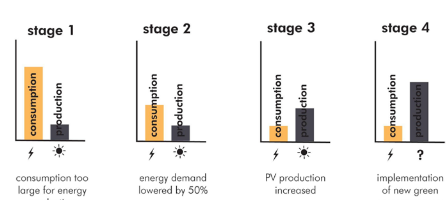


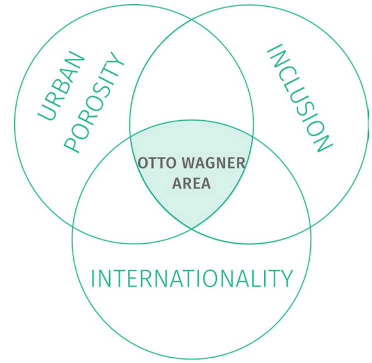
Pavilion Solar PV Future Scenario



Parking Garage Solar PV Future Scenario





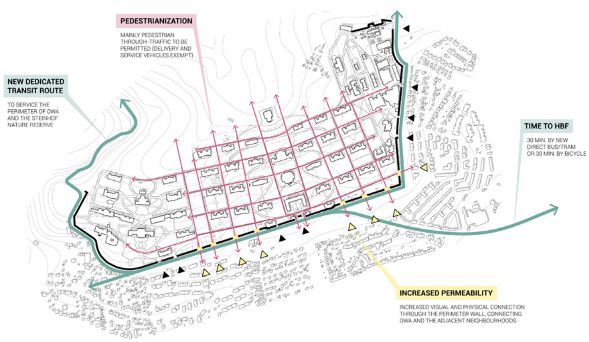


Green Globe Creators

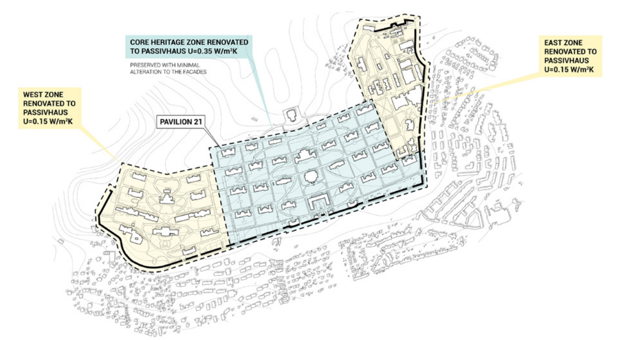
Qëndresa Bresa, Michael Mazurkiewicz, Mikolt Piller, Nazanin Shakoori

Our approach operates at two levels.
At an urban level, we incorporate the spirit of the site by inverting its original principles as a walled community. The „white city", as it was known, was a self-contained area in which the pavilions were differentiated according to social class and surrounded by an opaque stone wall, which today acts as a metaphorical, psychological, and architectural barrier. We propose to increase permeability and transit access to and across the site, reverse the homogeneity of the CEU-planned programs, and introduce a site-wide energy strategy, which would balance the interior-retrofit central core with the exterior-retrofit East and West zones. The overall energy balance would qualify as a Positive Energy District (PED).

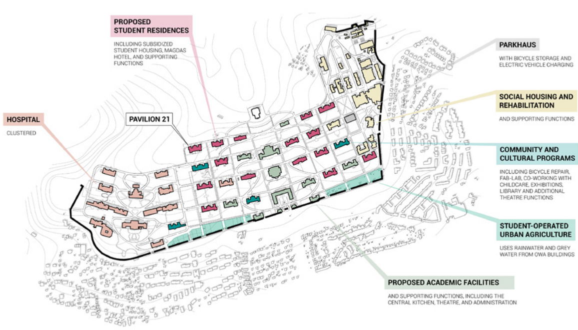
Urban Strategy



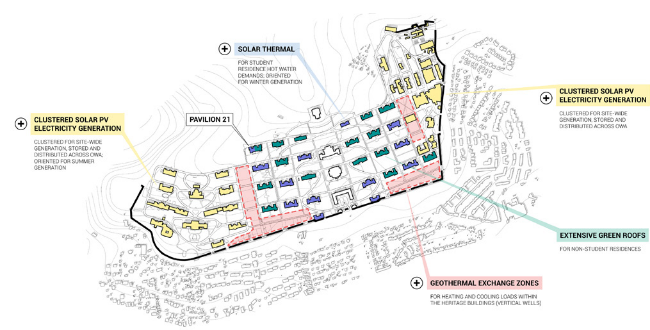
Energy Consumptions



Proposed Site Programming

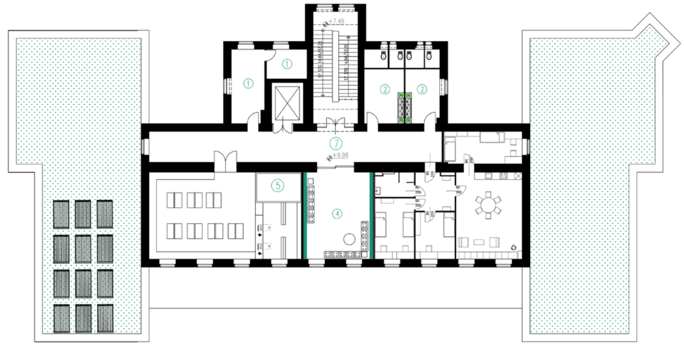


Renewable Energy Usage



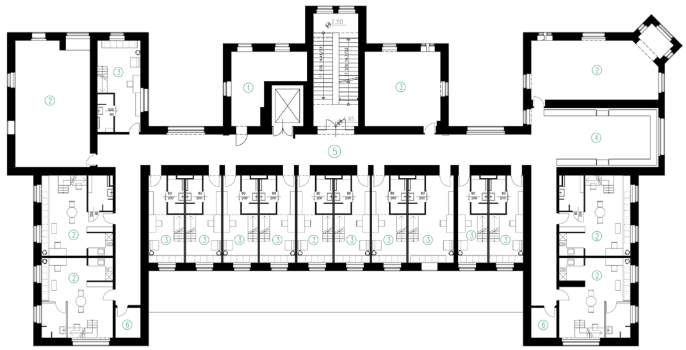
Second Floor

1. Dormitory Manager’s Office
2. Washroom
3. Shared Dorm (5-person)
4. Lobby Area
5. Library
6. Extensive Green Roof
7. Corridor



First Floor

1. Kitchen
2. Dorm Suite (2-person)
3. Dorm Room (1-person)
4. Lobby Area
5. Corridor

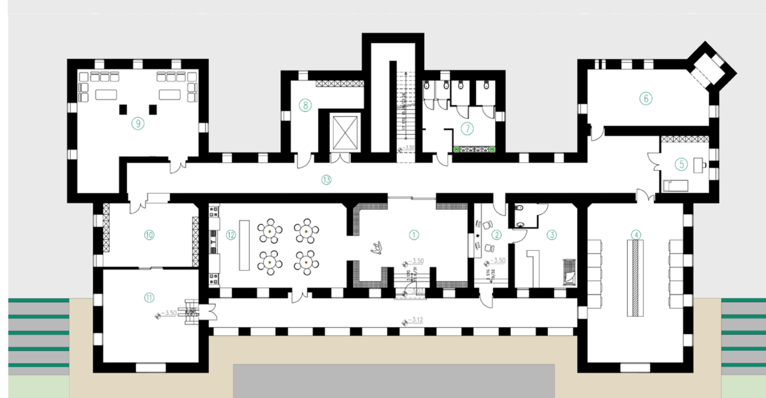


Ground Floor

1. Barrier free entrance
2. Kitchen
3. Media Room
4. Lobby
5. Dorm Suite (2-person)
6. Dorm Suite (1-Person)
7. Server Room
8. Corridor

Basement

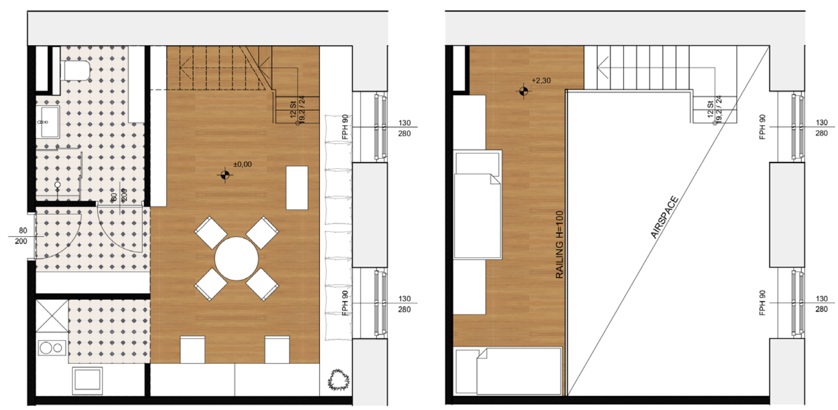
1. Entrance
2. Concierge/Security
3. Concierge Rest Area
4. Laundry
5. First Aid Room
6. Mechanical Room
7. Washroom
8. Storage
9. Party Room
10. Lockers
11. Gym
12. Kitchen and Dining Area
13. Corridor



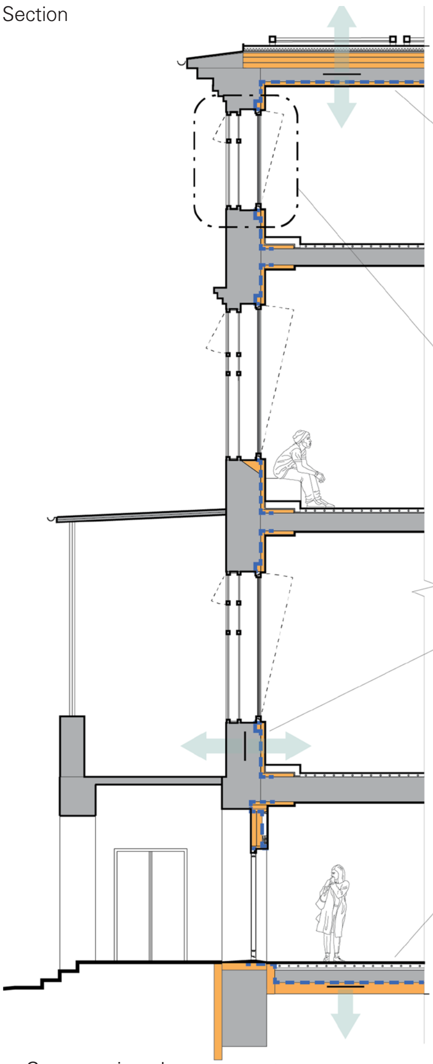
At the building scale, we propose an interior retrofit of Pavilion 21, which would preserve the exterior heritage qualities of the building. The conversion of this building into a student residence, with three room types, is intended to inject life into the new Central European University campus. Pavilion 21 - along with all the core buildings - would be renovated to meet the EnerPHit standard by component criteria sensitive to material selection and application. After first reducing the energy demand (through improvements to the enclosure) the proposed mechanical systems focuses on renewable energy generation using a combination of geothermal heat exchange, solar hot water panels, and solar photovoltaic panels. The overall energy balance within Pavilion 21 itself supports our broader goal of converting the Otto Wagner Area into a Positive Energy District (PED).

Dorm Room (1-person)

Dorm Suite (1-person)



Wall Section



Existing Structure
New Thermal Control Layer
New Air Control Layer
Vapour drying profile

Roof
U=0.15 W/m²K (to meet EnerPHit Standard)

Solar thermal (vaccuum tube, internal reflector for solar inclination)	
Extensive green roof and root barrier; planted with native species	8 cm substrate
Exterior mineral wool insulation (free draining and vapour-open)	30 cm
Weather control membrane inboard of mineral wool (vapour-open)	0.5 cm
Existing concrete roof structure	25 cm
Clay plaster levelling layer (primary air control layer, vapour-open)	2 cm
Interior aerogel insulation (vapour-open)	3 cm
Interior plaster finish (secondary air control layer, vapour-open)	2 cm

New Windows Inside Historic Windows
$U_{installed\ (new + historic)}$=0.85 W/m²K; SHGC=0.5-0.6 (to meet EnerPHit Standard)

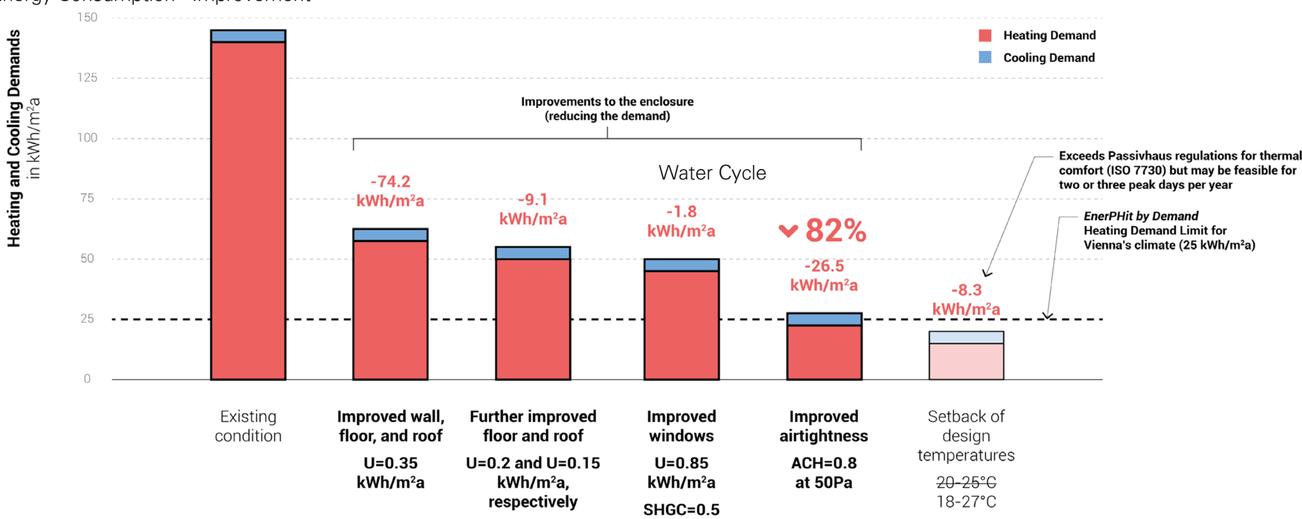
Walls
U=0.35 W/m²K (to meet EnerPHit Standard; Component Method)

Existing brick structural wall (vapour-open)	25 cm
Clay plaster levelling layer (primary air control layer, vapour-open)	2 cm
Interior aerogel insulation (vapour-open)	3 cm
Interior plaster finish (secondary air control layer, vapour-open)	2 cm

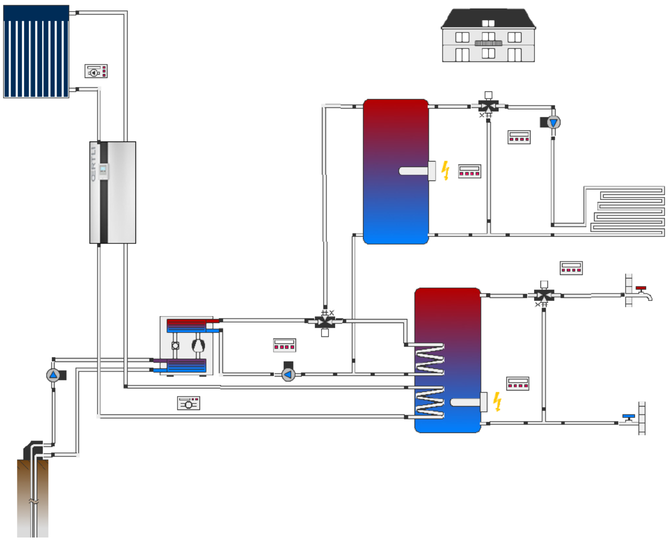
Floor
U=0.2 W/m²K (to meet EnerPHit Standard)

Interior tile finish (new tile replicated to match historic tile as required)	3 cm
Screed with in-floor radiant tubing	7 cm
Impact sound insulation	3 cm
Gravel or clean fill	5 cm
New concrete structural slab	15 cm
Vapour-impermeable membrane (to prevent ground vapour transfer)	0.5 cm
Extruded polystyrene insulation (vapour-closed)	14 cm

Energy Consumption - Improvement



Energy System



Total fuel and/or electricity consumption of the system [Etot]	16,747 kWh
Total electricity consumption [Ecs]	16,747 kWh
Total energy consumption [Quse]	102,710 kWh
Seasonal performance factor (SPF-SHP)	6.1
Primary energy factor	0.29
Comfort demand	Energy demand covered

Collector area	77.5 m²
Solar fraction total	23.4%
Solar fraction hot water [SFnHw]	43.5 %
Solar fraction building [SFnBd]	15.2 %
Total annual field yield	24,413.7 kWh
Collector field yield relating to gross area	315 kWh/m²/Year
Collector field yield relating to aperture area	347.9 kWh/m²/Year
Max. fuel savings	809.5 kWh(el.): [Electricity] , 4,418 kWh: [Electricity]
Max. energy savings	5,227.4 kWh
Max. reduction in CO2 emissions	2,804 kg

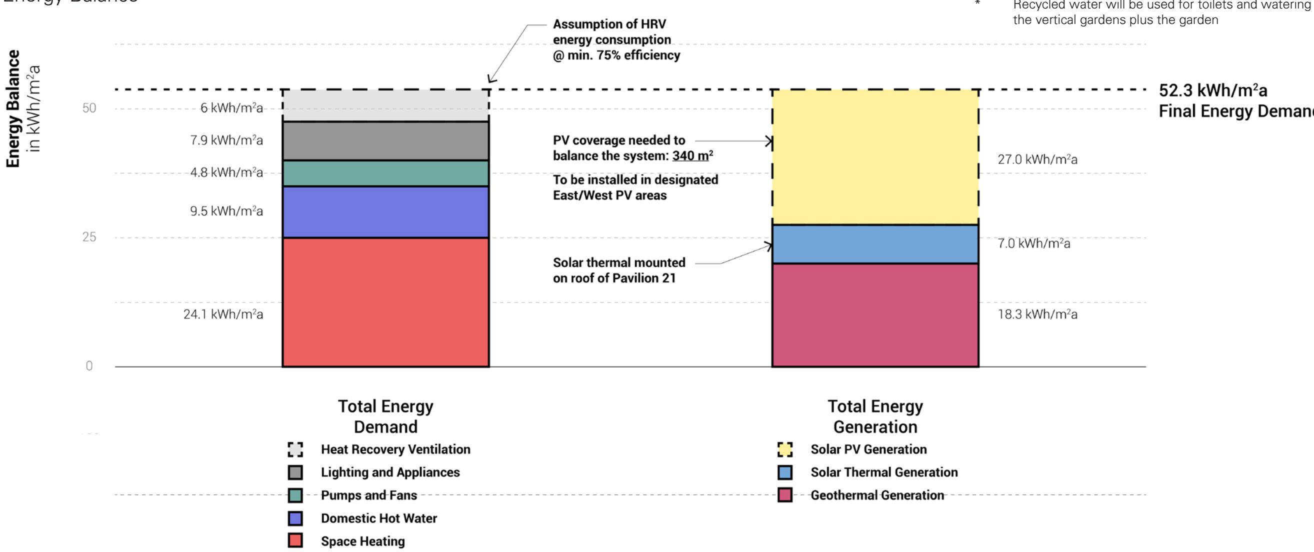
Seasonal performance factor (without pump energy)	5.4
Total electricity consumption when heating [Eaux]	14,562 kWh
Ground loop length (Total)	1,396 m
Energy withdrawal of the ground-source loop	63,435 kWh
Total energy savings	63,373 kWh
Total reduction in CO2 emissions	33,993 kg

To quote Wagner in his inaugural address to the Vienna Academy of Fine Arts: „Art and artists should and must represent their time ... [to] breathe a new and pulsating life into forms". We interpret this as Wagner's consent for a more porous urban strategy and an architecture that responds to the challenges of energy production and consumption - responding to climate protection, heritage preservation, and a high quality of life for the building occupants.

Water Cycle

* Collecting rain water on the roof
* Rainwater automatically filtered through the green roof
* Collecting grey water separetly
* Grey water will be filtered in a dry-liqued separator
* Recycled water will be used for toilets and watering the vertical gardens plus the garden

Energy Balance

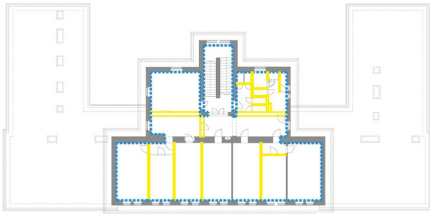


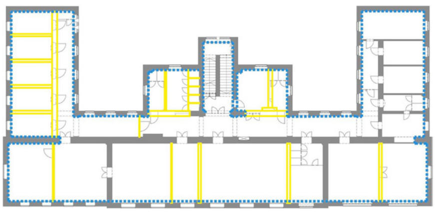

ground floor

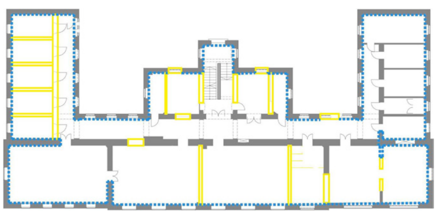
Greenmakers

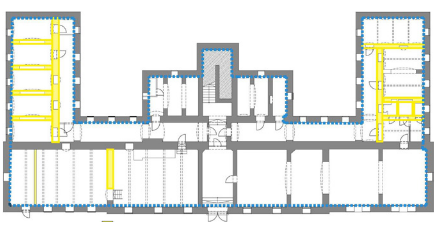
Rama Alhammami, Sahana Doravari, Tereza Jandaskova, Thomas Kelz

We are a team of four makers from four different professions, cultures, countries and time-zones – Syria, India, Czech Republic and Austria, who have a shared passion for a sustainable and healthy world. As our case study we chose to work on „The Pavilion 8 University Departments".
The first phase of our work was an urban planning analysis for the Otto Wagner Areal, re-zoning the master plan into separate areas, from west to east in sequential order (private, semi-private, semi-public, public). The main elements of the landscape design were the green slope, the green areas, water features, and the artificial lake, (which is a good means for generating power) and a recreation area for skiing in winter or water sports in summer. Additionally, coffee shops, a shopping center, a grocery store, bars, facilities for entertainment, students' departments and services such as laundry, a pharmacy, sports services and bus stations, were included.
The second phase was dedicated to the refurbishment of pavilion 8, located in the southeast of the Otto Wagner Areal. Our main concept was to create a sustainable and comfortable area, whilst taking conservation and respect for the historical buildings into consideration. As it is a very green area we proposed to keep all the trees around the buildings, even planting more trees in order to offer shaded areas in summer. The roof was converted into a green roof while using the existing holes and ducts for ventilation and as skylights. These holes can be opened in summer and closed in winter. Most of the exterior walls and load-bearing interior walls were maintained to preserve the structural integrity of the building. No changes have been made on the exterior façade of the building in order to preserve the historical appearance. The insulation is mounted on the inside and a humidity barrier and additional insulation have been added to prevent thermal bridges. Low temperature heating and natural ventilation systems are to be installed in order to reduce energy consumption, while providing thermal comfort.
As a building insulation we propose to use vacuum insulation for the roof, calcium silicate boards for the wall and foam glass boards for the underground floor. Using these environmentally friendly insulation materials we could achieve excellent U-values (roof: 0,11, wall: 0,28, underground floor: 0,22) and meet passive-house standards. Our strategy to achieve an energy neutral system, comfortable working, less emissions and a nearly self-sufficient building, was to use a combination of different energy sources. As heat sources we have selected two heat pumps installed in combination with an earth collector with four boreholes and a heat exchanger for heating in winter and cooling in summer.

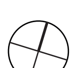




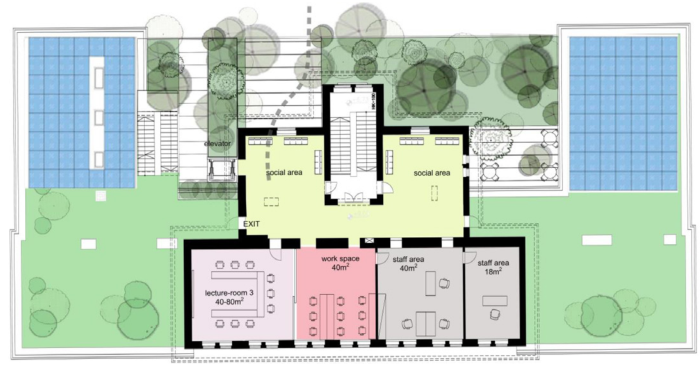




Interior Insulation   Removed walls

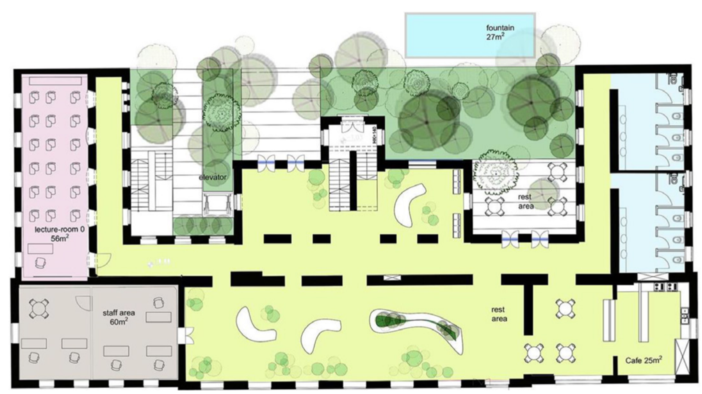


Second Floor

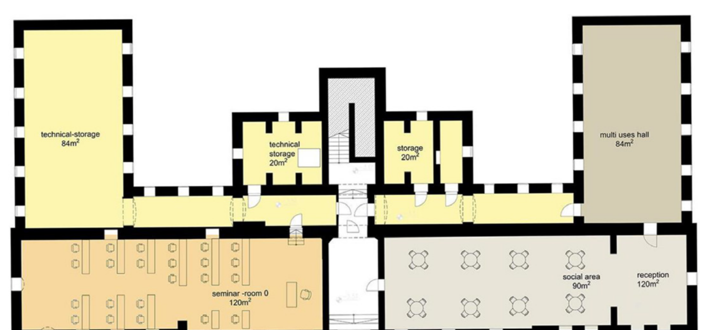


First Floor

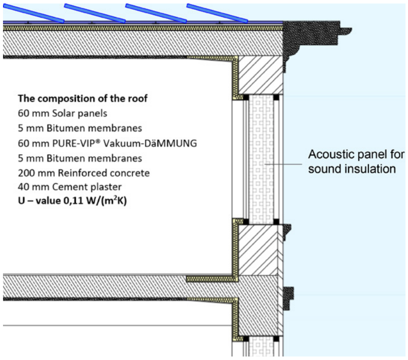
Ground Floor

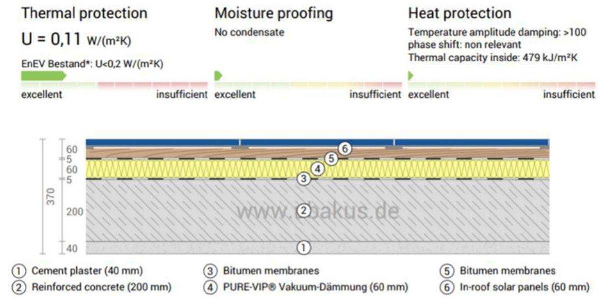


Basement

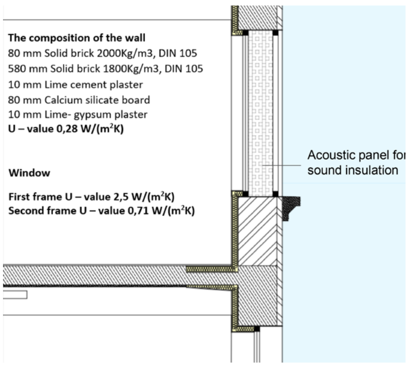


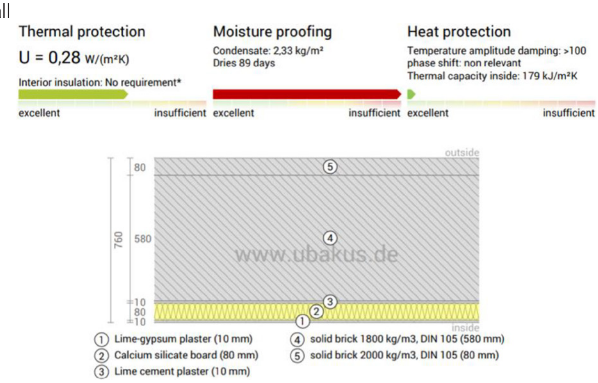
Roof Slab



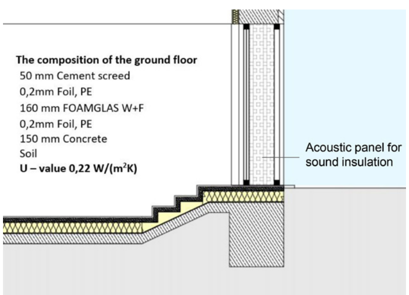


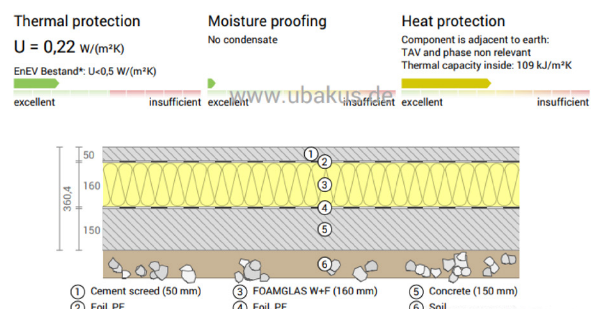
Exterior Wall



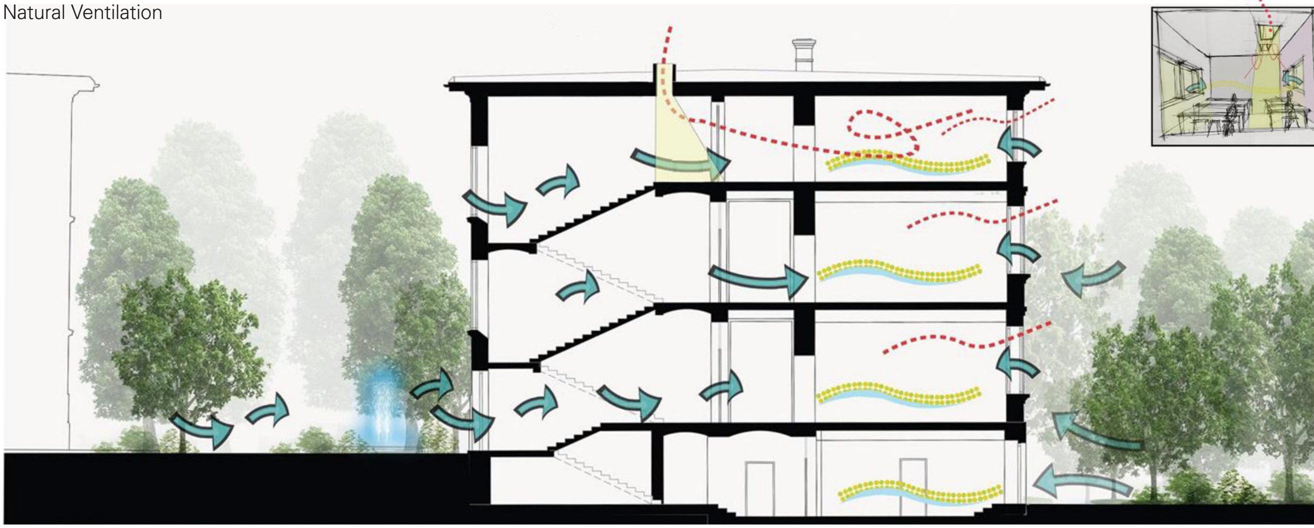


Underground Floor

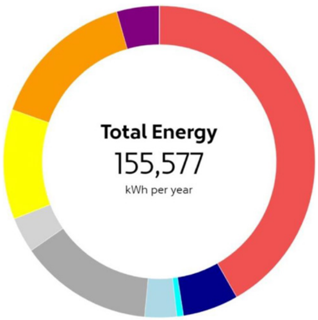




Natural Ventilation

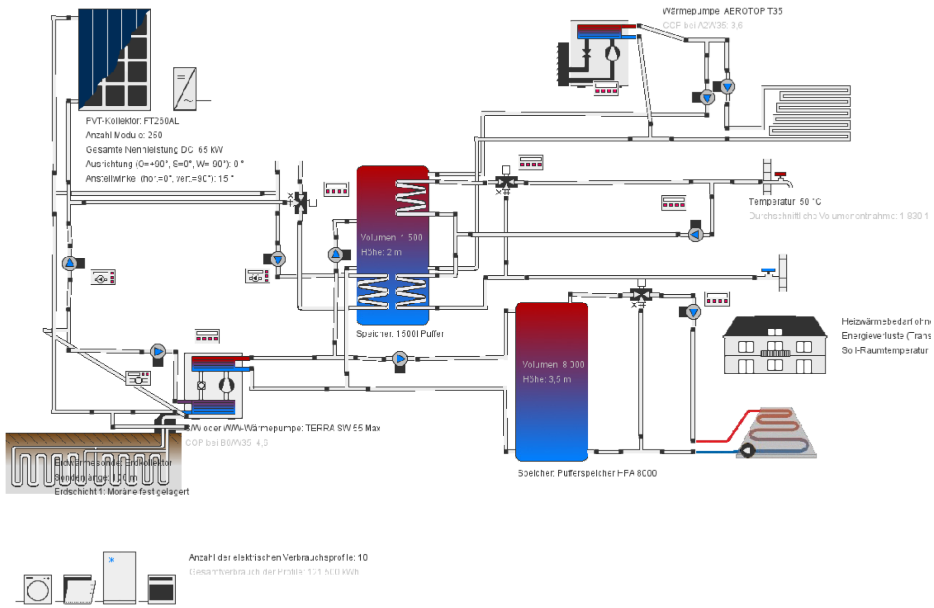


Annual Energy Use

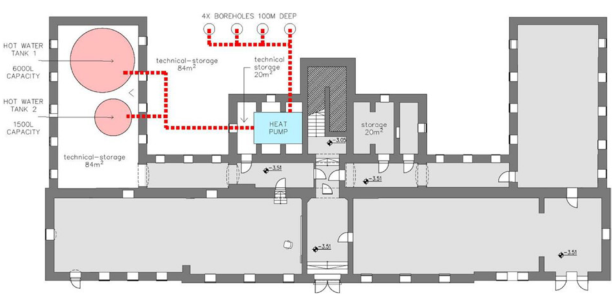


Segment	kWh per year	% of total use
Heating	**64,920**	**42 %**
AHU	67	0 %
Zones	64,853	42 %
Humidification	0	0 %
Cooling	**15,212**	**10 %**
AHU	8,983	6 %
Heat Rejection	1,064	1 %
Zones	5,165	3 %
Fans	**27,254**	**18 %**
AHU	21,539	14 %
Zones	5,715	4 %
Interior	**41,348**	**27 %**
Lighting	17,721	11 %
Equipment	23,627	15 %
Pumps	**6,843**	**4 %**

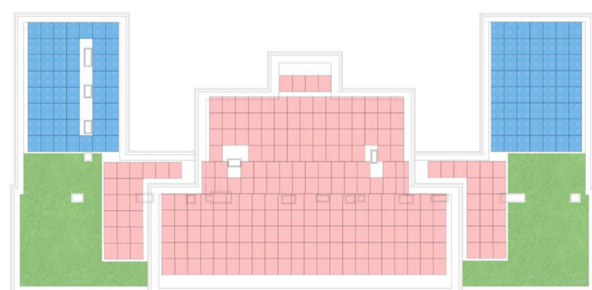
Energy System



Basemen Floor Systems

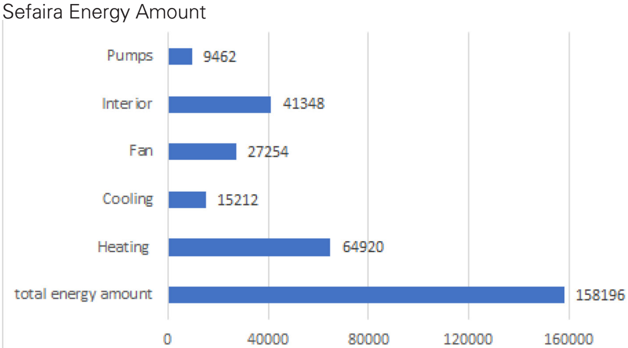


Roof Usage

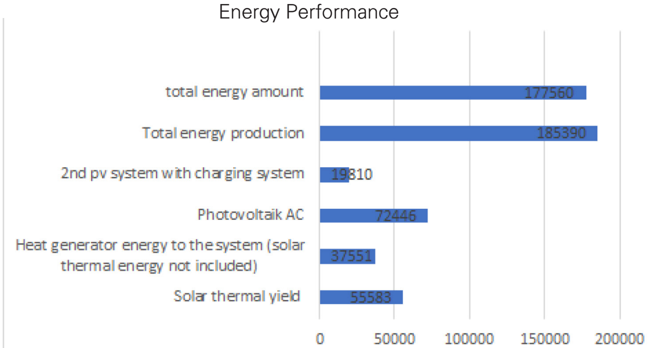


PV panels - 110sqm   PVT collectors - 450sqm   Green roof

Sefaira Energy Amount



Energy Performance



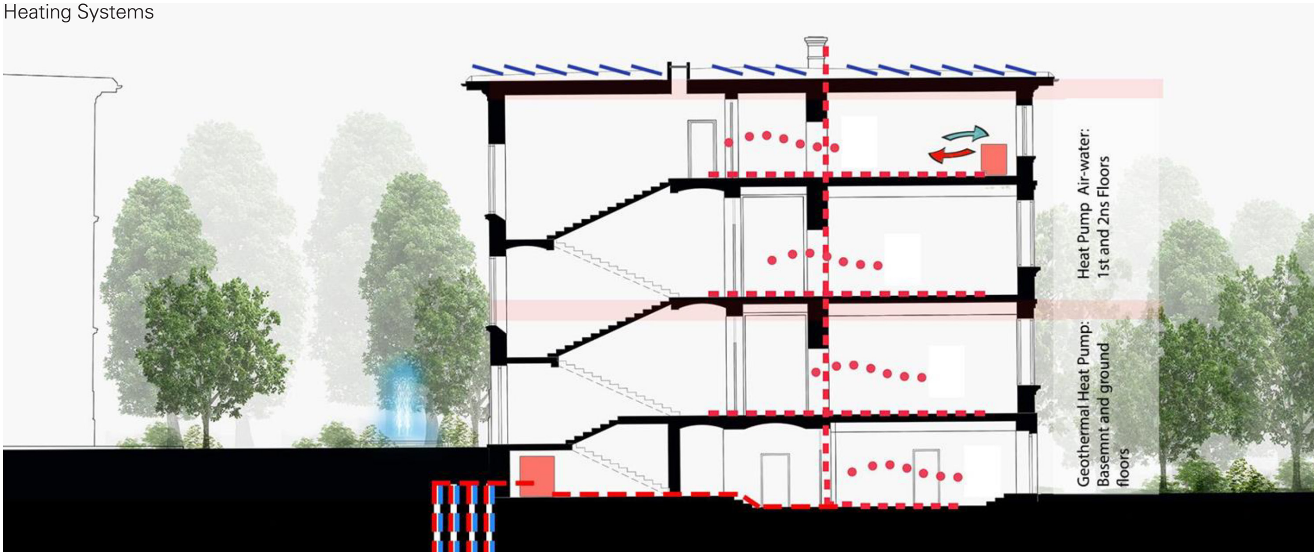
In order to reduce CO2 emissions we installed 250 PVT panels, which produce 72447 kWh of electricity and 55750 kWh of thermal energy, saving 7214 kg CO2 emissions. The proposed system includes an electric charging station. The calculated total energy demand of pavilion 8 is 177.560 kWh. As the energy system delivers an amount of 185.390 kWh, there is a calculated plus of 37.194 kWh.

Description of energy system

* Heat pump and earth collector 50 kW (water to water)
* Heat pump 50 kW (air to water)
* Geothermal system (earth collector 1x4 boreholes), annual energy withdrawal of 42.400 kWh
* PVT collectors with 70 kW, 250 modules
* Energy production: 72447 kWh
* Thermal Energy Production 55.570 kWh
* PV collectors, 30 modules with 350 W each
* Total nominal power 18.000 kWh
* Storage tanks 8000 l and 1500 l

Finally, the Green-Makers proposal presents a reflection of our passion, hard work and ambitions, which were empowered by the GBS journey.

Heating Systems



Under floor heating and conduiting

Glashaus

Kindagreen

Natana Char, Alejandro Tangassi, Olivia Daschill, Visie Solo

The Otto Wagner Areal (OWA) in Vienna's 14th district was built as a hospital and still houses parts of the former medical center. When the OWA-complex was built, the idea was to move out of the city center and to offer a peaceful place for patients, hidden from the curious public eye. Nowadays, the City of Vienna wants to accommodate the Central European University (CEU) there and to pay homage to the historical complex that offers so many possibilities at the same time.

Site functions. The first goals of the current proposed program are the creation of new access points to the complex, the zoning of the area and the creation of an internal mobility plan. As the area has a slope, we have incorporated an E-BUS route plan and stations, also including the current 48A bus route. The plan also includes E-Bikes available for rent publicly.

Mobility on site. The program proposes to have different use areas, not only for the students and local employees, but also for the neighborhood community. With an extensive green area to the north (see view), the project continues to allow hiking on the hills, including breathtaking views of the landscape, and interaction with nature.

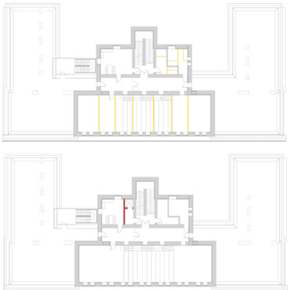
Site Functions

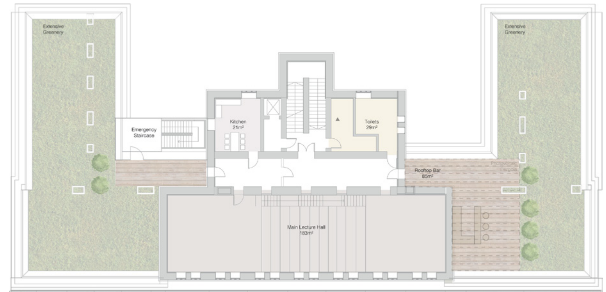
Entrances
New Entrance Proposal
Pavilion 08 - Office/Lecture Glashaus
Dorms & Community Area
Public Area & Culture
University Buildings & Administration
Others
Leisure in Nature - City Hiking
Community Urban Garden
Green area
Cemetery

Mobility on Site

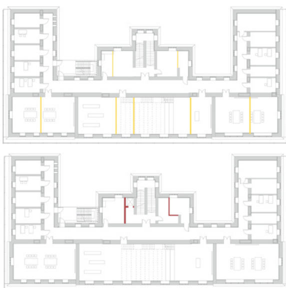
Entrances
New Entrance Proposal
Pavilion 08 - Office/Lecture Glashaus
Route 48A Bus (frequent intervals of 2-3 mins)
Route of Small E-Bus (at any point less than 300m walking distance)
Charging Station E-Bus
E-Bike Charging Station

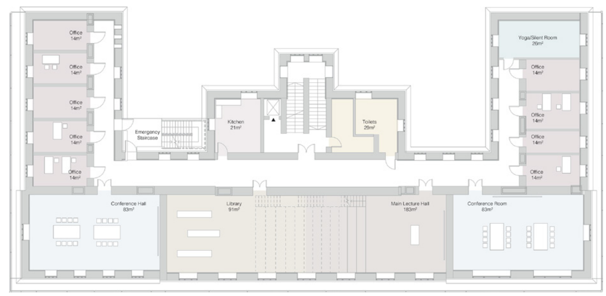
Second Floor



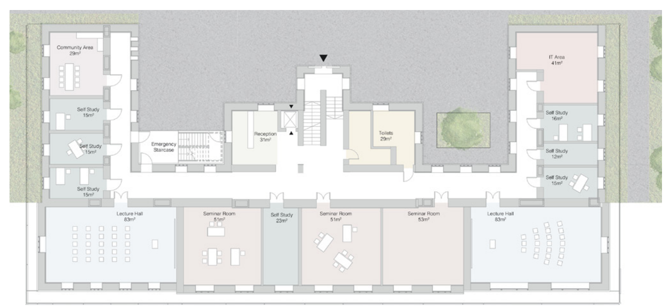


First Floor

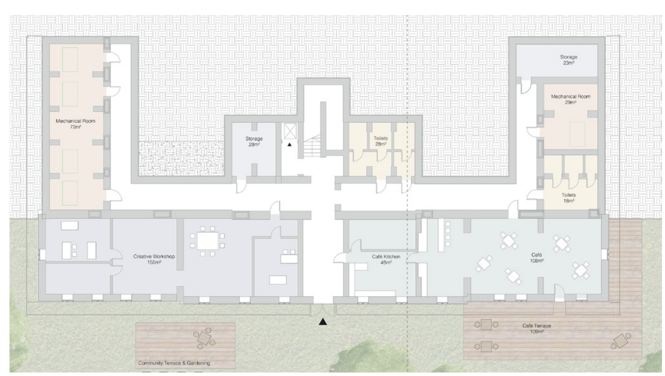




Ground Floor

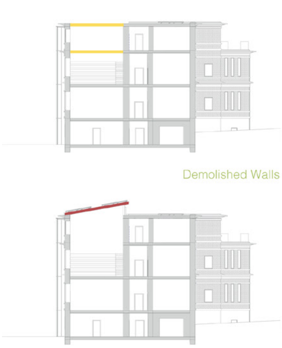


Basement



On the ground floor you will find lecture rooms, toilets, entrances, staircases and connecting corridors, double entry elevators implemented in the South facade, study rooms, the IT area, and a community area serving as a student meeting point or waiting room. Only few walls have to be demolished to rearrange the building with the insertion of the new use of the rooms.
On the first floor sits the main lecture room and a local library, both sharing the same space. By removing a few walls the main lecture and library room provide an expanded space for core programs and learning. A silent room for yoga, a conference room, offices, toilets, staircases and connecting corridors are also located on this floor.
The top floor can be accessed from the west side of the library and with a second access point from the security staircase. This floor contains the kitchen, more toilets and a rooftop terrace bar for leisure time and possible small meetings/celebrations of the students and employees. The roof has a green flooring to complement the buildings environmental quality.

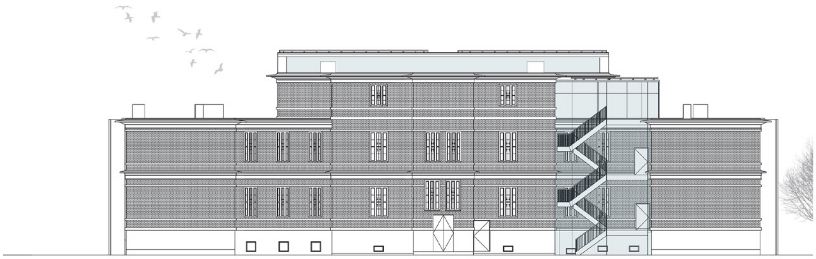
Cross Section



South Elevation

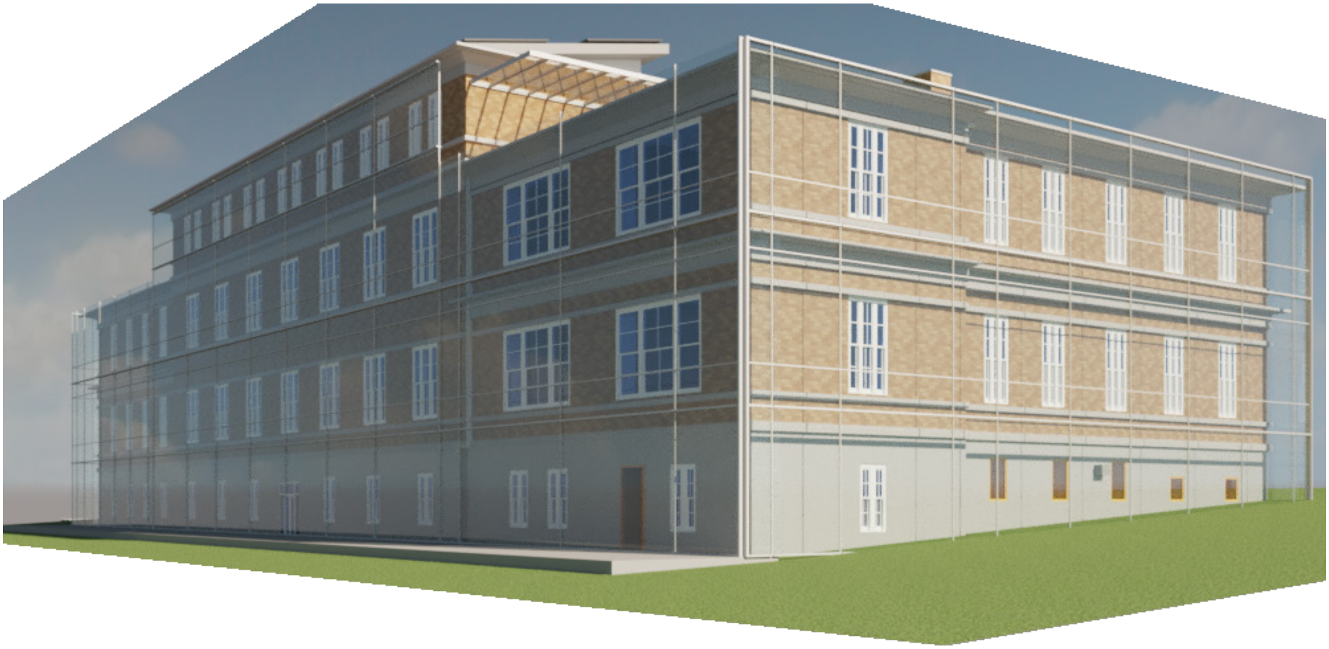
East Elevation

North Elevation



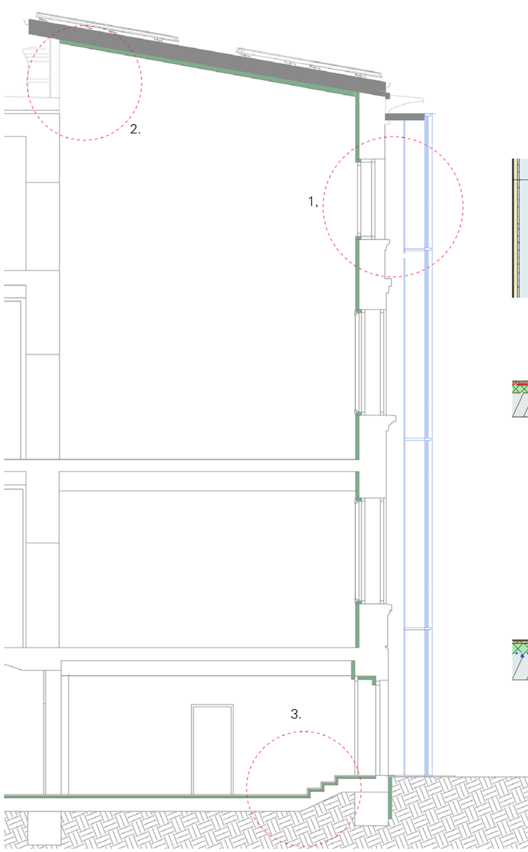
West Elevation

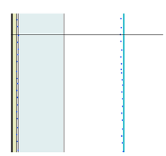
3D View



With the goal of protecting the historical building and exterior aesthetic, the project proposes to implement a glazing curtain on the South, West and East facade. The delicately installed glass has the characteristics of a non-reflective surface, so the original facade stays visible. To improve the ventilation and avoid over heating during summer, an earth-pump system provides air circulation working with the interior mechanical ventilation system. On the diagram below, you can see how to mount the interior wall insulation to prevent thermal bridges, the insertion of new windows on the inside, and the absence of floor insulation, in order to avoid reflective heat from the glass curtain.

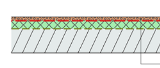
Facade Section





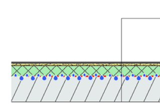
1.
Insulation glass, double glazed, Ug=01.1
Solid brick 1600Kg/m3, DIN 105 (600mm)
Stationary air (unventilated) 80mm
Stationary air (unventilated) 24mm
Kooltherm K5 WDVS-Dämmplatte (50mm)
HASIT 110 Haftputz (12,5mm)

Kooltherm (50mm) plus glass facade U-0.22
Remarks: best result so far (only 50mm insulation); better misiture control (33 days than without glass facade)



2.
Gravel (50mm)
THERM SL 500 (5,2mm)
Kooltherm K 103 Fußboden-Dämmplatte (100mm)
Vapour barrier Sd=100m (0,5mm)
Concrete (300mm)

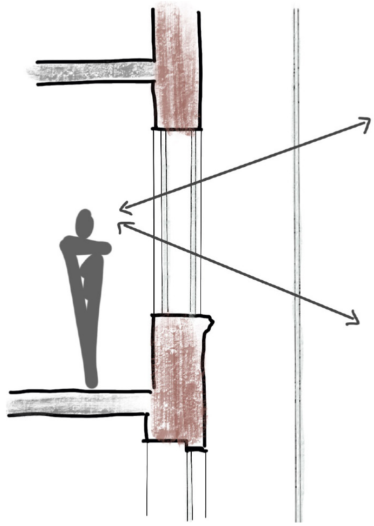
Roof with Kooltherm insulation (100mm) U=0.2
Remarks: best insulation performance (acceptable moisture control: 33 days)



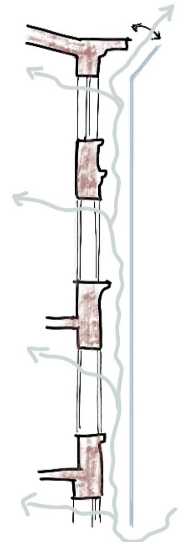
3.
Concrete (240mm)
Vapour barrier Sd=100m (0,5mm)
Kooltherm K 103 Fußboden-Dämmplatte (100mm)
SWISS KRONO OSB (22mm)
Tiles (ceramic, 10mm)

Flooring with Kooltherm insulation (100mm) U=0.19
Remarks: best insulation performance (acceptable moisture control: 33 days)

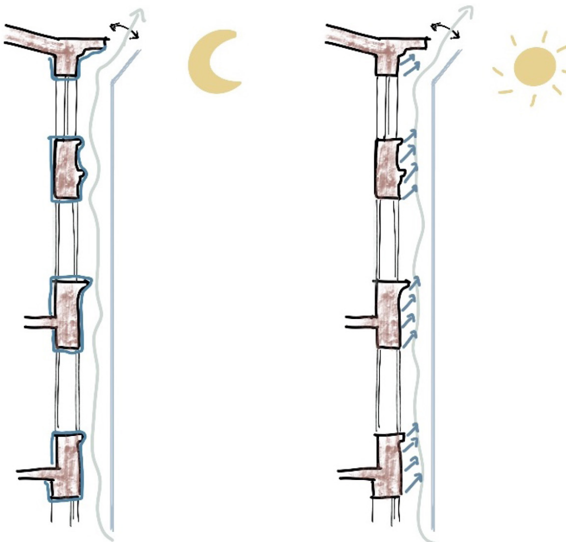
Double Facade Concept



Look-Through Facade

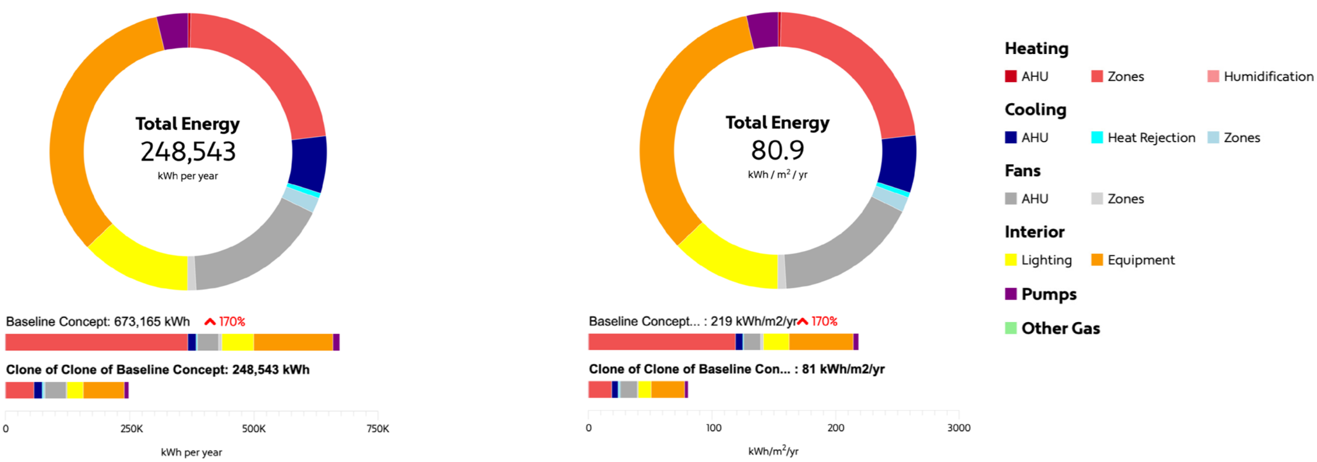


Guided Ventilation

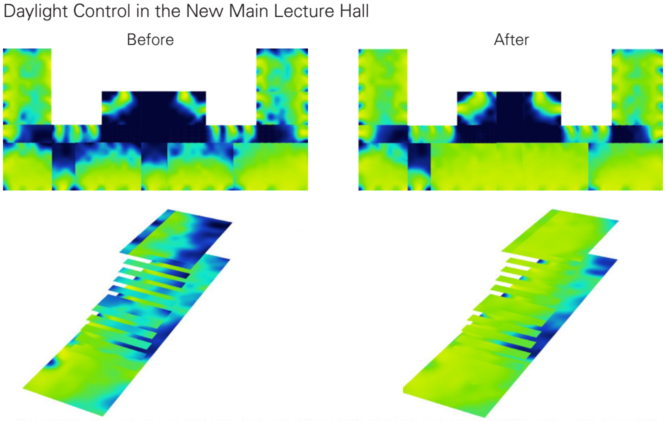


Night-cooled storage mass helps cooling the ventilation air in Summer days

Energy Demand



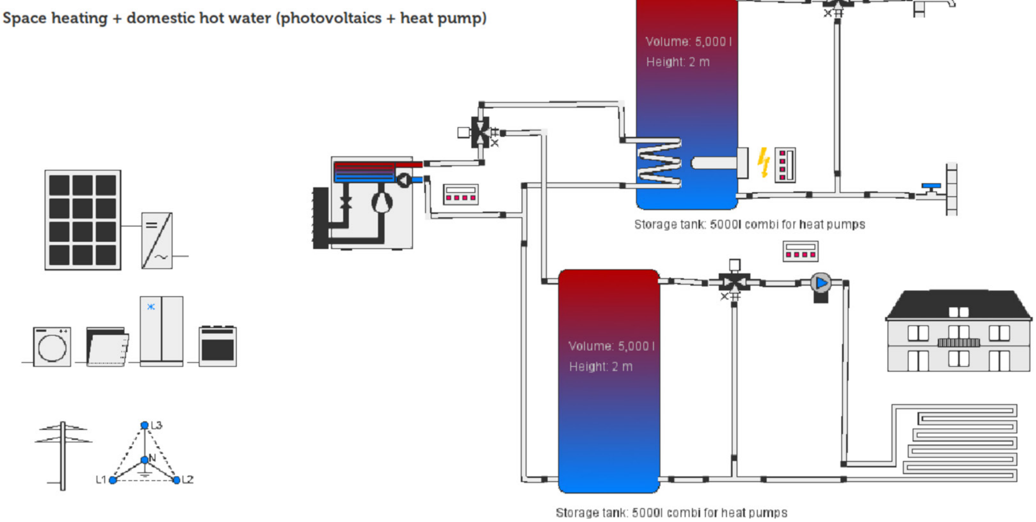
Daylight Control in the New Main Lecture Hall



Percentage of occupied hours where illuminance is at least 28 footcandles, measured at 2.79 feet above the floor plate.

0% 25% 50% 75% 100%

Energy Systems

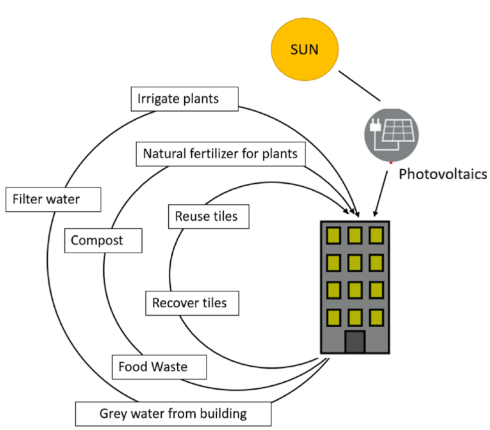


Energy Flow Diagram

Before

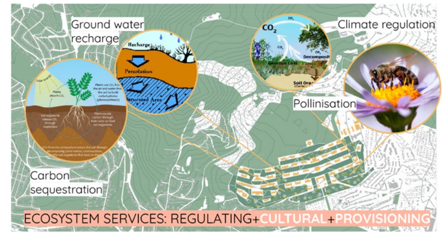
After

Circular Resources Management



1. Product stage
   - Raw material • Transport • Manufacturing
2. Construction process stage
   - Construction installation process
3. Use stage
   - Use • Maintenance • Repair • Replacement
   - Refurbishment • Operational use of energy
   - Operational use of water
4. End-of-life stage
   - Demolition • Transport • Waste processing • Disposal
5. Benefits and loads beyond the system boundary
   - Reuse, recovery, and recycling potential


Positive
Energy District
City within the city
Gathering-place
Self-sustaining
Promote a sustainable
lifestyle
Precedent to
the future



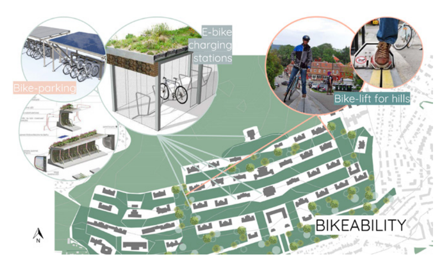
Spaced

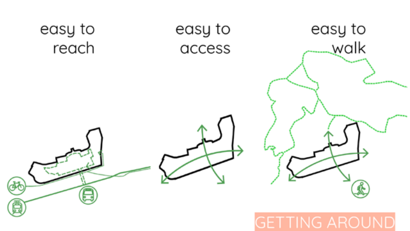
Christine Dalmund, Marija Cvetovic, Edwin Espino, Nuria Roig, Sonja Morzycki

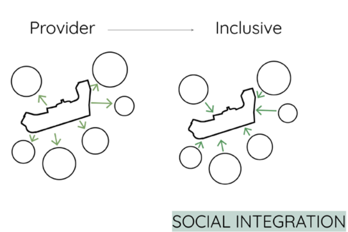
Our vision is to create a „city within the city" (originally coined by Bertrand Goldberg for his Marina City, Chicago development), a campus that is self-sustaining and convenient for residents, including housing, entertainment, restaurants, markets, etc., creating its own village, while still situated in the larger city of Vienna. The project aims to promote a sustainable lifestyle, lowering the carbon footprint of Vienna's inhabitants, which is currently an average of 6.9 metric tons, to less than 2 metric tons by 2050 - an „open experiment", where all the technologies/strategies used are shared.

The project will become a hub and „exporter" of knowledge regarding renewable energies, sustainable consumption and production, in order to promote and support the implementation of these technologies by the visitors, in their own houses, cities or districts. Although the campus will provide residents with amenities and activities, additional routes to -and -from the 1st-District will be added to provide a stronger connection between the campus and Vienna's city center. The campus will also act as a venue for surrounding neighborhoods to gather and mingle through means of community gardens, green spaces, public lectures and events. With many elderly residents living in the surrounding area, activities will be designed that facilities the mixing of different age groups. A „culturally inclusive exchange-hub" can educate international students about Viennese history and culture, and local residents about other cultures around the world. Locating the campus in a low-density area provides an ideal foundation for a Positive Energy District (PED) and will allow for experimentation with new green technologies. We aim for our Central European University concept to be a precedent to for future sustainable neighborhoods, highlighting the importance of carefully managing energy use of the buildings' systems. We also hope that it will serve as a guide for ensuring socially responsible and diverse development, while still maintaining higher than average comfort standards and reducing our carbon footprint by using renewable energy sources.

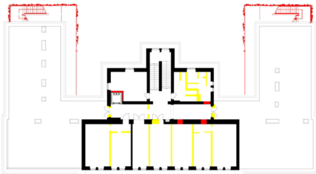
ECOSYSTEM SERVICES:
REGULATING+**CULTURAL+PROVISIONING**

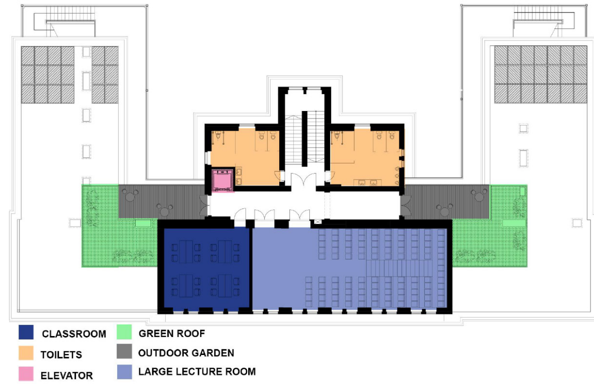




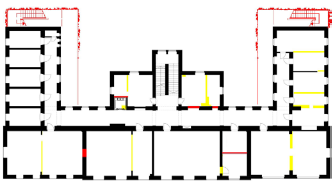


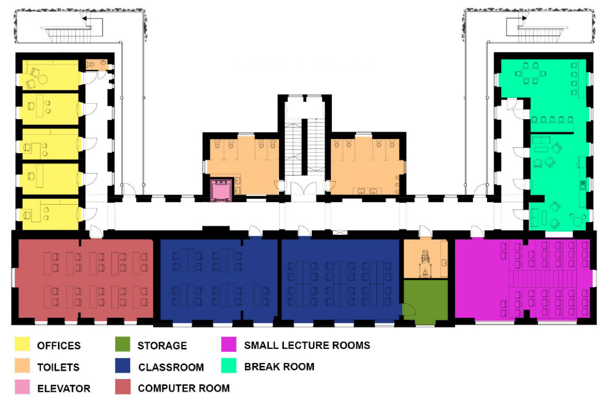
Second Floor



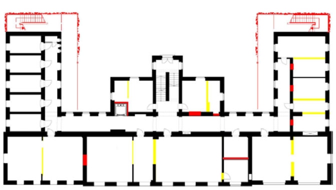


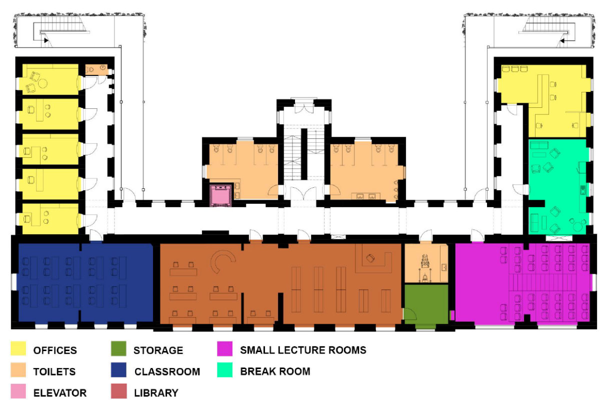
First Floor



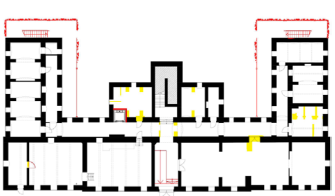


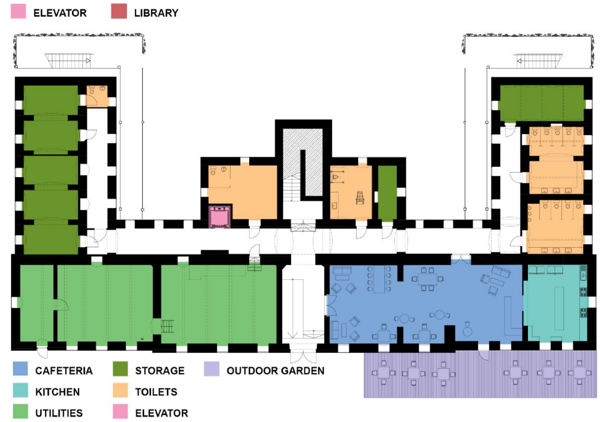
Ground Floor

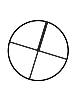




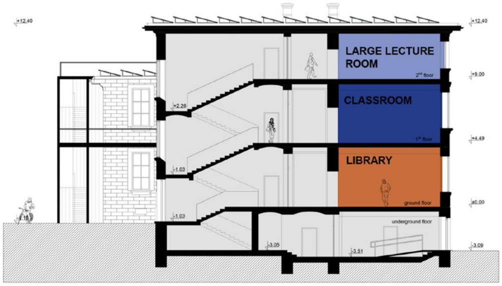
Basement



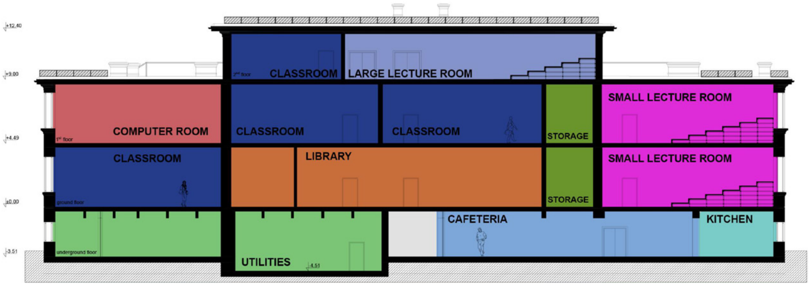




Cross Section



Longitudinal Section



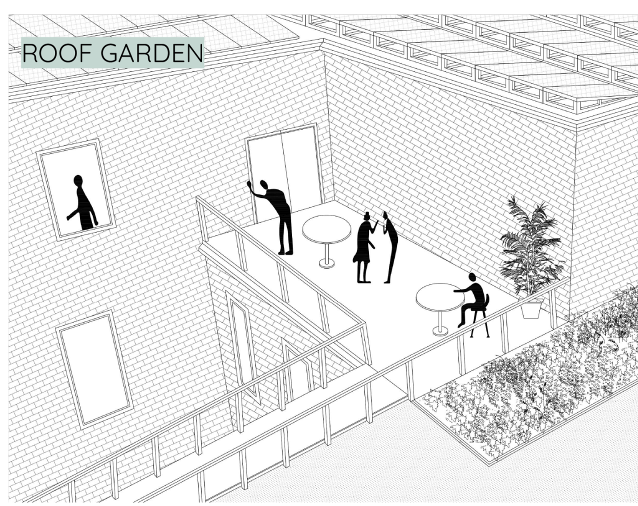
West Elevation

South Elevation

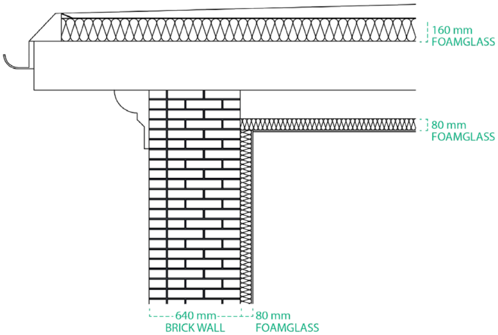
East Elevation

North Elevation

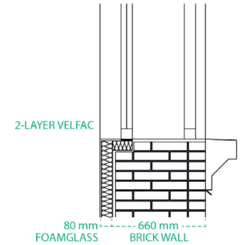
Atmosphere



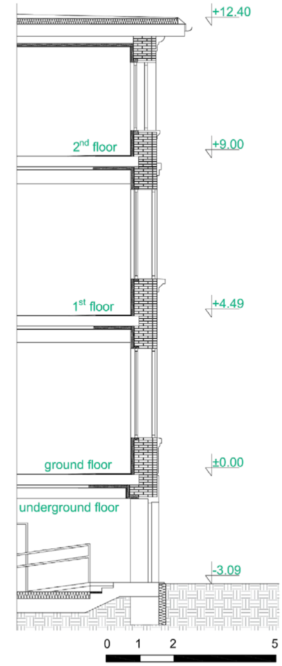
Roof Detail



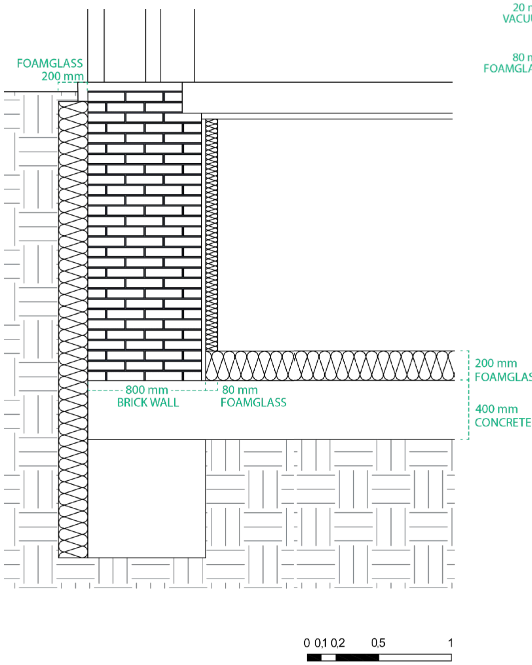
Window Detail



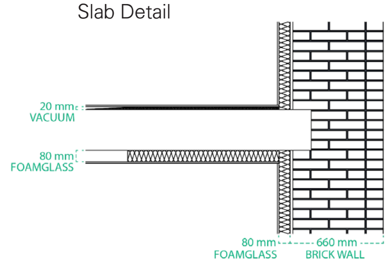
Facade Section



Foundation Detail



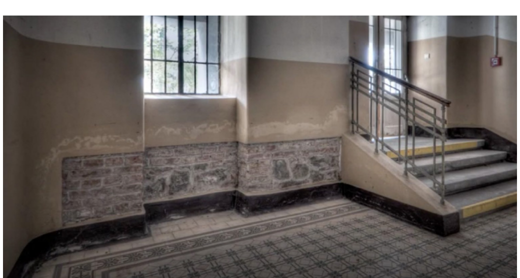
Slab Detail

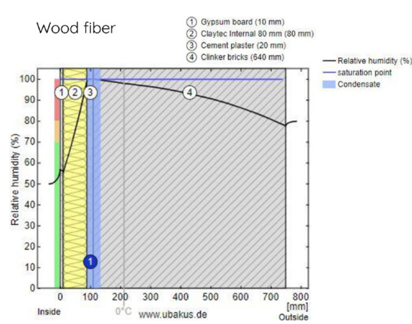


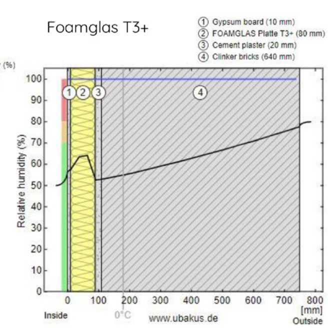
Selection of insulating material

Through our research of similar buildings from the time, we determined that the wall construction is solid brick. This, as well as our calculations and analysis of various insulation types, influenced our decision to use FOAM-GLASS as our insulation material. Foam Glass would be installed to the interior of the facade, to floor slabs, as well as to some interior walls to ensure no thermal bridging.

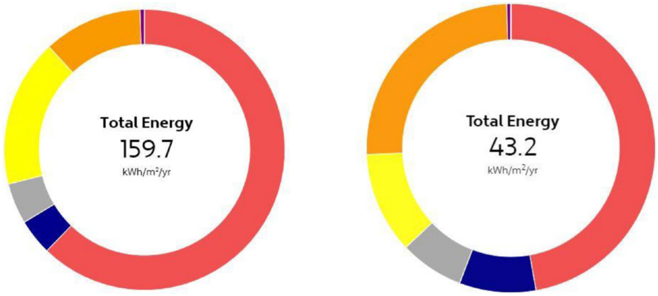
Material	Thermal conductivity [W/m.K]	Water vapor permeability [kg/m.s.Pa]	Thickness (m)	Ref.
Rock-wool	0.036	9.85 x10^-11	0.1	[1]
FoamGlas	0.031	0	0.1	[1]
Wood fiber	0.046	4.93 x10^-11	0.06	[1]
Polyurethane (PUR)	0.031	5.63 x10^-12	0.1	[1]
SkamoWall (Calcium Silicate)	0.068	6.566 x10^-11	0.05	[2]



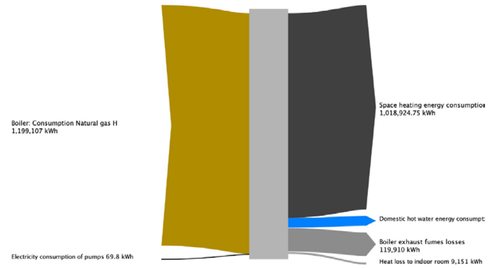




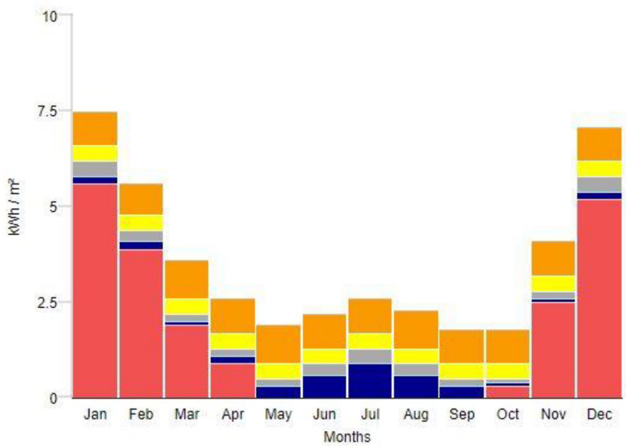
Total Energy Demand



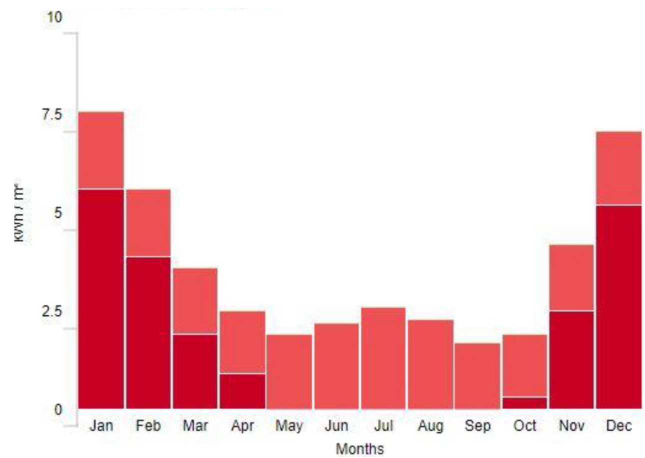
Initial energy Flow



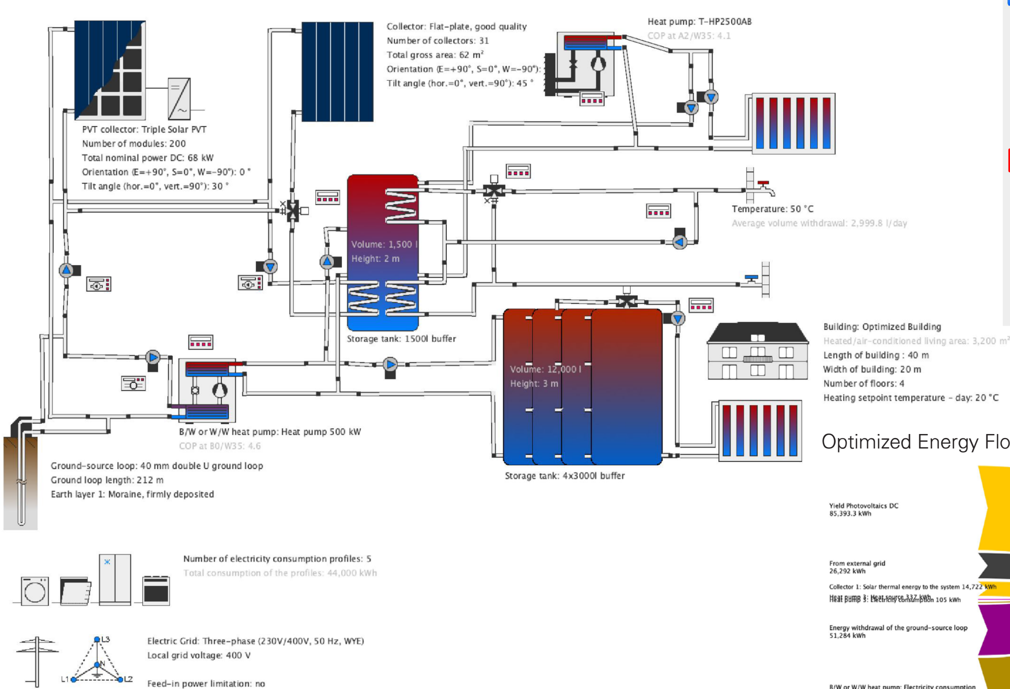
Monthly Energy Demand



Monthly Energy Mix



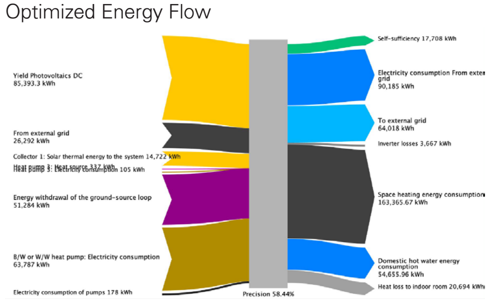
Energy System



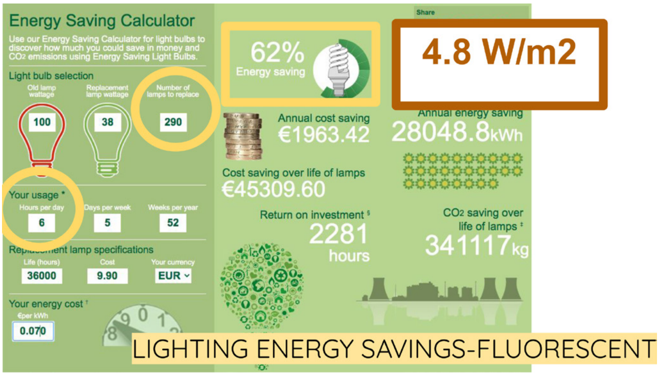
B/W or W/W heat pump | Building | Cold water

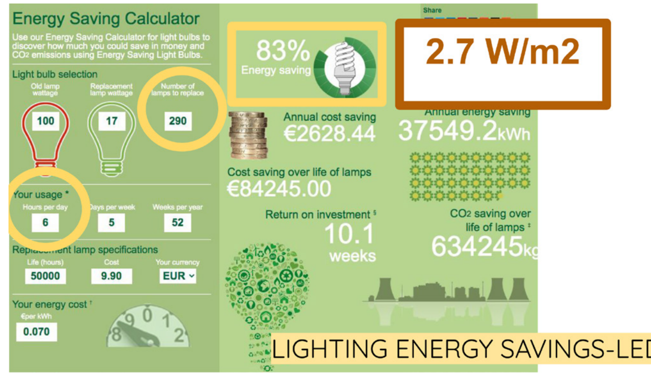
Name	Symbol	Unit	Year
Temperature		°C	2,084
Minimum value		°C	28.8
Maximum value		°C	88,250 7
Flow rate		l/h	59,658 8
Minimum value		l/h	4,500
Maximum value		l/h	108,000 1(
On/Off		%	5.9
Seasonal performance facto...			3.45
Fuel/electrical consumption	Eaux	kWh	60,169 1
Minimum value (Power)		W	0
Maximum value (Power)		W	153,773 1!
CO2 emissions		kg	32,274
Energy savings heat pump		kWh	147,576 2
Energy savings solar thermal		kWh	32,474
Supplied heating energy 2	Qaux	kWh	207,744 3
Minimum value (Power)		W	-62,37... -
Maximum value (Power)		W	8,174,... 7,
CO2 savings heat pump		kg	79,160 1
CO2 savings solar thermal		kg	17,419
Operation time		h	521
Primary loop temperature di...		°C	10.6
Minimum value		°C	0.001
Maximum value		°C	35.3
Primary loop inflow tempera...		°C	-5.9
Minimum value		°C	-10

Optimized Energy Flow

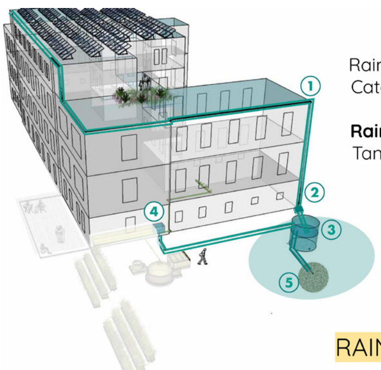


Artificial Light Optimization





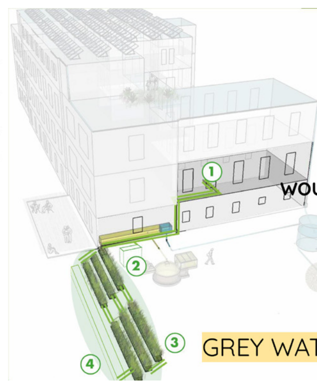
Water Cycle Optimization



Rainfall	558.8 mm per year
Catchment surface	ca. 805.79m2
Rain harvested	**ca. 450,279.92lts**
Tank size	151,000lts

1. Harvesting area
2. Filter
3. Underground storage tank with pump
4. Output
5. Overflow to storm sewage system

RAINWATER HARVESTING



ca. 1,031,125 ltrs PER YEAR
784,750 ltrs PER YEAR GREY WATER

ca. 70%
WOULD NEED TO BE TREATED TO FULFILL THE DEMAND

1. Grey water pipes
2. Surge Tank + pump
3. To subsurface drip irrigation
4. Storage tank > wc supply

GREY WATER TREATMENT/ RE USAGE

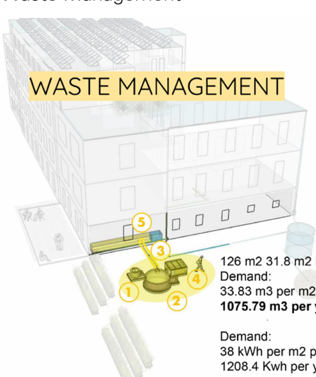
Drinking + cooking+ cleaning, 10lts per day per person	150 people
Dishwasher 30ltrs per load	5x per day
Hand basin use, 5 ltrs per use	100 people
Toilet flush single, 6 ltrs per flush	75 people
Toilet flush half, 3 ltrs per flush	75 people

SUMMARY

ca. 2,825 ltrs **PER DAY**
ca. 1,031,125 ltrs **PER YEAR**

ca. 450,279.92 lts **Rain harvested per year**
>>>>ca. 45% demand can be supplied by RW

Waste Management



126 m2 31.8 m2 Kitchen
Demand:
33.83 m3 per m2
1075.79 m3 per year

Demand:
38 kWh per m2 per year
1208.4 Kwh per year

100 MEALS PER DAY 0.6 lbs/MEAL
1200 lbs/month = 0.6 Tons/month

Food waste digester ca. 7 T/year
DM 15%

603 m3 Biogas per Year
1,450kWh per year

Solid waste ca. 3 Tons per year
670 m3 Biogas per year

1. Inlet
2. Anaerobic digestor
3. Desulfurizer
4. water pool
5. Stove

Building energy demand:
43.2 kWh per m2 per year
ca.140,000 kWh per year

Compost > Nitrogen and Carbon

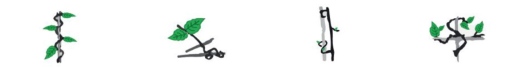
One human **0.25 lbs** of volatile waste per day

$$\frac{.25 \text{ lbs/day}}{2.205 \text{ lbs/kg}} \times 0.50 \times 0.35 \times 5.55 \times 10^4 \text{ kJ/kg} = 1102.2 \text{ kJ/day}$$

50% waster will burn as methane; Branching ratio CH4/CO2; Specific heat

100 people	110220 kJ/day
	30.61kWh per day
	6,122 kWh per year
Grass+trees	521.550 Tons per year
	91,669 kWh per year
Food waste	1 ,045 kWh per year
	Total 98,836 kWh

Gerüstkletterpflanzen:

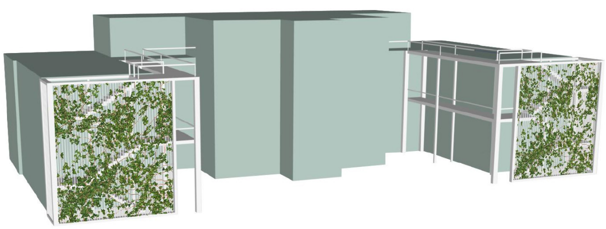


Schlinger/Winder (z.B. Blauregen) | Blattranker (z.B. Waldrebe) | Sprossranker (z.B. Weinrebe) | Spreizklimmer (z.B. Kletterrosen)

Chinese Wisteria

Silver Lace Vine

Clematis



	Vegetation supporting course thickness [cm]	4	6	8	10	12	15	18	20	25	30
Extensive greening	Mosses-Sedum	■	■	■							
	Sedum-mosses-forbs		■	■	■						
	Sedum-forbs-grasses				■	■	■				
	Grass and forbs						■	■	■		

Saxifrages

White Stonecrop

Dragon's Blood

GREEN ROOF & STAIRWELL

WINDOWS
Original windows will be collected and **reinstalled** in the façade. In the **inside new** high performance double glazing windows are proposed in order to improve the overall thermal performance of the building.

WALLS
Only bricks that are **severely damaged** should be cut out and replaced. Replacement bricks **should match the existing ones** as closely as possible in size, colour, texture and durability. They should be laid in the same way, ie with the same bond.

THERMAL PERFORMANCE
The selection of insulation material was based on a careful analysis of its interaction with existing massive brick walls, specially **air/vapor permeability**.

ORIGINAL DECORATION
Tiles and other removable decorative elements that could be damaged during renovation works will be collected and reinstalled following the original ornamentation principles.

MONUMENT PROTECTION

Project guidance by

Ass.Prof. DI Dr. Karin Stieldorf

Karin Stieldorf has specialized in science, research and teaching in the field of „sustainable building“ since 1992 and is an expert in the dynamic energetic simulation of buildings. In addition to research projects (House of the Future, housing research by the BmwA and the State of Lower Austria), she regularly takes part in competitions, works on practical projects as a consultant, and initiates and organizes student competitions on this topic. For her work, she received a.o. the Golden Decoration of Honor of the Republic of Austria, awards from the bm: vit and from GAU: DI (European architecture network). With her students, she was successful in gaining top places at international competitions ((Solar Decathlon, GAU: DI, ISOVER). The winning project of the Solar Decathlon „LISI“ was successfully positioned in the prefabricated house park „Blaue Lagune“ and thus on the market. The experiences from this project were used in the VIVIhouse project (www.vivihouse.cc), which is currently an official exhibit at the International Building Exhibition (IBA) in Vienna.

Arch. DI Georg W. Reinberg

Georg W. Reinberg is CEO and owner of Architekturbüro Reinberg ZT GmbH (architecture studio) in Vienna, Austria. He studied at Vienna Technical University and Syracuse University NY, USA. His office is specialized in ecological green buildings, some of them producing more energy than they need to be served (Plus Energy Building). Since 1982 he has built more than 100 solar projects. His office is active in research, design, planning and construction management.

Reinberg is a visiting professor at the Danube University Krems. He lectures at the Technical University of Vienna (MSc Program „Renewable Energy Systems“, inter alia.) and at the FH Campus Wien (University of Applied Sciences in Vienna). He is also teaching and giving lectures internationally.

He realized more than 100 projects with high ecological standards. He has also won many architectural design competitions and honouring prices in the field of sustainable architecture.

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BOKU Universität für Bodenkultur Wien University of Natural Resources and Life Sciences, Vienna

HSB Hochschule Bremen City University of Applied Sciences School of Architecture Bremen

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TU WIEN TECHNISCHE UNIVERSITÄT WIEN Vienna University of Technology

BERGISCHE UNIVERSITÄT WUPPERTAL

GRÜN STATT GRAU

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