oead student housing

österreichischer klimaschutzpreis Preisträger 2013

TU WIEN TECHNISCHE UNIVERSITÄT WIEN Vienna University of Technology

BOKU University of Natural Resources and Life Sciences, Vienna

FINAL REPORT

Idea by Günther Jedliczka

Green. Building. Solutions.

UN DECADE OF EDUCATION FOR SUSTAINABLE DEVELOPMENT 2005-2014

Ausgezeichnet von der Österreichischen UNESCO-Kommission

Online-Summer University 2021

Table of Contents

Opening at TU Wien with GBS students residing in Vienna and organising team ©OeAD student housing / N. Hainfellner

Introduction

The **Green.Building.Solutions. (GBS) Summer University** offers first-hand sustainable architecture knowledge and engineering expertise bundled into an intensive three-week academic summer program based in one of the world's most liveable cities: Vienna. This UNESCO-awarded program addresses a broad range of professions such as architecture, planning, engineering, construction, facility management and project development.

GBS is organized by OeAD student housing in close collaboration with BOKU University and TU Vienna, along with a variety of other partner institutions. It showcases the Austrian in-depth expertise in ecological construction and urban planning to a constantly growing international audience.

2021 was special –The GBS was once more held as an online-course – again under challenging global pandemic conditions. 46 participants from 30 nations and 10 time zones around the world completed the program successfully. The virtual program 2021 was – just like in its first virtual instalment in 2020 – a huge success evidenced by the quality of the project design work outcomes and by the very positive feedback from both students and the lecturers involved. With complementary backgrounds and notions in the fields of architecture, environmental management, energy engineering and urban planning, this year's participants produced high quality projects dealing with the specialist topic of "Transition of the Otto Wagner Area in Vienna under the aspects of sustainability, energy efficiency and heritage protection: design of a new multi-purpose pavilion and refurbishment of the old pathology building into a museum".

Building on the success of those experiences, we strive to facilitate the participation of an ever-expanding online audience from remote countries. It is currently planned that GBS will be held in person and online for the 2022 edition.

WHY GREEN.BUILDING.SOLUTIONS.?

The **future growth of cities and increase in population** pose several challenges to municipalities, city planners and architects. To create ecological and sustainable solutions for urban development and the building sector, education, knowledge and interdisciplinary collaboration is crucial.

Mitigation of the consequences of ongoing climate change demands the immediate reduction of CO_2 emissions in the construction sector. Energy efficiency, climate neutral approaches and circular economy concepts need to be consistently implemented across the industry. Sharing the best practices for net-zero energy housing, adaptive building systems and positive energy districts will pave the way for the development of future-proof solutions.

Existing buildings and infrastructures will continue to represent the vast majority of our urban built environment. For this reason, amongst many others, efficient renovation of existing buildings is essential to achieve objectives such as the Sustainable Development Goals. This needs to be a concerted effort supported from both a financial and political perspective. Each day across Austria 30 hectares of land is claimed by infrastructure and construction. This must be avoided and, in order to do so, the use of existing buildings and already sealed areas needs to be increasingly incentivized to make it more attractive.

The circular economy concept, as well as recycling and re-us of construction materials, need to become the default solution for the construction sector in a society where poor resource management often leads to waste. A widespread change in behaviour needs to take place across the value chain of buildings to reduce their significant carbon footprint.

Since 2011, GBS has showcased how sustainable buildings are not only possible, but can also achieve the highest quality standards, delivering a healthy living environment for generations to come. This is demonstrated by pioneering architects, planners and engineers sharing their personal experiences and best practices. Assisting the transition from the postmodern industrial era towards a circular and regenerative society, in which the urban built environment plays a central role, the aim of the GBS is to provide participants with a state-of-the-art toolset that they can immediately leverage into their careers.

We would like to thank all alumni, teachers, partners, sponsors, and the whole team for making GBS a continuing success in 2021 and for being a part of our story for a greener future for all.

Best wishes,

Günther Jedliczka (OeAD student housing), Karin Stieldorf (TU Vienna), Georg Reinberg (Reinberg Architekten ZT), Gerhard Zucker (Austrian Institute of Technology), Doris Österreicher (BOKU Vienna), Marcello Turrini (Marcello Turrini ZT), Barbara Mayr (OeAD student housing)

The program is organized and implemented under the leadership of OeAD student housing which is responsible for management, coordination and content curation of the master-level program.

The GBS is a **cooperatively organized** program by the following Austrian universities and educational institutions: University of Natural Resources and Life Sciences Vienna (BOKU), Technical University Vienna (TU Wien), University of Vienna, Danube University in Krems, University of Applied Sciences (FH Technikum Wien), Austrian Institute of Technology (AIT) as well as Reinberg Architekten ZT.

National institutions support the program by lecturing and promoting the GBS:

FH Campus Wien, FH Wien der WKW, FH Burgenland, FH Oberösterreich, MODUL University, Institute for the Danube Region and Central Europe & Danube Rectors' Conference (IDM & DRC), Graz University of Technology, International Institute for Applied Systems Analysis (IIASA), Passivhaus Austria, Paris Lodron Universität Salzburg, FH Vorarlberg, Montanuniversität Leoben, GRÜNSTATTGRAU, FH Joanneum, FH St. Pölten, ÖGUT – Österreichische Gesellschaft für Umwelt und Technik, SDG Watch Austria, Senat der Wirtschaft, Dachverband innovative gebäude Wien und Niederösterreich, Forum n, Klimakonkret, Green Energy Lab. The City of Vienna (MA 50 - Department for Housing Research and International Relations, MA 20 - Energy Planning) as well as the Austrian Federal Ministry of Education, Science and Research and the Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology also support the program.

The following **international institutions** also contribute to the success of the summer university:

Aalborg University, Bergische Universität Wuppertal, Canadian Green Building Council (CGBG), Central European University (CEU), The Centre for Environment and Development Studies of the University of Uppsala (CEMUS) and the Swedish University of Agricultural Sciences, Hochschule Luzern, The Club of Rome, Nottingham University, Ryerson University, Salford University, School of Architecture at Hochschule Bremen, Tokyo University, and the Waterford Institute of Technology (WIT).

WHY OEAD STUDENT HOUSING?

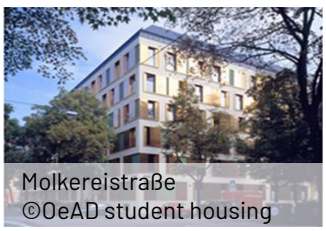
Sustainability is of great importance to OeAD student housing's mission. As a responsible non-profit organization, the company takes the lead in providing affordable, sustainable and energy efficient accommodation to students and guest professors from all around the world. Across the numerous projects which have been certified to the highest standards, residents have the added benefit and opportunity to experience the new innovations in passive house technologies first-hand. Through using high-quality building material and efficient insulation, an average "passive house for active students" from OeAD student housing needs 90% less thermal energy than similar buildings based on average energy consumption. Furthermore, it offers a healthier and more comfortable living environment than traditional buildings, for example in terms of air quality. The company is deeply engaged and dedicated to making the best possible use of resources to achieve these ambitious goals. OeAD student housing was awarded with the FIABICI World Prix d'Excellence in the category of "affordable living" for the PopUp dorms in 2019 and received the SDG Award in 2020. It was also nominated for the Green Product Award category "Architecture and Tiny Houses" in 2021. The mineroom in Leoben received the "Steirischer Holzbaupreis" 2017 and the Passive House Award 2021, amongst others.

FIABICI World Prix d'Excellence
(G. Lang, T. Lebinger, S. Straßer & G. Jedliczka (f.l.t.r) ©M. Lang


mineroom in Leoben, Styria ©J. Konstantinov

OeAD student housing


Gasgasse dorm ©OeAD student housing


Molkereistraße
©OeAD student housing


PopUp dorms in aspern Seestadt ©OeAD student housing / N. Hainfellner

Drawing from its own expertise as a property developer and operator, OeAD student housing is uniquely positioned to disseminate knowledge in the sustainable building sector, which is the primary target of the GBS Summer University. Globally, Austria is a forerunner in energy efficient and climate-conscious building practices. The country is continuously doing research on green, ecological and alternative solutions in this sector, which has allowed OeAD student housing to engage with world class experts over the years. GBS effectively acts as a platform for local experts to convey their insights and knowledge to an international audience of people who consequently become pioneers in this field in their home countries. Over the past 11 years, hundreds of alumni worldwide have become GBS ambassadors. Under non-pandemic circumstances, the GBS takes place in person in Vienna. During the intensive three-week program all international participants are gathered under one roof: one of the OeAD student housing guesthouses certified to the passive house standard. If the positive experience of living in a passive house leads participants to carry out projects and build their homes according to eco-friendly standards, or even launch an initiative similar to GBS in their home countries, the goal of educating and inspiring people has been achieved.

Challenges in the Building Sector

"Managing urban areas has become one of the most important development challenges of the 21st century. Our success or failure in building sustainable cities will be a major factor in the success of the post-2015 UN development agenda."

John Wilmoth
Director of UN DESA's Population Division

Population growth, the intensification of urban agglomerations together with the consequences of climate change and the COVID-pandemic have already begun to pose major challenges, and this is expected to continue in future decades. This concludes not only in the urgency for solutions in the building industry but also brings to the forefront social issues like population migration and integration on a political level.

Global goals like the COP 21 Paris agreement to keep global temperature rise below two degrees above pre-industrial levels, or the Sustainable Development Goals serve as foundational guidelines for the GBS summer university. In addition to raising general awareness, GBS offers a unique chance to learn actionable skills and expertise that will increasingly be in demand in the future. Thermal renovation and insulation, construction of energy efficient buildings and even plus energy districts are part of the global climate change adaptation and mitigation strategy. This implies not only the necessity to reduce greenhouse gas emissions from a technical perspective but also the need for

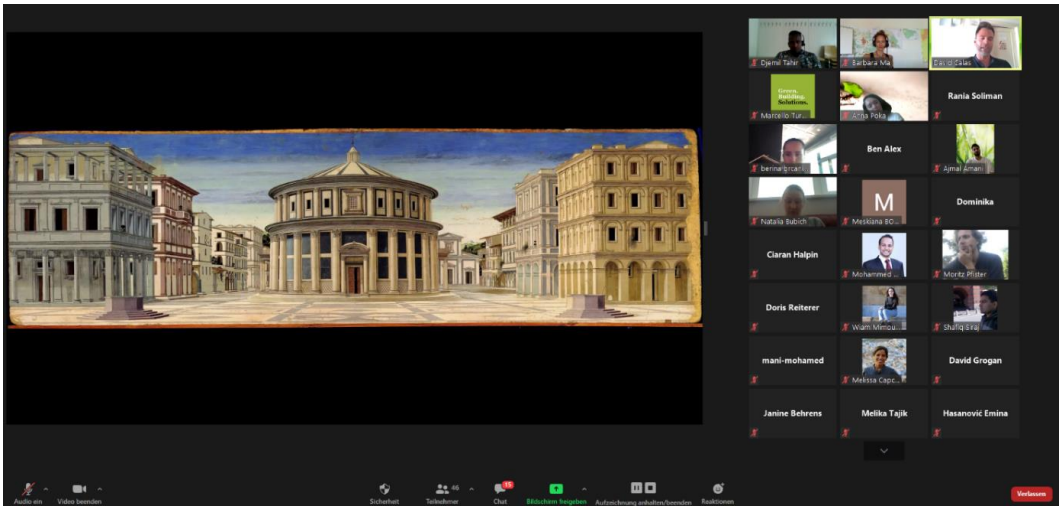
healthy changes to take place in economic systems to enable those reductions.

Renewable energy technologies and their uses are well established in a lot of northern countries, where harvesting sunlight and wind is part of national priorities. Renewables would be able to replace, or at least substitute, fossil fuels, eliminating the need for coal mining in the process. To tap the full potential of these renewables, future architects and building engineers need to focus on renewable energy and innovative technology integration in their design process.

The Curriculum

The central topics of GBS are sustainable architecture and resource-efficient planning including renewable energy concepts. This naturally includes the integration of ecological aspects and new technologies, but also tackles socio-political issues. The program gives participants a unique opportunity to learn about specialized content from an interdisciplinary point of view, in an international and multicultural setting. The imparted knowledge both deepens the existing competencies of the participants and broadens their perspectives. The overall aim of the course is to generate awareness and develop long lasting know-how, ultimately leading to real world implementations.

Screenshots - Lectures 2021



The target groups of the summer program are architects, urban and energy planners, constructors, building and civil engineers as well as students and professionals from similar fields in the construction environment. We also invite people with fields of study such as resource planning, ecology, and landscape planning to apply.

The focus lies on academics and professionals; therefore, our minimum requirement is a successfully completed bachelor's degree in a building related field, as well as very good knowledge of the English language.

The three modules of GBS

The learning methodology includes lectures, workshops and excursions for each of these three modules:

Module 1. Sustainability in Building and Urban Planning

Module 2. Principles of Passive House planning

Module 3. Renewable Energies and Business Concepts

Program 2021

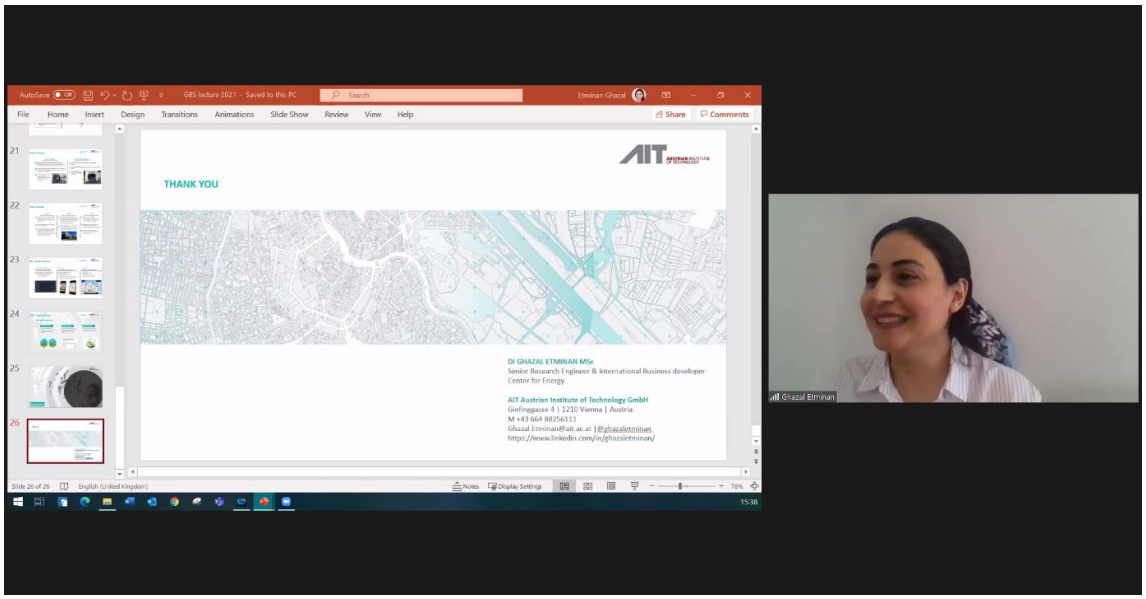
Already in 2020, the program was adapted into an online course, as physical presence for most of the international participants was not possible due to the travel restrictions dictated by the global pandemic. Based on the restructured concept which includes offering all lectures and excursions in an online format, and the outstanding experience in 2020, the 2021 edition of GBS was again held in a digital mode. The main goals were to reach out to a broader audience and enable even more participants to take part, as well as keeping the quality of the program as high as the year before. While the online edition of the program is significantly different to holding the course in Vienna, the mission remained the same: to offer a **unique opportunity** for architecture and planning students, to gain 7 ECTS from BOKU University and to enable them to connect with experts and like-minded people from all over the world. Moreover, we have been able in 2021 to award **empowerment scholarships** to highly qualified students from low-income backgrounds based on eligible applications and qualification. This was possible thanks to our partners and sponsors, and it allowed us to **reach out to even more people** who could participate without the extra cost of travelling to Vienna. As a result, we not only **increased equality** of opportunities, but also contributed to **lowering the CO_2 footprint** of the program itself. Furthermore, this enhances inclusion and fairness, and supports the implementation of the **UN SDGs 4, 7, 11, 13 and 17** through knowledge transfer on the topics of sustainable construction and management.

ONLINE-GBS: SET-UP AND IMPLEMENTATION

As the BOKU University is a main partner of GBS, the 2021 organisational team used **BOKU as a home base** during the 3 weeks of the program. In order to enable international participants across the different time zones to take part in live interactions it was decided to hold all sessions with experts in the afternoons, at 13:00 Central European Time. The mornings were dedicated to self-study periods for participants who were provided with reading material, relevant publications, presentations and other reference material for the topics to be discussed in the afternoon.

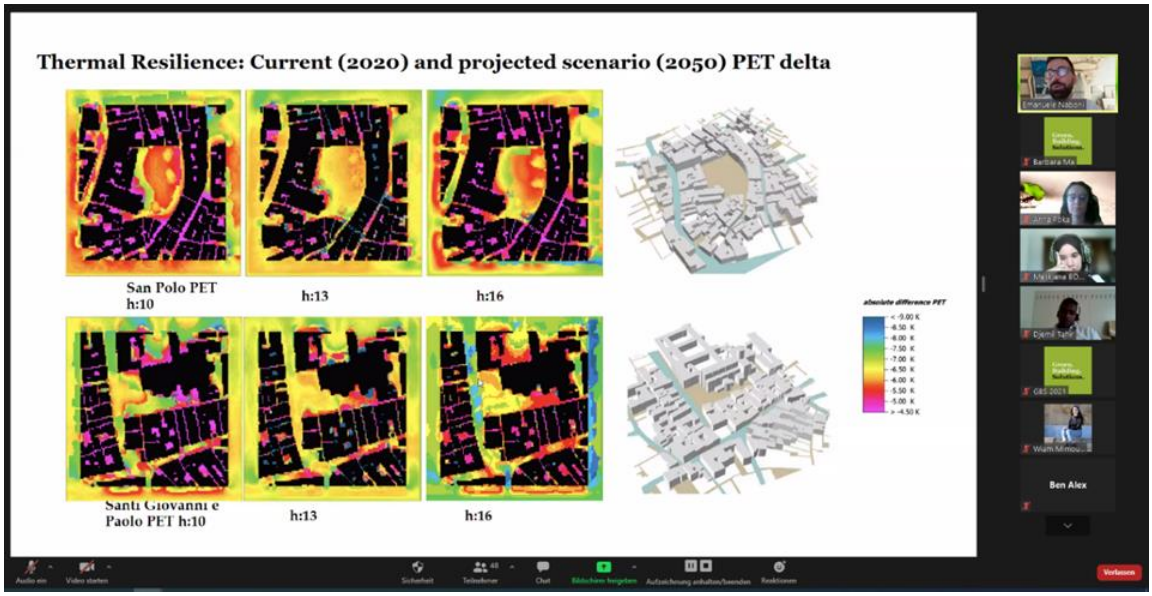
Zoom was used as a video conferencing tool for the live lectures and discussions. The chat function was used for open questions from the students, which were answered by the experts directly after their lecture. Technical and content moderation was supported by tutors. Some live lectures were followed by moderated panel discussions with the experts. For example, there was a high level debate under the title **"How can passive become smart?"**, where central questions about the future influence of smart buildings on fundamental passive house design principles were discussed by passive house experts Günter Lang (LANG consulting), Georg Reinberg (Reinberg Architekten ZT), Martin Treberspurg (Treberspurg & Partner Architekten) and Laszlo Lepp (Passivhaus Austria) led by Doris Österreicher (BOKU University).

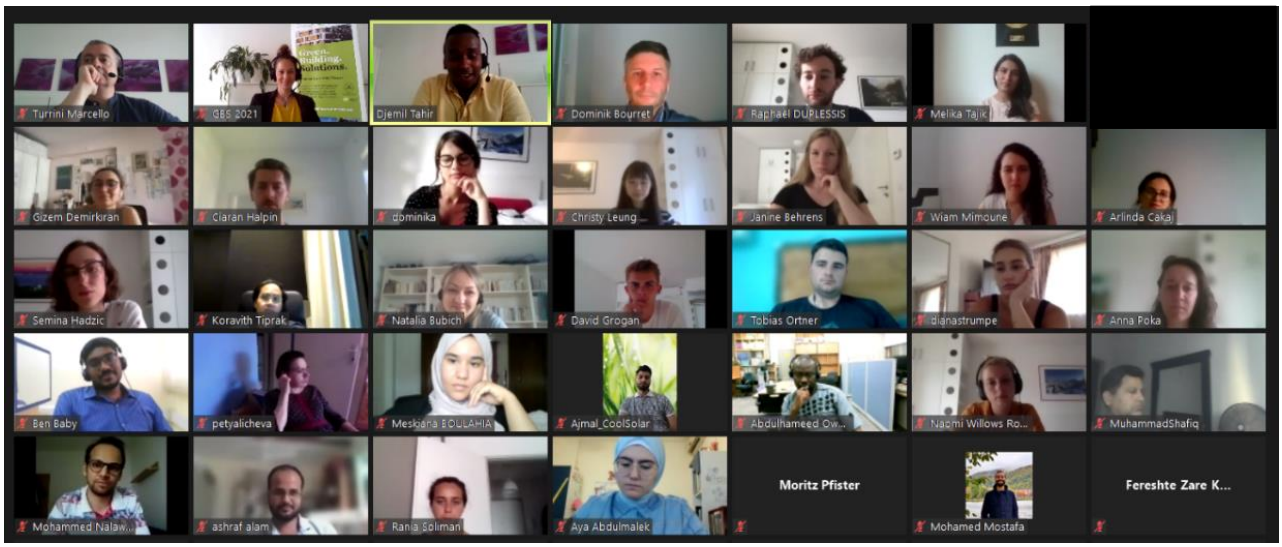
Communication, interaction and networking between students, lecturers and the organisational team took place on the online platform **Discord**. Via this tool, the daily program overview and links to content were provided. Several channels were created for information, announcements and discussions. In addition, virtual "team project work rooms" were created for each of the seven project groups to facilitate cooperation and joint work on the project deliverables. Lecturers remained available on Discord via a dedicated "ask-the-experts" channel, where participants could continue the conversations started in the live sessions and get answers to their remaining questions.



Lecture by GBS alumni G. Etminan

Climate scenario by E. Naboni





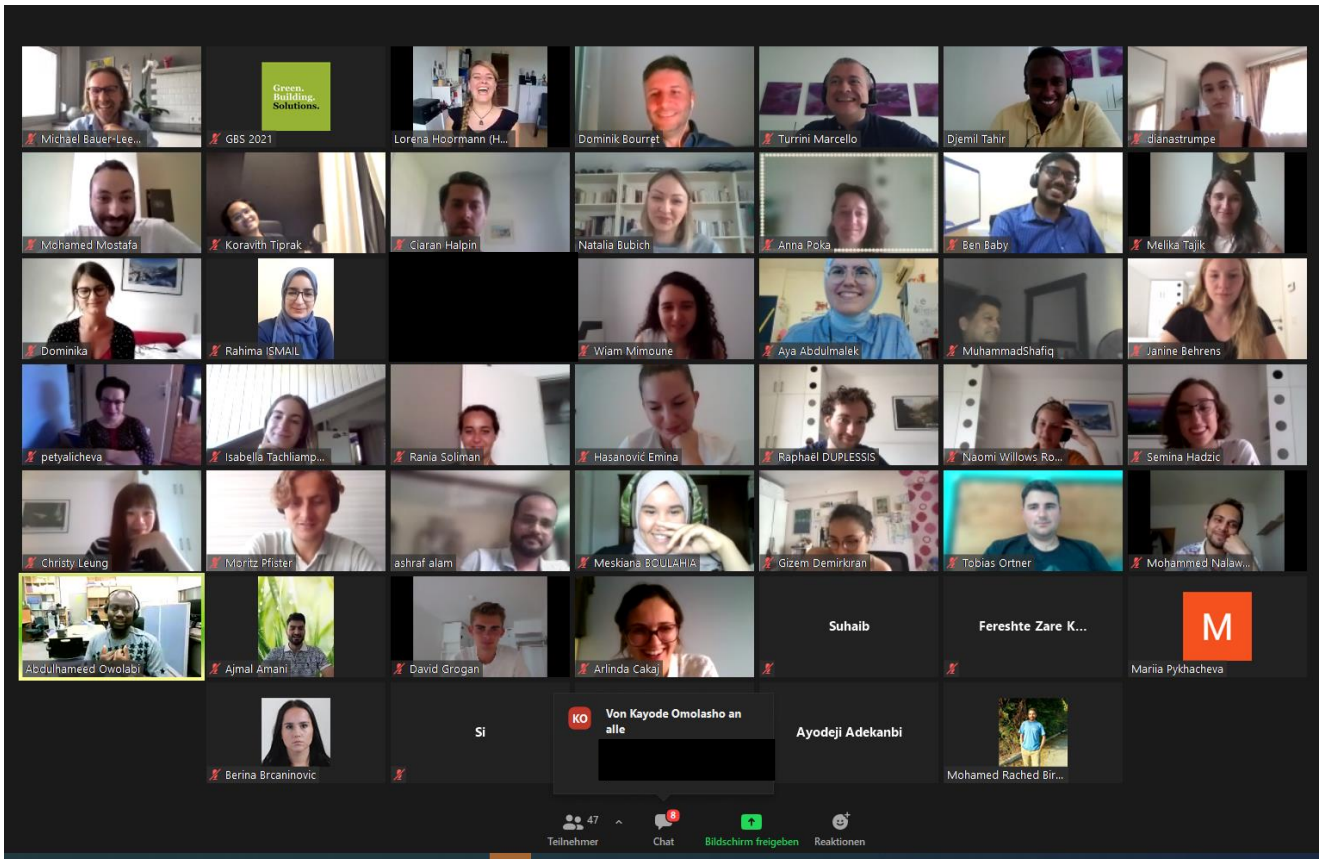
Attentive students during the orientation session for the GBS program

The start of the program

During the first weekend, the students were introduced to the program, the structure and content of the lectures, the overall organisation and the topic of the project work. After a technical and organisational onboarding by the GBS team, Michael Bauer-Leeb (WEITSICHT - büro für zukunftsfähige wirtschaft) and Lorena Hoormann (Hoormann Consult) led the first ice breaker session with the whole group of participants, giving them the chance to get to know each other.

On Sunday, participants were introduced to the City of Vienna by Eugene Quinn, as we presented his pre-recorded virtual tour through the inner districts, with emphasis on historical and architecturally important buildings and neighbourhoods. This was followed by a quiz, which already captured the attention of the students on the very first official day of the program.

On Monday, it was the students' turn to present their preparatory work dealing with green buildings and sustainable technologies in their home countries. This task served as a general introduction to the topic and an initial assessment of the students' background knowledge. The aim here is also to expand horizons and profit as much as possible from the know-how and expertise coming from different parts of the world. On Monday, also the grand opening for the AEMS and GBS took place in the TU Wien Kuppelsaal.



Features of the program 2021

In 2021, there was a total of **20 days of teaching** and further activities such as workshops, excursions and events; within **9 thematic modules**, to which **50 lecturers, workshop leaders and facilitators** contributed. The program also included:

- **Inspiring talks** and discussions about sustainable architecture, ecological building alternatives, passive house technologies, renewable energy production and integrated urban planning.
- Virtual onsite tours guided by experts demonstrating **Vienna's best practices** in low energy housing with professional videos produced exclusively for GBS.
- **International lecturers and experts** live-streaming from Canada, Great Britain, Ireland, Italy, Germany and Croatia.
- **A real-life case study project work regarding the Otto Wagner Area** in an international setting and in interdisciplinary groups.
- Building simulation workshops by the **Austrian Institute of Technology (AIT)** and the **FH Technikum Wien**, to assess the energy demand and consumption of the proposed building design created as part of the project work.
- **In-person excursions** to the best practice examples with students residing in Vienna while at the same time **live streaming the contents to remote students** and providing content via discord, video chat and by sending pictures.

GBS Expert Talk Series

We offered a GBS Expert Talk Series for the first time in 2021. These free Expert Talks were targeted at an international audience relevant to our sector and were hosted in an attractive online format. Additionally, they provided a great opportunity to stay updated about the hot topics in green building. GBS students and alumni could stay in touch with a network of like-minded people as the talks were followed by 1:1 networking-sessions. The talks have been recorded and are now available for the public:

- Expert talk #1 "Positive Energy Districts"
- Expert talk #2 "Circular Economy in Buildings"
- Expert talk #3 "Decarbonising buildings – Low Tech vs. High Tech"

Public Opening Event

The kick-off event for the Green.Building.Solutions. (GBS) and the Alternative Economic and Monetary Systems (AEMS) Summer Universities was held in person at the TU Wien Kuppelsaal on July 19th, 2021, under the motto **"Climate change – Is there a new dynamic?"**.

The event started with warm welcome words by **Andrea Mautz-Leopold** (member of the Viennese Landtag and the municipal council), **Anna Andrea Steiger** (Vice Rector Human Resources and Gender at TU Vienna), **Guenther Jedliczka** (CEO of OeAD student housing) and **Helga Kromp-Kolb** (Academic Head of AEMS and Initiator of the Center for Global Change and Sustainability at BOKU Vienna).

This was followed by three keynote talks by **Helga Kromp-Kolb** (climate expert), **Anika Dafert** (activist Fridays for Future Austria) and **Gabu Heindl** (architect and urban planner).

The all-female panel was moderated by Nora Laufer (Der Standard). In addition to the 100 guests enjoying the event in the charming environment of the Kuppelsaal, another 80 participants tuned into the event's livestream via the event platform HOPIN. This was a unique chance to be part of the opening celebrations from all over the world.

We had very inspiring talks to kick-off our Summer Universities:

Anika Dafert talked with passion about the climate crisis and the urgency of acting, discussing the recent extreme weather events happening all over the planet such as the floods in Austria and Germany and the fires in Greece.

In the title-giving speech of the event, **Helga Kromp-Kolb** illustrated the development of global temperature over the centuries and its consequences shown by the occurrence of natural disasters all over the globe. She welcomed pledges made by nations around the world, and shareholder pressure for a more sustainable future, describing them as signals of hope.

Completing the trio of speakers was **Gabu Heindl**, who discussed the climate crisis and necessary actions in relation to her profession. She stressed the rights and demands on resources, land and water, and the increased need for citizens to participate. She referred to the world-renowned "Red Vienna" social housing programme (1918–1934), which implemented policies to improve standards of public education, healthcare and sanitation.

The event then moved into a panel discussion, debating a wide variety of topics, and afterwards a networking event was held to give participants of both summer universities a chance to familiarise themselves with each other before the start of studies. The **recording** is available to watch here.

Visitors, students, sponsors and lecturers amongst the audience ©OeAD student housing / N. Hainfellner

Anika Dafert (Fridays for Future Austria) ©OeAD student housing / N. Hainfellner

At the "all-female"-panel in 2021: climate expert Helga Kromp-Kolb, Anika Dafert, Gabu Heindl (f.l.t.r.); the discussion moderated by Nora Laufer (daily newspaper Der Standard) ©OeAD student housing / N. Hainfellner

Amazing ambience at the Kuppelsaal at TU Wien ©OeAD student housing / N. Hainfellner

Architect and urban planner Gabu Heindl (GABU Heindl Architecture) ©OeAD student housing / N. Hainfellner

Lectures, Workshops and Discussions

Lecture content was planned according to the modules in the curriculum and ranged from passive house technologies and renewable energy production to "greening" strategies for buildings, also encompassing the theme of heritage protection.

The virtual edition allowed us to include renowned international experts in our portfolio of speakers due to the possibility of streaming online independently from the locations of the speakers and the event. For this reason, we had excellent lecturers live-streaming their input from Canada, Great Britain, Ireland, Italy, Germany and Croatia in addition to Austria. Thereby, we could not only invite representatives and guest speakers from longstanding international GBS partners, but the whole lecture program was greatly enriched and included a wide range of topics according to a **modular structure**, which closely followed the framework of the Sustainability Development Goals promoted by the United Nations.

The nine GBS online modules were:

0. **"Global challenges and role of buildings"**,

where the focus was climate change resiliency, was discussed from a socio-cultural and scientific perspective. Besides the opening ceremony with Helga Kromp-Kolb and Gabu Heindl, Peter Holzer and Emanuele Naboni gave insights about climate sensitive design and climate change resilience. Christoph Thun-Hohenstein, Director of the MAK - Museum of Applied Arts Vienna, discussed the role of architecture in the contemporary environmental climate.

1. **"Historical development and introduction of green building design"**,

where the general aspects of sustainable and regenerative design were discussed. Martin Brown explained the reason why the time for regenerative sustainability is now, Georg W. Reinberg demonstrated the new aesthetics of green building architecture by way of a review of his own projects. Another passive house pioneer, Martin Treberspurg, introduced the topic of the passive house Standard by visualizing his architecture and building projects. Laszlo Lepp and Günter Lang went more in detail about the passive house certification and international development of the standard.

2. **"Quality of life in and around buildings"**,

where health and wellness has been treated as the main target of design at a construction level, but also at an urban level. Gregor Radinger spoke about the optimization of daylight inside the buildings. Dawid Michulec explained how to achieve the thermal comfort inside the buildings and Marcello Turrini showed how to achieve it in outdoor areas. Maria Auböck – an expert when it comes to the Otto Wagner Area – brought in her expert knowledge by talking about the importance of a quality landscape with special reference to the project area in Vienna. She introduced the topic of Nature Based Solutions, which was explained in detail

by Susanne Formanek including the many advantages of living walls and living roofs in cities.

3. **"Socially inclusive and accessible urban spaces",**

where the topics of equity and social inclusion were discussed by experts in the field of sustainable and participative urban planning. Yvonne Franz and Elisabeth Aufhauser introduced the advanced inclusive social policies of the city of Vienna, while David Calas argued about the participative urban design on the background of this digital era.

4. **"Circular economy in the building sector"**,

where the economic and environmental advantages of recycling in the building sector have been explored in their scientific and their practical aspects. Within this module, Viennese and Canadian expertise highlighted the best practice to an effective circular economy: Researcher Umberto Berardi from the GBS partner Ryerson University talked mainly about new and alternative materials to achieve increased building resiliency. Roland Bechmann – who had already shared his expertise in the second GBS Expert Talk – explained how to approach the highly relevant topic of recycling in the building sector and showed the pioneering and excellent example "NEST" – built by recycled material.

Claudia Schrenk and Klaus Kodydeck introduced the local policies in relation to this and talked about the DoTank Circular City of Vienna and attempted developments. Mark Gorgolewski explained new creative methods of reusing waste materials as resources for new constructions. Peter Moonen, who specializes in wood building, illustrated the use of timber in the Canadian building industry. Karin Stieldorf gave insights about the alternative of using natural materials, the so-called NawaRos.

5. **"Economy for sustainable buildings"**,

where the new strategic role of sustainability in the financial world was explained. This topic was part of the program for the first time this year, due to the increased interest in not only financial and economic aspects, but also green investment in the real estate sector. These green financing mechanisms were introduced in the lecture of Katharina Muner-Sammer, while Kay Killmann discussed the importance of building certifications. Marko Markov highlighted the potential of green projects to attract investors. Melanie Ross illustrated the long-term financial benefits of green buildings on the background of natural disasters and referred also to the "Living Building Challenge", explained by Martin Brown earlier.

6. **"Energy concepts and technologies"**,

a classical module of GBS, where the latest findings of technology for the use of renewable energy are taught by the experts of the Austrian Institute of Technology from a technical point of view. Michael Lauermann explained the technology of heat pumps and solar thermal collectors. Karl Berger gave an in-depth insight on photovoltaic technology in architecture. Bianca Pfeffer from ÖGUT introduced the relatively new topic of "Anergie"-networks, an approach to the use of renewable energy at a district level. Simon Schneider established the subject of Positive Energy Districts, followed by Stefan Sattler who went deeper into the energy policies of the City of Vienna. This day was

brought to a close by GBS alumni Ghazal Etminian who concluded with showcasing the European practice in design and implementation of positive energy districts. The topics were carefully coordinated to convey theoretical knowledge, but also practical application with use of examples.

7. **"Software toolbox"**,

where the participants learned how to use the most up to date calculation software for energy demand and use in buildings. Philip Horn introduced the technique of the building dynamic simulations and how to use the software IDA-ICE. In parallel – so that the students could choose - Jens Leibold offered workshops and supervision on the use of Polysun. Finally, Agron Deralla from the architectural office AllesWirdGut spoke about BIM (Building Information Modeling) – another topic of increasing importance in the digital planning era.

8. **"Team design project"**,

where the participants experimented with the practical application of all the information gained during the lectures and discussions in a real project, as explained in detail in the next chapter.

Excursions, visits, social events

Also, this year, excursions and site visits were part of the program: For example, longstanding partner and supporter **GRÜNSTATTGRAU** introduced different greening methods for buildings and lectured about the influence of green roofs and facades on the climate in Vienna, as well as the wellbeing of its residents. This was topped by a visit of the students residing in Vienna on their green roof at the office, which gave valuable insights into how such concepts are implemented. Additionally they visited the **MUGLI**, which is a great example of different types, techniqes and possibilities in regard to facade and roof greening. Participants got to learn about the **Bike and Rails** passive house in Vienna's Sonnwendviertel, by watching a recorded tour through the building, guided by Georg Reinberg (Reinberg Architekten ZT). With a special eye on sustainability in construction, the architect showed the highlights and implemented technologies. The building was collaboratively built in a participative planning approach involving its residents. A special visit was also organized in a private apartment which was renovated according to passive house standards during the early phase of the movement. Via live-stream the participants followed the owner, who explained all the details and provided inspirational statements.

Social activities have always been an important component of the program. This year, they were again provided as optional sessions for the AEMS and GBS participants.

Daniel Murphy, a GBS alumnus 2015 from Ireland gave a lecture about his **Tiny House and the Zero-Waste Lifestyle**. Being a Sustainable Energy Engineer himself, he talked about his self-built tiny house on wheels and other community projects he joined in NZ. By sharing

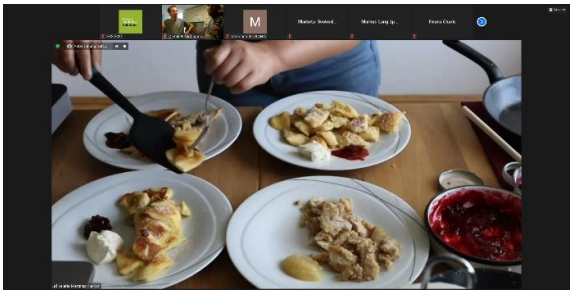
his experiences with eco-friendly construction and upcycling waste, he wants to inspire others to be creative and to think in a more circular way.

Further events

- Live-cooking workshop with Valeria Martínez Alarcón (Cocina de Vale): the students learnt the preparation of a typical Austrian "Kaiserschmarrn"
- Online Pub Quiz with mixed groups of AEMS & GBS students
- Energizer and ice-breaker sessions held by Michael Bauer-Leeb & Lorena Hooremann
- Sport events & dinner at a typical Viennese Heurigen
- The visit to the first refurbished flat in passive house standard worldwide
- Workshop on wood construction held by the company Sihga GmbH
- Alumni Natana Char (Brazil) and Simran Munde (Canada) presented outstanding projects from GBS 2020. The best GBS project from last year was awarded with the Best Paper Award at the SBE21 Sustainable Built Heritage (Italy)
- Curator of the Wien Museum, Andreas Nierhaus, discussed with the students about important criteria and needs when designing a museum.

Social activities

Passathon-Tour to GreenHouse / aspern Seestadt ©OeAD student housing / Luiza Puiu



Live-cooking-session with students M. Nalawala (middle) and D. Tahir (below) ©OeAD student housing

GROUP PROJECTS

Kirche am Steinhof (left) and pavilion at Otto Wagner Area
©OeAD student housing / B. Mayr

During the final week of the program the participants were dedicated entirely to the practical aspects of designing sustainably built environments. Within the seven project work groups, the participants took on a real-life project under the supervision of involved experts. This year's topic for the **project work** was **"Transition of the Otto Wagner Area in Vienna under the aspects of sustainability, energy efficiency and heritage protection: design of a new multi-purpose pavilion and refurbishment of the old pathology building into a museum".**

Each group had either to design a new multi-functional service building for the Campus or to refurbish the former pathology building, turning it into a museum. So, the task was to work on a single building of the larger complex, taking special attention to the topics of sustainability. energy efficiency and heritage protection, achieving the best energy performance to make the single building contribute to the entire area of the former Otto Wagner hospital, conceived as a "Historical Plus energy District".

The **Otto Wagner Area** is located in the 14th district of Vienna, which will serve as a campus for the **Central European University (CEU)** in the future. Each project team had a local representative based in Vienna, and a site visit was organized in order for them to get a feeling of the Otto Wagner Area in person. They shared their findings via video call and pictures with the members of their respective groups. Particularly important was the consideration of parameters of heritage protection, restoration and energy supply.

The buildings for the campus, designed independently by the groups under the daily supervision by experts, were intended to contribute to a "Positive Energy District" concept, which means it requires a positive energy balance over the entire year. Technologies such as photovoltaics, solar thermal energy and heat pumps were therefore key components of the energy concept. Another important part was the inside

insulation and restoration of existing structures or walls. The use of environmentally friendly materials with a lower ecological footprint, maintaining and developing green areas, as well as efficient rainwater management also had to be considered.

Furthermore, the following criteria had to be considered for the project work:

- Maximum energy efficiency of the building
- Systems for renewable energies
- High ecological quality & building materials
- Monument protection
- Attractive architecture
- High functionality
- Longevity
- Room climate
- Use of Smart Technology
- Exterior design (green spaces) of the area

Each project team had to develop a **detailed plan of their building** as the final output. The groups consisted of up to 7 people, each with different fields of study and professional backgrounds. The teams were created to encourage interdisciplinary collaboration as much as possible, enabling dialogue about architecture, building physics, engineering, planning and so on. The biggest challenge was the collaboration across 10 time zones and the fact that it took place exclusively online.

The groups could choose one out of two offered design approaches for their project. One was a new **multifunctional service building**, that had to replace the Pavilion 35, which contained functions important for the quality of life of the students on site, such as a cafe, a chilling zone and a FabLab. The second option was the **renovation of a listed building** (former pathology) as a museum.

The first approach, the new service facilities, demanded the design of a building, which had to relate to the historical context of the listed pavilions designed by Otto Wagner surrounding it. A strong relationship with the outdoor area was one of the main requirements. Another matter was the design of the demolition process of the old pavilion 35, that had to be a dismantling operation, in order to make the materials available again for the new construction.

The second project, the refurbishment of the listed pathology building, had to deal with the challenging aim of developing an innovative museum inside a heritage-protected building, fulfilling the requirements of the positive energy standard. The passive strategy for all the groups was the implementation of an inner thermal insulation and a natural ventilation as the main cooling strategy, taking profit of the high amount of thermal mass already present in the building. As active thermal strategies, solar energy, district heating and ground heat have been implemented the most.

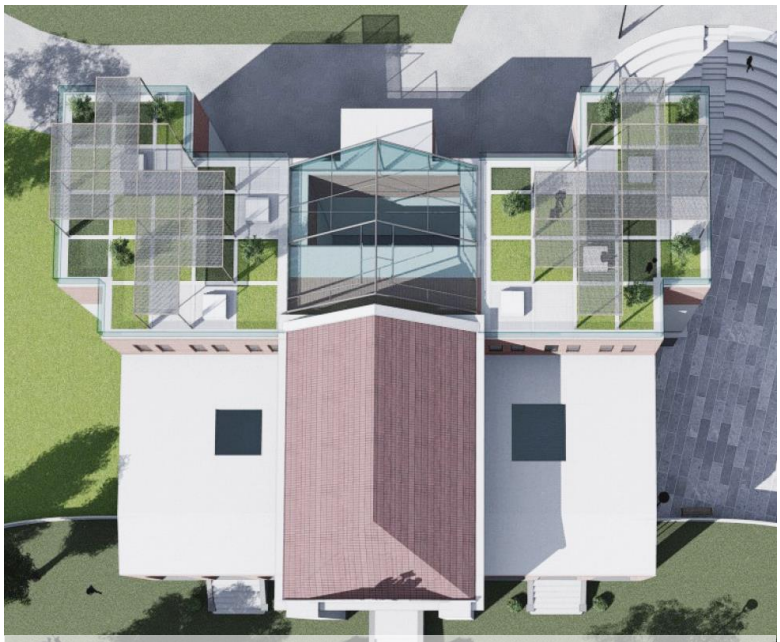
Besides the above-mentioned reuse of materials, the adoption of environmentally friendly materials with a lower ecological footprint, maintaining and developing green areas, as well as efficient rainwater management had to be considered. It was rewarding for the organizers to see how the newly implemented program encouraged the groups in the adoption of new ecological strategies for the projects.

Final presentations

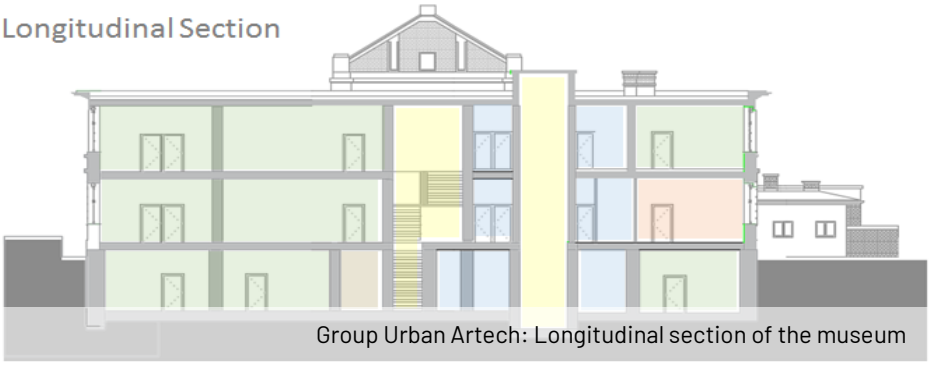
The final presentations were held on the last Saturday of the program. Each group presented their design online to a **panel of experts and a jury** composed of Georg Reinberg, Karin Stieldorf, Günter Lang and Philip Horn. Overall, the jury was astonished by the outcomes and design approaches the students where presenting. The participants managed to produce **interdisciplinary project outcomes of a very high quality while collaborating online and across several time zones** in small teams. This is – with special regard to the short timeframe allocated for the project – a great success for the second digital GBS edition. Everyone was highly satisfied with how the course went, and the organizers are satisfied and proud of the outstanding results.

The official touch down took place after the group presentations of the projects. The program closed with an online ceremony and the virtual handover of the certificates by Eugene Quinn who also interviewed the new graduates about their plans and ideas on how to implement their new knowledge after successfully closing the GBS 2021!

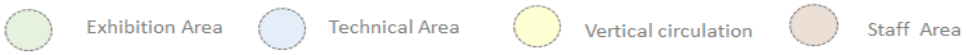
Group ECORENO: The entrance of the Museum

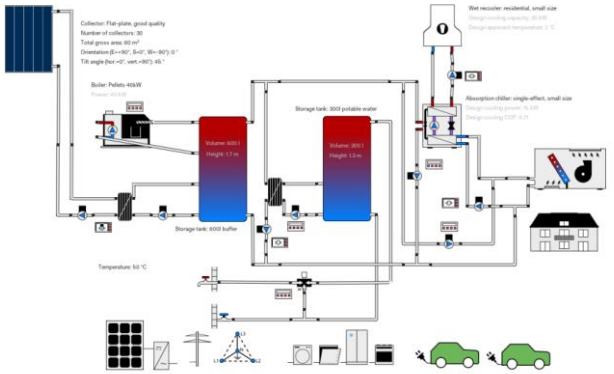


Group Ecosynthesis: Rooftop of the Museum

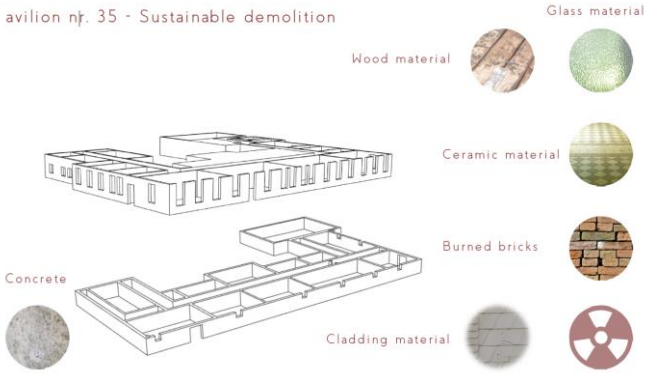


Group Urban Artech: Longitudinal section of the museum



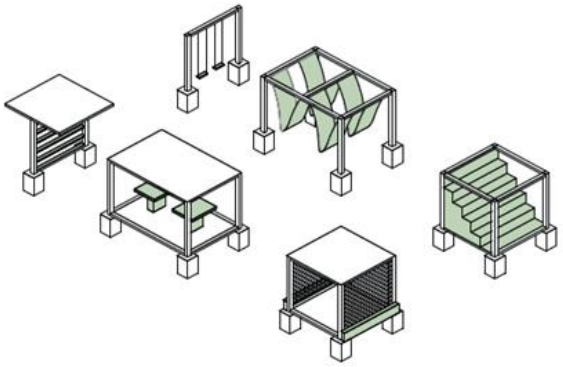


Group Ecoynthesis: Energy-Simulation with "Polysun"

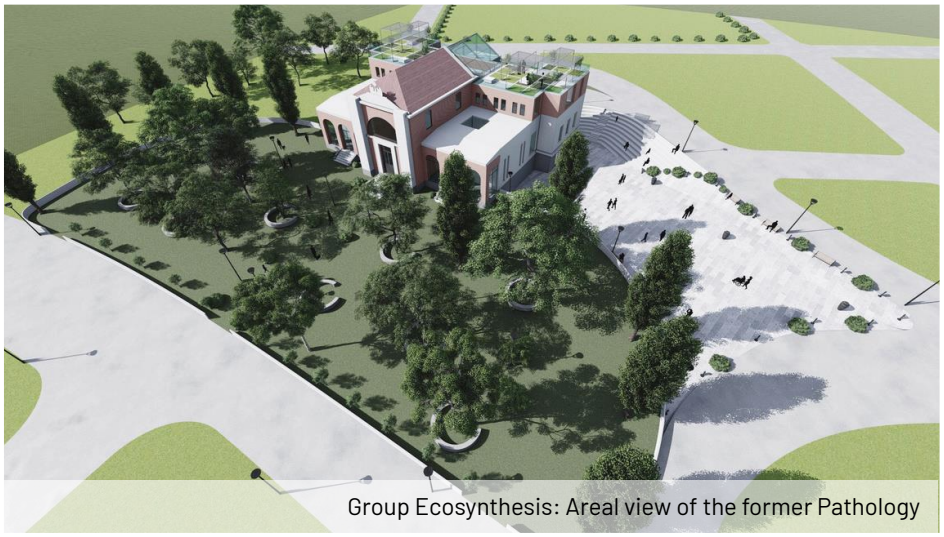


Group Camas: Sustainable demolition concept

Group Plan B: View of the new glass house



Group Plan B. Flexible Pavilions



Group Ecosynthesis: Areal view of the former Pathology

Achievements & Future Ideas

GBS 2021 – the 11th instalment – was not only a success but also exceeded the expectations of participants, organizers and even lecturers. This year's graduates, who designed well-researched and high-quality projects, now have the chance to implement their newly acquired know-how in their home country. This year's format again demonstrated how an online program can create the space to effectively share pioneering knowledge with an international audience.

Intercultural networking was made possible by online platforms. However, it cannot replicate the special character of in person meetings and live interactions. In the current pandemic situation, the participants managed the teamwork over 10 time zones very well. They had a deeply meaningful online learning experience and were able to seize the opportunity to develop their skillset during these difficult times. Additionally, the offer to stay in the OeAD student passive houses in Vienna in 2022 is an opportunity not only to connect with other participants but also with the next generation of GBS scholars.

Since its beginning in 2011, GBS hosted more than 390 participants from 85 nations all over the globe. To continue this engagement and foster connections, there is a Facebook alumni group, an Instagram and a Twitter account, as well as LinkedIn. Furthermore, a newsletter is sent four times per year to keep in touch with the partners, the contributors and the alumni. **For 2022**, we are preparing to host GBS again **in person in Vienna, as well as online**, to allow even more people to take part in the green building movement. This is how we plan to further spread the vision of green and sustainable buildings all over the world!

WHAT PARTICIPANTS SAY ABOUT THE GBS ONLINE 2021

"First of all, I liked the variety of topics covered and then I really enjoyed our lectures, real professionals who create and implement green solutions in their everyday work."

Natalia Bubic, Russia

"The group work was my favourite bit, we had a team of seven people from different backgrounds, different places, different ideas. I can't express in words how amazing it is, to work with people who are equally motivated."

Ben Alex Baby, India

"Of course I'd recommend GBS, I thought it was great. It was really interesting for me because the region I'm from, there is an urgent need that we also adopt these energy solutions talked about in the GBS summer university."

Muhammad Shafiq Siraj, Pakistan

"I'd definitely recommend GBS Summer University. There are so many reasons to participate, because not only do you get given the whole broad spectrum, it will also let you identify your own specific interests which I think that is very important because there is so many things to do."

Suhaib Arogundade, Nigeria

Some more statements...

"[...] so many really nice lectures and people and experiences, the best summer university ever!"

"Thank you for your hard work organizing this wonderful and inspiring GBS program. Doubtless, this program is my best summer experience so far even if it is a virtual course [...]."

"[...] I'd love to thank you for the chance to participate in this amazing program and meet such great people (it's a pity that online, but anyway that was fantastic)!"

"Thank you very much once again for the organization and the perfect summer university 2021."

"It was a great experience, and I learnt a lot. Everything was perfectly organized and very professional. Thank you very much!"

MANY THANKS TO

We are deeply grateful about the excellent contributions and the dedication by all the organizers, lecturers and further people involved to the program:

Lukas Allner
Maria Auböck
Elisabeth Aufhauser
Michael Bauer-Leeb
Roland Bechmann
Umberto Berardi
Karl Berger
Aurelien Bres
Martin Brown
Markus Brychta
Frank Bürkle
David Calas
Natana Char
Agron Deralla
Ghazal Etminan
Christoph Falkner
Susanne Formanek
Yvonne Franz
Peter Franz
Harald Frey
Mark Gorgolewski
Magdalena Górecka
Peter Holzer
Lorena Hoormann
Philip Horn
Chien-Hua Huang
Johanna Kairi
Helga Kromp-Kolb
Kay Killmann
Günter Lang
Markus Lang
Michael Lauermann
Jens Leibold
Laszlo Lepp
Marko Markov
Valeria Martínez Alarcón
Peter Moonen
Dawid Michulec
Marvin Mitterwallner
Nicole Mothes
Simran Munde
Katharina Muner-Sammer
Daniel Murphy
Emanuele Naboni
Andreas Nierhaus
Doris Österreicher
Michael Palfi
Bianca Pfefferer
Eugene Quinn
Gregor Radinger
Georg W. Reinberg
Marcus Rennhofer
Melanie Ross
Stefan Sattler
Robert Schild
Simon Schneider
Claudia Schrenk
Peter Schubert
Tim Selke
Roman Smutny
Karin Stieldorf
Christoph Thun-Hohenstein
Marcello Turrini
Martin Treberspurg
Franziska Trebut
Andreas Zottl
Gerhard Zucker

THANK YOU FOR YOUR SUPPORT!

Organization and program management: Barbara Mayr

Tutors and assistance: Marcello Turrini, Dominik Bourret; Petra Isepp, Erik Salaun

Organisational team: Yvonne Franz & Elisabeth Aufhauser (Universität Wien), Günther Jedliczka (OeAD student housing), Georg Reinberg (Reinberg Architekten ZT), Karin Stieldorf (TU Wien), Stefan Sattler (MA 20), Gerhard Zucker (AIT) & Philip Horn (ecob.consulting), Jens Leibold (FH Technikum Wien), Marcello Turrini (Architekturbüro Marcello Turrini ZT), Dominik Bourret (Bourret Energy Consultants) and Doris Österreicher (BOKU University).

Special thanks to: Djemil Tahir, Lottie Millington, Rania Soliman, Ben Alex Baby and Anna Poka.

We would like to thank all our partners, sponsors and supporters for making this event possible.

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GBS will be back in July and August, 2022

Find us online at www.summer-university.net

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