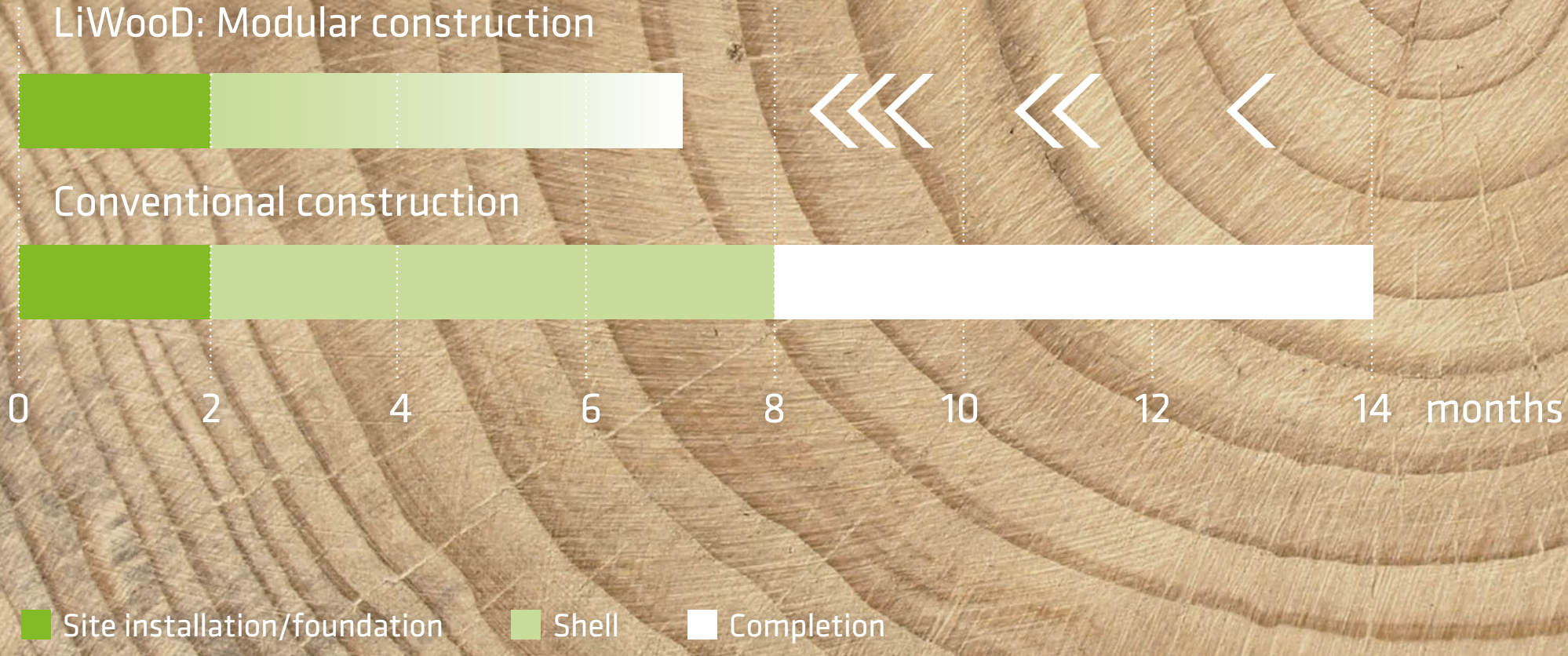
LiWooD

LIVING IN WOOD

Incredible time-savings with LiWooD



LiWooD - Living in WooD

As ingenious as it is simple

LiWooD

Living in WooD

Building with wood is efficient as well as sustainable

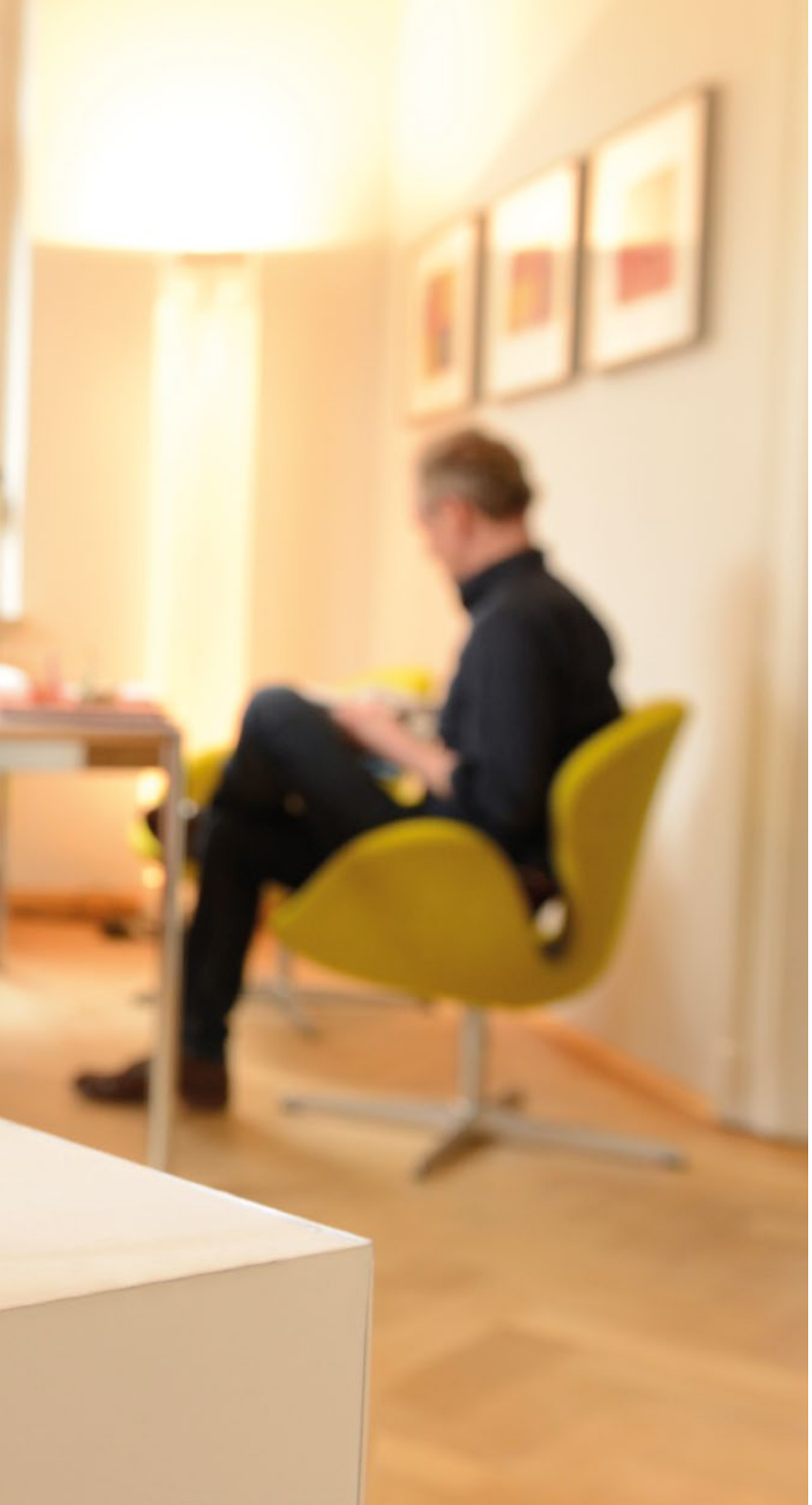
Our approach combines the two qualities: efficiency and sustainability. LiWooD's work is distinguished by extremely short construction programmes which allow us to quickly implement different construction tasks and projects. Our buildings are also hugely energy efficient. We make the widespread desire for sustainability, a reality.

Living in Wood

We think modular for buildings

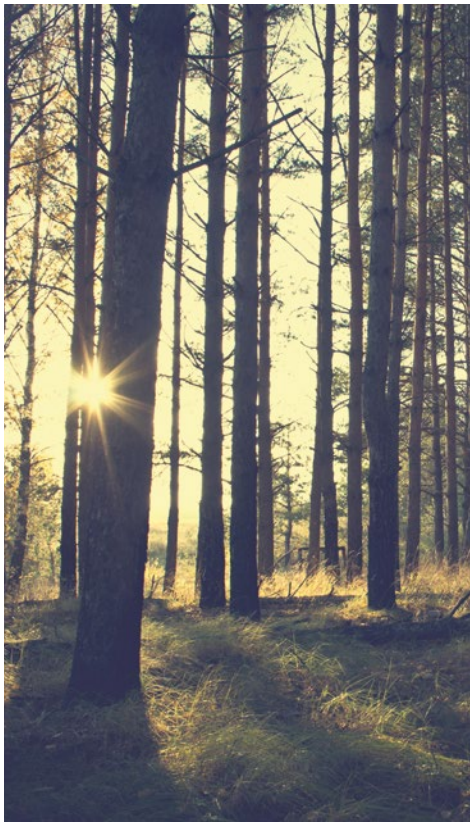
Since 2006 we have been planning and developing modular multi-storey buildings as diverse as social housing, student apartments, hotels and retirement homes.

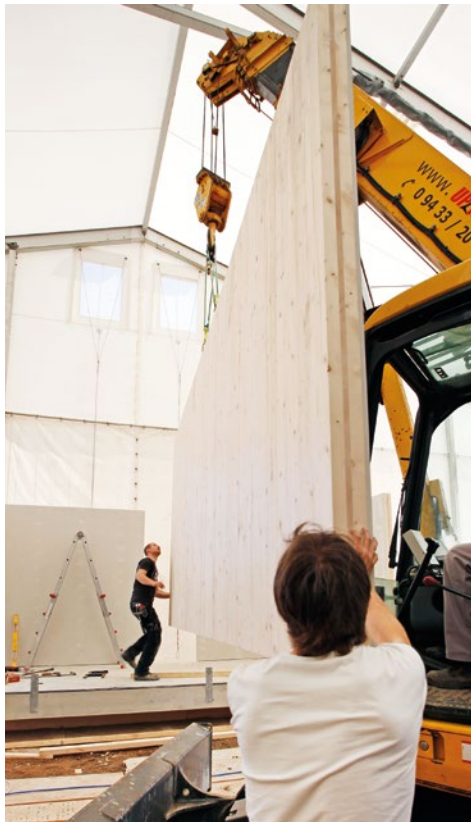
In our projects, we put the challenges of sustainability into practice. It is our first and foremost objective to apply green construction principles to our buildings without losing sight of quality and budget.



Our focus is on sustainability

Building in a responsible manner involves sustainability. We implement this in our projects to the highest standards. Everything we do is based on quality; and we are aware that sustainable buildings must be compatible with a competitive cost structure.





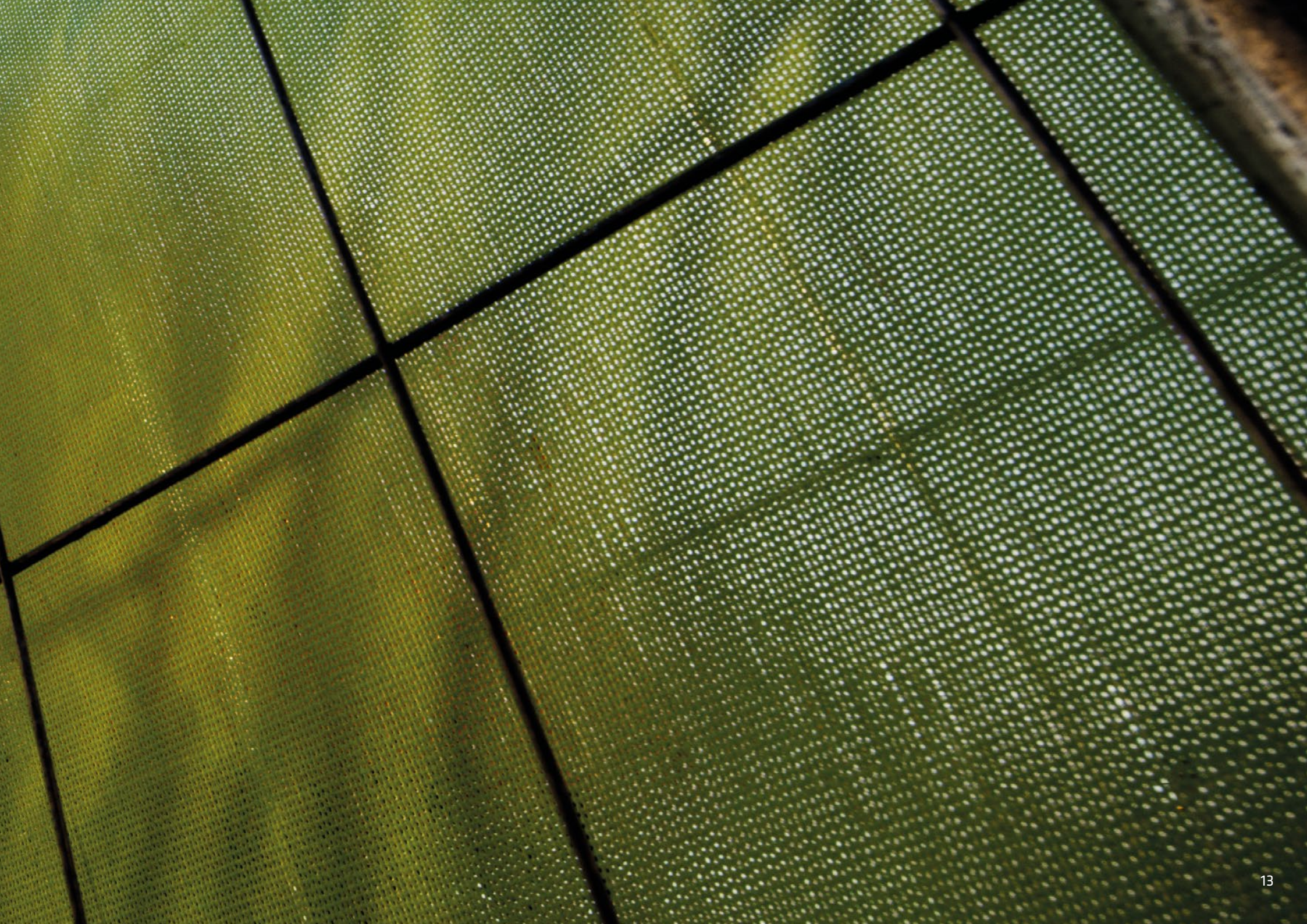
Wood is our basis

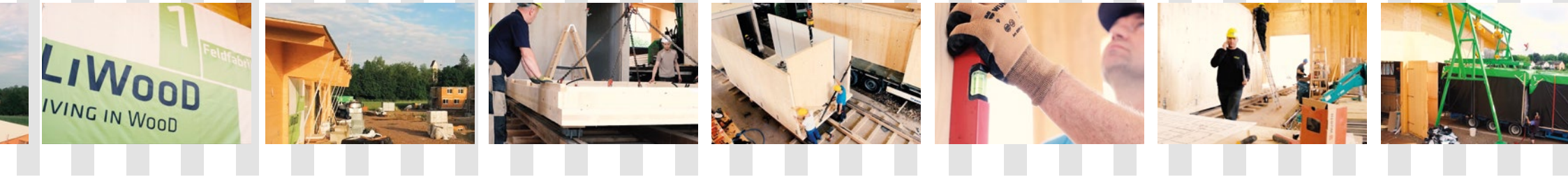
No material other than wood has such a positive effect on our wellbeing. Even the touch of wood is better than that of other construction materials. You will experience this unique characteristic, as well as of our passion for wood, as soon as you enter our buildings. Wood is the only construction material for true green buildings and we rigorously apply this knowledge to our work to meet contemporary requirements.

We build in an efficient way

The timber we use, the way we assemble our modules and our logistics are crucial to efficient and resource-friendly construction. We support, advise and accompany you from the planning stage through to construction until the building is ready to be occupied. We take responsibility for the entire building process.


WOOD





Modular construction requires extensive pre-planning and logistics

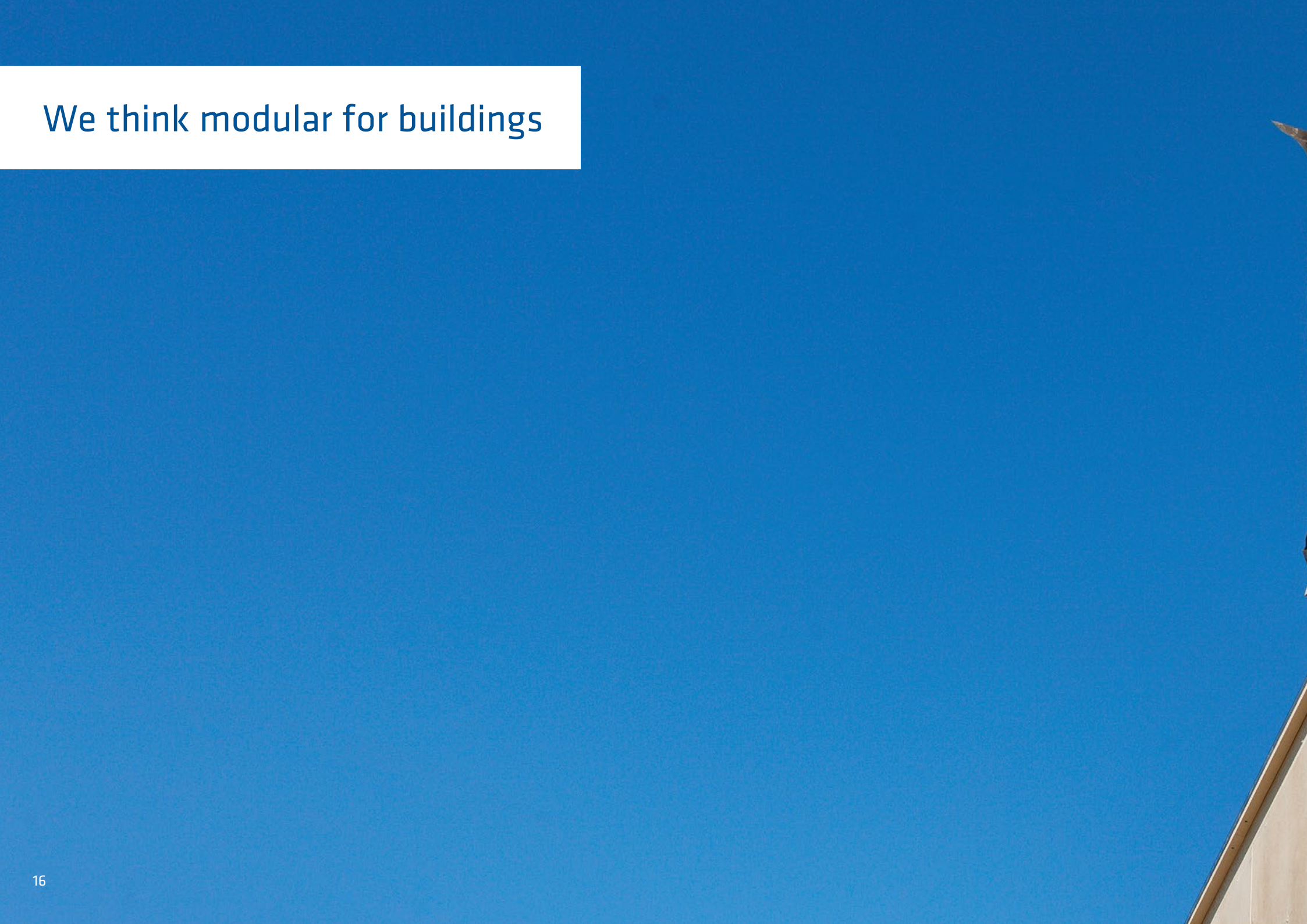
The prefabricated components are delivered to the site based in a precise sequence. They are directly assembled in our field factory on the building site (or in its immediate vicinity) and subsequently combined into a complete building using a mobile crane. This advanced construction method is superior to conventional methods, especially with regard to sustainability and speed. The prefabricated single components are delivered based on a specified logistics schedule and immediately processed. This requires less storage space and fewer truck deliveries, as single components can be transported more economically than preassembled room modules. This saves time, money and is environmentally friendly. The use of wood keeps a lot more CO_2 in the building permanently (= sustainably) than is generated in the production process. This cannot be accomplished with conventional building materials. These and many other benefits are what sets our approach apart from conventional building providers.

LiWooD - the film

The film was produced in the summer of 2016 as part of a project building residences for a total of 600 inhabitants. The film shows how individual components are assembled to almost finished modules in the field factory located on the building site. Immediately afterwards, the modules are then linked together to form a complete building.

Scan QR code or click on the following link: www.liwood.com/en/themovie

We think modular for buildings



Timber is the basis for sustainable and efficient construction

No other construction material has changed the history of building as dramatically as wood. What laid the foundation for modular construction were the wood building techniques derived from ship building. Construction of the large Romanesque and Gothic churches was only possible through the use of separate elements of standardized structural components that could be handled by cranes. Even back in those days, components were delivered and assembled following precise logistics.

With its modular philosophy and perfectly coordinated logistics scheme, LiWooD's building concept requires considerably shorter construction times meaning that buildings are ready for occupancy at an earlier date. This approach creates new premium living space within the shortest time. A particular bonus is that this considerably reduces the adverse effects and emissions so common at conventional construction sites, not only in quantity but also in duration.

Pre-construction planning

Every building project starts with careful and detailed pre-planning. This is when we work together with our architects, technical planners and the owner to define and specify the requirements for the building. In this phase, the building is designed and technically developed in all its technical details, creating the basis for a smooth and efficient building process.

Prefabrication

Using wood as a building material is what makes rapid construction possible. Timber can be used to build various types of modules and to make them fit different applications. There is hardly any other material which is more flexible and can be produced industrially. The individual elements of our modules such as walls, ceilings, floors and bathrooms are produced on the basis of our detailed design plans and delivered to our field factory on time. Standardisation and industrial series production not only guarantee a high level of precision, but also consistently high quality. As our entire production process is completely weather-independent, we can build during the winter.

The prefabricated ready-to-use bathrooms can be customized and are delivered to our field factory. In contrast to conventional bathroom building, this dispenses with the need for half a dozen different tradesmen, therefore saving a lot of time in the construction process.

Logistics

A high level of prefabrication requires sophisticated logistics. Here, the exact delivery sequence of the individual components is an important criterion for the efficiency of our field factory as well as for the entire construction process. Our field factory is one of our unique selling points. We set it up directly on the building site, which enables us to assemble and complete modules from individual components right there. This highly efficient process takes place under optimal (weather) conditions and is a crucial prerequisite for fast and sustainable on-site construction.

Module assembly in the field factory

In the field factory, the modules are produced from individual components following the sequence specified by LiWooD. Modules leave the production line after 70 to 90 minutes (depending on the degree of complexity) and can then be stacked and assembled into a building. The maximum production capacity of the field factory is ten modules a day.

Positioning

Using a mobile crane, the finished modules are first connected horizontally to form storeys and then vertically stacked to create a complete building. The modules are already equipped with all the necessary facilities and connections. Once this step has been completed, building extension and facade work can start immediately. This highly ecological as well as economic construction concept fulfills the requirements for an up-to-date and sustainable construction site and is exemplary in meeting today's environmental demands.

Buildings of up to eight storeys can be erected (high-rise building limit). The desired technical equipment such as locking systems or modern media facilities have already been pre-installed at this stage.





Completion

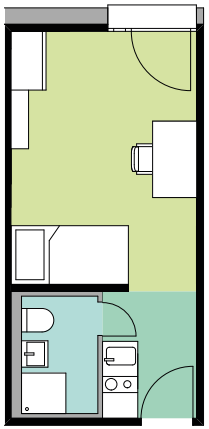
Once all modules are in place, the building process enters its final stage. Completion of interiors starts and at the same time our field factory is dismantled and transferred to the next location. Simultaneously, work on the facades begins, and once this is concluded, the outdoor facilities are dealt with next. When this work is finished, we can then hand over the keys to the owner.

LiWooD

Living in WooD

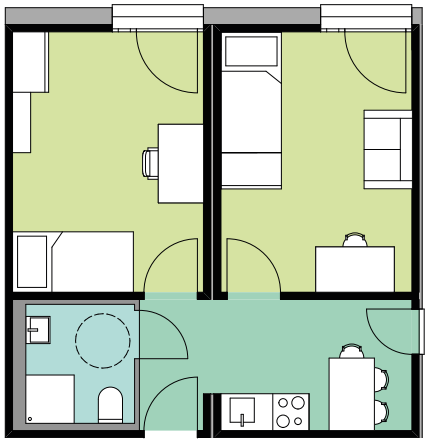
A wide variety modular systems

What invariably comes to mind when you hear the word module are standardized units, endless rows of identical rooms. Yet this does not have to be the case when our concept is adopted. Our residential units come in the most varied dimensions and therefore allow the design of different floorplans that can also be ideally adapted to the conditions of each building plot. For student residences, for example, we can design single-, double- or multi-bedroom apartments to give students their own individual space as well as various communal rooms.



Basic single modules

The basic module functions as a self-contained residential accommodation unit of approx. 20 square metres of floor space. It consists of a fully furnished bathroom and a living area with enough space for comfortable living, sleeping and working. Depending on the purpose and requirements for the whole building, single modules can also function as laundry or drying rooms, as a functional room for electric facilities, Internet/network servers, heating, or as usable floor space. For buildings with an administrative area, a basic module can also be used as an office or administrative room.



2 modules can be used in various ways

Two modules have double the floor area and can be used in different ways. For flat-sharing, two rooms of identical size can be created, plus a third room for use as a common area. This is where the kitchen/dining room and the wheel-chair-accessible bathroom is. The kitchen is adapted to the size of the module and can be fitted with a larger work surface and more kitchen cabinets.

The rooms can also be adapted for use as a two-bedroom flat for couples. In this case, a bedroom and a large living and dining room are created. It is barrier-free which makes the flat particularly suited for wheelchair users.

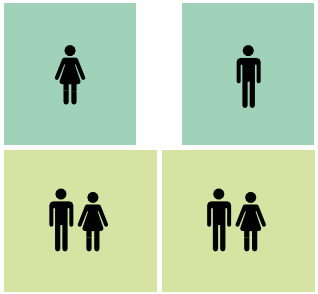
3 modules and more

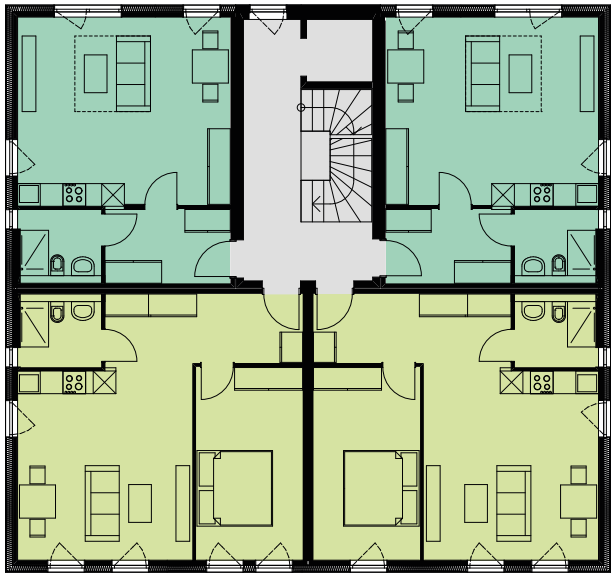
Vast usable space is created by leaving out interior walls. Using slim supports, versatile rooms of a floor space of 40 square metres, 60 square metres, 80 square metres or more are created which can be also be used for a cafeteria, a lounge, a small restaurant or a kiosk. Furthermore, depending on the purpose of the building, these modules can also house event, conference and computer rooms.

Intelligent basic concepts allow a high degree of flexibility

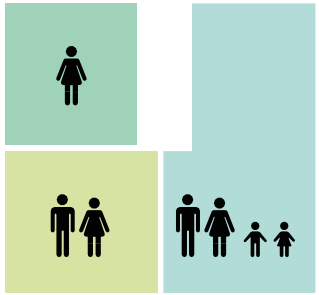
Especially in social and integrative housing, the requirements for the size of the residential space may change in the course of time. Our concepts also allow for subsequent changes to the floor plan, thus eliminating the need for extensive modifications, reconstruction or costly adaption measures.

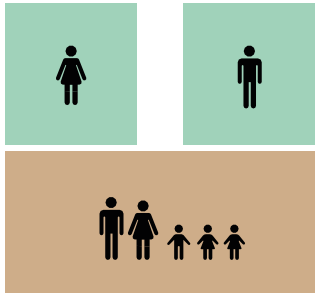
We have, for example, developed layouts which are tailored to the needs of clients. Starting from an almost square surface area which is accessed from the centre, various combinations are possible. Within these floor spaces, differently sized residential units can be created, or also smaller separate units. Combining two units will provide sufficient space for a family of four. Combining the two large units will even yield enough room for a family of five.

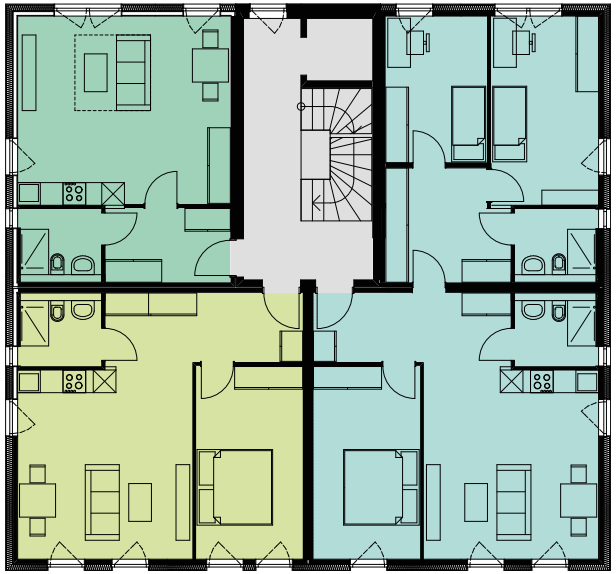




Standard







Variant I

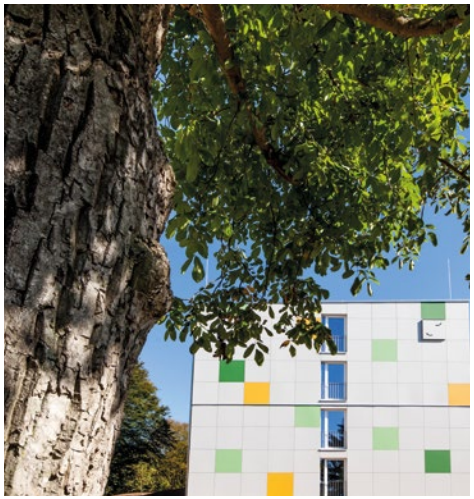
Variant II

We build for various uses

Student living

Starting their studies for many young people means entering a new stage of life as they move out of their parents' home and prepare to live independently for the first time. Student residences can help get them off to the right start by giving them space for experiencing a sense of community, and also for study and privacy. The building should be designed to meet the various needs of its inhabitants and a diverse student community.

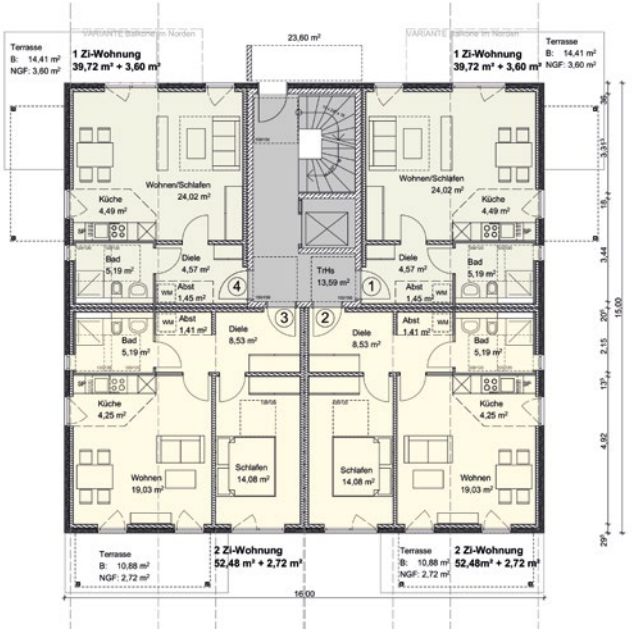
Students' housing situation has deteriorated in view of the increase in student numbers in recent years. Residential space therefore needs to be created within the shortest possible time for the steadily rising number of students. The project for the Trier Student Union outlined here consists of 84 energy-efficient single apartments each having a floor space of approximately 20 square metres. Construction of the complex was from March 2015 to September 2015. The two buildings were ready for use in the winter semester of 2015/16.

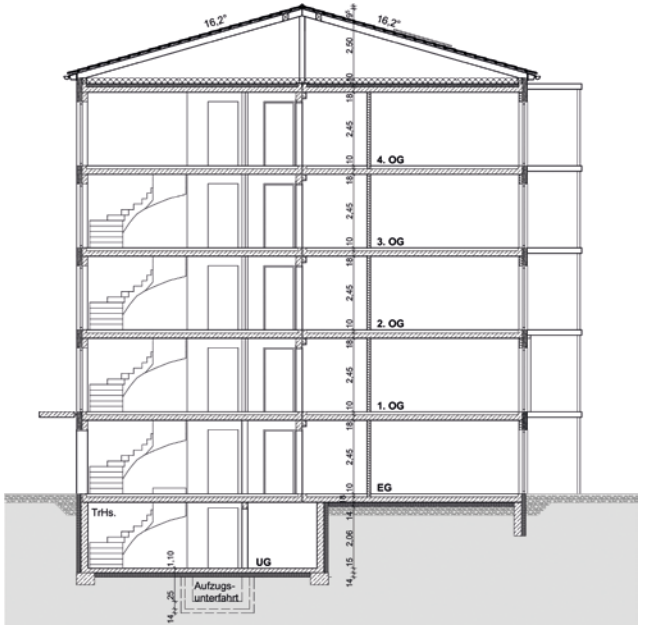


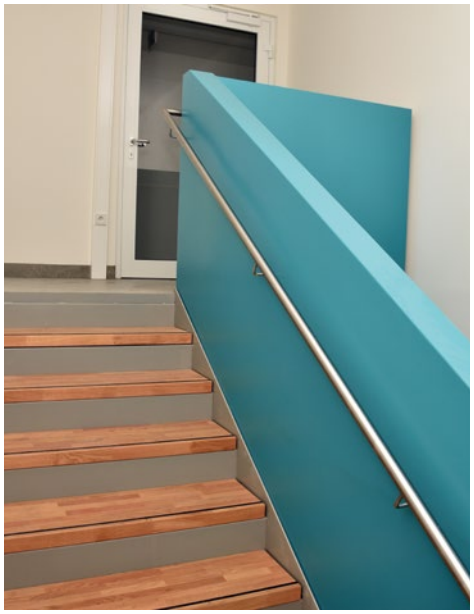
Designed by Grassinger Emrich Architekten

Apartment buildings – Social Housing

We can create various types of apartment buildings. Options range from single and two-room apartments to apartments for large families. There are only few limits to the scope of creative design. It is possible to combine different types of flats under one roof, or to construct a building consisting of apartments of a uniform layout.







Designed by KUG Architekten, GbR

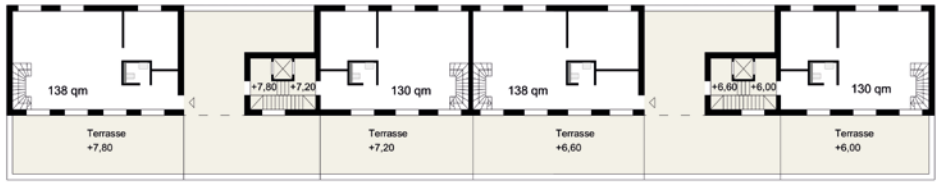
Social housing

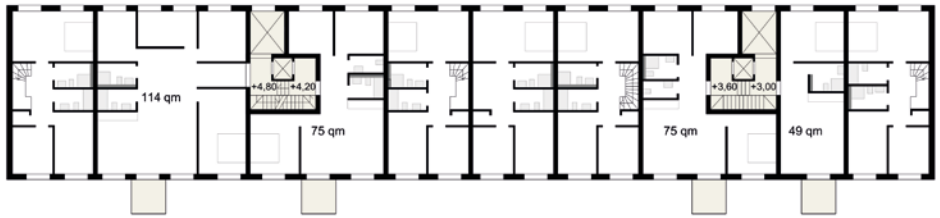
Social or subsidised housing is literally gaining ground again, especially in the larger conurbations. Cities and municipalities promote this by awarding contracts for various projects aimed at creating new and energy-efficient housing. In 2016, as part of an immediate-action programme initiated by the city of Munich, we were entrusted with the task of creating housing for orphans and asylum seekers at four different locations. The enormous time-savings afforded by our concept as well as the superior quality of our construction gave us the decisive qualities to win these contracts.


Fahrräder
+3,50
18qm
Studentenwohnen
Fahrradrampe
TG
+3,00
Gemeinschafsraum
Quartiersplatz
+488 müM =+4,5
488,5 müM =+5,00
A
B
C
+2,40
+2,00
+1,60
+1,40
+1,00
Terrasse
Gärten
Familienwohnen
Fahrräder/Abstell/Gartengeräte
Sonnenbank
Blütenhain
öffentlicher Gehweg
Umgriff TG
Spiel
Fahrräde
Müll
Abstell
+483,5 = +0,00
Senioren WG
179 qm
+1,80
25 qm
+1,80
+1,20
75 qm
+1,20
62 qm
+1,20
62 qm
+0,60
124 qm
+0,60
+0,60
77 qm
+0,60
49 qm
+0,00
62 qm
+0,00
Gärten
Generationenwohnen

Community living

With major demographic changes building housing suitable for the elderly is a major challenge. Residential projects which fall outside the traditional care home facilities offer advantages for residents of all ages. Cross-generational living draws on mutual support and helps promote residents' different skills. The project illustrated combines student living with housing for senior citizens and family living. For this purpose, we have designed various types of buildings in order to implement the integrative housing approach.





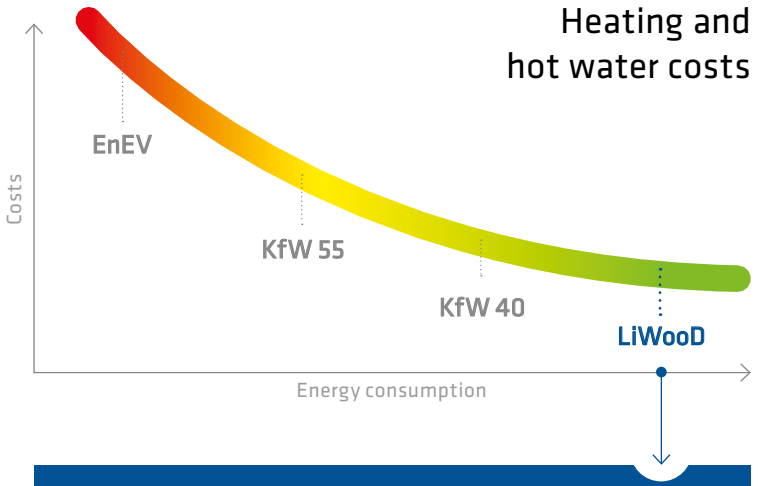
Designed by Händel Junghans Architekten GmbH

Hotel

This design was prepared for a developer based in northern Germany and can easily be adapted for guesthouses or serviced apartments. Here, too, the objective is to create the best possible living comfort for a limited residency.

Designed by Noor Architektur, Balasz Nagy

Energy-efficient construction



A SMART COMBINATION

+ Insulation characteristics of wood with mineral fibre insulation
+ Air-water heat pump
+ Photovoltaic system
+ Panel heating

= LiWooD´s high energy efficiency

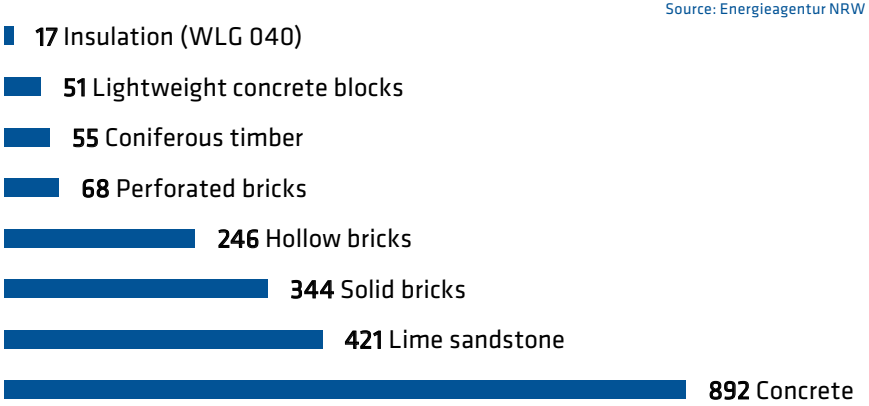
Air-water heat pumps

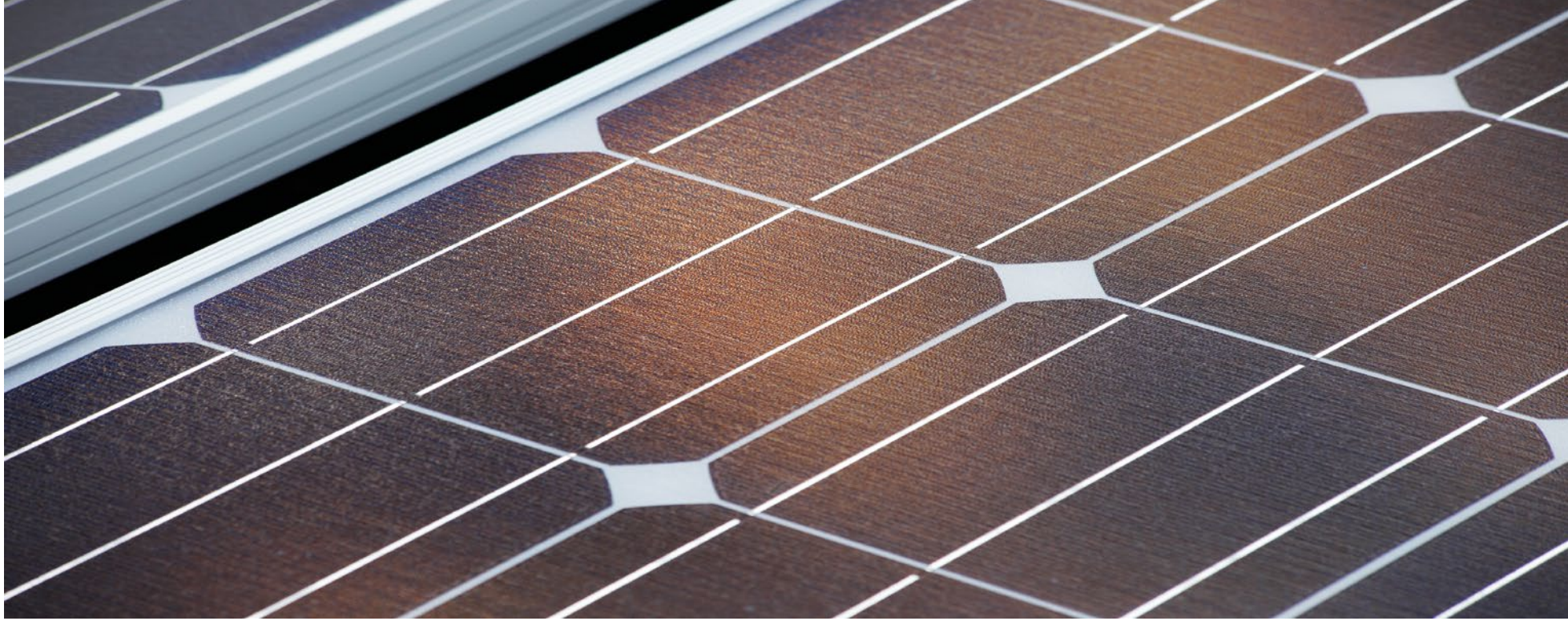
Owing to its good insulation characteristics, wood is the prerequisite for achieving excellent energy-efficiency standards, including the energy efficient house 40+ standard. Energy for heating and hot water is generated on the roof by means of air-water heat pumps. The decision to mount them on the roof was not based exclusively on design and space-saving reasons but because we find it rather fascinating to take heat from ambient air at the exact spot where a building gives off heat – no matter how well insulated it is. Air-water pumps do not generate any CO_2 emissions, they are environmentally friendly and can be operated at low cost. As much as 75% of the energy actually required can therefore be generated from ambient air – an invaluable contribution to reducing global warming.

To optimally exploit the benefits of this kind of heat generation, we recommend the use of panel heating, especially underfloor heating, which offers advantageous design options and increases the level of comfort. The low flow temperatures of an underfloor heating system make it more economical than radiators. In addition, it does not take up any space and can also be used for cooling.

Cold and heat protection – layer thickness (in cm) required to achieve the same effect

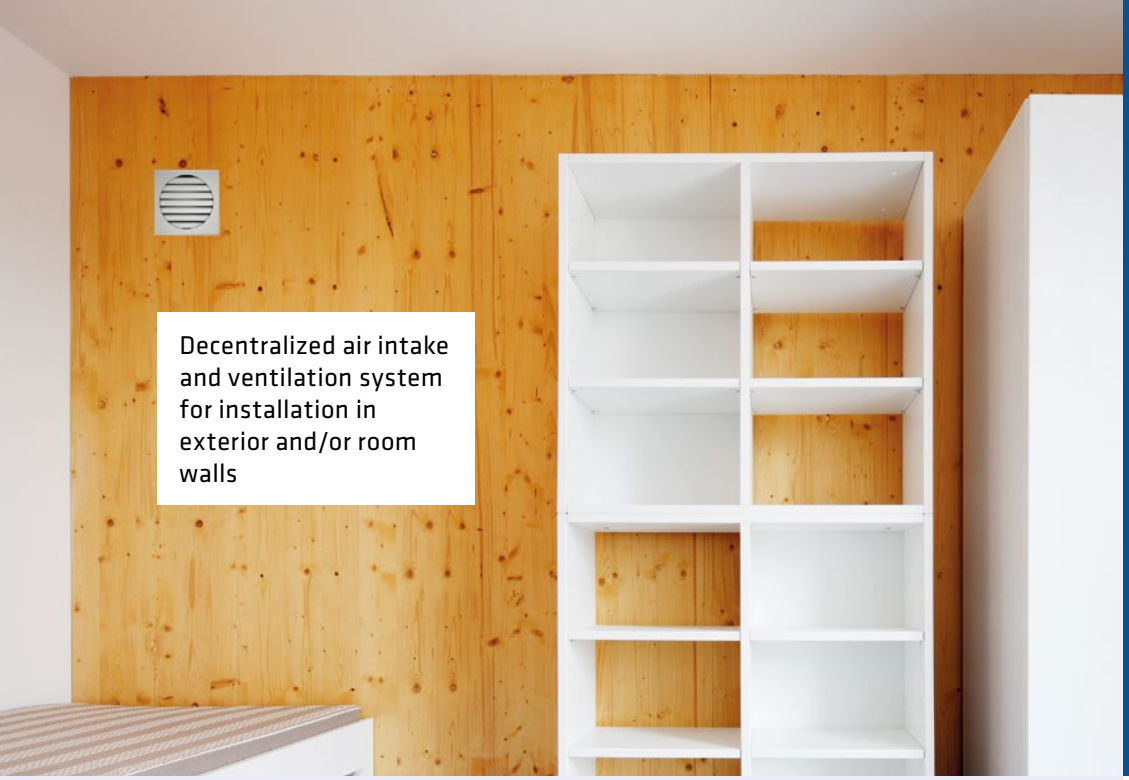
Source: Energieagentur NRW





Photovoltaic system

To provide the energy needed for the heating, we recommend the additional installation of a photovoltaic system on the roof, allowing the building to produce the electricity for operating the heat pumps (on an annual basis). Any excess electricity not required for heat generation will be used exclusively for the building's own power supply needs. Additional benefits are its minimum maintenance, its long service life as well the fact that is does not emit any CO_2.

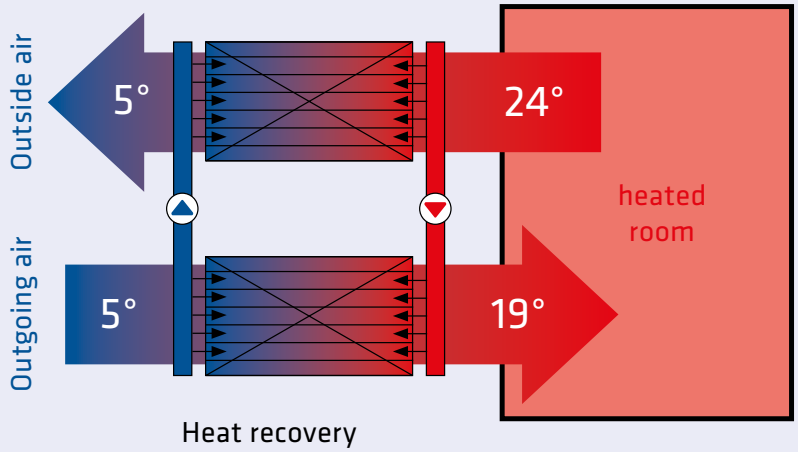


Decentralized air intake and ventilation system for installation in exterior and/or room walls

Heat recovery

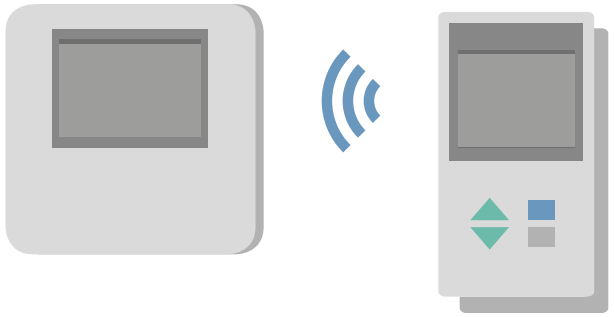
Heat recovery may be the solution of choice for certain applications, and the heat may be recovered from outgoing air and/or waste water. In our low- and zero-energy houses, the energy contained in the outgoing air can be used to heat the incoming air. In this process, cold incoming air is heated, and in summer, hot incoming air can be cooled. Central ventilation systems are high-maintenance and require a lot of cleaning. This is why we only use heat recovery systems in certain selected locations (for example in communal kitchens and bathrooms). Heat recovery from waste water may be the optimal solution for buildings with many residents, for those places that generate a sufficient amount of hot water (mainly showers and bathtubs). In each case, purchase costs will have to be set against potential savings. In view of our highly efficient LiWooD energy system, the use of systems of this type will remain the exception.

Operating principle of a heat recovery system with 80 % efficiency



Heat recovery

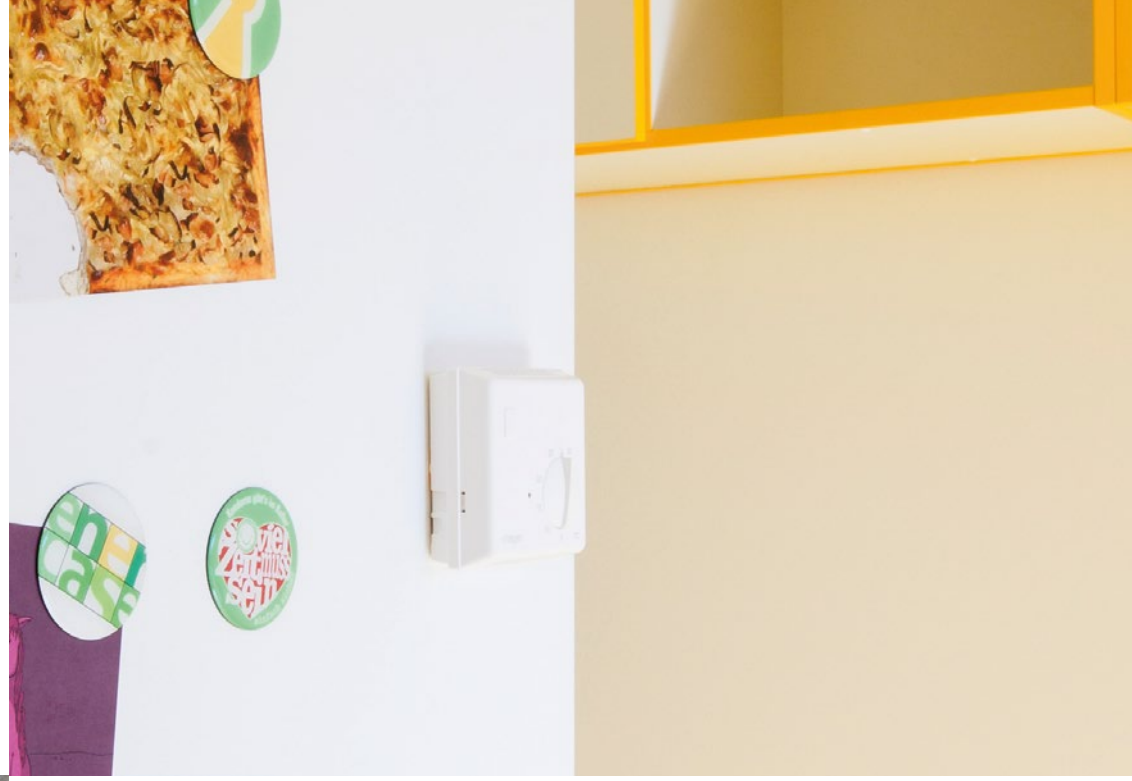
Individual control

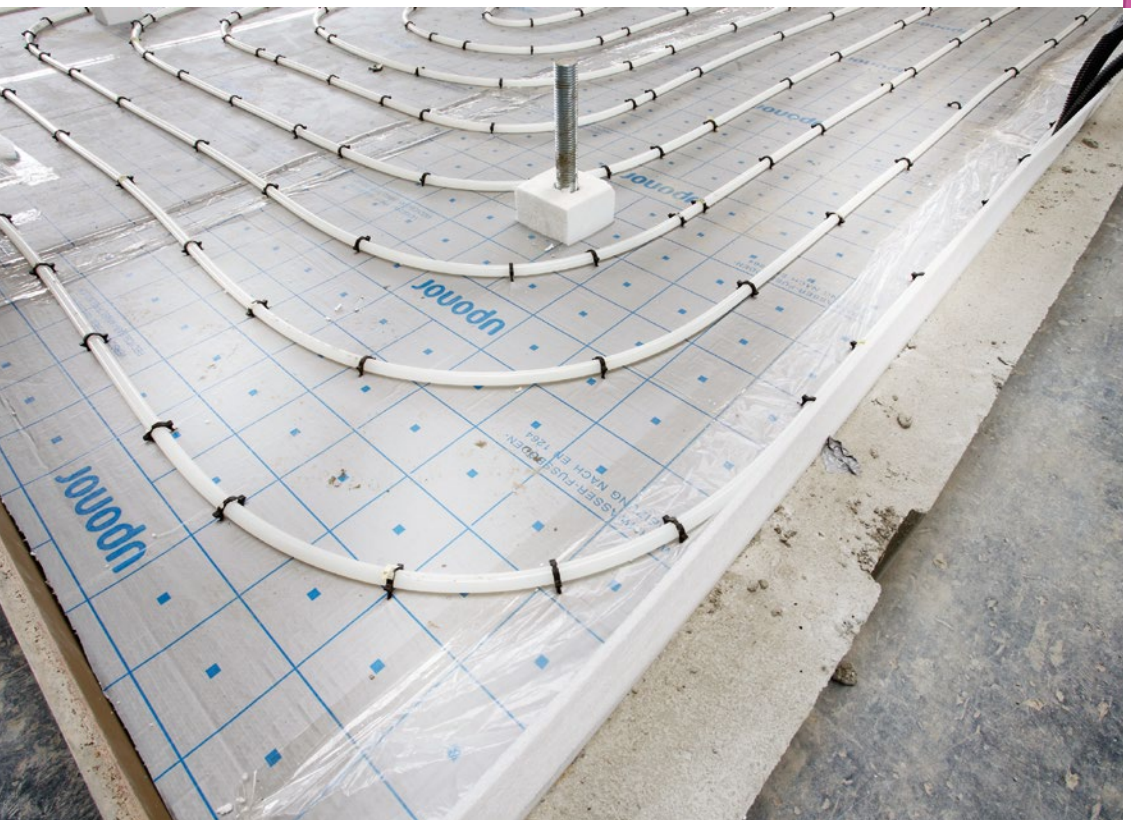


Heat distribution

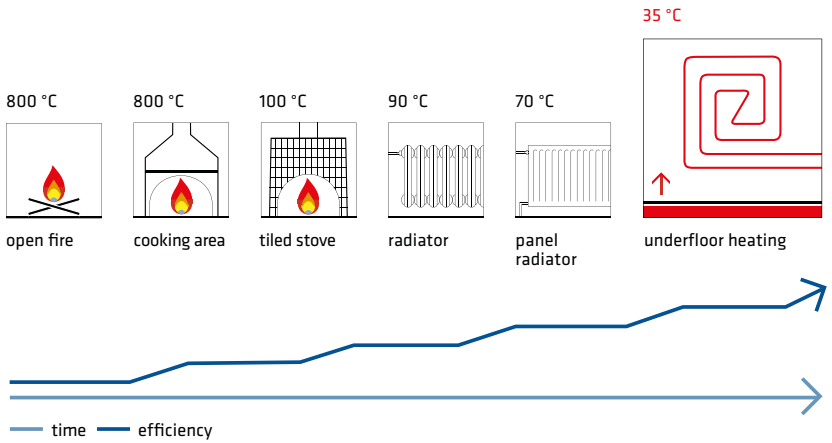
Conventional heating system have flow temperatures of between 70° and 90°C. An energy-efficient solution is the use of panel heating in walls, ceilings and floors which requires clearly lower temperatures (approx. 35 °C flow temperature). The use of air-water heat pumps is a very economical way of generating this temperature and eliminates the need for fossil fuels or district heating.

Heating a room in this manner will provide a particularly comfortable atmosphere.





Underfloor heating efficiency

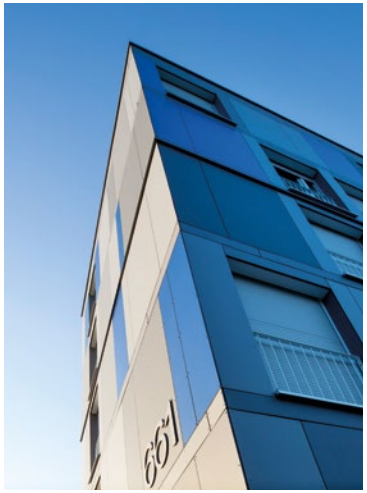


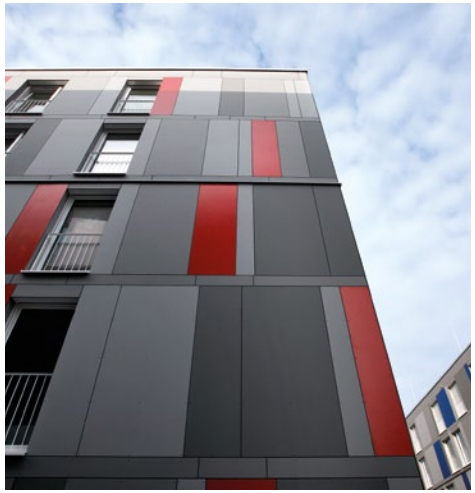
Access for service options and local heating pipes

Concept: The Trier Student Union

In construction projects for two or more buildings that are close together, we use highly insulated local heating pipes. This saves costs for unnecessary and redundant heat generation systems and allows the efficient use of power engineering. Through an accessible utility and installation shaft under the building, the building operator can perform inspection work from the installations room to the head ends of riser pipes and on to installation shafts which are accessible for service, and on and up to residents' rooms. Besides facilitating repairs, this also makes it easy to replace obsolete components of the building's technical services equipment.

Facades





When designing facades, we offer optimal solutions, both in terms of ventilation and design. Our solutions are based on different material and design options. The ratio of glass and wall elements can be varied as desired so as to give each building a unique appearance. There are numerous different design options, ranging from a uniform arrangement of windows, which is especially suitable for student housing, to large glass fronts for hotels and apartment buildings. Using coloured fibre concrete panels on a facade is a design option which requires very little maintenance as it can be provided with an additional graffiti resistant coating and is easy to clean. We used these rear ventilated facades on the student residences in Heidelberg and Trier for a modern and cheerful effect, and help to avoid maintenance costs. The use of a natural facade of untreated timber, as in the case of orphanages in Munich for example, demonstrates how “alive” this ecological building material is since the untreated larch material will gradually turn silver-grey in the course of time and become weatherproof. Facades made of natural wood are just as durable as any other facade systems. Generally speaking, our concept allows the use of the most varied types of facades such as double facades, rear ventilated wall cladding or elegant curtain walls and modular facades but also functional insulating composite facades and sound insulation facades. For our facades, we exclusively use insulation material made of mineral fibres and/or soft fibres.

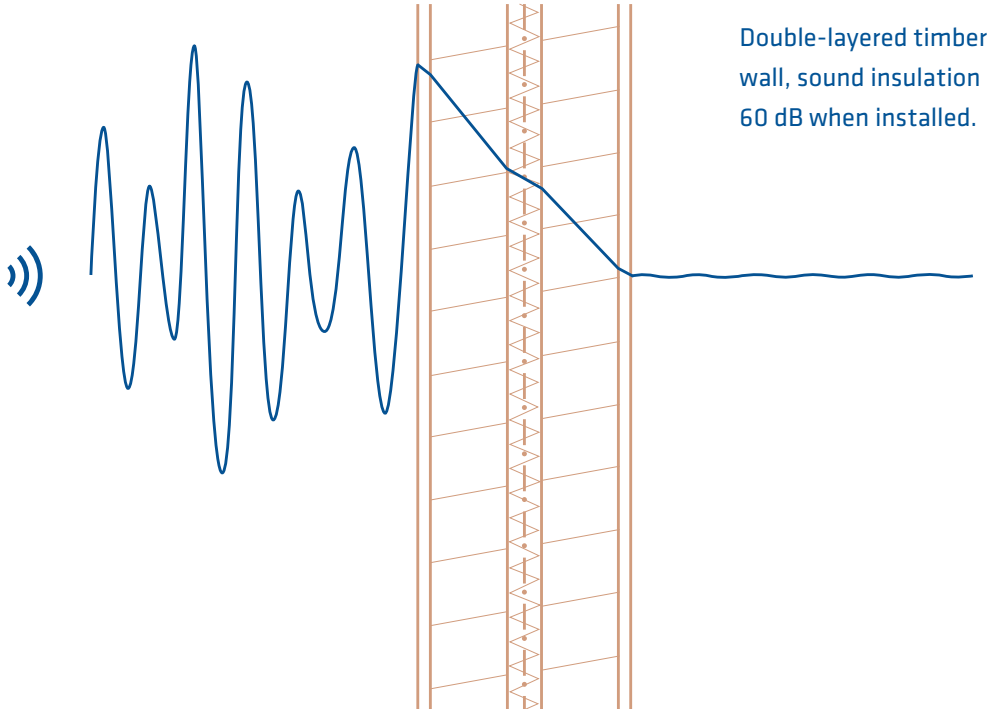
Wooden buildings are safe and promote a sense of wellbeing

Fire protection

The fire prevention properties of wood buildings are not inferior to those of conventional buildings made of concrete, brickwork or steel. Owing to its excellent combustion rate of 0.77 mm/min, timber retains all its statically necessary properties in the case of a fire. The burnt-up wood will protect the wood that is still intact and burn down in a predictable manner. Steel by contrast loses its static properties with increasing heat and therefore constitutes a major danger in case of fire. If appropriately sized, our cross-laminated timber walls may thus contribute to achieving a higher fire-resistance classification.

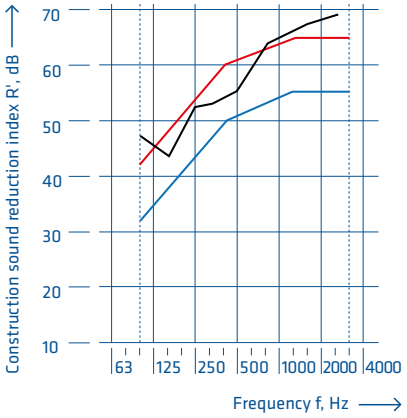
Our fire protection concepts were developed by fire protection wood building specialists who also oversee their practical implementation. They monitor our projects throughout the construction period.

Sound insulation

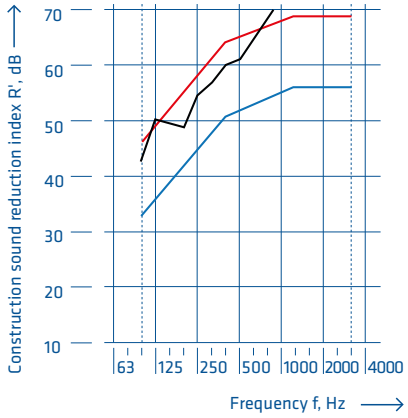


Double-layered timber wall, sound insulation 60 dB when installed.

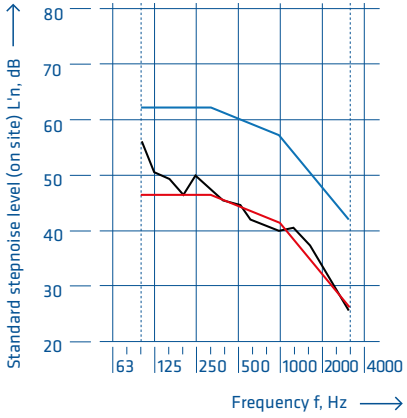
Airborne sound insulation between corridor and apartment



Airborne sound insulation between two apartments



Footstep sound insulation between two apartments



As a rule, our projects are planned and built with increased sound insulation in compliance with DIN 4109, Supplement 2. The above graphs illustrate the insulation properties for the Heidelberg student residence. The walls between the modules have an airborne sound insulation value of more than R'wR = 60 dB and thus substantially exceed the standard requirement of 55 dB. The ceilings between the modules have an airborne sound insulation value of R'wR = 62 dB and thus also exceed the requirement of 55 dB. The impact sound insulation of the ceilings in the residential modules is L'nw = 44 dB and therefore also below the required value of 46 dB. In the graphs, the red curve represents the values of a reference component according to ISO 7171. In segments, the red curve is always below and/or above the measurement curve.

Wood is the answer

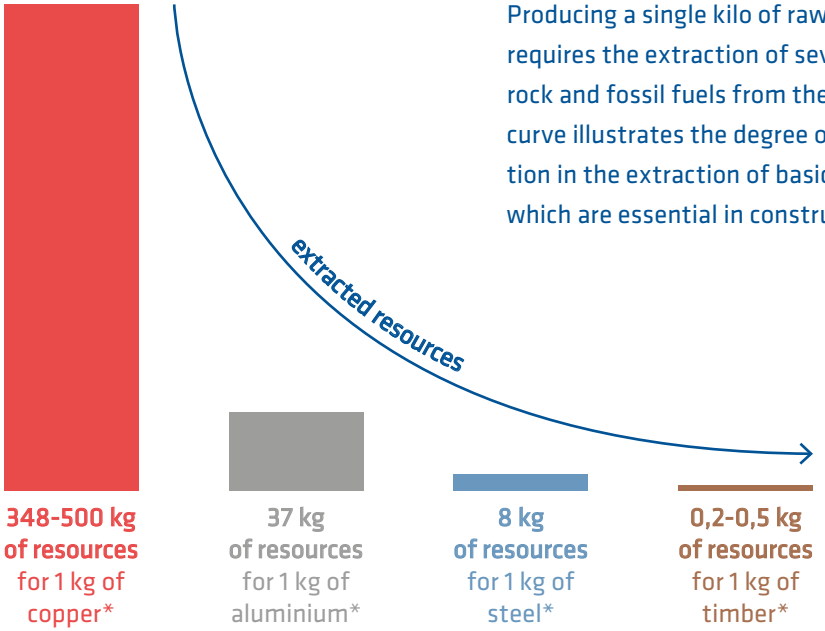
Climate change population growth scarcity of resources

These are the most pressing issues of our time. According to the "Deutsche Stiftung Weltbevölkerung", the earth's population almost quadrupled during the 20th century. At the beginning of the 21st century, more than 50% of the population lives in crowded cities. Urban planners, administrations and authorities therefore have to deal with the enormous challenge of creating new living space quickly and efficiently. And all this against the backdrop of imminent climate change and the need to make sustainable use of resources. A greater population size results in a higher demand for resources, energy, food, and of course, living space. All these demands are met through the enormous use of natural resources. This is even going so far that, for a reference period of one year, all renewable resources are already used up by the month of August. We are living massively beyond our means and leave it to future generations to deal with the consequences of our actions. This is inconsistent with the basic idea of sustainability. It is the duty of us all to restrict the large scale release of CO_2 instead of increasing it even further by using fossil energies and conventional building materials.

Image: open-cast cooper mine

Conventional construction entails a high degree of denaturation in order to obtain the materials used.

Wood as a building material saves more than one ton of CO_2 per cubic metre and also avoids the release of CO_2 in its production, unlike other building materials. The additional use of renewable energies, such as air-water heat pumps in combination with photovoltaic systems, even saves resources. This makes us independent of the use of fossil fuels.



Producing a single kilo of raw material requires the extraction of several kilos of rock and fossil fuels from the earth. The curve illustrates the degree of denaturation in the extraction of basic materials which are essential in construction.

*Source: The “Ecological Rucksack” concept of Prof. Schmidt Bleek

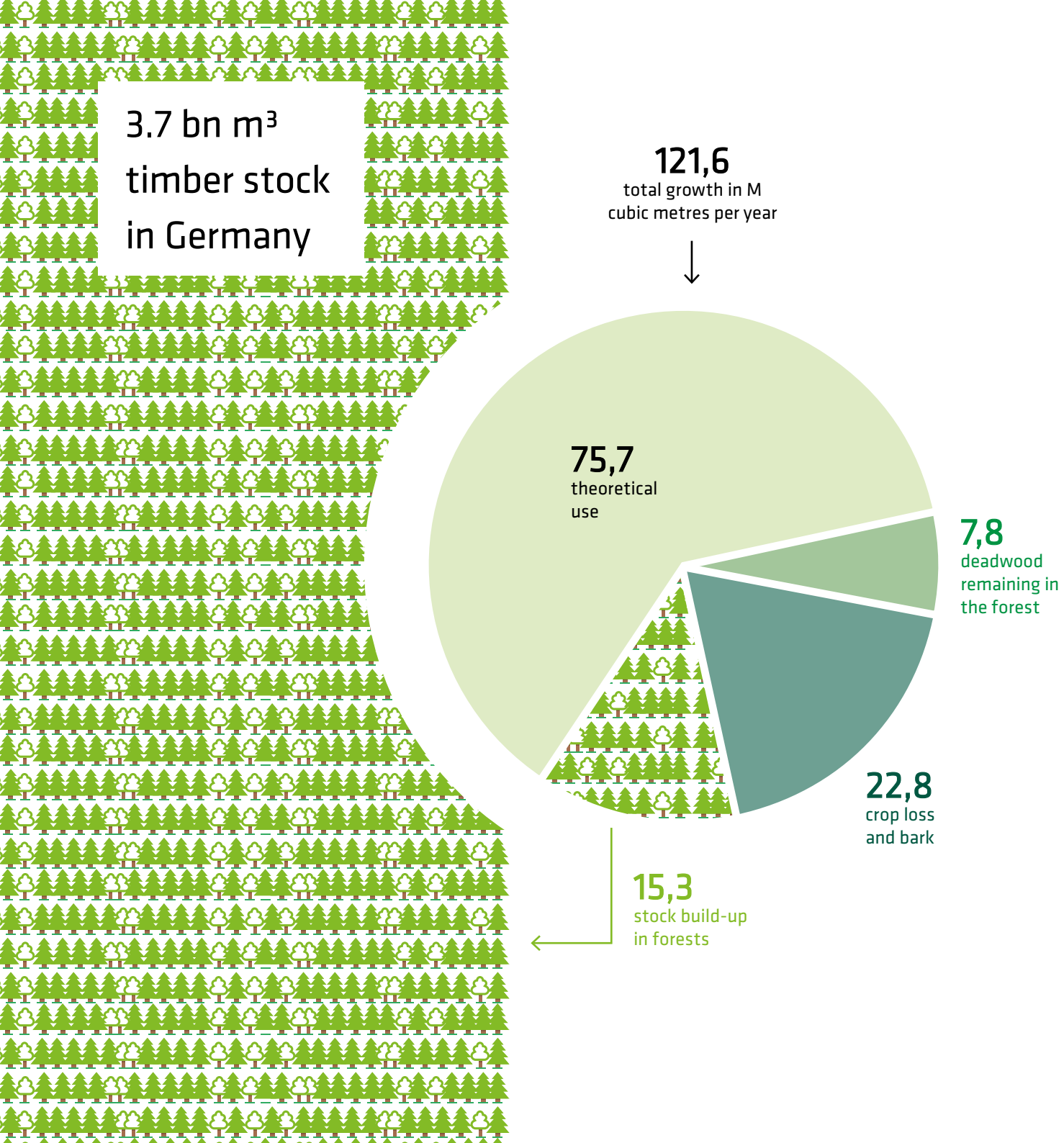
Sustainability

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.“

- United Nations Commission 97

of the Sustainability – the original idea

Its roots can be traced back far into the past. Often, the concept of sustainability is attributed to Hans Carl von Carlowitz (1645–1714), a mining administrator from Freiberg, who also transferred this concept to forest management. In order to implement sustainable action, Carlowitz believed that only so much of a forest should be cleared as will grow back naturally in the foreseeable future. The concept of sustainability was to ensure that a natural system remained intact with its essential characteristics in the long term. This approach laid the foundation to sustainable thinking and action.



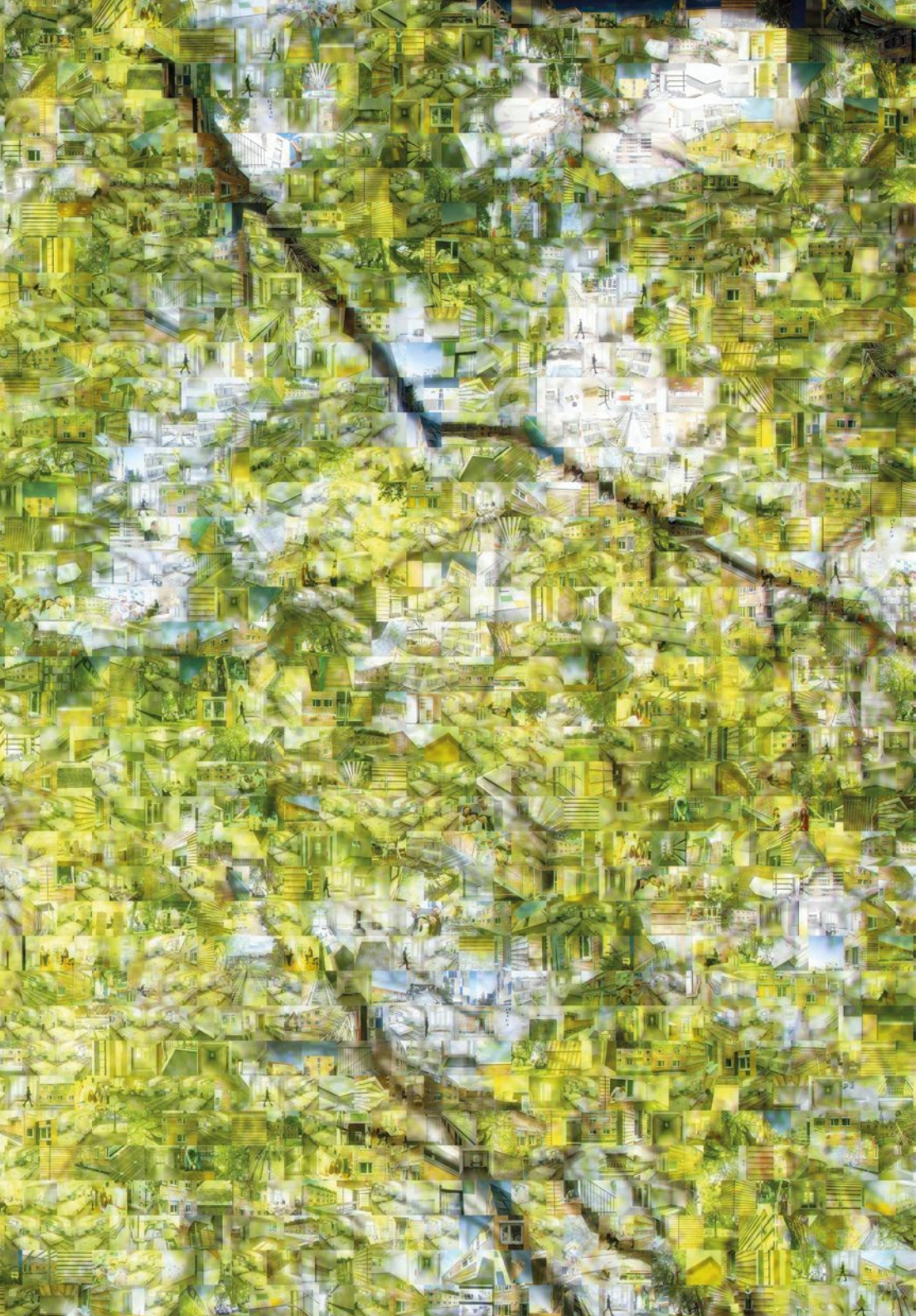
Availability of this building material

We mainly use sawn timber, mostly spruce, for producing our cross-laminated timber boards. Wood is invaluable to climate protection. Therefore it is extremely important to sustain existing forests in the long term, and perhaps even grow more.

According to data collected in the National Forest inventory, the future growth of our forests will continue to exceed the demand for timber - which harbours enormous growth potential for wood construction. An average annual growth increment of 121 M solid cubic metres of standing wood in the years of 2002 to 2012 was available for a theoretical use potential of 76 M cubic meters of raw timber harvested per year. Over the next 40 years, almost half of the potential raw material volume (almost half of which is produced in Baden Wuerttemberg and Bavaria) will therefore be spruce, with its share of 44%.

As a result, the total timber stock of presently 3.7 bn cubic metres in Germany, one third of which is covered by forests, will continue to increase in the long term.

Source: www.bundeswaldinventur.de



Sustainability

Sustainability comprises various aspects. And what does sustainability mean to us? Actually, a lot more than just minimizing the consumption of energy and resources of our buildings.

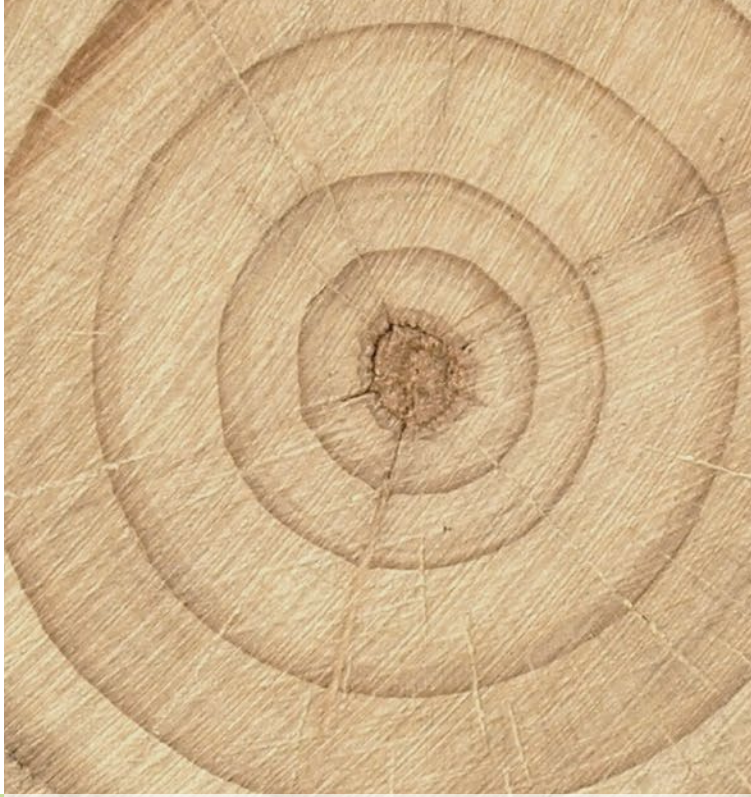
- Long service life of our buildings, accessibility according to DIN 18040, already implemented in our Trier project; furthermore, the flexibility of our buildings to be adapted to different functions and/or uses by expanding or modifying them using different modules.
- CO_2 neutral heat generation by means of air-water heat pumps, combined with photovoltaic systems.
- Short construction times which result in earlier use and thus a lower impact on the environment during the building phase.
- Rooftop gardens that filter out air pollutants and reduce electro smog; moreover, they increase the efficiency of the photovoltaic system.
- Greywater utilisation reduces water consumption, thus saving resources as well as costs.

These are the benefits of building with wood

1

Service life

The service life of a wood building is between 60 and 100 years, depending on its utilisation, and thus fully compares to buildings of conventional design.



2

Process

Wood construction results in a low-emission construction site and largely dispenses with the use of water on site.

3

Thermal insulation

Wood is a rather poor heat conductor. Its numerous tiny air-filled pores make it difficult for this material to transfer heat. This makes wood the perfect construction material for building houses since wood stores heat in rooms.

4

Indoor climate

Wood is permeable. Its pore structure allow it to absorb moisture from the ambient air and to release such moisture again to the environment in dry conditions. This regulatory property thus contributes to an excellent indoor climate.

5

Origin

Wood grows almost everywhere and usually all by itself. It does not have to be shipped across oceans and thus not only saves a multitude of kilometres in transport routes but also supports the domestic economy.

We are your partners

Describe your building project, and we will show you how it can be implemented in an ecological, economical and elegant manner. Benefit from our experience to find the best way of implementing your project, no matter whether on your premises or at our Munich offices.

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