

# architectum

INTERNATIONAL MAGAZINE FOR BRICK ARCHITECTURE

## IN THIS ISSUE:

Sustainable building concepts  
Energy-Efficient solutions  
Optimizing living quality



#21  
02|2017  
[www.architectum.com](http://www.architectum.com)





**CHRISTOF DOMENIG**  
CEO Clay Building Materials Europe

## READY FOR THE FUTURE WITH CLAY BUILDING MATERIALS

The construction industry has a vast potential to contribute to a sustainable society. Buildings are responsible for 40% of energy consumption over their lifespan, which is why the EU has set new targets to change that. All buildings constructed as of the beginning of 2021 will have to consume nearly zero energy. This will affect the way we build in the future.

Sustainability and energy efficiency have to be considered right from the start in the planning phase, starting with the right choice of building materials. With our innovative and energy-efficient ceramic product solutions and our holistic housing concepts we support architects and builders to fulfil all these future requirements today.

Clay blocks, bricks and roof tiles as well as clay pavers are not only aesthetic, but also represent particularly green and sustainable building materials. They consist of natural raw materials and are produced in close proximity to the market, which helps keep the transportation distances short. Furthermore, they have a very long service life – easily lasting for over 150 years. They guarantee a high quality of living and make an active contribution to the fight against climate change.

Some of the best examples of sustainable and energy-efficient projects can be found in this issue. They demonstrate that with the help of innovative clay products you can realise futureproof buildings right now.

Enjoy reading!

**Christof Domenig**

### IMPRINT

**EDITOR** Wienerberger AG, 1100 Wien **PUBLISHING HOUSE** Starmühler Agentur & Verlag GmbH, 1010 Wien, [www.starmuehler.at](http://www.starmuehler.at)  
**CHIEF EDITORSHIP** Andrea Blama (Wienerberger AG) **CO-OPERATION** Alexa Uplegger (DE), Dario Mantovanelli (IT), Kairi Pops (EST), Mélinna Zivan (FR), Patrick Alexander (CH), Sabine Merlevede (BE), Tom Dearden (UK), Zinaida Barbaros (RO) **GRAPHICS & DESIGN** Starmühler Agentur & Verlag GmbH, Artdirector: Thomas Tuzar, [www.starmuehler.at](http://www.starmuehler.at) **PRINTING** Ueberreuter Print & Packaging GmbH, Industriestrasse 1, 2100 Korneuburg **PRODUCTION** Ueberreuter Print & Packaging GmbH  
**PHOTO COVER** Studio Claerhout **PHOTO REAR SIDE** Geraldine Bruneel  
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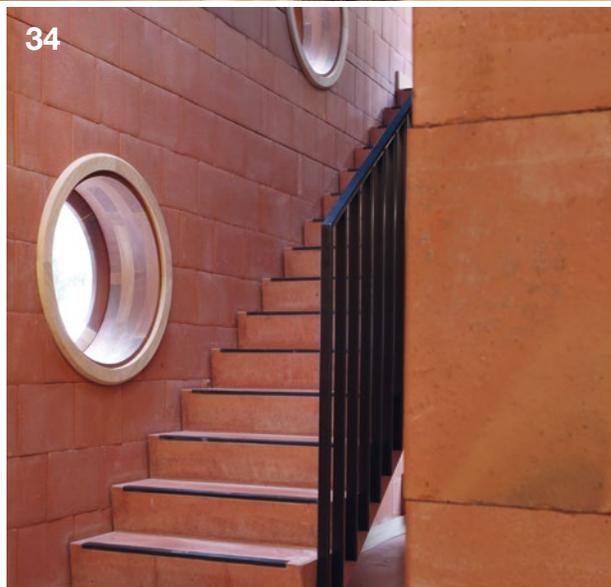
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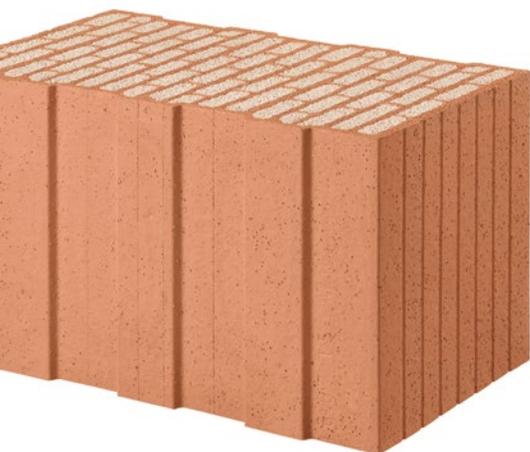
## LONG-TERM SUCCESS MEANS COMMITMENT TO SUSTAINABLE ACTION

At Wienerberger Clay Building Materials Europe, sustainability is embedded in the corporate strategy and constitutes an integral element of the corporate culture. It also serves as one of the main sources of innovation for new and optimized products. This includes new products and system solutions that are durable and cost-efficient, contribute to the energy efficiency of buildings, have a positive impact on the health and safety of their inhabitants, and are particularly interesting in terms of architectural aesthetics. For further information, please refer to the Wienerberger sustainability reports:

[www.clay-wienerberger.com/expertise/what-sustainability-means-for-us](http://www.clay-wienerberger.com/expertise/what-sustainability-means-for-us)



Made from naturally-occurring raw materials, clay products represent lasting value, longevity, high-quality living and innovative construction.



Filled with perlite Poroton-S9-P, they provide excellent thermal insulation.

## POROTON-S9-P – INSULATION FILLED CLAY BLOCK OPTIMIZED FOR MULTI-FAMILY PROPERTIES

Multi-family properties need clay blocks and wall systems that fulfil the highest demands in terms of structure, energy efficiency, fire safety and acoustics. To further optimize this product segment, the perlite organic binder has been replaced with mineral binder (cement based). The new binder improves the fire resistance of the clay blocks, and they now have a Class A1 fire resistance rating – the best. They can also be used to construct buildings over 6 stories high, thanks to a masonry strength of  $f_k=5.2\text{N/mm}^2$ . Plus, with a U-Value of  $0.20\text{W/m}^2\text{K}$  (wall thickness 42.5cm), low-energy buildings are feasible. In addition, Poroton-S9-P has achieved an eco-label as a healthy building material – emitting no harmful substances.

[Alexander.Lehmden@wienerberger.com](mailto:Alexander.Lehmden@wienerberger.com)



Eco-brick is less wide, so you can add up to 3.5 cm more insulation and that is great for your energy bills.

## ECO-BRICK: THE WALL CLADDING SOLUTION FOR LOW-ENERGY HOMES

Eco-brick is a genuinely contemporary wall facade brick. The bricks are narrower than conventional bricks, creating space for up to 3.5 cm additional insulation, which means less energy consumption. The reduced thickness can also result in greater living space internally, and is perfectly suited for use in renovations, where work has to be carried

out within existing set perimeters. However, this does not mean compromising aesthetics: Eco-brick is available in a wide range of timeless colours. Finally, the reduced weight of these blocks means they are easier to use on site, and transportation is more energy-efficient.

[export.be@wienerberger.be](mailto:export.be@wienerberger.be)



Lien Vansteenkiste and Hein Verbeke are members of Groep III architects, located in Bruges, Belgium.

## BALANCING COMFORT, PRIVACY & SPACE

Lien Vansteenkiste and Hein Verbeke from Groep III, Belgium, talk about sustainable architecture, energy-efficient building and maximising human comfort in their work.

**E**nvironmental changes and the EU Directive on 2020 energy efficiency targets are increasing the pressure on the construction industry to find sustainable and energy efficient solutions for buildings. The directive stipulates that all buildings built after 2020 must be zero energy buildings. This means that houses must be able to generate as much energy as they consume. Is this something that is hard to deal with, or is the concept of focusing on sustainable architecture one that you would apply anyway?

L. V.: Sustainable architecture has become an important aspect of contemporary architectural design. We always try to design buildings that offer minimal environmental impact and maximum human comfort. We have a mission statement that says that we want to inspire, encourage and support our clients in the

design process. In this way, we can make the most of the environment and enhance it in a positive way. One way we seek to inspire clients is to emphasize the importance of sustainability.

**Does “encourage” mean that the client is participating in the design process or is it more like giving advice?**

L. V.: We give advice, inspire and we also make sure that they can follow every step of the design process, because sustainable design starts with the first concept.

**Are the houses that you construct already able to produce as much energy as they consume?**

L. V.: We try to find the balance between economic benefits and also environmental benefits. Zero en- >

## Site plan Groen Steenbrugge:

- |               |                                |
|---------------|--------------------------------|
| 1 Studenthome | 5 Public park                  |
| 2 Office      | 6 Underground parking entrance |
| 3 Housing     | 7 Bike- and walkway            |
| 4 Gardens     |                                |



> ergy buildings are the aim, but they are not always affordable. So we have to try to find a way and make it possible to improve the building later on.

### What are the major sustainability characteristics of your project Groen Steenbrugge?

L. V.: In general, one of the aspects of any sustainable concept is to promote space efficiency. The basic concept of Groen Steenbrugge is urban density and multi-functionality. Space efficiency is a major factor in urban planning. On a plot of 3000 m<sup>2</sup>, our plans included eight houses with small private gardens and one office for two companies. There is also student accommodation with 12 rooms. In addition, there is a communal garden, which is used by all occupants and an underground parking area with direct access to each house. So, we have carried out a big project on a very small plot and maximized the space with attention to differentiation.

### So the use of space is one main characteristic of sustainability in this project. Is this, in your opinion, an aspect of sustainable construction that should be more extensively developed in general?

H. V.: Flanders has become highly urbanized and the urban sprawl around its cities is expanding further and further. We now have the support of the Flemish Government Architect who has said that we cannot go on like this. Flanders already is "over-built"; there

is no high quality open space. So we have to re-think how we plan and build. Space must be used more efficiently.

### So in Flanders, is there legislation about the size of construction spaces?

H. V.: There are regulations, but they can differ from city to city. In the future, we will have to build nearer to each other, but that doesn't mean that we cannot have more quality of living. And we have to keep in mind that individual space is important, even if the density of buildings is higher.

### But this is surely a challenge: to balance comfort and privacy against the constraints of smaller spaces and energy efficiency. How does this influence your work?

H. V.: I think our project Groen Steenbrugge is a very good example. It demonstrates that it can be done. Of course, every project is unique. Using space responsibly, whilst maintaining high quality of design, is a permanent challenge for planning. Plus, alternative forms of housing, such as co-housing projects,

»We always try to design buildings that offer minimal environmental impact and maximum human comfort.«

Lien Vansteenkiste



Natural, almost monochrome materials characterise the ensemble of the project Groen Steenbrugge.



transgenerational design, assisted living residences, etc. can provide an answer to this challenge.

**What do you think architects could and should do to advance sustainable building concepts?**

H. V.: We should advise clients and also inform them. In our office, we typically look beyond the site where the project is planned. For example, if it is a school we have to build, we want to find out what the architectural quality of the surroundings is like, what infrastructure is already there, and which functions are already active on the site. So we can come up with a masterplan which has added value and is more than just building a school.

**Another aspect is choosing the materials, of course. Clay, as a natural material, is very popular and often used for sustainable projects – what are the advantages of using this material?**

L. V.: We like to use clay because it's made of natural materials. It is very versatile, comes in different colours and textures, and you can use it to create different architectural styles. It's a very durable and robust material, which is a unique quality. We also design a lot of social housing where brick is popular for these qualities, and because of its economic benefits. In addition, comfort inside the building is an important issue, and clay has another unique quality which plays an important role in this – it has a high thermal mass. For example, when outside temperatures are fluctuating throughout the day, a large thermal mass inside a building can serve to “flatten out” the daily temperature fluctuations.

**So using bricks provides something like a form of natural climate regulation?**

H. V.: Yes, because the thermal mass will absorb thermal energy when the surroundings are higher in temperature than the mass, and give thermal energy back when the surroundings are cooler. I find it quite natural to use bricks in my architecture. ■

# AN ENERGY EFFICIENT HOUSE BUILT WITH CLAY BLOCKS

This single-family home in Romania was built in accordance with the principles of the e4 concept, which focuses on energy, economy, ecology and emotion. The building combines clay blocks and the use of alternative energy sources to create a home that represents sustainable, high-quality, living with affordable construction and low maintenance costs.

With this e4 house near Bucharest, Tecto Architectura has proven that sustainable building does not have to look dull. As affordable construction was part of the brief, the architects achieved a modern look by using clear and structured forms and the interplay of black and white. This concept has been applied both externally and internally. Keeping in mind the comfort needed for a modern family with two children, the architect created flowing indoor spaces and big windows to let in plenty of daylight.

**IN FULL CONTROL OF THE INDOOR CLIMATE** The clay block walls ensure a balanced indoor climate and protect against sudden temperature changes. Furthermore, this e4 brick house reflects the owner's willingness to use innovative solutions when building their home: from the groundwater heat pump to the solar collectors on the roof. The house has a "central brain" incorporating the latest automated technologies, which allow the owners to control all the parameters affecting their comfort and optimum management of the maintenance costs.

**CLAY BLOCKS – SUPPORTING LOWER ENERGY CONSUMPTION** An additional distinctive element is the thermo-

## FACTS & FIGURES

**Primary energy consumption**  
38.5 kWh/m<sup>2</sup>a

**Thermal heat consumption**  
8.5 kWh/m<sup>2</sup>a

**CO<sub>2</sub> emissions**  
6.4 kg<sub>CO<sub>2</sub></sub>/m<sup>2</sup>a

**Project name**  
e4 house, near Bucharest,  
Romania

**Architect**  
Tecto Architectura

**Client**  
Private

**Products used**  
Porotherm TermoExpert 38 STh

**Year of completion**  
2015

dynamic solar wall – "Trombe wall". It contributes to the natural ventilation of the house by enhancing heating/cooling of the interior with zero power consumption. This is possible due to a combination of solar power technology and the thermal inertia of clay blocks. In winter, the thermodynamic solar wall absorbs heat during sunlight hours and then slowly releases it overnight, supporting lower energy consumption.

Wienerberger developed the e4 concept to offer energy-efficient, healthy and affordable housing. It reflects the growing wish of many clients to make a statement in support of climate protection, whilst simultaneously realising their own ideas. ◀

**Find out more:** [www.clay-wienerberger.com/expertise/the-e4-brick-house-concept](http://www.clay-wienerberger.com/expertise/the-e4-brick-house-concept)





Due to their excellent capacity for storing heat and superior insulation properties, clay blocks help to reduce CO<sub>2</sub> emissions and the overall need for energy. Used in combination with an innovative heating system, total energy consumption is minimized.



»The e4 concept applied to a single-family home represents the ideal vision for the potential house of the future. The project simultaneously explores multiple ways of ensuring the low consumption of energy and materials, both during the building process and over the service life of the property.«

Dr. Architect Sergiu C. Petrea, Tecto Arhitectura

# TAKING ROOT IN AN ENVIRONMENTALLY-CONSCIOUS RESIDENTIAL BUILD

“Le Candide” is a multi-storey social housing project in France, providing 29 flats to a previously neglected neighbourhood. The project is rooted in the Wienerberger e4 concept: ecology (renewable energy sources), economy (affordability), energy efficiency, and emotion (unique quality of living).

The building might suitably be described as a residential habitat, an alternative design for urban living. To its architect, it is a laboratory for ideas that provides the occupants with opportunities for evaluating “natural living” in a multi-storey context. The twin block provides a workshop for repairs on the ground floor, a vegetable garden on the rooftop, and greenhouses, a wind turbine for irrigation and a shared playground with a terrace for children.

## CERAMIC BUILDING MATERIALS – INSIDE AND OUTSIDE

When viewed from the outside, the most striking elements of the building are its balconies. Created from woven willow balustrades, and different on every floor, they create a wave around the façade. Here, LEDs shine like fireflies at night and are recharged during the day. Brick cavity walls provide enhanced heat and sound insulation, and a better indoor climate for the well-being of all residents.

**EXAMPLE THROUGH INNOVATION** The starting point for this project was an architectural competition, followed by a prize in a competition inviting ideas for low CO<sub>2</sub> emissions solutions. This presented the opportunity to review the energy-saving facilities and

## FACTS & FIGURES

### Primary energy consumption

18.93 kWh/m<sup>2</sup>a

### Thermal heat consumption

8.54 kWh/m<sup>2</sup>a

### CO<sub>2</sub> emissions

2.1 kg<sub>CO<sub>2</sub></sub>/m<sup>2</sup>a

### Project name

Le Candide, Vitry-sur-Seine, France

### Architect

Bruno Rollet Architecte

### Client

OPH de Vitry-sur-Seine (Housing improvement operation)

### Products used

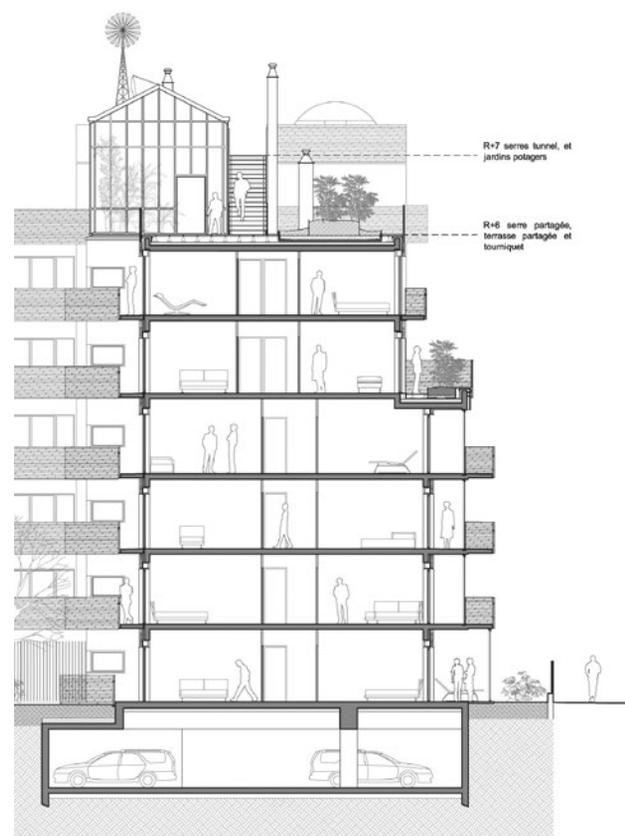
Porotherm GFR20Th+, Terca Rhônes

### Year of completion

2012

Balconies with wickerwork balustrades undulate softly around the dark brick facade.





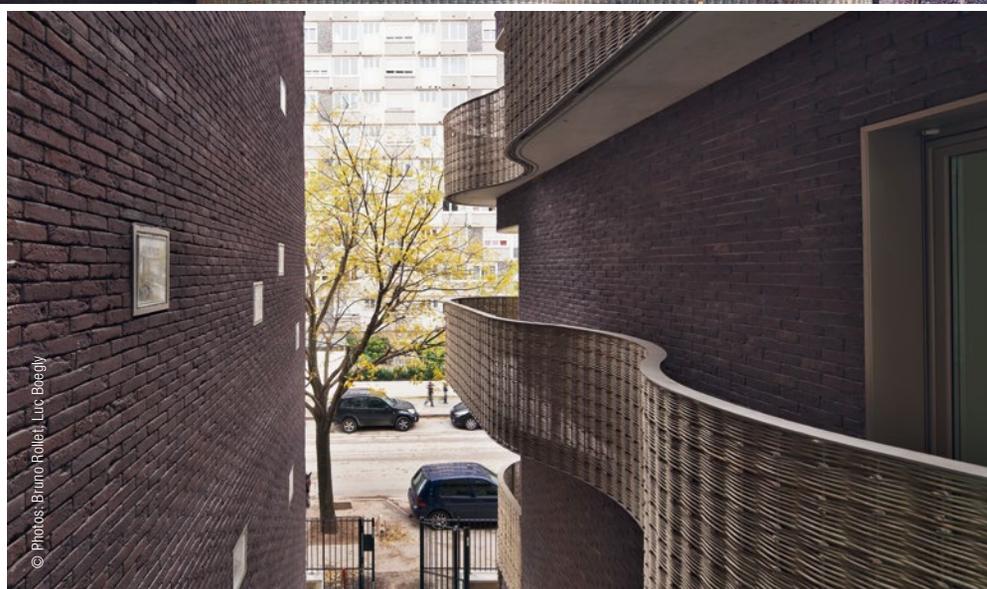
A wind turbine on the roof is used to irrigate the communal greenhouse and planters on the balconies.

propose systems to achieve CO<sub>2</sub> emissions below 5 kg/m<sup>2</sup>a. The housing cooperative decided to implement these alterations, thereby combining architecture, building services and social engagement. New technologies were integrated into the project, such as a photovoltaic system, a ground water heat pump, waste water heat recovery and a hybrid natural ventilation system.

The project is an excellent example of how suburbs can be upgraded through attractive, environmentally-conscious housing construction. ◀

»The district had long been neglected, so we had to go back to basics. Brick is ideally suited to that. It stands up to the passage of time.«

Bruno Rollett, Bruno Rollet Architecte





# SUSTAINABLE BUILDING AND LIVING, THROUGH AND THROUGH

The “Sustainable Neighbourhood” in Belgium explores the extent to which sustainability is feasible and affordable, whilst using classic construction methods and familiar ceramic materials. Based on the Wienerberger e4 concept (ecology, economy, energy and emotion) the terraced houses provide optimal living comfort.



With this pilot project, Wienerberger Belgium wants to prove two claims: It is possible to realize a sustainable living project, which fulfils the criteria of the BREEAM 'Excellent' rating, with low construction costs - taking into account both the initial investment and the long-term maintenance costs and savings compared to a standard new-build house.

The concept of sustainability was integrated into the project from the outset, by carefully selecting the location – on the edge of the city, circled by a cluster of seven homes. Despite providing multiple housing units for seven families, the floor area of the construction remained nearly the same (increasing from 30% to 33% of the land).

**ENERGY CONCEPT** The first step was to create the optimal building envelope. The next elements to be considered were energy-efficient devices and renewable energy. So far, the houses have performed significantly better than expected. With E7/E12 and K16/K19 ratings (for mid-terrace and end-of-terrace homes respectively) the houses are 'future-proof' and achieve the passive house standard of 15 kWh/m<sup>2</sup>/year.

**WATER MANAGEMENT** For rainwater, the goal is to achieve water neutrality. This means that as much rainwater as possible is collected and reused. The houses have sloping roofs with ceramic slates. Each home has a 5000-litre rainwater, which is connected to the toilets, a maintenance faucet, and a pipe for the washing machine. Excess water leaves through an overflow to a common, gravel-filled, filtration basin in the communal garden.

**GOOD INVESTMENT** The final cost of construction was 1,100 euros per m<sup>2</sup> plus VAT for the mid-terrace houses and 1,210 euros per m<sup>2</sup> for the two >



## FACTS & FIGURES

### Primary energy consumption for heating

7,436 kWh prim/year

### Net energy consumption for heating

9 kWh/year

### CO<sub>2</sub> emissions

-477 kg CO<sub>2</sub>/year

### Project name

De Duurzame Wijk' – The Sustainable Neighbourhood, Waregem, Belgium

### Architect

Wielfaert Architects, Landscape architect: Fris in het Landschap

### Contractor

Eribo Building & Immo

### Technical Adviser

3E

### Products used

Terca Eco-brick Linnaeus, Koramic Bellus slate engobe + Koramic Fleece Plus underlay, Porotherm PLS 500, Penter customized water-permeable pavers

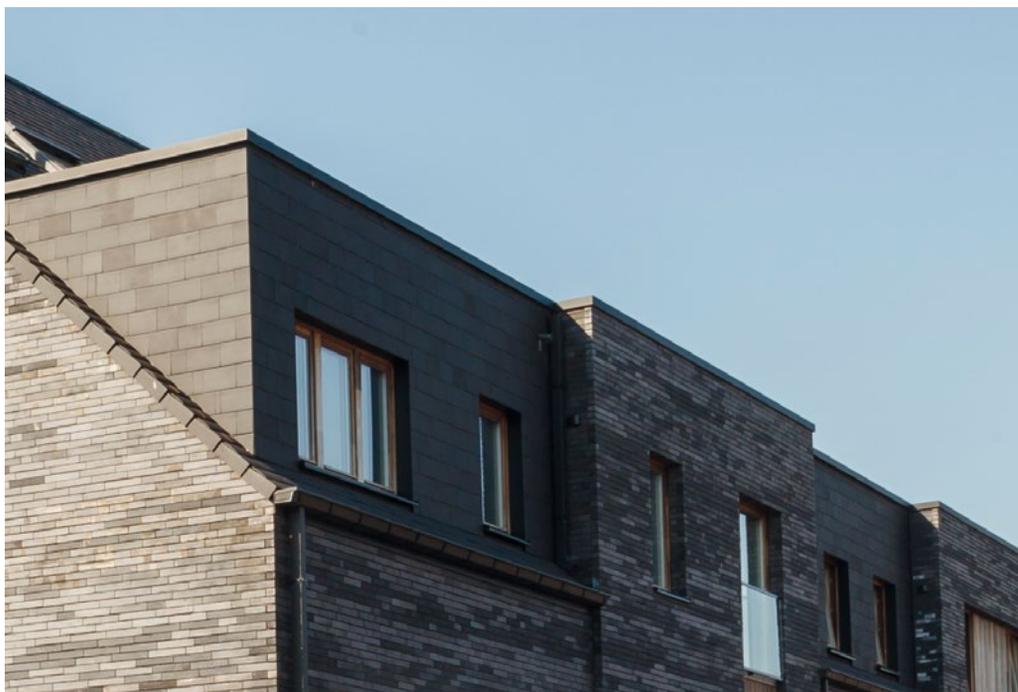
### Year of completion

2016





During the construction phase, a number of precious trees were carefully protected, meaning that the limited private outdoor space belonging to the residents directly adjoins a mature communal garden area.



> end-terrace homes. Almost a quarter (24 %) of this cost was spent on the superstructure, which has a big impact on the performance envelope. The conclusions are clear: opt for a sustainable, yet affordable, building envelope, and prioritize collective heating, with specific consideration given to a renewable energy plan.

**HIGH QUALITY LIVING OVER GENERATIONS** Living comfort was paramount. The solid construction minimizes fluctuations in temperature via its thermal buffering capacity. To achieve optimal sound insulation, the houses are separated by a concrete slab and there are double partition walls between the houses, which are filled with acoustic insulation. In addition, a flexible joint separates the exterior façades. To allow the homes to evolve over the lifespan of the residents, detailed consideration was given to

**Traditional building methods, using typical clay building materials, are perfect for affordable projects with a long service life, and do not compromise on quality or aesthetics.**

accessibility and adaptability, including minimized thresholds at the entrances, wide doors, turning space for wheelchairs, a staircase suitable for a stair lift, and more.

The project achieved BREEAM (Building Research Establishment Environmental Assessment Methodology) certification with a rating of “Excellent”. It is only the second residential project in Belgium to achieve such a high score. 



## PROMOTING SUSTAINABILITY VALUES IN A LARGE SCALE

The Seven Acres residential project in the UK garnered a whole series of awards before it was even completed. The prizes recognized not only the architecture, but also the concept of sustainability applied in the 128 newly constructed homes.

The project lies on the southern outskirts of Cambridge, where the intention is to create 3,500 new flats with communal facilities and green spaces. The master plan for this project was developed by Formation Architects. The right-angled site is organised around a park-like communal space with tables, benches, pergolas and a barbecue area,

as well as grassy playing fields and a children's play-house. Trees and planters border the space, which also has acoustic screening in the form of a glass wall. In addition, three small gardens can be used to grow vegetables.

**VARIOUS BUILDING TYPES** Formation Architects built a total of 128 residences – 70 two and three-storey houses, and 58 flats in four-storey buildings which flank the entrances to the new neighbourhood. The different building types are arranged in long and short rows, are staggered individually, or paired like semi-detached houses. Recessed structures and varying heights, narrow storey-spanning windows, >



## FACTS & FIGURES

### Project name

Seven Acres, Cambridge,  
United Kingdom

### Architect

Formation Architects

### Client

Skanska

### Products used

Terca Marziale

### Year of completion

2014

Recessed panels in the facades and roof terraces lend the houses the appearance of upright building blocks.



»We chose a brick with an almost handmade quality. It is light in tone and relates to the investor's Scandinavian heritage, whilst being sympathetic to the brick found in and around Cambridge.«

Michael Richter, Formation Architects



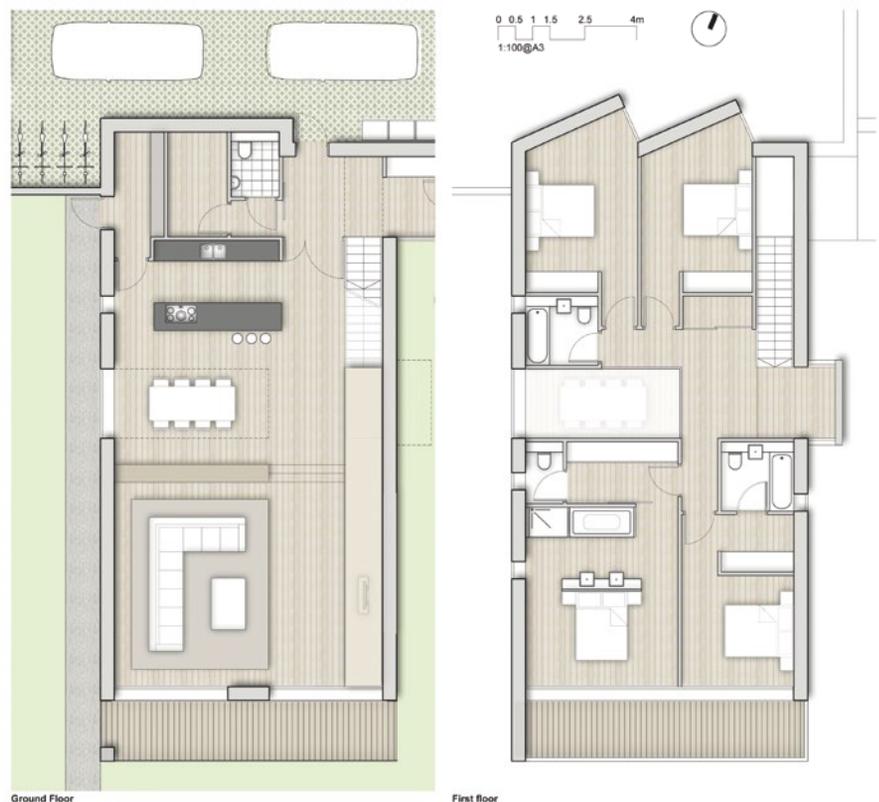


Sculptures at the edge of the project, towards the curve of the road, invite play.

> and small balconies give the place the appearance of having been playfully assembled with building blocks.

**OUTSTANDING BRICK WORK** The design of the cohesive brick façades, which lends the houses serenity and size, is particularly noteworthy. Projecting headers and incised ornamental surfaces create appealing aesthetics. Explaining the choice of bricks used, Michael Richter of Formation Architects, says, “We chose a brick with an almost handmade quality.” Oak timber completes the limited materials palette of the eight house types and three apartment buildings. All residences have a minimum ceiling height of 2.7 metres or feature gallery-like openings; sliding doors allow for variable connections; and terraces on all floors supplement the narrow gardens.

**SUSTAINABLE FEATURES** Strong insulation, managed ventilation with heat recovery, triple glazing, photovoltaics, green roofs, and rainwater collection all form part of the environmentally-conscious profile of this neighbourhood. Bicycle storage rooms in each house remind the residents how they themselves can contribute to saving energy. ■



4-bed house - Ground and first floor plan

# COLOURFUL AND SUSTAINABLE CLAY BLOCK WALLS – INSPIRED BY SWEETS

The colourful walls of Kinderhaus Buntspecht, (“Woodpecker” day care centre for children) in Germany, were built in a monolithic clay block construction; the high thermal insulation qualities of the blocks demonstrate forward-looking energy efficiency without the need for additional insulation layers.

The method of construction used updates the benefits of the single leaf wall to enable modern energy-efficient construction. The clay blocks provide a load-bearing block and thermal insulation of the external walls all in one, so that no additional layers of insulation layers are required on either the external or internal walls.

**LIQUORICE AS AN INSPIRATION** “Of course, the design idea for such a project has to be based on children as the ultimate users,” says djb project manager Matthias Bettmann, describing the origins of the design. “Children love sweets and they love colour, too! So we took our inspiration from liquorice allsorts. The monolithic building mass was visually broken up into individual, coloured, shear walls, between which are vertical cross-storey, dark-coloured, window elements representing the liquorice in the sweet.”

**OPTIMIZED BUILDING ENVELOPE** The exterior walls were erected from filled clay blocks 49 and 42.5 cm thick. The lightweight vertically perforated clay blocks filled with mineral wool boast thermal conductivity of  $A_v = 0.07 \text{ W/mK}$  and can even be used in KfW-efficiency and passive-energy houses for monolithic exterior walls with high thermal insulation. With 49 cm masonry thickness, plus 2 cm of external lightweight render and 1.5 cm lime-gypsum plaster on the inside, a heat transfer value of  $0.14 \text{ W/m}^2\text{K}$  was achieved. The load-bearing interior walls were also built with clay block masonry. They support a healthy indoor climate as high-porosity clay absorbs moisture and heat and gives it off again after a certain delay. For buildings in which children and childcare workers spend time, this is a huge advantage.



## FACTS & FIGURES

**Project name**  
Kinderhaus Buntspecht,  
Spardorf, Germany

**Architect**  
djb-Architects

**Client**  
Spardorf council

**Products used**  
Poroton T7-MW

**Year of completion**  
2014

The walls support the ceiling over the ground floor as well as the flat roof over the upper storey. This roof closes with concrete fascia running around the entire building, which the designers say has several functions – both in terms of structural requirements and with regard to eliminating thermal bridges.

**SPACE FOR CHILDREN** The net floor area of 1,280m<sup>2</sup> accommodates a layout with a total of five group rooms for a crib, nursery and day care centre, plus a sports room, two sleeping areas, a crafts room and a staff area. ■



Two white free-standing columns mark the entrance area of the two-storey building. They join the façade where it meets the roof, avoiding thermal bridges in the monolithic construction.

# A NEW BUILDING LOCATION FOR SUSTAINABLE RESEARCH

Located in Estonia, the Rakvere Smart House Competence Centre is an experimental concept, designed to house a research facility for intelligent building technologies. The objective was to create a physical 'body' where different technical solutions for future constructions can be developed and tested.



With partners from several universities in Estonia, in addition to regional vocational schools, companies and local authorities, the competence centre endeavours to contribute by becoming a central hub of the building industry in order to support regional development and innovation. The fields of research include new technologies for home and office equipment, as well as automated building systems and building management. In addition

to being a local expertise hub, the competence centre also actively participates in various European sustainable energy initiatives and advocates energy efficiency through innovative and smart buildings.

**SUPPORTING NEW TECHNOLOGIES** Contributing to its sustainable and innovative purpose, the competence centre was designed as the first public near-zero energy building in Estonia that utilizes different build-



plot also includes the heritage-protected building of the Bank of Estonia, which still appears as the visually dominant building by the central square. The new building peers out from behind, creating an aesthetic contrast to the old one. The earthen-coloured bricks of the façade help to create a connection. They are used to create a unique pattern, while at the same time not straying too far from the style of the old building, which was constructed using clay blocks. Both buildings are united through the ceramic materials and the time-resistant structure.

**BUILT-IN SUSTAINABILITY** In addition to the new sustainable features such as solar heating and water re-usage, the facility was designed while keeping traditional sustainable building methods in mind. This is reflected in the choice of building materials. Apart from making the façade attractive, brick has excellent heat storage capacity, and it helps to keep the building warm in winter and cool in summer. Tark Maja serves as an example of how to combine natural building materials with the latest technology. 

The competence centre was designed as the first public nearly-zero energy building in Estonia.

## FACTS & FIGURES

### Project name

Tark Maja ("Smart House"), Rakvere, Estonia

### Product used

Terca Westminster

### Architects

Alver Arhitektid

### Client

SA Virumaa Kompetentsikeskus

### Year of completion

2015

ing automation technologies, and it has been engineered from the start using the BIM methodology. A variety of sustainable energy sources, such as solar panels and geothermal heating pumps, are used to heat the building. A unique demonstration and testing environment is set up inside the centre, which allows researchers to have the perfect space for academic work. Within the urban construction context, the house is an extension of an existing building. The

The monolithic nature of the building is emphasized by the choice of uniform materials, such as local sands, chalk and white cement.



# REGIONAL VALUES AND SUSTAINABLE DESIGN

The detached home in Southern Tyrol has the elegance and tranquility of a stately home. The white monolith features an energy-saving construction and the use of natural local materials.

The client wanted to create a small, but impressive residence. The detached house is located at the entrance of the Mühlwald Valley at an altitude of 862 m. It blends into the landscape, while at the same time radiating the elegance and tranquility of a stately home. The square windows of various sizes relate to significant points of the steep mountain scenery in the immediate vicinity and provide breathtaking views of the mountains and forests.

**LOCAL BUILDING MATERIALS** The harmonious selection of materials such as local sand, limestone and white cement highlight the monolithic character of the building. The emphasis is on the natural tone of the material. The façade surfaces are made of washed coarse plaster. A natural and robust material – brick – was selected as the wall material. The rhombus-shaped roof tiles were made by hand from white cement and dolomite sand and then sand-blasted to achieve a perfect match with the façade. All of the materials used, both outside and inside demonstrate their regional roots.

## FACTS & FIGURES

**Heating energy consumption**  
41.54 kWh/m<sup>2</sup>a

**Primary energy consumption**  
73.28 kWh/m<sup>2</sup>a

**Project name**  
Haus am Mühlbach,  
South Tyrol, Italy

**Architect**  
Pedevilla Architects

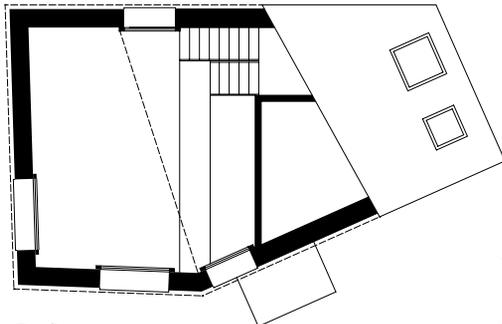
**Client**  
Private

**Products used**  
Porotherm PLAN 50 T

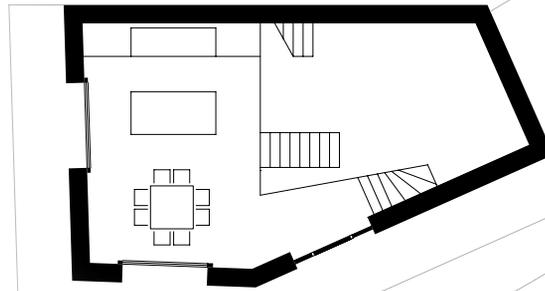
**Year of completion**  
2014

>

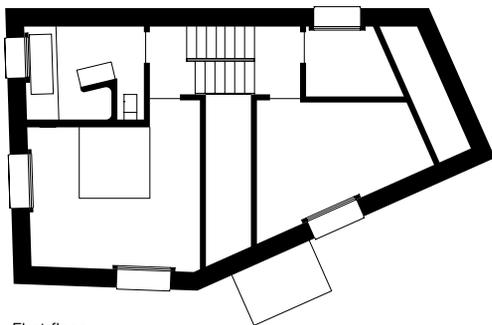
Access is via the garage door, which is recessed deep into the narrow side of the building, and via the wooden door on its long side. Internally, the rooms are staggered at half-storey intervals, ranging from the kitchen and dining area on the ground floor to the living area on the top floor.



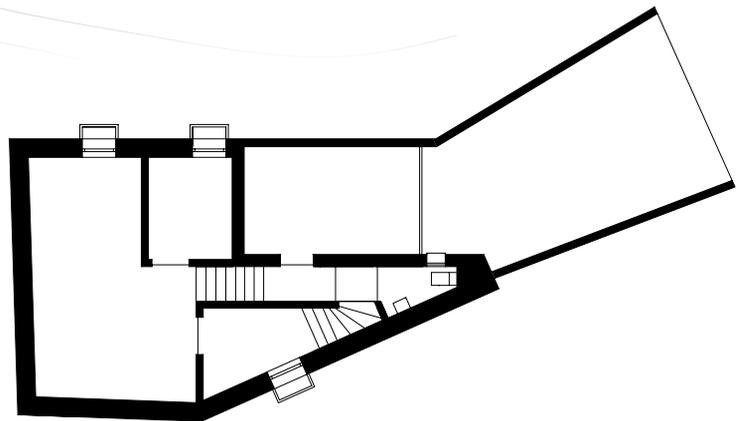
Top floor



Ground floor



First floor



Basement

> **HONEST CRAFTSMANSHIP** A special emphasis was placed on high quality craftsmanship and the use of typical local materials for the interior. The plaster for the interior walls was made from a composition of slaked lime, marble sand and earth pigments. The warm appearance of the surfaces was highlighted by the use of hand-planed elm wood and Passeir gneiss

flooring. Natural materials create a good interior climate and their combination creates a comfortable oasis in the midst of the mountains.

**REDUCED ENERGY COSTS** The architects and the client deliberately did not use complicated building technology in order to keep maintenance of the building as low as possible and invested the money in high quality materials.

The project complies with Class B of the Low Energy House Certification in South Tyrol. This class describes a building with a heating energy consumption of less than 50 kWh/m<sup>2</sup>a (kilowatt hours per square metre of living area per year). ■

»To achieve a high level of regional value, a high priority was placed on quality craftsmanship and the use of typical regional materials.«

Pedevilla Architects



A lot of care also went into designing the interior, with great emphasis placed on high-quality craftsmanship and the use of typical local materials: chalk-based internal plaster, hand-planed elm wood, passeirer gneiss and blacksmith's-bronze.

# MODERN AND ENERGY-EFFICIENT TOWN VILLA

This eye-catching villa, divided into flats, is part of an urban development in Germany. The cubic form, enhanced with light beige bricks, is more than just visually appealing. Thanks to the double-shell design of the walls the house also uses the latest energy efficiency technology.

One of the largest current urban development projects in Germany is taking place in Dortmund, on an area of 200 hectares, on a former industrial site. Plans for the development include an artificial lake, new business and industrial buildings, and homes.

**SCULPTURAL ACCENT** In the midst of this the newly created living area, a modern beige cube offers comfortable living in outstanding design. Architect Anja Engelshove and her client chose light brick to provide a retro look, contrasting with the modern appearance. The rustic bricks have uneven and slightly fractured edges that are created during the production process to give the material an aged look.

**CONSISTENT CONSTRUCTION WITH CLAY** From the outset, the clients asked for a brick façade, and it took little persuasion for architect Anja Engelshove to convince them of the advantages of building the inner walls from clay blocks. The double-shell design using 17.5 cm-wide unfilled clay blocks provides excellent thermal insulation. This type of construction has a positive impact on air quality and supports a healthy indoor climate. The inner walls were also constructed using clay blocks to simultaneously provide optimum absorption of water and store heat.

**ENERGY EFFICIENT DESIGN** The spacious, south-facing windows provide a lot of natural light and warmth from the sun. This helps to save energy needed for

## FACTS & FIGURES

**Project name**  
Stadtvilla am Phoenixsee,  
Dortmund, Germany

**Architect**  
Anja Engelshove

**Client**  
Private

**Products used**  
Terca Oud Laethem,  
Poroton T16

**Year of completion**  
2015

heating. Overall, this city mansion achieves a minimum U-value of 0.171 W/m<sup>2</sup>K – which is why the house has been awarded the rating of KfW- Efficiency House 55 in Germany. The rating confirms that the building fulfils modern energy efficiency standards and financial support can be issued.

**HIGH QUALITY OF LIVING** The elegant architectural style continues inside, with clear contours, sophisticated materials and plenty of light throughout the building. The house enables relaxed living with sustainable features in an exclusive ambience – and views over the lake. ■





Large windows provide clear views across the Phoenixsee lake and allow plenty of natural light into the space. The theme of light colours chosen for the exterior of the building continues inside.



Flexible living arrangements. Behind the small windows and balconies lie mini flats, all with access to the generous shared living spaces.

## A NEW WAY OF LIVING TOGETHER – AFFORDABLE, QUALITY HOUSING

Cluster House – House A in Switzerland is trying to address current issues: how people can live together, how they can relate to each other and relate to public space from the inside to the outside, and how can they share facilities?

House A is part of the new Hunziker Areal in the north of Zurich. This site features 450 flats, united under the promising title “mehr als wohnen” – more than living. The flats are spread across 13 buildings of various designs by different architects. “More than living” means providing more than just living space – the residents and members of the cooperative are offered various services like car sharing and electro mobility (if they do not have a car of their own), communal kitchens, greenhouses, herb gardens and hotel rooms in the building for visitors.

**SHARED SPACE AND SOCIAL AREA** However, the most impressive feature of the residence is its new and innovative floor plan typologies, such as that of House A by Duplex Architects. It offers its inhabitants both a big >

### FACTS & FIGURES

**Project Name**  
Cluster House, House A,  
Zurich, Switzerland

**Architects**  
Duplex Architects

**Client**  
Baugenossenschaft  
mehr als wohnen

**Products used**  
Poroton-T7, Poroton-T8,  
DryFix polyurethane foam

**Year of completion**  
2015



»We built this whole building using the dimensions of the brick as the lowest common denominator. In that way we managed to minimise the cutting of bricks and construction waste and to improve the insulating properties. That fits well with the innovative social concepts of this project.«

Duplex Architects

The floor plan shows the mini flats with one or two rooms, a kitchenette and a small shower room, as well as the shared living space.



The buildings are made to give people affordable, quality housing with a sense of community.



> shared space and their own area to retreat to. This area can be described as a mini-flat, consisting of one or two rooms, a tea kitchen and a little shower room. The inhabitants are very happy with the new concept. Marco Gähler, 27, a physicist & chemist, comments, "Four hundred square metres, with a huge kitchen-diner, an even bigger living room, an usually large loggia you can throw parties in, and all of that in the middle of Zurich? I would call that social luxury." Anna Hambitzer, 28, a physicist and medical technician, says, "Being here really is more than just living. This building is a contribution to a future form of coexistence that transcends society, far beyond the classic student flat share."

**BUILDING WASTE REDUCED TO A MINIMUM** Aside from the social aspects, one of the most impressive features of House A is the innovative way it is built. The entire external wall was built as a monolithic masonry wall with integrated insulation in the form of perlite. All geometric dimensions of the building, such as the height of the floors and the width of the windows, are based on a multiple of the dimensions of the bricks, so waste was kept down to a minimum. In order to avoid reducing their insulating properties, the bricks were not placed on a bed of mortar, but rather glued to one another with 2 mm-thick polyurethane foam layers. Thanks to all these measures, no additional thermal insulation was necessary. 



This new build is respectfully inserted among the old trees, which are part of the climate concept.

# COMBINING A FEEL-GOOD ATMOSPHERE WITH SUSTAINABILITY

In Hasselt, Belgium, a small after school club was built, respecting the natural surroundings, maintaining the green area for the whole town, and creating a pleasant environment for all the children attending it.



Lens°Ass Architecten demonstrated their sensitive feel for context with this project. Their initial brief was to build onto an existing row of terraced houses, whilst providing a passageway to a park. The architects decided not to erect any additional large buildings at the expense of the precious trees. Instead, they approached the task from the other end. To maintain the green area for the town, they did not extend the row of houses, but designed a pavilion in the park with “roots” between the trees and shrubs. They used the garden wall as a rear wall,

so the building is barely visible from the street. The façade was laid in the thin-bed method; the texture of the bricks fits very well into the rampant growth of the surroundings.

**URBAN RECREATION AREA** Using a pavilion allowed a larger space to be kept vacant. In addition, the interaction between the two functions – urban park and day care centre – brings added value to both, and also to the urban fabric. All functions are clear, obvious and spatially logical. The round skylights >

## FACTS & FIGURES

**Project Name**  
De Ark, Hasselt, Belgium

**Architects**  
Lens°Ass Architecten

**Client**  
VZW De Wiekslag

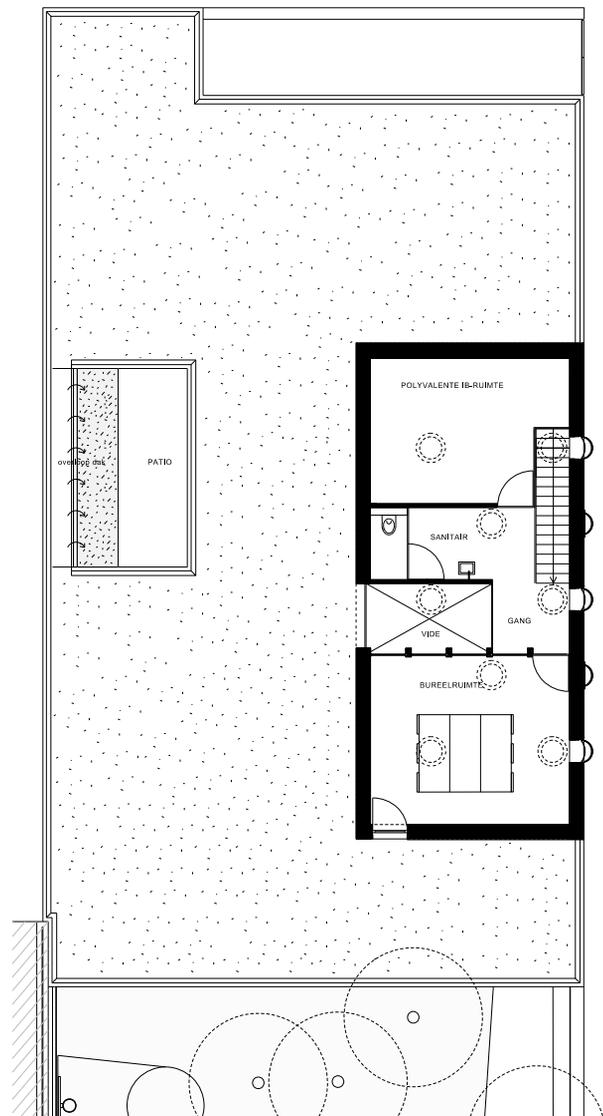
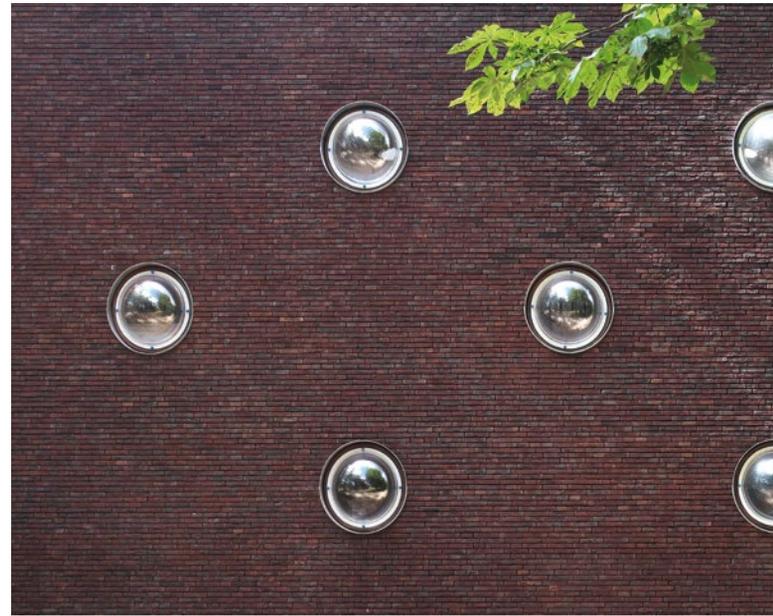
**Products used**  
Terca Blauw-Rood Genuanceerd

**Year of completion**  
2014



GELIJKVLOERSPLAN 1/100

Ground floor and first floor plans illustrate the clever use of partitioning between rooms in "De Ark".





The round windows in the outer wall are actually repurposed skylights. They allow the residents to keep an eye on the park.

> punctuating the outer wall as windows increase social control in the park. They create a friendly atmosphere, doing justice to the name of the project: “De Ark” – the ark. Together, the pavilion and wall create a space protected from the outside world.

**SUSTAINABILITY AS A KEY REQUIREMENT** All materials used (concrete, brick and wood) were chosen and incorporated with the application of the relevant sustainability criteria. The large trees which were preserved, and which shelter the new pavilion, contribute to the climatic concept. Rainwater is collected in the courtyards and on the roofs, and is able to seep into the ground. The choice of bricks, too, reflects this approach: clay is part of our physical environment. Bart Lens says that, as the architects had dealt with some very old houses in the course of their

many conversion projects, they naturally became acquainted with the unique properties of brick. He appreciates brick because of “the wonderfully aging patina, the easy cleanability, flexible use and reuse, and also the solid robustness of the material”.

“De Ark” creates a feel-good atmosphere in respect to nature and sustainability. ◀

»Nowadays, it's all about sustainability and the ecological footprint. History teaches us that brick buildings are not only long-lasting, but are also exceptionally durable. A comforting thought for anyone who invests in real estate.«

Bart Lens

# ATTRACTING ATTENTION FOR RECYCLING

Paris has created a new public Recycling and Sorting Facility under the Boulevard Périphérique, which marks the border between the city and the suburb of Pantin. The facility features an unusually stylish design to attract passers-by, inviting them to bring in their waste and help to save resources.

The sorting facility is located in a part of the city which was, until recently, devoted to industry, business and car parks. Over the last thirty years, the decline and relocation of these activities have led to the renewal of the whole area.

Located on a former roundabout, which was redeveloped to allow a tram to run through it, the site is surrounded by roads: the ring road above, a road tunnel below, and four lanes on each side. This gives it a strategic position at the centre of several logistic routes, and offers the advantage of being highly visible with excellent access.

**FANCY DESIGN AND RECYCLING** A sorting centre is hardly a glamorous scheme so, in order to make the building stand out and promote reuse and recycling to everybody, a striking white brick design was chosen. Brick itself is a natural material and ties in well with the overall concept.

Covering an area of 1,400m<sup>2</sup>, the facility stands out from the network of roads like a pearl in a tarmac jungle. It is protected from its hostile environment by an enclosure of white clay and glass bricks, which form curved walls measuring 35–40 metres in length. The aim of this finishing touch is to rouse the curiosity of the many people passing by, inviting them to bring their waste there too, and to gather and reuse as many resources as possible.

**STRENGTH AND LIGHTNESS** The wall enclosing the facility is both robust and lightweight, contrasting

## FACTS & FIGURES

**Project name**  
Espace de tri Porte de Pantin,  
Paris, France

**Client**  
City of Paris

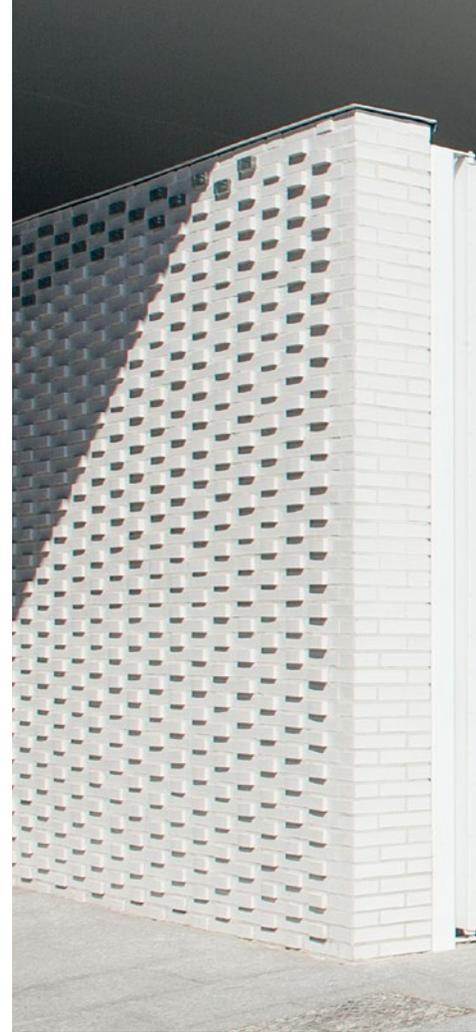
**Architect**  
Data Architectes

**Products used**  
Terca brique blanc emailé

**Year of completion**  
2016

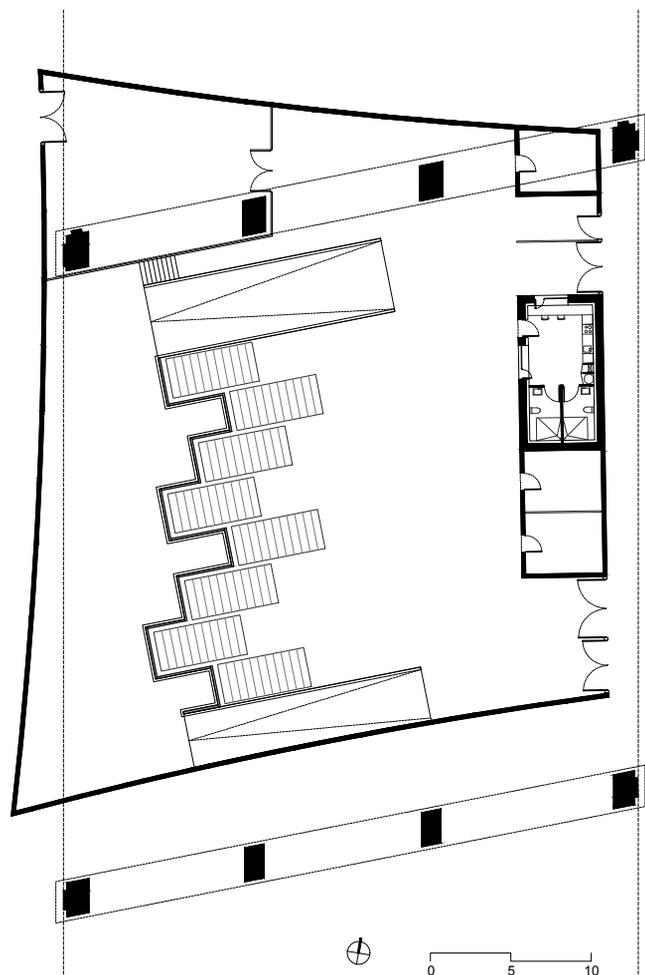
with the infrastructure surrounding it and creating a dialogue with passing pedestrians. It is constructed from glazed white clay bricks, set in a staggered design, with some bricks pulling away from the wall. This design, and the height of 3.3m, prevents intrusion whilst letting in light and allowing curious passers-by to see in through the glass bricks. The urban environment is reflected on this shining brick facade, which vibrates in the sunlight and under the lights of passing cars.

This recycling centre, with its bold architecture, promotes sustainable values while serving as a necessary tool for the treatment of waste. After all, doesn't today's waste provide the resources of tomorrow? 





The combination of clay and glass bricks creates an appealing interplay between light and shade.





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**Wienerberger**

