

BUILD

Leca®

A MAGAZINE FROM LECA

No. 1 – 2022



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50 years

The traffic safety and traffic flow of Ring Road III will be improved in an ongoing project set to be completed in 2023 in the area of the city of Vantaa in Finland, both between Vantaankoski and Pakkala and near Askisto. GRK Infra Oy is the main contractor in the Finnish Transport Infrastructure Agency's project. In addition to the new Leca® lightweight aggregate (LWA), material recovered from old structures has also been used on site. "The demolished LWA fill structures has provided really good quality material, the material has not changed in 50 years!", says Ville Keränen, who works as a Site Manager at the site.



780 kg/m³

The specific weight of rooftop garden soil lightened with crushed 3–8 mm Leca® lightweight aggregate (LWA) is only 780 kg/m³, while normal sandy soil weighs about 1000 kg/m³. Thus, it reduces the load on the structures over the deck structures. With the crushed Leca LWA, the structure of the growing medium is lighter and at the same time both water-retaining and permeable.



SUSTAINABLE COLLABORATION FOR INCREASED CIRCULARITY

ISOVER and Leca have started a collaboration where the glass wool waste from ISOVER's production is used in Leca's production.

ISOVER is a supplier of innovative insulation materials and systems for sustainable construction. ISOVER glass wool is made from guaranteed at least 70% recycled glass. From 2022, Leca has a collaboration with ISOVER where production waste from ISOVER is sent to Leca for recycling in their processes and used as a raw material in the production of new products, e.g. Leca® LWA.

The glass wool waste is added in the process and means that you can reduce the amount of clay and thereby reduce the use of original natural resources.

The collaboration between Leca and ISOVER is part of Saint-Gobain Sweden's sustainability plan for net zero greenhouse gas emissions in 2045, where one of the focus areas is innovative and circular solutions.



BIM – A DIGITAL SERVICE FOR ECONOMICAL AND SUSTAINABLE COLLABORATION

Digital transformation is a central theme within Architecture, Engineering and the Construction Industry. The complexity of projects is growing and the advancement of technology helps professionals to work more efficiently.

BIM is a collaborative process, built by the different stakeholders in the design and construction phase. It allows the creation of digital 3D models that includes data associated with the physical and functional characteristics of the products that will be installed. Thus, before construction, it is possible to estimate the quantities and costs of raw materials and to design a 3D visualization of the space.

BIM is an economical and sustainable collaborative process, both financially and environmentally. Through BIM, projects are completed faster, safer and with less waste.

LECA, as a manufacturer of construction products, already offers a BIM library. Currently this library is already available on the leca.pt website, but the intention is to extend it to other countries in the coming months.

NEW AND UPDATED ONLINE WATER MANAGEMENT CALCULATOR

We are pleased to launch our new and improved online Water Management Calculator, which has been updated by our design engineers to provide more accuracy on the water management properties of LECA LWA. This is suitable for engineers to assess the water management suitability of LECA LWA when developing highways, embankments, green roofs and much more.

LECA LWA has the ability to delay water runoff by a principle known as water detention. Providing a steady and manageable flow of water, reducing the risk of flooding. LECA LWA has a highly porous internal structure and an abundance of voids between the grains - allowing for the detainment of water flow to reduce the peak intensity of runoff from an area.



The water management calculator offers the ability to input specific design requirements to assess the material's suitability for any given project. This is now available now across all our local LECA websites.



Text: *Dakota Lavento*
Photos: *Janne Pappila*

The house is a modern variation of the standard post-war house for Finnish veterans and migrants.

PERFECT FAMILY HOUSE ON THE HELSINKI SHORELINE

FINLAND *A detached house built from Leca® blocks in maritime Helsinki is a modern, dream version of the standard houses built for migrants and veterans in post-war Finland.*

Marika and Riku Lähdemäki bought a 470 m² sloping plot on a rock base in Kruununuorenranta in Helsinki. Nestling on the boundary of a nature reserve, this attractive plot of land was simply waiting to be built on.

Modern ‘veteran’s’ standard house

The couple did not have to waste much time worrying about what kind

of house to build, since this had been decided by a precise urban area development initiative with specific building instructions. Their house had to be a modern variation of the standard post-war house for Finnish veterans and migrants.

However, this clear framework did not prevent them from meeting their

own family’s needs and preferences. Riku Lähdemäki is grateful to the architect, Joonas Koskela, for designing the perfect design solution that the family craved.

A floor for specific purpose

With two residential levels, plus a basement and an attic, each floor of the house can serve a different func-

tion. The Lähdemäki family have a sauna and lounge with a fireplace in the basement. This floor is also a living space to accommodate guests.

The lower residential floor has a kitchen and living areas, and the bedrooms are located on the upper residential level.

At first, Marika and Riku Lähdemäki did not think that they would need an attic floor. Luckily, they decided to utilise the attic space, which turned out to be a peaceful remote work area during the coronavirus pandemic. However, more space will soon be required, since the couple's third child was born in the autumn of 2020.



The Lähdemäki family is pleased with the house.

Strong and solid

Marika and Riku Lähdemäki wanted their version of a detached house to be built from stone. Having no experience of housebuilding, the couple regarded stone detached houses as strong and solid solutions.

Together with a neighbour who was also building a house, they opted to use Leca blocks after considering several suppliers. "The overall gains of using Leca blocks was based on: establishing manageable costs for the project, excellent product properties and attaining a good service," Riku Lähdemäki explains.

"We wanted to utilise a thin-joint masonry design to avoid unpleasant surprises in terms of concrete costs. The Leca sandwich block had good properties — and we were also impressed by Leca Finland's good service."

The benefits of living in a stone house

After three years in the house, the couple's expectations have been proven correct. The house is solid, sturdy and quiet. Outside sounds are now extinguished and cannot be heard inside the house. "The exterior wall is an excellent barrier to noise."

The partitions are also stone, load-bearing partitions being made from Leca Lex blocks and light partitions with the EasyLex system. Stone partitions make the house solid in every respect. Riku Lähdemäki says that the partitions also provide good noise insulation. "In addition, a stone wall is a great backdrop for a shelf or picture."

Now that the family has lived in the house for three years, it is time for them to give their final verdict.

"We've been delighted with it!"



Project information

Location: Helsinki, Finland

Commissioned by: Marika and Riku Lähdemäki

Design: Arkkitehtitoimisto Antti Heikkilä / Joonas Koskela

Leca products:
Building frame: Leca® Design sandwich blocks
Interior walls: Leca® interior wall blocks

The lower residential floor has a kitchen and living areas.



STANLEY DOCK WAREHOUSE CONVERTED TO NEW LUXURY APARTMENTS WITH A NEW COMMUNAL AREA

UNITED KINGDOM *The Stanley Dock Tobacco Warehouse is a grade II listed building and is the world's largest brick warehouse. It is adjacent to the Stanley Dock, in Liverpool, England.*

Standing 125 feet high, the building was, at the time of its construction in 1901, claimed to be the world's largest building in terms of floor space and the number of bricks used for the building.

The warehouse has been recently developed into luxury apartments. For the new development, a new shared communal area has been created,

which will be a shared area for all the residents. This will incorporate new planters and create an attractive communal area.

Alternative Groundwork Solution Required

For the groundwork development, polystyrene and crushed concrete (MOT/6f2) aggregate was originally proposed. But through the research

into the groundwork properties of Leca lightweight aggregate (LWA) and the unique ability to be pneumatically delivered within confined spaces, the specification and design was changed to Leca LWA.

Restricted Access to Courtyard

The key factors for the use of the Leca LWA was the lightweight nature of the material which would impose

Delivered in a difficult to access courtyard

minimal impact on the ground, providing effortless compaction and delivered in a difficult to access courtyard, through the pneumatic delivery method. For the delivery of the material for this project, the development fully utilised the 50m piping system over a 10m wall obstacle.

The Leca LWA was delivered over five deliveries onto a delicate and difficult to access industrial area. It was later acknowledged that for this particular project, it would have required an additional eleven deliveries to carry the originally proposed crushed concrete. Thus cutting back on CO₂ emissions,

man power, cost and protecting the surrounding environment as a result.

Rapid Pneumatic Delivery Solution

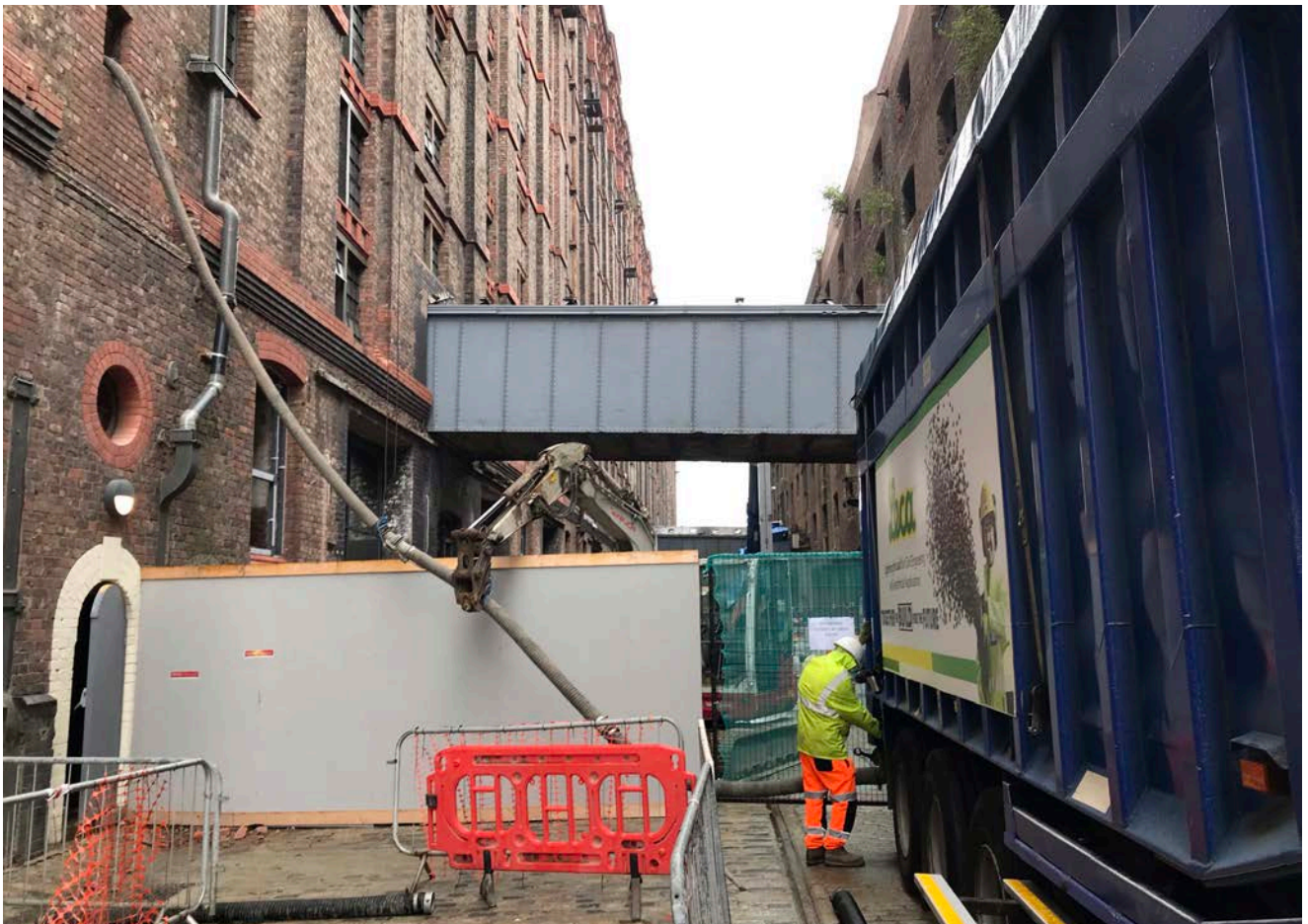
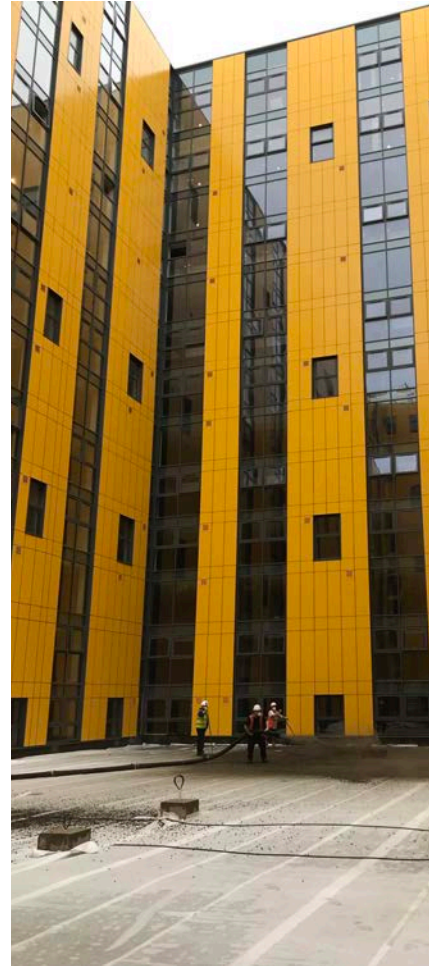
Through using the Leca pneumatic blowing facility for this project, capable of delivering on average 55m³ per load. The vehicle was able to deliver the material up to a distance of 50 metres – this allowed the Leca LWA material to reach the central courtyard with ease - allowing greater flexibility and aiding environmental consideration to a variety of access and constructional challenges.

Project information

Contractor: Abercorn Construction Ltd

Delivery method: Pneumatic delivery

Product: Leca LWA (10-20mm)



Utilising a 50m piping system over a 10m wall obstacle

INTERVIEW

The hydroponics agricultural system - Leca[®]ton as a substrate for the cultivation of plants



Dr. Heinz-Dieter Molitor was a scientist at the Institute for Urban Horticulture and Ornamental Plant Research as well as a lecturer at the Wiesbaden University of Applied Sciences. During his active time, he was significantly involved in the development of hydroponics in Germany with studies in Geisenheim as well as technical articles in publications and seminar lectures.



What would you say is so fascinating about hydroponics?

First of all, it seems to make sense to me to define the term hydroponics a little more precisely in connection with indoor greening. In this case, the term stands for the "hydroculture plant-holding system", which is known mainly in the German-speaking European area. The characteristic feature is the use of expanded clay as a plant substrate in an accumulation zone with a water level indicator.

As a plant nutritionist, I was fascinated by the fact that hydroponics makes it comparatively easy to measure and optimize the supply of nutrients. Disturbances caused by interactions with the substrate can be largely ruled out. The nutrient and water supply can be easily determined by measuring the nutrient solution, as can the pH value and salt concentration. The very complex taking of substrate or soil samples, the extraction in the laboratory and the often difficult interpretation of the measured values are now a thing of the past. In some cases, important parameters can already be measured on-site and implemented promptly. The oxygen supply is always optimal, at least outside the accumulation zone. Due to

its production process, expanded clay is free of pathogens.

In addition, expanded clay as a plant substrate is structurally stable, not depleted and can be reused even after years of use. This can be a decisive advantage regarding the increasingly demanded sustainability of a product.

What can you tell us about the history of modern hydroponics?

The development of the "planting system hydroponics" started with the discovery of expanded clay as a substrate for the cultivation of plants. Gerhard Baumann from Switzerland had this idea in 1959 and developed the Luwasa hydroponic system based on it. The system consisted of a watertight container, a hydroponic plant grown in expanded clay, a special culture pot, expanded clay as a substrate and an accumulation zone with nutrient solution, controlled by a water level indicator. The plant was fed via nutrient batteries with the ion-exchange-based slow-release fertiliser Lewatit HD5 developed by Bayer AG. This basic principle was taken up and improved by horticultural companies in Germany, Switzerland and Austria. Decisive progress was made through



Dracaena fragrans in the hydroponics system

standardisation of the system components. The development was also promoted in the 1970s and 1980s, because almost all horticultural test facilities worked thoroughly on the "hydroponic system". The main focus was on questions concerning the cultivation of hydroponics plants, nutrition and water quality, the accumulation height and the quality of the expanded clay, or even plant protection. This contributed significantly to the introduction and dissemination in the private sector and in professional indoor greening. The quite simple and safe plant care combined with high-quality equipment and constant product innovations were very convincing. This development stopped in the 1990s when the "hydroponic system" became a mass product. Today, the "hydroponic system" is a permanent fixture in professional indoor greening, while its use in the private sector can only be found rather rarely.

THE USE OF EXPANDED CLAY THAT IS SUBJECT TO RAL QUALITY ASSURANCE CONCERNING SUBSTRATES FOR PLANT CULTIVATION IS AN IMPORTANT PREREQUISITE FOR SUCCESSFUL HYDROPONICS.

What are the prerequisites for successful hydroponics?

The first prerequisite is the right choice of plants in terms of light, temperature and humidity. Avoiding plant species that are known to be sensitive to certain pests, as well as

strict adherence to preventive plant protection measures contribute significantly to the durability of a planting. Another prerequisite for successful hydroponics is the use of expanded clay that is subject to RAL quality assurance concerning substrates for plant cultivation. This ensures that the physical and chemical parameters defined there are adhered to.

It is imperative that the nutrition of the plants is adapted to the respective water quality. The choice of the fertiliser type, i.e. liquid fertiliser, ion exchange fertiliser or basic fertiliser, depends largely on this. Only high-quality products may be used as fertilisers, which in particular also contain all the necessary micronutrients in a stable form and in the right proportion to each other. The level of nutrient supply is based on the fact that in indoor greening, the aim is to achieve an optimal appearance of the plants with moderate growth. No compromises should be made with softened tap water, since this is unsuitable as irrigation water due to its usually high sodium concentration.

A too high accumulation of nutrient solution must be avoided by all means because of the danger of oxygen deficiency of the roots in the overwatered area. Justified exceptions may include locations with high irradiation, where a quick consumption of the nutrient solution can be expected. Otherwise, the principle of "hydroponics" is to have as little accumulation as possible.



Dr. Heinz-Dieter Molitor, former scientist at the Institute for Urban Horticulture and Ornamental Plant Research, Germany

What is the current state of the art?

Users can choose from a wide range of high-quality vessels for every style of living. There is a high level of innovation in the development of new vessels in this area. By now, improvements in cultivation pots have been achieved by adding side slits in the upper part of the pots. This makes it easier for the plants to root out into the unaccumulated moist zone.

According to our experience, users are very insecure when it comes to choosing the appropriate fertiliser and, in this context, the quality of the irrigation water. Regarding the quality of the quite large number of liquid fertilisers on the market, sometimes vast differences must be assumed. Most people prefer liquid fertilisers because of their easy handling, although in many cases they should not be used because of their insufficient Ca and Mg concentration of the irrigation water.

What innovations are possible in the future?

Future innovations will concern the display of the water level, an improved design of the culture pot and a convincing concept for the reuse of used expanded clay.

The misleading indication "maximum" must be dropped from the water level display. The display should be limited to "watering" and "stop". Many users would certainly be delighted with an electronic display of the water level via an app directly on their smartphone. Other interesting pa-



Leca-ton, the natural expanded clay substrate for hydroponics

rameters, such as pH value, temperature and conductivity of the nutrient solution, might also be added.

Regarding the durability of a plantation, decisive improvements in oxygen supply in the growing area could be achieved by setting low water levels. Previous developments, however, have failed to make a breakthrough on the market.

EXPANDED CLAY AS A PLANT SUBSTRATE IS STRUCTURALLY STABLE, NOT DEPLETED AND CAN BE REUSED EVEN AFTER YEARS OF USE.

The aim in the design of the cultivation pots must be to facilitate rooting out of the pot into the moist area that is not covered by water. The optimal solution would be a culture pot that dissolves over time in the relevant area.

In terms of sustainability, a convincing concept for recycling used expanded clay should be developed. As is well known, expanded clay is not used up even after many years of use and is much too good to throw away. After cleaning, it should be possible to use it again immediately for hydroponics or other applications. This would be an undeniable advantage over all other substrates, including those based on organic materials.



Leca LWA was used as fill material for a green roof project

LECA[®] LIGHTWEIGHT AGGREGATE (LWA) PROVIDES A LIGHTWEIGHT SOLUTION FOR A GREEN ROOF IN A RESIDENTIAL COMPLEX

PORTUGAL *Lightweight and easy to handle. These were the main reasons why Leca Lightweight Aggregate (LWA) was the specified material for a new green roof project in Coimbra, Portugal.*

Two symmetrical buildings with a large concrete roof resembling the wings of a gigantic butterfly when seen from above, inspired the name

Papillon Nature and distinguishes this building in Coimbra, Portugal.

The two buildings, intended for res-

idential and commercial use, were designed using organic shapes. Their rounded and asymmetrical balconies create a wave effect on the façade



A total of 400 m³ of Leca LWA, delivered in small and bulk bags, was used in this project.

and make it stand out from the surrounding buildings.

Leca® LWA for green roofs and flower beds

A patio accessing the apartments was created above the underground parking area between the two buildings on the ground floor. It was here, the developers installed a green roof using Leca LWA as a fill material.

"Given the uneven elevation of the floors, we chose to use Leca LWA, as it is light and easy-to-handle," explains Patrício Pascoal, from Pascoal & Pascoal, the building company that sponsored and undertook the project.

"We spread Leca LWA and levelled it to the desired elevation. We applied a polythene separator film over this layer and then Malhasol® (steel welded wire mesh) on top. Following this, we applied a levelling screed and finished with a final coating", he concludes.

Aside from the green roof, Leca LWA was also used on the existing flower beds on the building's rounded terraces. "We applied the levelling screed and laid anti-root APP (Atactic Polypropylene Membrane) waterproofing membranes. We then spread a 10-15 cm layer of Leca LWA, and finally the geotextile fabric and garden soil", outlines Patrício Pascoal.

A lightweight and easy-to-apply solution

With the help of Leca Portugal's sales team, Pascoal & Pascoal chose Leca LWA for the Papillon Nature project. Patrício Pascoal goes on to explain this choice: "one of the advantages of using Leca LWA is that it's easy to handle." Not only that, but Leca offers several delivery options - where 50 L bags and 1 m³ and 3 m³ bulk bags were used for this project.

A total of 400 m³ of Leca LWA was used in the project. The developer was very satisfied with the result: "it's an interesting product because of its properties, and I'll be using it in future projects," he concludes.



Project information

Construction project: Residential development Papillon Nature, in Coimbra, Portugal (2018 - 2021)

Promotor: Pascoal & Pascoal Construções

Building contractor: Pascoal & Pascoal Construções

Architect: Pedro Karst Guimarães & Associados

Leca® product(s) used: Leca LWA in small and bulk bags

Quantity used: 400 m³

A total of 400 m³ of Leca LWA, delivered in small and bulk bags, was used in this project



MANAGING STORM WATER AND REDUCING THE WEIGHT OF AN INNER COURTYARD DESIGNED FOR SOCIAL SUSTAINABILITY

SWEDEN Thanks to Leca® lightweight aggregate (LWA) versatile properties, the material was ideal for several engineering purposes in a new neighborhood inner courtyard.

Lundbypark is a new residential area consisting of four residential blocks with proximity to both the city center and nature. In one of the new residential blocks, named SoHå, Sverigehuset, 193 unique apartments have been developed - specifically designed to contribute to a healthy community development and urban environment.

It is a socially sustainable neighborhood with a mix of different forms of housing where all homes have access to the common courtyard with gazebos, a boules court, play areas and green landscapes. Construction started in 2019 and is planned to be completed in 2022.

Innovative benefits below ground level

In addition to the more social features, there are technically innovative benefits to the courtyard. What cannot be seen by the eye is that there is a layer of Leca LWA that, amongst other things, works as a detention and storage solution for storm water. Flooded storm water systems following intense rainfalls are a growing concern for many municipalities and property owners, especially in larger cities. As Leca LWA delays, drains and

insulates rain fall, it is possible to use green outdoor areas for innovative storm water management. Just like in this specific case.

HTE Produktion, a Swedish ground-works contractor, had the task of carrying out a complete ground work renovation for the housing block, where the courtyard was completed as the last part of the project. Frida Åman was the supervisor on site for the construction of the courtyard.

"The courtyard is built one floor up on joists. As the structure could only carry a certain amount of weight, a filling with lightweight material was required in order to be able to achieve the required height. Cellular plastic was originally specified, but since we have had good experiences of working with Leca LWA, we negotiated a change of material," says Frida Åman.

Multifunctional without a fuss

The positive feedback from using Leca LWA revolved around both the material's properties and the delivery method. Carrying out an installation was quick and easy because it was possible to pneumatically blow the lightweight aggregate into place. Average pneumatic blowing speeds is

one cubic meter per minute. The material can then be easily distributed with an asphalt rake for fillings over 0.4 meters and compaction can be simply achieved with a wacker plate or equivalent.

The lightweight filling has a high bearing capacity after compaction and through using Leca LWA, the vertical weight could be significantly reduced. And at the same time through specifying Leca LWA, the courtyard created a water management system to detain and delay stormwater. Local management of rainwater with Leca LWA reduces the burden on storm-water systems and can significantly prevent flooding. This is an innovative multifunctional solution that is sustainable and does not require any maintenance.

Project information

Project: Innergård, kvarter SoHå – Lundbypark

Location: Gothenburg, Sweden

Developer: Sverigehuset

Building time: 2019-2022, delivery 2021

Architect: Bornstein Lyckefors Arkitekter

Ground contractor: HTE Produktion

Leca-product: Leca Infra 10/20



The common courtyard has a gazebos, a boules court, play areas and plants that can enjoyed by the residents.



To distribute the material over the courtyard a simple asphalt rake was used.



By using Leca LWA, the vertical weight could be significantly reduced.



The beautiful area can accommodate 120 people, and is frequently used for lunches, summer parties and confirmation dinners by Comrod's staff.

A LOVELY ROOFTOP GARDEN WITH FIRE PROOF INNOVATION

NORWAY *Tau rooftop garden. A new recreational area to unite two buildings. Leca® lightweight aggregate (LWA) was the perfect choice, both when it comes to strength and stability, but also weight and the focus we have on working with sustainable materials.*

The Tau rooftop garden is a lovely green oasis, 350 m² in size, located between two office buildings belonging to NASA's antenna supplier, Comrod. Previously, the buildings were separated by a small space, unsuitable for socialising. Herlige Hager AS was given the task of remodelling the roof to create an inspiring recreational area that would unite the two buildings. In 2021, the rooftop garden was ready, with seating that could accommodate 120 people. It has since been frequently used for lunches, summer parties and confirmation dinners

by Comrod's staff. The founder and general manager of Herlige Hager AS, Janne Narvestad, discusses the construction of the rooftop garden and the challenges she and her colleague and project manager, Henning J. Myhre, encountered along the way.

"We have experience with the construction of rooftop gardens, but we have never worked with so many different types of materials. It was incredibly difficult, especially finding the right method of using all these different materials. We phoned LECA

numerous times because we had a responsibility to do the job correctly to ensure safety to the development, and we learned a lot by talking with them throughout the process."

Strong geotechnical properties

First of all, it was necessary to level the roof, which had to be done over several layers. All types of filler materials were considered but, in the end, the decision was made to use Leca LWA (8-20 mm). The roof has a slight resemblance to the hull of a ship, sloping down towards the mid-

dle. Using the clay pebbles, Narvestad and Myhre were able to construct a level surface for their work. Leca LWA can provide effective drainage across the entire roof. The layer filling was 5 cm deep at the thinnest and 40 cm at the thickest. According to Myhre, the Leca LWA formed a protective layer between the fibre cloth covering, geogrid, roofing sheets, polystyrene, decking area, stones, garden beds and tiles, and the pressure was evenly distributed to avoid having to make adjustments later.

“The tiles were the biggest challenge. We needed a fine gravel since everything had to be adjusted and completely level. Fortunately, Leca LWA provides an excellent foundation and I don’t think we could have found anything better.”

A sustainable alternative

One could say that quality and sustainability almost have a symbiotic relationship. For many contractors the aspect of sustainability is crucial to a project, and Herlige Hager AS was no exception. Narvestad says that it was good to work for a client like Comrod, since they were free to choose among a variety of materials.

“We are extremely focused on only working with sustainable materials. We feel that LECA meets many of the sustainability criteria we have determined.”

She lists the alternatives they considered and explains why Leca LWA was the best choice.

“We considered Glasopor, but it wasn’t a natural material and it didn’t have the sufficient capacity. It has potential, but you have to keep the environmental aspect in mind. Leca LWA, however, retains water, and provides good effective drainage capacity. It was also an advantage to simply pneumatically blow it into place instead of lifting it up in big bulk bags - this made the work more practical and efficient. Leca LWA is very light. It weighs only a

fifth of the weight of stones or gravel but has comparative engineering strength and stability.” Therefore, Narvestad and Myhre could pneumatically deliver the Leca LWA in place with a hose, which is a better option since the rooftop garden is on the second floor – about 7-8 metres above ground.

“It was quite compact when we blew it into place. First we had to rake it out evenly, then add a new layer of geogrid and fibre cloth and the surface was subsequently compacted. As soon as we put the geogrid and the ground cover on top we could walk on it.”

Leca LWA as a fireproofing solution

In addition to being lightweight and a robust filling material for various types of construction, Leca LWA also functions well as an insulation material and even offers a fireproofing solution. Leca LWA is a porous natural material, which makes them highly resistant to heat, whilst also retaining air and water.

“We chose Leca LWA for several reasons but our main focus was on roof levelling and fireproofing. There were so many elements and different factors to deal with and we looked at a wide range of alternatives. But when it comes to fire you can never be safe enough. This is partly why we chose Leca LWA – since the roofing underlays are all oil-based. A party, or even a cigarette break, could start a fire. That’s why we chose to use Leca LWA across the entire area, even if it wasn’t necessary. This was the best alternative in terms of weight, fireproofing, drainage and levelling.”

Project information

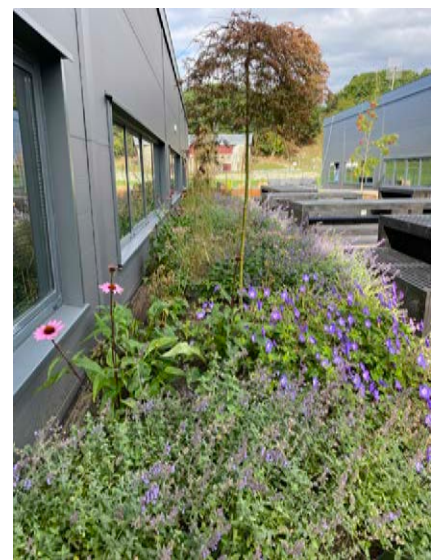
Project: Roofgarden
Location: Tau in Norway
Contractor: Herlige Hager AS
Design: Janne Narvestad
Client: NASA Comrod building
Leca product: Leca 10-20



Flower beds and rustic elements creates a relaxing atmosphere.



The roof garden area became an attractive relaxation area.



All the plants were chosen with biological diversity in mind.

INTERVIEW

Greener transport with gas-powered trucks



Every day, tons of goods and materials are shipped across Europe. A large part of that transport involves diesel-powered trucks, which emit large amounts of CO₂. Fortunately, alternative fuels, that can reduce CO₂ emissions from transport, have been introduced.



To strengthen their green profile, the transport company Frode Laursen in the Autumn of 2020 invested in 25 new trucks that can run on gas. Every day since January 2021, 5 of these trucks have driven with material from the Leca factory in Denmark to Leca / Fibo in Germany or directly to German customers.

The trucks are refueled with LNG (liquified natural gas) in Germany. The saving on CO₂ compared to a standard diesel truck is approx. 20%.

"This type of truck is more expensive to purchase and maintain than diesel trucks, but it is a necessary step to take to reduce CO₂ emissions," says Torben Hjortshøj, head of division, Road Continent, at Frode Laursen.

Frode Laursen wants to be ahead of the green development so they can meet customer demand for greener transportation. Initially, part of the additional acquisition costs was offset by cheaper fuel, but today that price has almost tripled compared to the same time last year.

"We are constantly keeping an eye on developments and are ready to invest when new solutions arise. Biofuels are only the beginning, whether the next step will be

hydrogen, electricity or something completely different we do not know, but we do know that we will be amongst the very first to buy the new types of trucks. We are a big emitter of CO₂, but do what we can to reduce it," Torben Hjortshøj says.

The trucks can run on both biogas and natural gas. In Germany, LNG (liquified natural gas) is refueled, while LBG (liquified biogas) is refueled in Sweden.



The saving on CO₂ compared to a standard diesel truck is approx. 20%.

"We have noticed that customers have become more and more interested in green transportation. Especially during 2021, we have met a constantly growing demand and we see a change coming. We have already seen the change within construction, and now it has also come to the transport of, for example, building materials."

From local haulier to international logistics company

Frode Laursen started as a local haulage company, but has grown and today operates throughout the Nordic countries and a large part of Northern Europe. The company is still family-owned and all administration is still located at the Vitten Headquarters, but today the company is a large Nordic logistics company.



The trucks are refueled with liquified natural gas.

Torben Hjortshøj says that the company today, in addition to the haulier segment, also offers 3PL (Third-party logistics) with warehouse hotels located in several places in Denmark, Sweden, Finland and Germany. "We pick up a large quantity of goods from a production company and drive it to our warehouse hotels. Here it is in stock until it has to be distributed in small quantities to the supermarkets."

"Furthermore, the company has a branch that transports building materials, such as Leca LWA and a division called recycling, which transports waste."

Green vision all around

At Frode Laursen, they have a "Green Warehouse Vision". This means, for example, that solar cells are installed and that all electricity is 100% green. The trucks are washed using rain-water and purified washing water and 95% of all waste is recycled.

"Our latest warehouse in Eskilstuna in Sweden has been built from scratch, and here we have applied a green strat-

egy throughout the construction process. Among other things, recycled materials have been used, the best possible insulation and the roof is nitrogen oxide "absorbing".

We try to think green and sustainable all the way around," Torben Hjortshøj concludes.



Why does Leca use Frode Laursen?

Why has Leca chosen to use the greener cars from Frode Laursen? Ole Lildballe, purchasing manager for Leca International, responds: "In 2019, Leca Denmark chose to start a collaboration with Frode Laursen on the transport of our Leca products, as they had competitive prices while at the same time understanding the importance of complying with our EHS rules. Furthermore, they are innovative and dare to be first movers on new technology such as gas-powered trucks, which in 2021 resulted in a saving of approx. 60,000 kg CO₂ for Leca transport to Germany."

”

**We try to think green
and sustainable all
the way around**

**FACTS:**

- About 2200 employees
- 700 trucks
- 1750 trailers
- 600,000 sqm. stock
- 5 countries



Ready-made pedestrian and bicycle path.

CREATING A SAFETY FIRST BICYCLE LANE WITH LECA® LIGHTWEIGHT AGGREGATE (LWA)

POLAND *Leca® lightweight aggregate (LWA) contributed to the safety of pedestrians and cyclists.*

Ensuring the safety of pedestrians, cyclists and drivers is the most important objective when building and repairing roads. This is not always easy to achieve. The road for motor vehicles to the town of Chełmża was built several decades ago. The terrain is geologically difficult. Organic soils with low bearing capacity dominate. When building the road, considerable amounts of soil were replaced

and the necessary reinforcements were made. After several decades of use, the traffic on the road has significantly increased. Furthermore, as part of healthier lifestyles, some drivers have switched to bicycles. To accommodate this, it was decided to build a new pedestrian and cycle path - separate from the carriageway. To avoid the risk of the road slipping away by digging trenches to replace

weak peat soils with load-bearing embankments, it was decided to relieve the pressure on the subsoil with Leca LWA.

A light embankment

A layer of soil with vegetation was removed along the width of the designed path. A sand ballast was laid as a platform for further works. Geotextile was then laid with ample sup-

plies to cover the fill. The next layer contained Leca LWA with a bulk density of 320 kg/m³. The aggregate was compacted and covered with geotextile and Gesso.

This type of filling fulfilled several engineering functions;

- relieving the pressure on the existing ground
- allowing the substructure, pavement and traffic load to be placed upon it
- allowing rainwater to pass through and drain its excess, collected in the ditch between the road and the path
- providing protection against ground freezing under the path

A layer of mineral aggregate was laid on top of the geotextile and a geo-mesh was applied as a covering to the sub-base. The slopes of the embankment were covered with sand and fertile soil, on which grass was sown. The surface was laid with concrete. The whole project went very smoothly, with only minor traffic disruptions affecting the project excavation works as the delivery of materials could only be achieved in one lane.

350 m³ of Leca LWA was laid to relieve the pressure on the subgrade. The section of path constructed provides full safety for all users during the day and at night.

Leca LWA performs well under many roads, paths, in bridge embankments, under building foundations and wherever poor groundwork soils do not allow for a robust foundation for construction. The innovative material allows for project cost savings when compared to other solutions such as piling or soil replacement.



Geotextile layering



Leca LWA layering



Covering the filling and sub-base for the pavement

Project information

Project: Bicycle path

Location: Toruń – Chełmża

Contractor: STRABAG Sp. z o.o.

Aggregate: Leca LWA 8/10-20 R

Quantity: 350 m³



The new access to the port of Bilbao connects the N-644 with the port over the railway tracks.

CREATING A NEW ACCESS BRIDGE TO THE PORT OF BILBAO WITH LECA[®] LIGHTWEIGHT AGGREGATE (LWA)

SPAIN *The construction of new bridges over existing and operational infrastructure is usually a challenge. For this project in Bilbao, the reduced space for the development of the foundations due to the existing railway tracks and the impossible task of deconstructing the existing road brought forward an engineering solution with Leca[®] LWA.*

The increase in the volume of maritime operations has made it necessary to improve access to the port of Bilbao with a new bridge that will speed up the transit of trucks, however, for the ambitious engineering development, the Basque Engineering company KREAN LKS had to provide a solution to offset the different engineering challenges.

The new access to the port of Bilbao called ZAD 3 is essentially a bridge that connects the N-644 with the port over the railway tracks. The bridge starts from an existing roundabout without the possibility of being modified or deconstructed during the development. This was due to the impact it would have on the flow of goods to the port on the existing train

tracks; leaving very little space for the development and construction of the foundations required for abutment '1'. The 'second' abutment was built on a soft soil typical of ports, which made it necessary to provide a geotechnical solution to reduce the potential overload produced by the fill of the abutment.



The reduced load that Leca LWA exerts on the ground also means that it does not require any treatment beyond the removal of existing plants.

Abutment '1' was, without a doubt, the construction that posed the greatest engineering challenge, since its construction could not create any type of interference or interruptions to the existing railway traffic. Due to the work space restrictions, this required an engineering solution which would only use small and agile equipment to develop the foundations of prefabricated abutments with micro-piles.

This structural typology required a solution where the backfill exerted a reduction in vertical pressure and this was achieved by filling the abutment with Leca LWA. This material also allowed for a rapid completion (1,700 m³ supplied and compacted in 3 days) and also a reduction in the amount

of industrial equipment required. The reduced load that Leca LWA exerts on the ground also means that it does not require any treatment beyond the removal of existing plants, which reduces costs in terms of time and manpower. The top layer was completed on this filler and the usual quality controls were carried out, such as the completed loading settlement values, which achieved the typical values required for roads with these characteristics. On this abutment, the beams that made up the bridge were built, generating enough stability to withstand the loads generated during their installation.

The filling of abutment '2' was also made with Leca LWA, which allowed for, in addition to the rapid comple-

tion, a control of settlements for the future. Something very important in access roads is that they must withstand intense and consistent traffic from trucks with extremely heavy loads.

From an environmental point of view, it is also important to consider the advantages implied by the development of this type of light infrastructure. This includes a reduction in terms of CO₂ emissions, together with a reduced use of raw materials such as concrete. Additionally, the emissions created, due to the reduced trucks required for delivery is lowered with Leca LWA, since it allows for a larger volume of material to be transported with a more favorable CO₂/m³ ratio.

The filling of abutment was made with Leca LWA, which allowed a control of settlements for the future.



Project information

Project: Creating a new access bridge to the port of Bilbao

Client: Bilbao Port

Engineering: LKS Krean

Contractor: Ute Acceso Zad3

Product: 3200 m³ Leca LWA 10/20



Fast and easy delivery by blowing truck.

CREATING A NEW BICYCLE PATH WITH PERMAWEB

DENMARK In collaboration with Mattle ApS, Leca Denmark offers a new, simple and powerful solution for roads and pathways. By combining the cube-shaped PermaWeb with Leca lightweight aggregate (LWA) you get a super-light-weight, yet robust construction, which is also significantly faster to build than a traditional pathway construction.

North of Copenhagen, a two-way cycle path has been established to increase safety for cyclists.

Geotechnical studies showed that in several spots there were up to 11 meters of soft subsoil before reaching solid ground, and out-of-the-box thinking was needed, as a traditional solution for building the cycle path could not be chosen.

Odsherred Municipality already had experience with Leca LWA from a nearby roundabout, which was established on top of Leca LWA more

than 25 years ago. In that period of time there had been very few problems with cracks in the asphalt due to settlements, therefore they were open to use yet another Leca solution.

No removal of material

In a typical area with soft soil, contractors with traditional techniques may be forced to dig out 5-6 meters of soil, to avoid subsequent settlement damage. In this case it was not possible to excavate and replace the soil. The area is an old inlet, and the ground conditions are known to be quite tricky. Odsherred Municipality,

therefore chose a solution with PermaWeb and Leca LWA, where only 10 cm of the top soil had to be removed.

“We only removed the organic material - the plant material on the surface. Then we laid out a specially designed PermaWeb on a particularly strong geotextile (Geolon Hmi-5) and filled the cells with Leca LWA. In the PermaWeb, weight and axle pressure are distributed in a plate formation, and at the same time it is permeable, so it drains rain water very efficiently,” says Christian Mattle, Mattle ApS.

Pneumatic delivery

The Leca LWA was delivered with the pneumatic blowing truck, and the contractor could simply blow the material directly into the many cavities of the PermaWeb. The Leca LWA was then compacted with a wacker plate until a height of 20 cm was achieved. The geotextile was then finally folded over the Leca LWA layer.

On top of the PermaWeb and Leca LWA, a layer of stable gravel was laid partly to protect against the hot asphalt, and partly to ensure that the construction can withstand heavier vehicles, such as the asphalt paver and the many agricultural machines that will cross the cycle path. All in all, the cycle path rises 20 cm above ground level. The removed material was used in the side shoulder along the sides of the path, meaning no soil had to be removed.

The solution with PermaWeb and Leca LWA is especially suitable for construction in areas where soft sub-soil conditions are present.

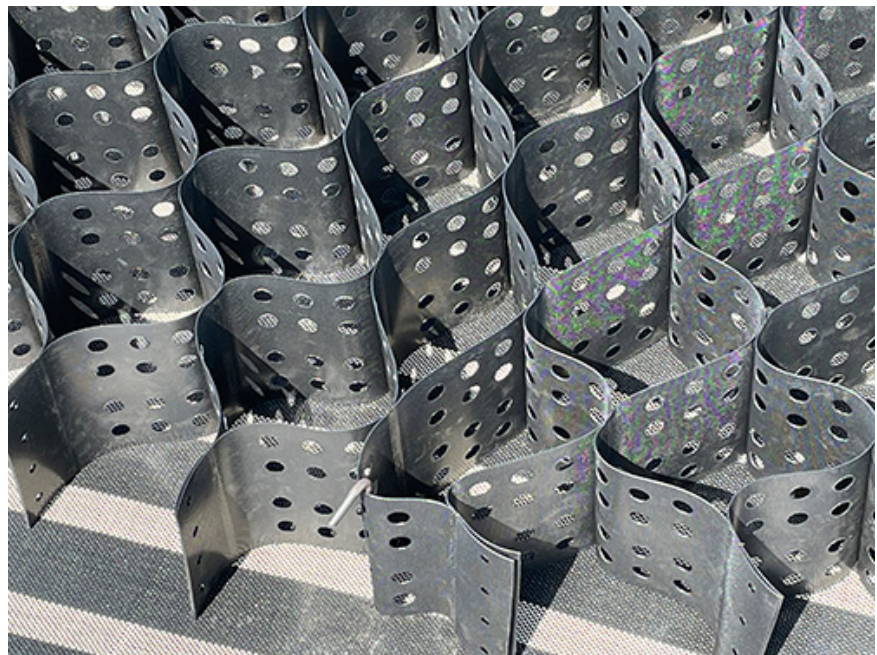
What is PermaWeb?

PermaWeb, is a GeoWeb that evenly distributes earth pressure from above and spreads them out horizontally. This means that you can reduce the weight of the layered material by up to 50% - depending on the engineering purpose and underlying soil conditions.

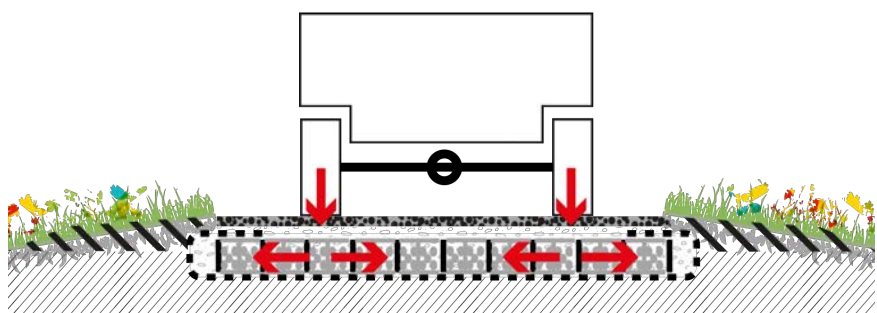
The panels are simple to handle. They are pulled out so the cells open, like a beehive, and filled with Leca LWA. When the cells are full, they are load-bearing. There is approximately a 30% cavity between the Leca lightweight Fill with PermaWeb and can therefore be a huge engineering advantage when used in LAR solutions.



Only the organic material, about 10 cm, had to be removed.



PermaWeb has cells like a beehive.



The PermaWeb distributes the pressure to a larger area.

Project information

Client: Odsherred Municipality

Client advisor: Luccon A / S

Contractor: Entreprenør Thomas Olsen ApS

Product: 1,400 m³ Leca® Lightweight Fill 10-20



BETONG ØST AND LECA NORWAY COOPERATE IN PUMPING LIGHTWEIGHT CONCRETE

With an increasing demand for lightweight concrete, Betong Øst and Leca Norway are facing the challenges related to pumping the material. The companies share a common interest in contributing to reduce the environmental impact from building concrete structures. The solution is available, and the consultants are now being challenged as to whether lightweight concrete can be utilized to a greater extent for slimmer constructions and larger spans in the future.

With the solutions associated with the well-known and widely used "Leca block" and furthermore, Leca Norway has been played a role and contributed to Norwegian construction history and culture. However, the past years the potential of Leca® lightweight aggregate (LWA) as an aggregate in lightweight concrete has not been particularly well utilized in the industry. The main reason for this is the issues related to the process of pumping. In recent years, Betong Øst has delivered pumpable concrete to large building and construction projects with imported lightweight aggregate. Uncertainty related to importation costs and logistics has contributed to growing interest in the use of Leca LWA. With mutual interests, Betong Øst and Leca Norge have recently allied to defeat old challenges and further emphasize the opportunities that lie in local LWA with easy logistics.

Great potential in the construction industry

The vast majority of the players in construction, whether private or public, has

a strong and increasing focus in reducing the carbon footprint and environmental impact the construction industry provides. With such levels of environmental awareness, it is important that the material suppliers can present the possibilities that are available in the business, so the choice of environmental solutions are made easier.

- Lightweight concrete is not a new phenomenon, but in comparison to the market size of normal concrete the market share is fairly modest. Whether this is due to the lack of willingness or competence of the projecting parties is uncertain, but there is no doubt that the properties that lightweight concrete possesses will pave the way for a changed construction method now that we have local produced lightweight concrete to offer. The weight of the structure is often dimensioning for the construction, and by reducing the weight of the concrete in the order of 3-700 kg / m³, the concrete constructions can be slimmer, the concrete floaters lighter, the spans larger and the carbon footprint smaller, says Stefan Skjæret, technology manager at Betong Øst.

- Leca LWA has in previously been challenging to pump, and this belief is likely still alive at some of the offices in structural design. It is important for us that we now increase the awareness that this is no longer the case, and that that there is no need to rely on imported light aggregates from the other side of the Atlantic to achieve good pumping properties. Thanks to today's superplasti-

cizing additives and binding substances, we are now able to put the lightweight aggregate under pressure without risking that the paste water is pushed into the aggregate and cause clogging and pumping challenges, says Geir Norden, R&D Manager at Leca International.

Skjæret tells that recently completed tests with Leca 800, 4-12 mm gave very uplifting results in terms of freshness- and pumping properties, and that the compressive strength meets the specifications.

- Watering of the aggregate before it is taken into the silo is important to achieve optimal pumpability. A day of irrigation is sufficient, but if the LWA have not absorbed enough water prior to concrete production. Then we face trouble with the pumping, says Skjæret.

Environmental and economic benefits

The potential for increased use of lightweight concrete is definitely present, and by utilizing the product properties, reduced environmental impacts will be achieved in the form of leaner and more cost-effective solutions.

- With the use of Leca LWA, we are talking local aggregate with a far more predictable price and logistics, that is fortunate for both concrete producer and end user. The LWA factory is located in Rælingen outside Lillestrøm, and close to the major transport axes and distribution network in Norway, adds Nicolaj Dahl, Sales and Marketing Director at Leca International.



LECA FINLAND IS INVESTING € 1.7 MILLION IN A WOOD PELLET PLANT

In January 2022, Leca Finland Oy started an investment worth approximately € 1.7 million to build a wood pellet combustion line with supporting equipment at its Kuusankoski plant. The burning of wood pellets will start in October.

By switching to wood pellets, the factory's CO₂ emissions will be reduced by 23,000 tonnes per year, from 38,000 tonnes to around 15,000 tonnes. The investment is part of a larger project, where Leca Finland Oy will transform its business operations to become carbon neutral by 2035.

The international building materials group Saint-Gobain is determined to be carbon neutral by 2050, but its Leca business and the Group's Nordic businesses have decided to reach the target earlier.

Even today, biofuels and recycled fuels account for about half of the energy used by Leca Finland Oy at its Leca® lightweight aggregate plant in Kuusankoski. However, the company has decided to increase the use of bio-based fuels as an energy source, as recycled fuel oil is also a source of carbon dioxide emissions.



LECA® NUTROFERTIL GREEN ROOF D: The first green roofing system with European technical evaluation (ETA) in Portugal

The concern for the sustainability of construction and the need to give buildings a more positive impact on the urban environment of cities, among other factors, has contributed to the construction of more and more green roofs in new buildings. Leca® LWA is a natural, porous and very lightweight granular material, with drainage capacity and totally inert. These characteristics over a long period of time, have made it an option to be considered when defining the drainage layer of a green roof. In addition, its ability to store water combined with its lightness make it an ideal complement to a substrate or plant growth medium: it lightens it, oxygenates it and gives it water and moisture retention properties that will be very important for healthy plant growth.

In this context, Leca Portugal SA established a partnership with the substrates company Nutrofertil, producer of substrates, and proposed to ITECONS the issue of the first ETA – European Technical Assessment for a garden roof in Portugal: Leca® Nutrofertil Green Roof D.

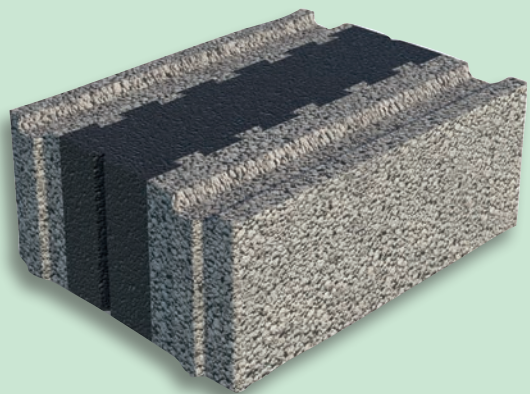
This type of document makes it possible to promote construction products across Europe that are not fully, or only partially, covered by a harmonized standard.

From now on, the Portuguese and European market will have a Portuguese green roof system that has been fully evaluated and tested.

MORE SUSTAINABLE CONSTRUCTION WITH LECA® SMART BLOCKS

Leca Finland has launched a new sandwich block with a smaller carbon footprint in spring 2022. The new product family is called Leca Smart, which means a smarter choice for the environment and the builder.

The raw material for Leca Smart blocks, Leca® lightweight aggregate (LWA), is made of clay in a rotating kiln, which makes it durable and a long-lasting building material. The carbon footprint of the new Leca Smart block is about 30% lower than before, as the fossil oil in the block's insulation material has been replaced with bio-oil. No palm oil has been used in the production of bio-oil and the insulation is 100% recyclable. The carbon footprint of the Leca Smart insulation block will be further reduced by halving the CO₂ emissions of Leca LWA's Finnish production by 2023.





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