

# BUILD

No. 1 – 2023



A MAGAZINE FROM LECA

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Modern housing estate has been created, designed in accordance with the slow life philosophy. → 4

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## NUMBERS & Facts



### 5.000 days

Occupational safety and continuous improvement are at the heart of our values. We want every employee to get home healthy. In March 2023, Leca Finland's Kuusankoski LWA plant celebrated 5,000 days without a non-lost time accident at work. Achievement is about systematic work for occupational safety and to reduce risks. According to Seppo Saarinen, Production Manager, the keys to success are the following: "Continuous learning, a good attitude of staff towards occupational safety and, above all, that we find occupational safety as a common issue."



### 4.195

People attended seminars, conferences and webinars during which solutions using Leca expanded clay were presented by the Leca Poland team in 2022. Presentation topics covered the entire spectrum of applications, with a particular focus on geotechnical engineering people and the environment.



### 15% decrease

In 2022, in diesel consumption in machines (in Liters) compared to 2021.

What was done:

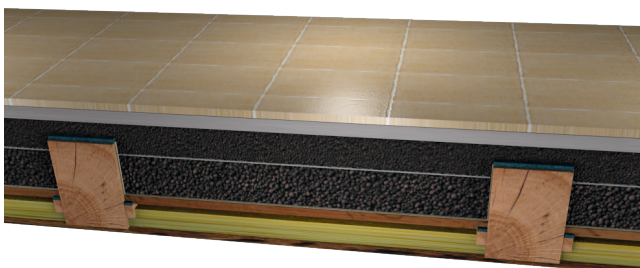
- Replacement of all old wheel loaders with new machines,
- Replacement of some old diesel forklifts with electric forklifts,
- Making all operators aware of the rational use of machines.





**LECA® LIGHTWEIGHT AGGREGATE – AN EXCEL-  
LENT MATERIAL FOR RENOVATING CEILINGS.**

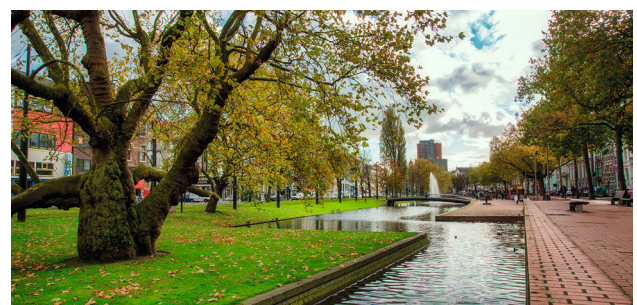
Leca® expanded clay is a material that is appreciated and recognised by a wide array of designers and contractors, especially those involved in building renovation work. Its unique properties make it perfect for renovations of all kinds of ceilings. Taking advantage of the availability of Leca's many size fractions of lightweight aggregate, it is possible not only to level an uneven or sagging ceiling but also to reduce its load or provide adequate sound insulation. Depending on the solution adopted, the expanded clay may be used to merely fill the void inside the ceiling or, as is most often the case, it serves as a filling and base for the screed. It is worth mentioning at this point that this material is widely accepted by building conservationists.



**SOMETHING OLD, SOMETHING NEW**

You may have noticed that our traditional logo has gotten a new look recently. With the new logo, we want to express our connection to the Saint-Gobain group and strengthen our position as part of the group's valuable and well-known brands, such as ISOVER, Weber and Gyproc. In our operations, we follow the group's values and operating principles, which is why we are proud to be able to make this change.

For our customers, the change means an even more comprehensive overall solution and getting numerous well-known building materials "under the same roof", quickly and effortlessly. Leca's expert teams around Europe are ready to help with all questions related to Leca solutions.







**Modern housing** estate surrounded by green forests of the Tricity Landscape Park

# MODERN HOUSING ESTATE BUILT IN LINE WITH THE SLOW LIFE PHILOSOPHY

**POLAND** *On the border of Gdynia and Sopot, surrounded by green forests of the Tricity Landscape Park, a modern housing estate has been created, designed in accordance with the slow life philosophy.*

The location of the estate and its architectural concept bring together all the advantages of the city and the convenience as well as the comfort that come with living in a quiet and peaceful environment. Low-rise, low-key buildings, well-thought-out design, high-end finishing materials inspired by nature and meticulous workmanship all create the unique atmosphere of this elegant estate. The buildings are integrated into the greenery and tranquillity of the surrounding forest, fully in harmony with the idea of slow life, which supports the thematic concept of making life as comfortable as possible.

One of the key elements of the project was the development of space around the buildings. Garage halls that are completely hidden beneath the greenery, the carefully landscaped, multi-level terrain, landscaping elements and water arrangements all create a functional and architecturally coherent whole.



## RETENTION AND LECA LWA

Leca® lightweight aggregate (LWA) was used to create a retention and drainage layer on the surface of the vegetation-covered garage ceilings and as a supporting material for landscaping. Leca LWA uniquely combines the ability to quickly drain excess rainwater with the ability to partially store it at the same time. The retained water remains readily available to the plant's root system whereas the free space between the aggregate grains facilitates air supply.



**Leca could** be used not only for green areas but also for traffic routes and other usable areas

## EASY AND QUICK APPLICATION

During construction, the contractor recognised the possibility of the pneumatic delivery of lightweight aggregate. Most of the aggregate was delivered by truck equipped with a pump and the material was fed directly to the site for its placement. Material was also delivered in big bags with the help of a crane. The laying of a layer of expanded clay was done without the need for internal transport or handling.

## PROVEN SOLUTION

The investor, and at the same time contractor, has once again opted for the Leca LWA in the implementation of his project. This is a clear indication of his confidence in the product and the functionality of the solutions offered. The designers too, based on their previous experience with the Leca LWA, used it in their design study without any doubts or concerns.



### Project information

**Site:** Multi-family residential complex

**Investor:** Invest Komfort S.A. Sp.k.

**Contractor:** Invest Komfort S.A. Sp.k.

**Project:** ROARK Studio Sp. z o.o. Sp.k.

**Product:** Leca EXPANDED CLAY 8-20 R

**Quantity:** 586 m<sup>3</sup>, of which 96 m<sup>3</sup> in Big Bags

**The material** was fed directly to the site of its placement





# LECA<sup>®</sup> LWA PROVIDES THERMAL SOLUTION FOR £27 MILLION LEISURE CENTRE

**UK** *Lightweight Aggregate (LWA) was specified for the Sands Leisure Centre swimming pool in Carlisle. This forms part of the Sands Leisure Centre development costing £27 million for redevelopments in partnership with Carlisle City Council.*

The new centre includes a new gym facility for the local residents and includes a new 8 lane, 25m swimming pool. The four-lane 20m pool is home to the Better Swim School and hosts the popular Water Workout fitness classes.

Over 700m<sup>3</sup> of Leca LWA was pneumatically delivered to fill the voids around the perimeter of the new swimming pool. Due to limited access, a solution was required to fill in the voids around the swimming pool and Leca LWA was specified to allow for a piping system reaching up to 50m to deliver the aggregate fill. MGL Group Site Manager, Gordon France explains “The project was an extension to the existing sands leisure centre in Carlisle which was to comprise of 2 new swimming pools as well as a multi-purpose indoor sports pitch.”



**The project** was an extension to the existing Sands Leisure Centre in Carlisle





**Leca LWA** had the structural properties sufficient to take loading of a 150mm thick concrete floor slab

### ACCESS RESTRICTIONS TO LEISURE CENTRE

MGL Group Site Manager, Gordon France goes on to explain why Leca LWA was specified for this project, “Leca LWA was selected for this project primarily due to its delivery method in a very restricted area of the project which required a lightweight fill for the exterior of the pool walls, this saved potentially 10+ days on programme and had the further benefit of enhancing the thermal values of the pool tank.”



**Specifying Leca LWA** reduced 50% of the labour requirements compared to GSB type fill

### LOCAL STOCKPILING FOR ACCELERATED DELIVERY

The material was conveniently stockpiled in a nearby carpark which allowed for the quick re-filling of the pneumatic delivery vehicle. This speeded up the process of delivery and provided a cost saving solution for the new development. Through specifying Leca LWA - engineering issues could be overcome which would have been found with type 1 fill material and GSB type fill.

This includes reducing the weight acting on the rear of the structure by at least 75%, in comparison to traditional fill materials. This reduction in weight can prevent potential sliding, overturning, slip and tilting or bearing failures.

### INNOVATIVE ALTERNATIVE SOLUTION TO GSB TYPE FILL

The MGL team had no previous experience of using Leca LWA but found that the delivery of the material through the unique pneumatic delivery facility to be a cost saving option, MGL Group Site Manager, Gordon France goes to explain “The volume delivered to the works via the hosed delivery method over the 3 days was circa 700m<sup>3</sup> – this reduced labour by 50% when compared to installing GSB type fill.”

Leca LWA has been applied for many swimming pools throughout the UK, due to its unique pneumatic delivery facility and its natural properties as a lightweight aggregate fill material and this was the case for the Sands Swimming Pool development where Leca LWA was a “...Light weight material which was manageable to level and compact with the structural properties to take loading of a 150mm thick concrete floor slab.” explains MGL Group Site Manager, Gordon France.

The project was successfully completed and the MGL team were satisfied with the speed of delivery and technical properties of Leca LWA. MGL Group Site Manager, Gordon France concludes “On the right project I would not hesitate to consider using Leca LWA again - whether it was a structural engineering project or as a need to improve programme times and bring forward the overall completion date of a project.”



**Leca LWA saved** potentially 10+ days on programme plans and had the increased benefit of enhancing the thermal values of the pool tank

### Project information

**Site:** Sands Leisure Centre, Carlisle

**Investor:** Carlisle City Council

**Contractor:** MGL Group

**Project:** New 8-Lane, 25m Swimming Pool

**Product:** Leca® LWA 10-20mm

**Quantity:** 700 m<sup>3</sup>





The Largo do Camarão historic building is located next to the Jardim de São Lázaro, in Porto.

# LECA<sup>®</sup> DRY SOLUTIONS: INVESTING IN SUSTAINABLE URBAN RENEWAL

**PORTUGAL** Sustainable, lightweight, positive acoustic performance, easy to deliver and apply: these were the main reasons for using Leca<sup>®</sup> aggregate to rehabilitate a historic building in Porto.

The Largo do Camarão historic building is located next to the Jardim de São Lázaro and only a few metres from several of the main cultural spots in Porto, including the Porto Colosseum, the Municipal Library, and São João Theatre. This granite

stonework building, which dates back to the 19th century, was converted into different-sized luxury flats, with works completed in December 2022.

Rehabilitation work began in 2019, keeping the building's original fea-

tures and preserving interior and exterior elements. That was the main challenge of the project: "keeping the façade's original design and its interior granite walls", explains João Rodrigues, the engineer responsible for the rehabilitation work.



## LECA® AGGREGATE - THE SOLUTION FOR RESTORING FLOORS

Considering the need to “reduce the distributed weight of the granite walls and, at the same time, guarantee that the underfloor was filled to protect the tubes over the reinforced concrete floors”, Leca® aggregate was, according to João Rodrigues, the ideal solution.

He added that “approximately 10 cm of Leca® Light Plus” fill was used on the structural flooring and “only a layer of reinforced screed was used on a polyethylene film”. João Rodrigues also explained that by using Leca® expanded clay aggregate (which does not need cement or water) on raised floors meant that “we reduced the weight per square metre and eliminated the amount of water needed in more conventional solutions, such as aerated concrete or lightweight concrete”. “Given the characteristics of expanded clay, this solution actually improved the acoustics between floors, an advantage welcomed by everyone involved in the project”, he said.



Rehabilitation work began in 2019, keeping the building's original features. (Photo: @Teodósio Dias 2013)

### FAST DELIVERY, EASY APPLICATION

There were other advantages to choosing Leca® lightweight aggregate for this project, i.e., quick delivery and straightforward application. According to João Rodrigues, “this was an extremely positive solution, and one we will be using in similar situations from now on.”

### LECA® SOLUTIONS FOR SUSTAINABLE CONSTRUCTION

Leca® has a number of environmentally-friendly, lightweight, durable and insulating solutions. Dry solutions, such as Leca® Dur or Leca® Light Plus, are especially suitable for urban renewal works. These solutions do not need water or cement, which means they are, therefore, more environmentally sustainable. Also, because they can be supplied in big bags or by pneumatic truck at the construction site, material delivery is straightforward and does not need to take up space at the yard.



#### Project information

**Project:** Rehabilitation of a residential building

**Developer:** Natural Phrases Unipessoal Lda.

**Constructor:** Tovisi S.A.

**Architect:** Arquitetos Matos

**Leca® product(s) used:** Leca® L

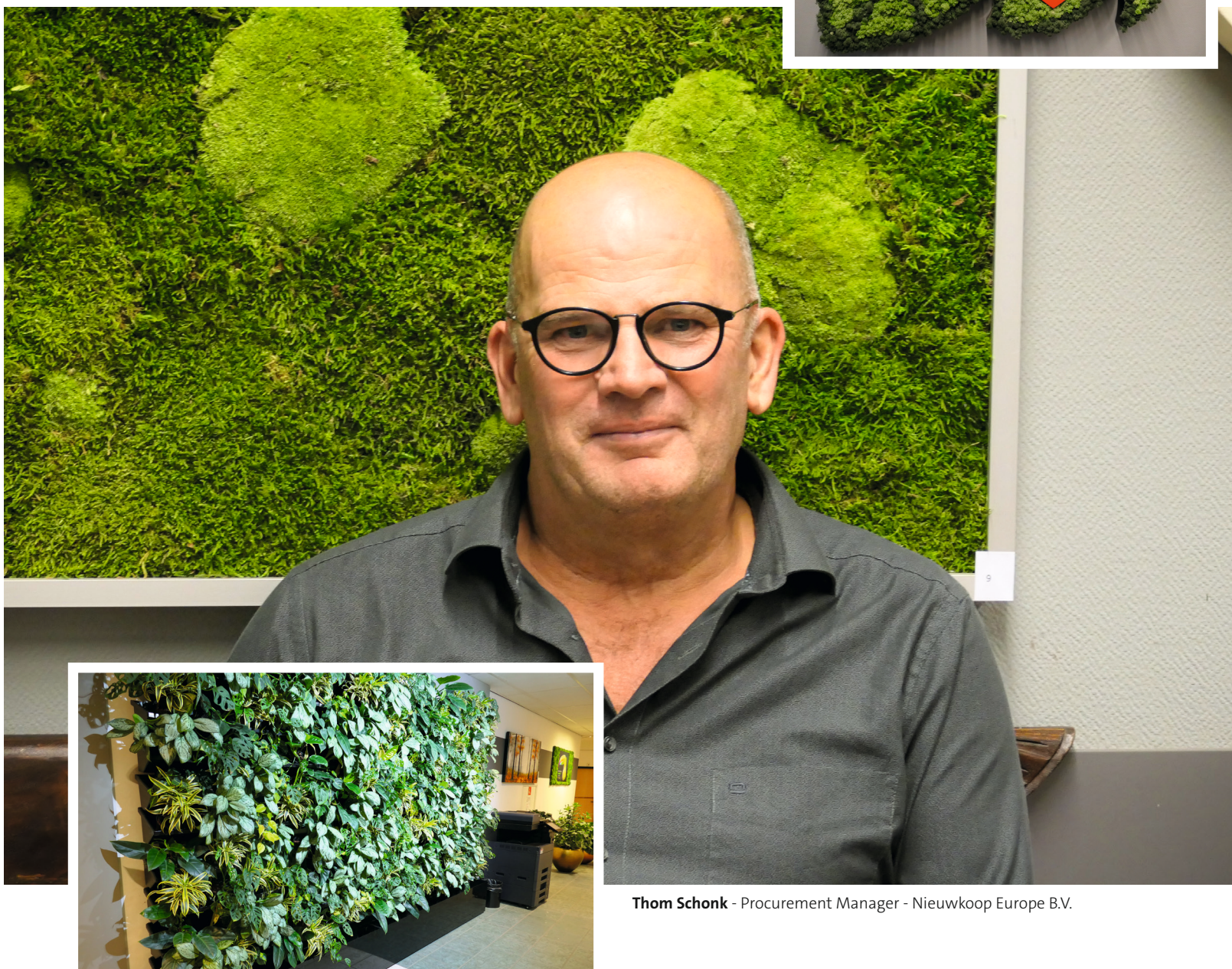
**Amount used:** 20 BBG 3 m<sup>3</sup> (60 m<sup>3</sup>)

**Dry solutions** are especially suitable for urban renewal works.



INTERVIEW

# 8 questions to Thom Schonk



Thom Schonk - Procurement Manager - Nieuwkoop Europe B.V.

***Thom Schonk has been with Nieuwkoop Europe B.V. for over 14 years. Starting as a Commercial Manager in 2008, he has been a Procurement Manager since January 2018 and is responsible for purchasing materials and products for resale. His main task is planning, coordinating, and dealing with buyers and purchasing departments in various organizations.***



**1. Give us a little introduction to your company. How big is the company, what is your focus? What range of plants do you offer?**

Nieuwkoop Europe is a nursery and wholesaler of hydroponics and potted plants that offers a comprehensive range of plants and accessories for indoor greening. In addition to many different types of indoor plants, this also includes pots, planters and green walls, as well as the products needed to implement and maintain indoor greening. In short, everything you need to transform any indoor space into a fresh, green environment! Nieuwkoop Europe can deliver worldwide, but only sells to interior designers and resellers of green plants, such as florists and web shop operators. A comprehensive service is of utmost importance to us. We strive for a close relationship with our customers and are happy to support them with our advice regarding the implementation of planting projects. We use our extensive knowledge and experience to advise on plant selection, on complex logistical issues or in compiling a complete product.

**2. How long have you been involved in the field of hydroponics?**

We have been active in hydroponics and the distribution of plants and accessories for over 50 years, since the early 1970s. Over the decades, we have been instrumental in developing, influencing, and promoting the large market of indoor greening with hydroponics plants and hydroponics components.

**3. In your opinion, how large is the plant spectrum in hydroponics?**

Basically, you can grow all indoor plants in hydroponics. Even orchids or cacti, which usually prefer dry soil or substrates, are suitable. When choosing a plant, make sure that it is suitable for the intended location, i.e. that the light conditions are sufficient, and that it is well cared for.

Today we offer a large selection of plants that have proven themselves

over the decades in hydroponics and indoor greening and are widely used, including the well-known species such as Aglaonema, Anthurium, Dracaena, Chamaedorea, Ficus, Monstera, Philodendron, Sansevieria, Schefflera with their diverse species.



**4. Why do you use Leca®ton? And when did you first encounter it?**

The basis of hydroponics is the substrate, in this case expanded clay. As hydroponics is a closed system, it is important that there are no harmful interactions between the root, the fertiliser and the substrate in the cultivation vessel that could harm the plant. Based on first positive experiences and investigations with various expanded clay origins, Leca®ton emerged as an excellent substrate at German research institutions in the 1970s. Even then, the excellent raw clay properties made Leca®ton an expanded clay granulate of outstanding quality. Salt content, pH value, water absorption, air void content, weight, grain shape and colour have made it indispensable in our applications ever since.

**5. What role does the quality of the expanded clay play? Which technical requirements must the product fulfil? (e.g. grain size, water absorption, chemical composition)**

As already mentioned, the quality of the expanded clay plays a special role. For this purpose, very clear specifications were drawn up 50 years ago, which an expanded clay had to fulfil - it must not exceed or fall below certain values for salt content, bulk density, water level, pH value, sodium, chlorine, or fluorine.

Today, there is an RAL certification procedure in Germany by the independent Gütegemeinschaft Substrate (Quality Association for Substrates), which expanded clays can undergo. In this procedure, the expanded clay is externally monitored and must, amongst other things, fulfil the above-mentioned criteria. Currently, Leca®ton is the only RAL-certified expanded clay in Europe. This is the reason for us to continue working with Leca®ton.

**6. In your opinion, what are the advantages of hydroponics with expanded clay?**

The big advantage is the optimal supply of the plant with water, air, and fertiliser. The water level indicator allows me to see at any time whether the plant is too dry or too wet. By using a slow-release fertiliser, I can fertilise the plant optimally for periods of 3-4 months. By checking the water level in the planter with the water level indicator, I ensure an optimal supply of air to the plant at all times, as the oxygen can circulate well in the porous expanded clay and its interstices above the water level and supply the roots with oxygen.

**7. What are the current trends in hydroponics from your point of view?**

The current trend is towards "green walls" which can also be implemented by means of expanded clay. There are complete hydroponic greening systems with Leca®ton; here, the nutrient solution circulates through the planters of the green wall with the help of a pump and gravity. This can significantly increase the humidity in rooms and enhance people's well-being.

**8. How do you see the future of hydroponics?**

We are very positive about the future of hydroponics. In our eyes, it continues to be irreplaceable in professional indoor greening and represents the absolute standard due to its easy maintenance.





Photo: Asplan Viak drone services

**LANDMARK:** Nydalsbrua will become a landmark in Trondheim

# LECA NORWAY IS AN IMPORTANT CONTRIBUTOR TO A NEW LANDMARK IN TRONDHEIM

**NORWAY** Has delivered 1,200 m<sup>3</sup> of lightweight clay as aggregate for the production of high-strength lightweight concrete.



**By using** lightweight concrete, the span of the bridge could be longer, says R&D Manager Geir Norden in Leca International.





Photo: Asplan Viak drone services

In October, Nydalsbrua at Sluppen in Trondheim will be open to traffic. With a span of 111 meters over Nidelva and a bridge tower of 55 metres, the bridge will become a landmark in the main city of Trøndelag.

Nydalsbrua will help to ensure that rush hour traffic on the south side of the city will flow significantly more easily. The existing Sluppen bridge, which for many years has been a notorious bottleneck, will be converted into a pedestrian and bicycle bridge. Nydalsbrua, which will have a total length of 184 metres, is being built as a combined cable-stayed box bridge and cable-stayed bridge where steel cables from a massive concrete tower on the west side of the Nidelva will carry the main span of the bridge.

The tower itself is again anchored to the tunnel inserts of the future Byåsen tunnel (construction is due to commence in 2027 at the earliest). While the first part of the bridge was cast from the ground, the rest of the bridge is now being cast using the free-build method. The bridge is cast in eight different stages from the Byåsen side towards the Sluppen side, where each stage is 8.5 metres.

**SELF-WEIGHT:** Bridges built according to the free-build method depend on a low weight so that the bridge can support itself during the construction phase.

Leca Norge delivered the aggregates for the production of lightweight concrete for the Nydalsbrua in Trondheim.

### LIGHTWEIGHT CONCRETE

In order to be able to build a bridge according to the free-build method, it is dependent on the bridge being able to fully or partially support itself in an unfinished state. And the greater the span of the bridge, the greater the challenge with self-weight.

By replacing conventional concrete with lightweight concrete, the specific weight of the bridge will be significantly reduced. Where normal concrete has a density of 2350 kg/m<sup>3</sup>, the density for lightweight concrete is only 1950 kg/m<sup>3</sup>.

A lower specific weight means that the span of the bridge can be longer, which in turn makes the placement of the foundations more flexible. Lightweight concrete will also be able to provide both lower construction costs and less CO<sub>2</sub> emissions.

The first bridge to be built with high-strength lightweight concrete in Norway was the Endrestø bridge in Rogaland in 1987. Since then, more and more bridges in the Nordics have been built with concrete of a lower density.

In this context, Leca lightweight aggregate has become an increasingly popular aggregate in the production of lightweight concrete.

Challenges related to pumping have been solved by pre-watering the aggregate before production itself.

In regards to Nydalsbrua in Trondheim, Leca Norge has delivered 1,200 m<sup>3</sup> of lightweight aggregate (Leca 800, 4-12 mm), which has generated the concrete quality LB55 MF40.

Unicon AS has been responsible for the actual production of the lightweight concrete. The company is Norway's leading concrete supplier with 150 employees and 24 permanent factories.

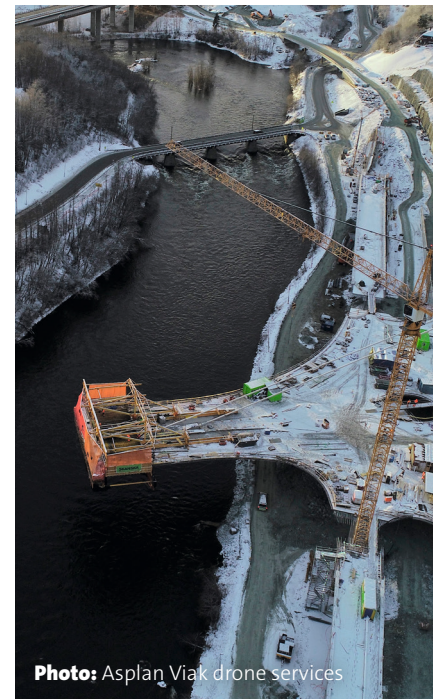


Photo: Asplan Viak drone services

**SKÅKABELBRU:** Nydalsbrua is built according to the free-build method. The bridge is cast in eight different stages from the Byåsen side towards the Sluppen side, where each stage is 8.5 metres.

### Project information

**Site:** Bridge in Trondheim

**Investor:** Statens Veivesen

**Contractor:** Skanska

**Project:** Nydalsbrua (combined cable-stayed box bridge and cable-stayed bridge)

**Product:** Leca 800, 4-12 mm

**Quantity:** 1,200 m<sup>3</sup>





# TWO STREETS CONNECTED, THERE IS NOW ROOM FOR CITIZENS

**Unloading,** spreading and compaction phase

**SPAIN** During 2023, various areas of the city of Madrid have been modified to create more environmentally friendly spaces for citizens. The connection between Pedro Bosch and the Doctor Esquerdo streets has been one of them, allowing for the elimination of barriers to the city by installing a new bike lane for sustainable mobility for its residents. Arlita® has supported the construction of this new space by providing a light and sustainable solution to the project.



**Initial situation** Vs situation after the improvement work



The project required dismantling part of the bridge on Pedro Bosch Street, thus allowing to achieve an open space at the junction with Ciudad de Barcelona Avenue. This new space will create a new barrier-free bike lane connecting the city in a more sustainable way.

The execution of the project was not easy, starting from the basis that it is developed in an urban environment and the work will coexist with the residents. The developers were forced to use construction methods that were not invasive but respectful to the local environment and in terms of noise. Any phase of the project that produced dust or noise was studied and corrected to prevent inconvenience to the residents.

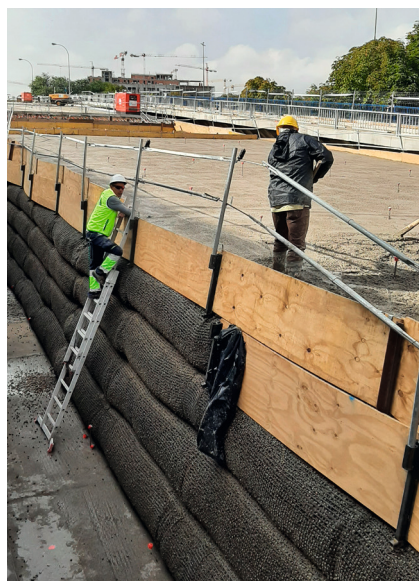
One of the challenges of the project was the works taking place in an area with an underground metro tunnel. This forced the developers to plan works with maximum care, such as filling when necessary to lower traffic from the bridge to street level. This filling had to be as light as possible to not interfere with the loads applied to the metro tunnel of line 6.

The construction of this section that leads traffic to the level of the street had to be executed in two phases allowing for the infrastructure connections for cars and buses to be constantly open. In this way, the first light filling was executed with Arlita® (with the granulometry of 10 to 20 mm) and this generated a design load of 400 kg/m<sup>3</sup>. The area closest to the bridge, with a height of 6 m, represented a load of 2400 kg. If the filling had been conventional aggregate, it would have generated an overload of 12,000 kg - so with the use of Arlita®, the load will be reduced by 80%.

### CONTAINMENT OF THE EMBANKMENT WITH GEOGRID

This project designed with Arlita® has important engineering characteristics and this how the suitable oedometer conditions (conditions necessary for the correct function-

ing of this material) can be achieved. Usually, these conditions are achieved with elements such as earth shoulders, concrete walls, reinforced earth walls, gabion walls or even concrete block walls, but all these solutions involve the use of concrete and steel that generate a high volume of emissions. The need to use a solution that is quick to execute, sustainable and with a very small CO<sub>2</sub> footprint led to the development of this innovative design solution. To ensure the correct functioning of the system, tests were carried out with various geogrids and with different geometries until an optimal result was achieved for this project. All tests were carried out in the prestigious Geotechnical laboratory of CEDEX in Madrid (Spain).



Lightweight embankment execution procedure

The development only requires wooden boards that function as temporary containment works while the geogrid is extended, and the material is then compacted. After the compaction and execution of the second layer (in this case they were 60 cm), the lower formwork can be removed to place it on the upper layer until the height of the project is completed successfully. This type of construction does not require foundations due to the low load exerted by the filling material, it offers a high stability, therefore, it allows for an extremely fast execution, with little personnel and few auxiliary equipment (spreading and compacting equipment) required.

### SUSTAINABLE AND SAFE CONSTRUCTION PROCEDURE

A modification as important as removing a section of a bridge more than 150 m long in an urban environment is a challenge for several reasons. The first due to the technical complexity of the operation and the second due to the limitations of the environment where it is carried out. An environment with a high density of inhabitants and traffic makes it very complicated to remove the sections that made up the bridge, as well as the introduction of a high volume of filling material to generate the new configuration. This problem was considered by the engineering firm and the city council, and it was decided that the use of Arlita (in addition to providing a lower dead load on the metro tunnel) would bring great benefits. This included rapid delivery (2,600 m<sup>3</sup> in 7 days) and with reduced logistical requirements since one truck can transport up to 75 m<sup>3</sup> compared to conventional aggregate which has a transport capacity between 13 to 15 m<sup>3</sup>. This means a reduction in traffic and emissions of 75-80%.

From the point of view of safety, it should be noted that possible occupational accidents are reduced by the absence of high-risk tasks such as working with steel and concrete, heavy formwork movements, etc., which is important for the workers who develop these jobs.

### Project information

**Project:** Partial demolition and restructuring of the overpass on Calle Doctor Esquerdo and Calle Pedro Bosch on Avenida Ciudad de Barcelona and the railway

**Client:** Ayuntamiento de Madrid.

**Ingeniería:** Torroja Ingeniería.

**Contractor:** Acciona Construcción S.A.

**Product:** (Leca®) Arlita® L

**Quantity:** 2.860 m<sup>3</sup>.





**The ground** was weak and unstable and required up to four meters of lightweight fill material.

# SUSTAINABLE LIGHTWEIGHT FILL ON THE E18 RING ROAD

**FINLAND** *The Kausela-Pukkila project on the E18 Turku Ring Road, implemented by Kreate, involved the demanding construction of lightweight fill structures.*

The difficult ground conditions of the E18 Turku Ring Road Kausela-Pukkila project required extensive experience and expertise throughout the different construction phases. Thanks to the close collaboration between Kreate, the engineers, and Leca Finland, the project could be completed with significant quantities of environmentally friendly Leca® lightweight aggregate (LWA).

Construction of the €35 million project, commissioned by the Finnish Transport Infrastructure Agency, started in August 2020.







**Construction of** the €35 million project started in August 2020.

### REDUCING SETTLEMENTS WITH LECA LWA

The soil in the project area has very high clay content. This thick, clayish soil made it particularly difficult to build underpass bridges and a bridge on the Aura River. Deep dikes were dug in the soil in the immediate vicinity of busy roads.

Project manager Ilkka Kaarakainen explains that several different methods of ground reinforcement were required in the clayish soil, including the replacement of soil and stabilisation. The site also required several lightening structures, some of them as thick as four metres.

“Leca LWA reduces the load on the subsoil caused by the overlying structures,” Kaarakainen says.

“We went through the project instructions with Leca Finland to make sure that even the thickest structures

were sufficiently compacted. We built up the lightening structure in sufficiently small layers, little by little.”

### A MASSIVE PROJECT

Deliveries of Leca LWA of grades between 4 mm and 32 mm were scheduled from September 2020 to June 2022. In total, a staggering 60,000 m<sup>3</sup> of Leca LWA was delivered to the site. It was delivered from Leca Finland’s plant in Kuusankoski, almost 300 kilometres away, usually in a few loads a day averaging 120 m<sup>3</sup> to 150 m<sup>3</sup>.

The Leca LWA was kept in an intermediate storage area to ensure that the work on the terrain could progress as fast as possible given the machine power at the project staff’s disposal.

According to Kaarakainen, the project logistics worked well. “Our site managers and Leca Finland’s logistics team made the deliveries work well - allowing us to work very efficiently.”

“The partnership with Leca Finland went well from the beginning, and despite the long transport distance, the material flows could be coordinated well and went as planned without a hitch. The material deliveries were completed as agreed and in accordance with the plans we made together.”

According to Marko Jelonen, Area Sales Manager for infrastructure solutions at Leca Finland, the Kausela-Pukkila project on the E18 Turku Ring Road has been one of the largest and most long-lasting infrastructure projects for Leca Finland in recent years.

Collaboration on the project went exceptionally well, and Jelonen was very pleased with the open and constructive discussions with the site personnel and engineers. He particularly emphasises how much he enjoyed working with Kaarakainen and Sami Laakso, the director of road construction.

#### Project information

**Project:** Lightweight fill on the Kausela-Pukkila stretch of the E18 Turku Ring Road

**Location:** Turku, Finland

**Client:** The Finnish Transport Infrastructure Agency in cooperation with the municipality of Lieto and the town of Kaarina

**Plan-and-implement model:** Kreate Oy

**Construction consultant:** Welado Oy

**Design:** Finnmap Infra Oy

**Leca product:** Leca® LWA 4–32 mm



*“It was great to work with such seasoned professionals.”*

**With Leca’s technical** support, even the thickest layers could be properly compacted.





**Norrtälje Harbor** is a brand new, sustainable district that is emerging next to a historic city centre.

# CLOSE COLLABORATION LED TO NEW SOLUTION FOR NORRTÄLJE HARBOR

**SWEDEN** *The geotechnical consultant and the contractor were able to find a smart solution by using Leca Trans 2. A unique product that is well suited for harbors and quays as it has the property of settling directly into water.*

NCC, is the executing contractor for this part of the new Norrtälje Harbor. They turned to Leca Sweden to investigate a possible solution for the sheet pile wall where they needed to fill material directly in water. But where one of the conditions was that the filling must not be too heavy. Based on the given circumstances, Leca Trans 2 was proposed as an innovative solution to NCC.



## HEAVIER, BUT STILL A LIGHTWEIGHTER

Leca Trans 2 is a special product that primarily have been used in other Leca countries such as Denmark. The product has a higher dry-bulk density and is therefore slightly heavier than the more well-known Leca-product Leca Infra 10/20. Despite this, it is easy to handle on the construction site and is still very much a lightweight product compared to conventional filling materials.

As 80 % of the material settles immediately, it is well suited where there is a need to tip material directly into high standing water.

“It had been done this way with good results in Uilenhaven in the Netherlands and we also did a small-scale test on site to ensure that the solution would work as we intended.”

Deliveries of Leca Trans 2 to the project started in the fall of 2021. The material was delivered by truck where a crawler excavator placed the material. To control the placement of material, the basin that was to be filled was sectioned using conventional masses. It provided better conditions for a controlled packing of the material and increased stability during execution. The installation was done by using long-armed excavators that could reach out with the material but at

“A challenge that emerged during the project was excess water. It was solved by putting in percolation wells with pumps. However, it was noticed that most of the water disappeared through cavities in the rafters above the water surface”, Frieberg explains. Together, material supplier, designer and contractor had the opportunity to explore new ground with good end results. And at the same time have important learnings for the future. The close dialogue and cooperation resulted in a good solution that all parties were satisfied with.



## FIRST TIME IN SWEDEN

“It was a close collaboration with the responsible geotechnical consultant. We exchanged a lot of ideas and issues back and forth because it was the first time this material would be used in Sweden”, says William Frieberg, technical specialist and geotechnician at Leca Sweden.

the same time stand on a distance on the existing pier. This is because the stability of the underlying clay was so low. Compaction of the material was executed in upper edge by overpasses with tracked vehicles. The superstructure was then compacted with road rollers that measured the compression and could see when it subsided.



## Project information

**Project:** Norrtälje Harbor  
**Year:** 2021-2022  
**Client:** Norrtälje municipality  
**Contractor:** NCC  
**Designer:** Geoteknologi Sverige AB  
**Leca product:** Leca Trans 2





The assembly of the elements and other processes could continue in parallel with the ongoing delivery.

# CPH AIRPORT'S LARGEST PROJECT EVER WITH THE EXPANSION OF TERMINAL 3

**DENMARK** Copenhagen Airport has completed its largest single project to date, an expansion of Terminal 3 between Gate C and B. The contract for the project was signed in March 2019 between the airport and contractor Per Aarsleff A/S, along with Cowi A/S, Vilhelm Lauritzen Arkitekter, and Zeso Architects.

The purpose of the collaboration was to develop a project that would lead to an expansion of the existing terminal with a whopping 60,000 sqm of new construction and 11,000 sqm of renovation. Building director Christian Poulsen from Copenhagen Airport had placed great emphasis on creating a terminal that passengers would remember and talk about. The terminal was supposed to make better use of daylight, and passengers should be able to experience the planes passing by outside.





In addition to the easy installation, Leca LWA guarantees a cavity percentage of at least 40%, whether used for ventilation or water retention. Moreover, Leca LWA has been used to fill between concrete walls and secant piles, which can otherwise be difficult to fill up, and with its lightweight and capillary-breaking properties, it also ensures the building against water and soil pressure.



#### Project information

**Location:** Copenhagen Airport  
**Client:** Copenhagen Airports A/S  
**Contractor:** Per Aarsleff A/S  
**Project:** Expansion of Terminal 3  
**Product:** Leca 10-20 mm coated  
**Quantity used:** 8.000 m<sup>3</sup>

**Application of** Leca's unique delivery system, where the material is blown directly into the desired location through flexible hoses using compressed air.



**Leca LWA has been** approved as a side support for pipes (DS-430), and at the same time, an extra work process in relation to subsequent plate insulation could be avoided in the foundation construction, as Leca LWA also has insulating properties.

When building on a project that is also a functioning workplace, there are generally very high demands on logistical solutions. When it is also an airport that is subject to particularly strict rules for transport routes on the premises and, of course, security, the executing forces face extra-large challenges. Aarsleff had originally chosen to use sea stones in their base construction, but after further calculations and considerations of the total project economy, environment, and solution, the choice fell on Leca LWA. By using Leca's delivery system where the material can be blown directly in using flexible hoses and compressed air, it was possible to use very little space, limit the need for personnel, and avoid taking up either cranes or machines.



INTERVIEW

*Meet the Global Sustainability Director  
at Ramboll Transport*

# Elina Kalliala



***Sustainable development requires  
broad-based collaboration and the  
courage to experiment***

***Elina Kalliala from Ramboll encourages construction operators to develop new things – and share their setbacks. Working together creatively and boldly helps tackle common challenges.***



**Elina Kalliala** is the Global Sustainability Director at Ramboll Transport. With around 3,600 colleagues, her job is to lead and develop sustainable development in the mobility, infrastructure, and land use sector.

“I have been with Ramboll Finland for 16 years. When I started, I was a graduate student of landscape architecture with a particular interest in sustainability and internationality. In my current role, I have had the opportunity to learn and promote sustainability practices in various countries and on different continents. Even if the cultures and practices vary, the goals are the same for everyone,” says Kalliala.

Sustainability has always been at the core of Ramboll’s operations.

“Our mission is to create sustainable societies where nature and people flourish. Sustainability is an integral part of Ramboll’s business, as was ensured by professors Ramboll and Hannemann, who founded the company in 1945,” says Kalliala.

Ramboll’s strategy focuses on sustainability and the four related unifying themes, which are directly linked to challenging global goals: biodiversity & ecosystems, decarbonise for net zero, resource management & circularity and resilient societies & liveability.

“Regarding these unifying themes, we want to increase our staff’s awareness and skills through concrete actions and develop practices and solutions with our customers in all our projects. It is no longer enough to focus on minimising negative impacts. Instead, we must also be able to increase the positive impacts of our projects holistically and in line with the principles of regenerative design.”



### **SUSTAINABLE MATERIALS PLAY A KEY ROLE**

**Sustainable and** interesting solutions are created by recycling and utilizing old structures and materials, Kings Cross, UK

Environmentally friendly products are of great value to the entire construction sector.

“We are all facing the same problem: we must find sustainable construction methods, and sustainable materials play a key role in that,” says Kalliala.

When it comes to development, much is expected of material producers, which is why Kalliala encourages all operators to be bold in developing and experimenting with new solutions and, where possible, to work with designers and contractors.

“We, as an industry, should experiment and develop resource-efficient materials that support the circular economy and can offer multiple benefits. This is a shared challenge, so it is important for all actors to work actively together. All open and purposeful activity will accelerate change.”

The whole sector aims to reduce the use of virgin raw materials and materials with a high emission intensity.

“The use of recycled materials and the potential for the reuse of materials should already be considered carefully in the design phase. Awareness of the properties of materials should be increased to facilitate reuse by knowing exactly what materials are used in construction and how they can be reused,” says Kalliala.





**A multi-functional** roof for everyone's use offers local farming and experiences using rainwater, Kampung Admiralty, Singapore





## INTERVIEW

### **NO CARBON NEUTRALITY WITHOUT THE CIRCULAR ECONOMY**

Whether it's emissions, raw materials or biodiversity loss, the circular economy provides a clear and concrete way to rise to the challenge.

"We should think about how to extend the lifespan of the existing built environment and how to make use of the elements and materials that are dismantled at the end of the lifespan. We already have good examples of how to use elements and materials from dismantled bridges or buildings, or how to raise an old bridge instead of building a new, higher one," says Kalliala.

The need and rationale for each construction project must be considered carefully, and thought must also be given to how buildings or building elements can be used or reused in the future. It also requires project owners, designers, and developers to have the courage to experiment.

"To make it profitable to produce new products in larger batches, the industry needs a common goal and approach to their use."

### **A CULTURE THAT SUPPORTS CREATIVITY HELPS SOLVE CHALLENGES**

Many of the challenges facing the sector, such as how to achieve carbon neutrality, are shared at the global level. These challenges must be solved in ways that help companies and communities meet their emission objectives. Kalliala is currently working on a white paper on how to accelerate decarbonisation of the infrastructure sector for the International Federation of Consulting Engineers.

"The white paper will be published around summer 2023. It will provide examples and support for best practices and key considerations for the different stages of the infrastructure life cycle," describes Kalliala.

A bold culture where new things are proposed and tried – and which also tolerates failure – would further drive the transition to sustainability and promote the tackling of common challenges. Building trust, creating a common mindset and looking at things from a shared, sustainable perspective can resolve various deadlocks. With the right creative atmosphere and culture, creativity can be nurtured more widely, both in communities and among professionals. This is something we are in desperate need of now and something that we all can contribute to.

"We are all facing a completely new challenges, and if we only make safe and easy decisions for fear of failure, we will not get very far. We already share good practices, but we should also share failures and experiments, and be proud of them, too. We need to challenge ourselves and each other genuinely and seriously to make the necessary change happen. Safe, familiar approaches alone will not be enough," says Kalliala.

For the good of society and humanity, it is important to harness everyone's creativity.

"We should all contribute in our own way to building a safe and supportive environment where creativity can be boldly use. Creativity as a driver of sustainability is not talked about enough, and we all have a part to play.

In the future, everyone in the industry will have to operate sustainably. There is no alternative – and being proactive and collaborative will certainly be rewarded," concludes Kalliala.

## **Creativity drives a transition to sustainability**



**Leca  
is part  
of the  
solution  
for floating  
wind energy**





**1. Lightweight aggregate concrete (LWAC) has been used for a long time. One of the earliest uses of reinforced LWAC was in the hulls of ships and barges from around 1918 in the USA. Why is LWAC still an important solution in the infrastructure market today? And what has changed over the last 100 years with LWAC technology?**

Well, we have the same challenges today as 100 years ago. Ships and floaters need to float and to achieve this, lightweight materials achieve better buoyancy. The weight of a concrete structure is still very dependent on the density of the material itself, so lightweight concrete offers a greater advantage. The quality of the LWA has improved significantly during the last 100 years in strength, density, ratio and variation. Today it is simple to make LWAC with a typical compressive strength of 60-70 MPa and still reduce the concrete density by 20-30%. The variations in the quality of the LWA is very low today with uniform and fine pore structure, resulting in standard deviation figures which are lower than for similar normal density concrete, which is remarkable. In addition, the binder system and reinforcement together with the knowledge on LWAC has improved. The largest improvement in recent times is the addition of additives including super plasticizers which make LWAC even more innovative, and this includes LWAC offering self levelling and pumpability for easy delivery to site.

**2. Can we compare normal concrete with LWAC, so we can substitute normal concrete with LWAC in every project, in terms of concrete characteristics, price, and sustainability?**

Yes and no. It is possible to substitute all normal weight concrete structures with lightweight concrete, but it is up to the Design Engineer to evaluate the benefits by doing so. It is all in the design, how to design and construct a sustainable structure. The LWA itself costs more than ordinary concrete aggregate, hence this will increase the concrete costs of the LWAC comparable.

From recent projects, my experience tells me that LWAC comes in at a 1.5 to 2 times higher price, depending on the mix design and logistics. It is therefore reasonable to use LWAC where you can find a benefit from the reduced weight and size of the construction. And there are several types of projects. Typical applications are floaters and structures with a long span. Here we can utilize the low weight and reduce the construction costs despite the higher unit price of the LWAC comparable. The LWAC offers good mechanical characteristics and can cover the price differentials when compared to normal density concrete. All designers should be able to calculate and design with LWAC.

Regarding the question on sustainability, the answer is similar; reducing the weight of the structure and being able to construct longer, wider, and slimmer designs, whilst reducing the concrete structure itself, will generate an overall more sustainable structural design.



**3. Today, LWAC is widely used across the world as an alternative to normal density concrete (NDC). Can you please mention some of the key projects in recent times where Leca® LWA was used in the design?**

I would like to highlight the Norwegian oil platforms and some of the world's largest bridges with long spans. This includes the Troll Oil and Gas platform which is a floater and a gravity-based platform with modified light weight concrete in the top shaft. Two recent bridges built in Norway are also highly noteworthy; The Tryssfjord Bridge is a 537m long cantilever bridge with LWAC in the main span. The current development at Nydal bridge in Trondheim is the first structure in Norway where we have pumped LWAC with pre saturated Leca® 800. I would also like to highlight the modern offshore windmill floater that was built in Spain recently by DemoSATH - we believe this structure is groundbreaking for floater design.



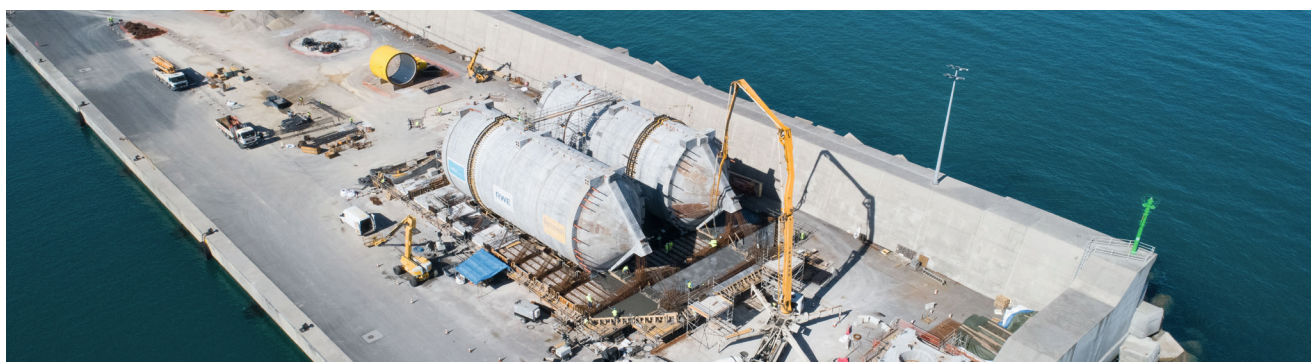


### 1. One of the possible applications of LWAC is in offshore technologies, can you tell us more about it?

As Geir mentioned, there are many projects with Offshore projects; ships, oil tankers and even oil & gas extraction platforms such as Trollwest. The use of lightweight concrete in a marine environment is recognized and proven, therefore this technology is applicable to the construction of floating platforms to support large wind turbines located offshore and in deep waters. This technology allows the size of the wind turbines to grow since it will be able to house larger diameter rotors, thus being able to generate more green energy in a more sustainable way.

We must be clear that this technology is under development and in the short/medium term we will be able to see 14 MW turbines with 222m diameter rotors. Can you imagine the size of the floating platform that a wind turbine with a 222m diameter rotor needs? These dimensions are difficult to imagine, for sure, but you can easily think of the size of a football stadium, and you won't be too far from reality. These are huge dimensions even for a single wind turbine but imagine the number of wind turbines it will take to reach the 17.6 GW that recent studies indicate will be needed by 2026.





**2. Can Floating structures be the solution to a greener electrical transition and guarantee a more sustainable future? Please share with us information on the DemoSATH – Saitec Offshore Technology project.**

The energy transition to green energy is a reality. We currently live in a scenario where energy is key to the development of our society and must be obtained in the most sustainable way.

The DemoSATH is an innovative project. The floating platform on which the wind turbine is installed is 30m wide and 64m long. The rotor has a diameter of 96m. The installed wind turbine produces 2 MW and it will be installed in the sea, off the coast of Bilbao. The SATH (Swinging Around Twin Hull) technology consists of a catamaran-type double-hulled barge made up of two cylindrical floats of precast modular light weight concrete (LWAC) braced to each other and two submerged plates of the same material. It is characterized by having a single anchoring point, which allows it to be aligned with the direction of the wind to make the most of the wind resource. This prototype and technology are developed by the Spanish engineering company Saitec Offshore Technologies and has a very interesting design concept when compared to other prototypes that are being developed on the market.

Its main characteristic, from the point of view of its construction, is that it has a design that allows for it to be assembled in its entirety in the port and then towed later to its location. In other words, it does not require complicated and expensive assembly operations on sea, where working conditions are very difficult. Through constructing a lightweight structure, the total assembled structure can be transported out of the construction harbor even on relative shallow waters.

Furthermore, the construction of the windmills is simpler onshore, where good weather conditions are required to install the wind turbines. If the selected technology allows the turbines to be installed very quickly, it will allow more units to start up and therefore generate greater profitability.

We must also highlight that the DemoSATH pilot, due to its reduced weight of the total structure is a result of design-

ing with lightweight aggregate concrete. This will allow these floaters to be built in a greater number of locations and ports around the world, improving the total sustainability of the design concept.

Another important fact is that building lighter parts makes it possible to build larger geometries with reduced resources such as cranes and manpower. We must not forget that these cranes in ports have very high costs and availability can be limited. Therefore, moving excessively heavy parts could create a bottleneck in production performance.

Sustainability is key for offshore windmill development. Not only to produce green energy, but also the way the projects are designed and conducted at inception. As mentioned by my colleague Geir Norden, the key to better sustainability is the design. Using LWAC will allow the Design Engineer to optimize the design of the structure in many ways.

There are many characteristics that make the DemoSATH a very successful prototype of what this technology will be in the next 4 to 10 years.

**3. Innovation and sustainability go hand in hand for the future of large-scale engineering and this project was recognized with two awards, tell us more about them.**

A project that consists of generating energy through wind turbines floating offshore in deep waters is certainly innovative. This innovation has been recognized and has won awards as you have mentioned earlier.

The first award for this project was for the material chosen to construct the floater; The lightweight concrete. This award was given by the ANEFHOP association (It is the association of the most important concrete producers in Spain). The second award was from the Federation of Aggregates (FdA) of Spain for the Sustainable Development Award in the category of Innovation and Climate Change.

For LECA and Saint Gobain, it has always been of great importance to spearhead projects that, through innovation, new technologies and materials, allows us to take the next steps towards more sustainable solutions.





## THE KLIMA 2050-PROJECT IN NORWAY IS COMPLETE

**NORWAY:** The traditional ways of managing rain and stormwater have been challenged by Leca! Leca was given the opportunity to develop and document Leca products for water management purposes through the innovation project Klima 2050. Klima 2050 was partly funded by the Norwegian research council and its main purpose was to create ideas and innovations to reduce societal risk connected with climatic changes.



Leca certainly contributed and we can now offer our customers an innovative and cost-friendly way to increase city resilience and protect infrastructure against torrential rain. Instead of constructing complicated and space demanding drainage and collection systems, we proved that Leca LWA is an ideal detention medium that delays water and reduces run-off intensity. If a Leca-solution is constructed for water management, Leca LWA's simple yet elegant function is due to its porosity and large surface area. This property holds water in check long enough for rain to safely pass without causing local overflows and flooding. Water will trickle out of the Leca LWA, and the material is ready for a second rainfall in just few hours. Thus, instead of expensive, outdated systems, the money saved can be used to build parks, gardens and recreational spaces on top of Leca-fillings that will fulfil the water management functionality.

Leca LWA can be both used for infiltration to the subsoil, and for detention on solid surfaces, e.g. on top of parking garages. A Leca substrate also significantly increases the efficiency of green and grey roofs. To evaluate during winter conditions, one of the major pilots was executed at Høvringen RA in Trondheim. A sprinkler system also constructed to be able to simulate extreme weather as well. Now the Klima 2050 project is ending, and you can read about all the research and development done at [www.klima2050.no](http://www.klima2050.no)







## ***LECA IS ON THE WAY TO A SUSTAINABLE FUTURE***

Our goal is to be part of the solution to a problem affecting the entire world - how do we guarantee a sustainable future? By investing in environmentally friendly forms of energy in our operations, we can reduce the use of fossil fuels. In accordance with life cycle thinking, our product is long-lasting, durable, safe and, above all, reusable in many ways. Curbing climate change and adapting to it requires concrete change from the construction industry. The change is not easy, and not all the steps are clear yet, but the joint journey must start today. Everyone must do their part to ensure a sustainable future for all of us.

Do you see a path towards a carbon-neutral built environment? We see.

Are you ready to take the next step with us? Read more: [leca.com](https://leca.com)







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