BETOLAR

Concrete Chronicle

Betolar Annual Review 2023

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Betolar's world view is evolving **PAGE 16**

Mission possible: Turning data into business **PAGE 25**

Betolarians share the mission to build a better tomorrow **PAGE 26**

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Our sustainable hollow-core slab technology enables:

- Up to 75% lower CO2 emissions compared to standard hollow-core slabs
- Fast mould cycle, curing and retention time for efficient production
- Similar characteristics with cement-based concrete and compliance with EN standards

GEOPRIME®
BETOLAR

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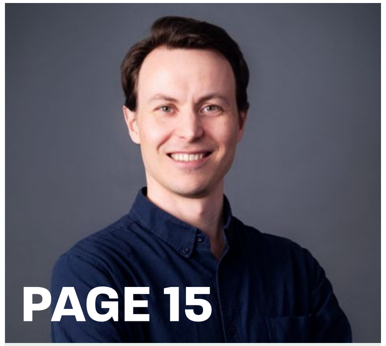
EDITORIAL BY RIKU KYTÖMÄKI
Solutions that work for the planet

MARKET INSIGHT Navigating to the high-volume markets



GUEST COLUMNIST ANTTI RUUSKA
Earth's carrying capacity sets the boundaries of sustainable construction

COLUMNIST HASSAN RAAD
New standards needed to unlock sustainable construction

SUSTAINABILITY IN FOCUS
We can do better, states Melina Pinomaa

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SOLUTIONS DO NOT JUST COME BY SITTING IN MEETINGS. WE NEED THOSE WHO BRING CHANGE TO ENTRENCHED STRUCTURES BY CREATING NEW INNOVATIONS AND WAYS OF WORKING.

Solutions that work for the planet

The survival of the planet is not a simple equation. Humanity needs structures for all its activities. However, the sustainability of construction and mining activities in terms of climate impact and saving virgin raw materials presents a significant challenge.

Solutions do not just come by sitting in meetings. We need those who bring change to entrenched structures by creating new innovations and ways of working. As a materials technology company, we bring solutions.

RIKU KYTÖMÄKI
CEO
BETOLAR PLC

Rather than focusing on the past, we want to focus on the future. That is what we can affect, that is what we are creating and that is where we are going.

With this annual journal, the Concrete Chronicle, Betolar showcases how to reduce the environmental and climate effects of big industries, such as by upcycling the waste materials from energy and metal production.

Last year, we made market openings and signed important partnerships. We refocused our strategy after gaining valuable new insights into the performance and applicability of our technology solutions in different product segments.

Our team has developed to align with the strategic business goals that we have determined to be most important for our growth and success. Large-scale business opportunities also lead to significant benefits for the health of the planet.

A clear strategy and a focus on growth markets

We updated our strategy in March last year. The understanding of the market for our solutions has grown rapidly in the early years of the company. Our focus has sharpened as we have identified new application areas, new markets and new partners.

To grow a business, one needs product categories that can scale quickly, customers from around the world and markets with high demand. That is why we are focusing on the mining industry as our growth driver. Our solution significantly increases the degree of circularity in the use of side streams, mine construction and waste management.

> The sustainability of construction and the mining industry is a major challenge in terms of climate and natural resources.

The rate of adoption of our solutions in the smaller concrete product groups has been too slow to accommodate growth. The pioneers are indeed open-minded, but often local or regional. We will contin-

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> Our new focus is on larger-scale customers and applications in the mining sector.

ue to support them, however faster growth will come from elsewhere.

The mining and concrete elements segment have a much larger market and more international players. We have made progress with concrete product manufacturers in Europe and Asia on industry-changing low-carbon solutions.

The regulation of some building materials in the EU has not kept pace with technological developments in alternative building materials. Elsewhere in the world, there has already been a move towards performance-based standardisation.

We have been able to create innovative material solutions that meet regulations while radically reducing emissions. Most importantly, the products have excellent properties. You can read more about this theme in a column by Hassan Raad, our R&D Director, among others.

Mining is a global growth industry

Our new focus is on larger-scale customers and applications in the mining sector. A key role is played by the exploration and commercialisation of untapped industrial side streams. Our focus on side-stream-centric, larger-customer and higher value-adding mining and construction materials is building our growth on a new foundation.

In particular, long-term research into unused side streams enables new value for our materials technology, our customers and the environment.

Mines produce a large amount of side streams and also require large quantities of cement for their. The entire mining value chain at different stages generates new business for Betolar through the recovery of side streams, shotcreting, filling of mine tunnels and tailings stabilisation.

A stronger grip on the value chain provides steering power

Cement prices have risen, driven by geopolitics and inflation. At the same time, the price of already known side streams has also risen. New industrial sources of side streams are therefore needed. Their usability needs to be studied and commercialised.

Side stream logistics offers Betolar the opportunity to play a bigger role in the value chain.

We are building hubs that will transfer side-stream materials and chemicals. Our AI platform will create a marketplace for side-stream trade. It will exponentially increase our own data foundation and bring knowledge advantage.

Combining Betolar's mix design knowledge together with innovative trailblazer concrete manufacturers and end-users enable fast development of material solutions that meet the sustainability requirements of the value chain.

The construction sector is undergoing a fast transformation thanks to the private and public sector developers and the societal support for innovation. As Antti Ruuska, the CEO of the Finnish association of the World Green Building Council network, says in his column in this magazine, they are creating sustainable change together.

A vision for a better world drives the community forward

Our business is built on the quality and intellectual property rights, as well as the industry knowledge and logistical knowhow that we have acquired in Betolar. Our work community's distinctive culture supports our vision, our capability and our aspiration to participate in the global green transition.

By executing the strategy effectively, we will establish a more solid foundation for growth and scaling. You can find out how on the next pages. The planet is grateful for the effectiveness of the solutions. ■

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CONCRETE HIGHLIGHTS OF 2023

0.5 M€	3.2 M€	9
Net Sales	investments	patent applications in progress

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AALBORG HARBOUR CUTS PAVING EMISSIONS IN HALF

In Denmark, a large cargo area in the port of Aalborg was coated with Geoprime paving stones. The paving stones for the 110-trailer park used 90% less cement while cutting emissions in half. IBF has prepared a CO_2 emission calculation based on the requirements of the European Construction Standard (EN15804).

"Our goal is to be a forerunner in sustainable development. In the competition, IBF was the most innovative concrete producer, able to demonstrate a reduction in carbon dioxide emissions of more than 50%," says **Brian Dalby Rasmussen**, Project Manager at the Port of Aalborg.

READ MORE >>

Reform of concrete standards

Betolar is working to reform concrete standards. The aim is for performance-based standards to support the adoption of low cement and cement-free building material technologies.

In August, Betolar joined the Alliance for Low-Carbon Cement and Concrete (ALCCC). It promotes, within the framework of the Environmental Coalition on Standards (ECOS) the use of low-carbon cement and concrete.

"Construction and buildings are a major contributor to global warming and resource depletion. Concrete standards must be reformed to support the adoption of new technologies," says **Ville Voipio**, Chief Commercial Officer at Betolar.

READ MORE >>

AQUAFIN STARTED INSTALLING GEOPRIME SEWER PIPES

The production of sewer pipes based on Betolar's technology started in October 2023 at Aquafin's sewerage plant in Duffel, Belgium. Aquafin installs around 200 km of drainage and waste water drainage pipes every year.

Geoprime drainage pipes are designed for the conveyance of rainwater. They use alkali-activated industrial side stream as a binder. The use of side stream material instead of cement reduces CO_2 emissions from the raw material by up to 78% compared to conventional concrete.

READ MORE >>

New projects supporting side stream circularity

In December 2023, Betolar announced that it will start a side stream study with Eesti Energia to investigate the use of ash from oil shale combustion as a binder for concrete.

In September 2023, Betolar signed a contract for a side stream study by Inno Precast Company Limited, part of the leading real estate developer Pruksa Group in Thailand. The objective of the order is to study and analyse local alternative side streams to promote a green transition in the production of concrete products.

In November 2023, Metso and Betolar announced a collaboration to offer Betolar's side stream technology globally to

customers in the mining and refining industry using Metso's lithium hydroxide process. Betolar's material technology solutions will analyse the analcime sand produced as a side stream in lithium separation and its downstream processing value.

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685	60	8
CO_2-eqv tonnes carbon handprint	staff in average	international professional events

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LOW-CARBON HOLLOW-CORE SLABS TESTED IN FINLAND AND MALAYSIA

In summer 2023, precast concrete manufacturer Consolis Parma and Betolar announced an extensive test programme for low-carbon hollow-core slabs.

"Together with Betolar, we have carried out industrial-scale production tests and validated the production potential for hollow-core slabs with very low cement volumes. The test results show that it is entirely possible to produce a structural concrete product even almost entirely without cement," says **Hannu Tuukkala**, CEO of Consolis Parma.

The research and testing phase included extensive laboratory tests both at Betolar and at Consolis' material development centre in Rusko. Industrial-scale production testing was carried out at Parma's Hyrylä plant. After factory pilots at the end of the year, the technology was also transferred to a concrete element manufacturer in Malaysia.

€2.7 million for side-stream research

Business Finland awarded Betolar a significant grant for extensive research and development work on side streams. It will fund half of a research project to identify and evaluate different side streams to replace cement. In addition, Betolar will develop standardised methods for the treatment and use of these materials in construction.

Valuable contacts from events

Betolar's solutions attracted widespread interest at several international construction and environmental events. Meetings with leading industry players and pioneers in sustainable business focused on questions about the future of concrete construction and Betolar's answers to them.

In 2023, Betolar participated in leading events in its key markets, attended by thousands of experts, decision-makers and investors.

- Concrete Expo (London, UK)
- World Circular Economy Forum (Helsinki, Finland)
- EIT Raw Materials (Brussels, Belgium)
- BIBM Congress (Amsterdam, Netherlands)
- ACE Reflect (Ahmedabad, India)
- European PropTech Association Startup & Scaleup Europe Award 2023 (Brussels, Belgium)
- World of Concrete (Mumbai, India)
- Green Building Congress (Chennai, India)
- Reuters Events Responsible Business Awards (London, UK)
- Beton Event (Rotterdam, Netherlands)
- MENA Green Building Awards (Dubai, UAE)
- SLUSH (Helsinki, Finland)
- The Big 5 Global (Dubai, UAE)

Betolar entered critical metals research

The EXCEED project aims to explore sustainable ways to recover specific critical metals from lithium mines and unlock the full industrial mineral potential of Europe's vast critical metal resources.

Europe is currently dependent on imported lithium for the production of lithium batteries. Batteries are key to achieving carbon neutrality in the energy and mobility sectors. The four-year innovation project involves Betolar, Imerys, Keliber and several European research organisations such as VTT and the University of Oulu.

READ MORE >>

Enabling more sustainable mining

Betolar accelerated the commercialization of its technology in the mining industry, which generates large quantities of currently unused side-stream materials.

"There is huge resource potential in mining side streams. With our technology, the side streams can be used as a binder and aggregate for concrete, reducing, among other things, the use of cement and its negative impact on the climate," says **Pasi Karekivi**, Development Director of Betolar's mining business.

With Betolar's solutions, side stream materials can be used in massive structures in the mining industry, replacing cement. In addition, unused side streams can be diverted to the safe stabilisation of soil and tailings.

In November 2023, Betolar became a member of Mining Finland, the mining industry's representative organisation

PATENTS FOR RADICAL INNOVATIONS

In June 2023, Betolar received approvals for a patent related to the use of waste materials in electricity storage. The patent on electricity storage was extended to the European, Indian and the US markets.

"Our invention relates to a method in which a waste-based concrete-like mass has the ability to store electricity. The mass could be used in infrastructure products such as solar panel bases, building foundations or wall elements," says **Jarno Poskela**, CTO of Betolar.

Betolar's normal product development process generates innovations that, at best, lead to new value-added, patentable solutions. To date, Betolar has received approved patents for five inventions. A further nine inventions are in the process of being approved for patenting.

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New remedies for the growing pains of a growth company

Green construction may seem like a simple goal on a strategist's map. But the world has never been built without a clear vision, dealing with ambiguity and constant learning. You can only innovate if you are willing to go on an adventure and confront the issues, quandaries and hardships that arise along the way.

Betolar had a clear roadmap when it became a public company at the end of 2021. The positive message of the green transition in construction has been spread with high expertise and passion.

"Our strategy is focused on commercialising the Geoprime concept as a replacement for cement and launching international business through customer pilots, partnerships, development and testing of solutions. What's new are higher volume product categories than before," says Riku Kytömäki, CEO of Betolar.

This discovery leads to a change in emphasis from concrete products to concrete elements and further into large-scale mining and its side streams. In particular, attention is being directed towards research into the processing of new, as yet non-commercial, side streams.

> What's new are higher volume product categories than before.
>
> RIKU KYTÖMÄKI

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Pioneers in the green transition make products without cement

Betolar's Geoprime solution has been tested and developed in a number of pilot customers since 2021. Lessons on product characteristics and manufacturing methods have been learned from both customer projects and Betolar's research and product development.

The challenger technology has demonstrated the ability to quickly and completely replace cement in many concrete companies. Pioneering companies in Europe, India and the Middle East were quick to adopt the world's lowest-carbon materials technology, as the change did not require significant investment in production lines.

Manufacturers were able to quickly cut CO_2 emissions from concrete raw materials by up to 80%. This also enabled manufacturers of landscape and infrastructure concrete products in Central Europe to offer their customers emission reductions with their new technology product ranges.

"We have tested the product properties to find a cement substitute that meets the strength and durability requirements. The pavers must be able to withstand heavy loads. We have succeeded in this by using a binder based on the Geoprime solution," says **Esben Mølgaard**, product manager at Danish concrete product manufacturer IBF.

IBF supplied Betolar's solution paving stones for the 1.5 hectare car park of Aalborg, Denmark's fourth largest port. The aim of the project was to cut CO_2 emissions while ensuring the strength and wear resistance of the pavement.

Construction craves sustainable solutions

Another European customer of Betolar, Tubobel from Belgium, made drainage pipes without cement. They used the Geoprime solution to make alkali-activated concrete (AAM sewer pipes, which were put in last year at a sewage plant in Duffel, Belgium run by Aquafin.

The binder used in the manufacture of Tubobel sewer pipe is industrial side stream. The use of side stream material instead of cement reduces CO_2 emissions from the raw material by up to 78% compared to conventional concrete. In addition, Geoprime can be recycled in the same way as concrete sewer pipes.

"We spent a lot of time and energy developing this product. Aquafin's project has helped us to expand our range of innovative and environmentally friendly products and cut our emissions," says **Evert Lemmens**, CEO of Tubobel.

Danish IBF is one of the first European concrete product manufacturers to adopt Betolar's low-carbon solutions.

Geoprime in brief

Geoprime represents a new era of building materials by offering a more sustainable alternative to traditional cement. The focus is on utilising various industrial side streams as binders to replace cement and concrete products, for example.

The science behind Geoprime has been studied at an academic level for decades, focusing on the properties and application potential of geopolymers.

Geoprime offers an innovative and environmentally friendly building materials solution, combining process and utilization of mining side streams, proven reliability and versatile suitability. It is an attractive option for designers, builders and investors looking for a more sustainable and greener way to build the infrastructure of the future.

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Manufacturers and customers cut their emissions

By using side streams, Geoprime products reduce the need for fossil resources and meet the global demands of the circular economy. The IBF has developed a CO_2 emission calculation based on the requirements of the European Construction Standard.

For example, the Port of Aalborg can use the IBF's calculation to document its CO_2 emission reductions.

"Our goal is to be a forerunner in sustainable development in our industry. In the competition, IBF was the most innovative concrete producer, able to demonstrate a reduction of carbon dioxide emissions by more than 50%. The emission reduction targets were exceeded using IBF and Betolar's solution," says **Brian Dalby Rasmussen**, Project Manager at the Port of Aalborg.

Experts from WSP, the international built environment planning agency involved in the project, were also impressed by the reduction in emissions. For WSP, the Aalborg Port project is a reference project.

> By using side streams, Geoprime products reduce the need for virgin natural resources.

Precast solutions bring economies of scale

Landscape and infrastructure concrete products are made by thousands of manufacturers across the globe. It would take a lot of resources to make each of them more environmentally friendly. That's why Betolar has looked for product groups where bigger players dominate the market and production.

"We see that in the manufacture of concrete elements, the players are larger multinational companies. We have moved beyond paving stones and sewage pipes to larger building industry products such as concrete elements and hollow-core slabs. We have the technical capability to move to completely cement-free products, but standards established decades ago still require the use of cement at the moment. To address this, we have to include a certain amount of cement to our mixes," says **Ville Voipio**, Chief Commercial Officer at Betolar.

> We have the technical capability to move to completely cementless products, but standards still require the use of cement.

Betolar, together with Consolis Parma, developed the world's most low-carbon hollow-core slabs to bring low-carbon concrete to the precast industry. The research and testing phase of the development collaboration between Consolis Parma and Betolar has included extensive laboratory and production testing.

"Together with Betolar, we have carried out several industrial-scale production tests with different types of hollow-core slabs. These tests have validated the production potential for hollow-core slabs with very low cement consumption. The test results are so promising that it is entirely possible to manufacture such a structural product almost entirely without cement," says **Hannu Tuukkala**, CEO of Consolis Parma.


In Belgium, Tubobel builds a water system low-carbon pipes made with Betolar's Design mixes.


Duffel Mayor Jos Hellemans (left), Tubobel CEO Evert Lemmens and Aquafin Project Innovation Director Danny Baeten.


Betolar's Chief Commercial Officer Ville Voipio.

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From local manufacturing to big players

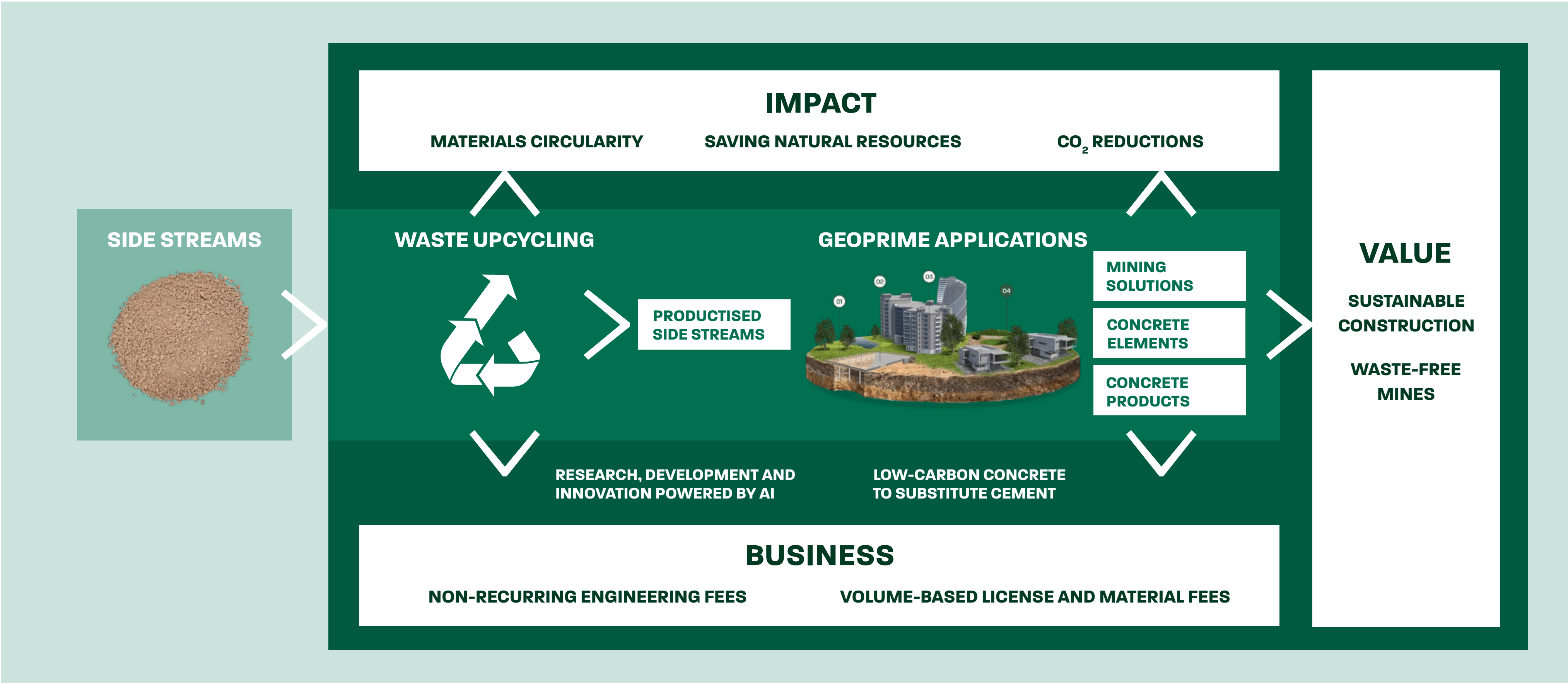
Betolar made the market entry in 2021 by introducing product groups with smaller requirements, such as paving stones and sewer pipes, as well as foundations for charging stations. The Geoprime solution remains ideally suited to these needs.

"During the first years of operation, we gained experience in different markets and different product groups. We updated the company's strategy in the spring of 2023, when we had identified the most natural next-phase markets and product groups," says **Riku Kytömäki**, CEO of Betolar.

Partnerships with major international players such as Metso, provide global coverage for the mining solutions developed and produced by Betolar.

"Our Geoprime concept has proven to be a viable solution for low-carbon concrete products. Betolar is now ready to accelerate growth in the building elements and mining sectors. Attractive growth prospects for new cement-free solutions have opened up there," Kytömäki says.

BETOLAR UPDATED IT'S STRATEGY IN MARCH 2023



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Updated strategy clarifies direction

To accelerate the scaling of its business, Betolar renewed its strategy for 2024–2026 to become the most attractive green transition partner for the construction, concrete, cement and mining industries.

"Growth will come at a slower pace but stronger than we originally estimated. Our goal is to continue to lead the way in solving global sustainability challenges in construction and process industry. There has been no need to change that assessment," Riku Kytömäki concludes.

Betolar's updated strategy is based on five key themes. They direct the company to focus on the most important drivers for scaling the business.

FIVE CONCRETE PILLARS OF THE STRATEGY

1 NEW USES FOR ALTERNATIVE SIDE STREAMS

At current levels of concrete production, replacing cement entirely with side streams such as fly ash and blast furnace slag would require four billion tonnes of side streams per year. Such quantities are not available on the market. Therefore, identifying and developing alternative side streams from the steel, energy and mining industries is key. In particular, the commercialisation of low-cost waste streams is a key strategic driver for Betolar.

2 A STRONGER GRIP ON THE VALUE CHAIN

Different industries produce billions of tonnes of industrial side-streams that end up in waste ponds and landfills around the world. By developing local solutions for waste recovey and materials recycling, companies can radically reduce their environmental impact. At the same time, they can generate new revenue streams from what was previously considered waste. Betolar is seeking a stronger position in the value chain of side streams, for example through cooperation agreements and logistical networks, investing in material centres where necessary.

3 TOWARDS A NEW SCALE

In addition to low-carbon precast solutions for the construction industry, Betolar's fast-growing potential lies in the mining industry. Research into the side streams of the mining industry is helping to find new material solutions. At the same time, the mining industry is also being helped to meet its own needs, such as shotcreting of structures and paste filling of closed mine shafts. In other words, mines are both producers and, to some extent, users of side-stream materials.

4 TO THE BEST MARKET FIRST

80% of the world's mining industry is located in Asia. Betolar focuses its sales and marketing on key geographic markets based on the demand for green transition, the availability of side streams and Betolar's ability to deliver economic value through productised applications. Building a global supply chain is based on understanding local needs and requirements and managing value chains.

5 INCREASING VALUE FROM DATA

Betolar's strong research and product development work is further boosted by the data that is accumulated from different customer cases and product applications. It accelerates the development of design mixes and customer applications by systematically collecting data and using artificial intelligence in R&D processes. Data-driven platform services will be built around the business model, with Betolar's AI platform playing a key role. The platform will bring together ecosystem partners to scale the green transition.

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Side stream availability and price formation changing the game

The availability and price of side streams play a key role in creating business value. Increased demand for existing known sources of side streams, in particular blast furnace slag and fly ash, has led to rising prices for these raw materials, while production volumes are decreasing globally.

"Betolar has studied several new side stream options in its laboratories, but now the research is also being offered to side stream producers as a consultancy service. We see a strong rationale for the service, as if a viable solution is found, Betolar is well placed to develop its solution with the help of the side stream," wrote **Antti Viljakainen**, principal analyst at Inderes, which follows Betolar, in a report in January 2024.

One of the key priority changes in Betolar's strategy update is to accelerate the development of alternative side streams to replace cement in concrete. Taking a stronger position in the value chain of side streams will allow Betolar to have better value creation potential in the future.

Side-stream research benefits the whole value chain

The most promising direction for Betolar is solutions for the mining industry and side stream exploration. These will benefit the entire value chain, as current side-stream alternatives to cement will not be sufficient, and the growing volumes of side-stream will require sustainable further use. New researched and tested alternatives and their sources are needed.

> We see a strong rationale for the service. Betolar is well placed to develop its solution with the help of the side streams.
>
> ANTTI VILJAKAINEN, INDERES

The mining industry in particular is struggling with its side-stream waste and its huge construction needs. Recently, Betolar has been active in the mining industry. Side stream research has expanded rapidly, and services and products for the mining industry have become a major part of the company's offering. Betolar offers cementless solutions for large-scale filling and concreting of mines.

"As a provider of low-carbon solutions, our new strategy emphasises our core competences. It is science-based material and side stream knowledge combined with deep industry expertise," Kytömäki explains.

Last autumn, Betolar was awarded a Business Finland grant to identify and evaluate alternative side streams and use them in standardised form in concrete production. The estimated cost of the project is €5.4 million, of which Business Finland will provide up to €2.7 million in grant funding.

"We need companies like Betolar that develop new solutions and boldly innovate business models. Betolar is an excellent example of a pioneer in the green transition," says **Kaisa Holma**, Business Finland expert.

New patented inventions quickly bring side streams into the business

Betolar's patent portfolio has strengthened over the last year and the previous year, particularly in the areas of side stream research. In 2022, Betolar patented its gypsum slurry invention, which can reduce both the risks of gypsum slurry ponds and the costs of landfilling side streams.

"Our invention relates to a method for treating and recovering wastewater, sludge and dregs from a mining site. Waste materials, such as gypsum slurry, can also be used in other civil engineer-

New business from side stream research

Side streams from industrial production or mining have a very high potential for the circular economy. Betolar's side stream research service offers a comprehensive material analysis and a clear path to take side stream materials into new use. In addition, the carbon handprint of a new product and the potential for cost savings can be modelled for financial and ESG management and reporting, among other things.

The process of side stream research covers scope definition, research and analysis itself, commercial analysis, and piloting and production. A holistic approach enables the optimisation and integration of side streams into the circular economy, which not only reduces environmental impact and associated risks, but also reduces waste treatment costs, frees up storage space and makes more efficient use of land.

Betolar's AI platform has analyzed the properties of hundreds of different side streams, which has made it possible to optimize design mix for different properties. In its purest form, side stream research promotes the circular economy and offers concrete benefits to producers of side streams, while enabling more environmentally friendly and cost-efficient production.

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The mining industry generates a huge amount of side streams that can be utilised in the production of low-carbon concrete.

Betolar is increasing its lead in know-how by producing data on industrial side streams for its databank and the use of its artificial intelligence platform.

Betolar's COO Tuija Kalpala

ing applications, which will be of value to Betolar's business down the line, said founder of Betolar Juha Leppänen, then Innovation Director and current board member, in summer 2022.

The green transition is not only about CO_2 emissions from materials, but also about solutions for the production and storage of renewable energy. A key challenge for wind and solar energy production is energy storage, in particular balancing supply and demand.

Battery technology is currently not at a sufficiently high level, even though it has developed in leaps and bounds in recent years. Betolar patented a process that can make use of large quantities of waste-based material.

"A waste-based concrete-like mass has the ability to store electricity. It creates new and interesting opportunities in infrastructure construction. For example, the mass can be used in solar panel bases, building foundations or wall elements," says Jarno Poskela, CTO of Betolar.

Data platform and logistics connect the concrete industry globally

Betolar has built a one-of-a-kind AI platform for storing test results and analysing data from side stream analysis. Concrete manufacturers can in the future be offered commercially viable manufacturing design mixes.

The aim is to scale up innovative and cost-competitive low-carbon design mixes using different side streams to needs. A data-driven head start will create opportunities to build a multilateral trading platform for the concrete industry, bringing platform economy solutions to different actors in the value chain, such as side-stream producers and users of side-stream materials.

> The ability of waste-based, concrete-like mass to store electricity creates interesting opportunities in infrastructure construction.
>
> JARMO POSKELA, BETOLAR

Building a global supply chain means understanding local needs and requirements.

"We focus on sourcing appropriate side streams and chemicals for our customers in the construction and mining industries. The key to our success is finding the right partners for a strong supply chain and establishing logistics hubs in key markets in Europe, the Middle East and Asia," defines **Tuija Kalpala**, Betolar's Chief Operating Officer.

Betolar delivers solutions for a growing global need

The price of cement has risen in response to war-driven inflation and increased demand. The prices of identified and certain standardised alternative side streams have correlated with the price of cement. In addition, the availability of these materials are estimated to diminish as demand for cement substitutes increases.

"The amount of concrete being used is growing faster than the world's population. We need to find substitutes for cement. Otherwise, the carbon footprint of construction will continue to grow, when it should be radically reduced. The pressure is creating a growing global demand for players like us and our solutions," Riku Kytömäki sums up.

Naturally, Betolar has faced a variety of growing pains on its path from a backyard furniture manufacturer to a global player in the concrete industry.

"Now, major cures have been found for these ailments," Kytömäki diagnoses. ■

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Building success within the limits of earth's carrying capacity

Construction has a key role to play in addressing the world's sustainable development problems. The energy transition and the circular economy are the keys to solving the twin crisis of nature and climate. The necessary systemic change will be achieved through cooperation across the value chain.

A troubled world is shaking up sustainability development

The world is facing many challenges and the future seems unclear and grim. At FIGBC, we paused to consider what kind of future we would like to create for the industry.

Energy and material scarcity is a key driver of sustainability change. Energy is not an unlimited resource, nor is it cheap in a world of conflict. There are also shortages of many raw materials.

The real estate and construction sector produces one third of emissions in Finland. Globally, the sector uses half of the world's resources. Average temperatures are currently rising by more than two degrees Celsius. These are bad things for society, for the planet and also for business. We need a rethink.

The climate and biodiversity crisis must be solved together

Construction will continue to play an important role in society. It creates the framework for a sustainable lifestyle. It also plays a key role in addressing the major challenges of our time.

The aim is for the sector to thrive within the carrying capacity of the planet. This requires putting sustainability genuinely at the heart of business and moving from minimising harm to delivering positive impacts.

The twin crisis of climate change and biodiversity loss must be tackled together. Built environment design and the circular economy can make a significant contribution to these issues. Buildings will then last for a long time, materials will be recycled and waste will be avoided.

Change is required from everyone, from owners to developers and financiers. Project by project. A change in thinking is also needed in zoning regulations and legislation.

Forerunners show the way

The construction sector has started to move from words to concrete actions. The circular economy and responsibly produced materials are of increasing interest to manufacturers in a wide range of sectors.

The manufacture of construction products uses by-products and waste to produce highly processed products. Soil and aggregates will be efficiently utilised and recycled, resulting in a significant reduction in the extraction of virgin materials.

Concrete is widely used in construction. Emissions from conventional concrete account for about 8% of global emissions. The use of industrial side streams in concrete production will radically reduce emissions, accelerating the green transition and making concrete more competitive.

In the future, concrete may even serve as a carbon storage. This would allow more carbon dioxide to be sequestered in concrete products than is released from their production.

There are already some good experiences and lessons learned from the sector on how to make the sustainability transition at company and project level. The FIGBC brings together knowledge and expertise from across the value chain to support industry development and decision-making. Together, we aim to develop and communicate new solutions and get them more widely adopted. In this way, change moves from theories to common industry practices. ■

COLUMN

Photo: Annikka Miettinen

ANTTI RUUSKA

Antti Ruuska, Doctor of Science (Technology), has started as the CEO of Green Building Council Finland (FIGBC) in spring 2023. Ruuska has previously worked as a Director of Sustainability at YLVA, which rents business and office space owned by the Student Union of the University of Helsinki HYY, and at VTT in various positions as a researcher and developer of a sustainable built environment.

Green Building Council Finland (FIGBC) is a non-profit association of sustainable built environment. Its members represent the entire built environment, throughout the value chain and life cycle.

"FIGBC's goal is the sustainability transition of all actors in the entire built environment. We produce information, know-how and tools to make this possible," Ruuska says.

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Betolar world view

AIMING FOR GLOBAL IMPACT

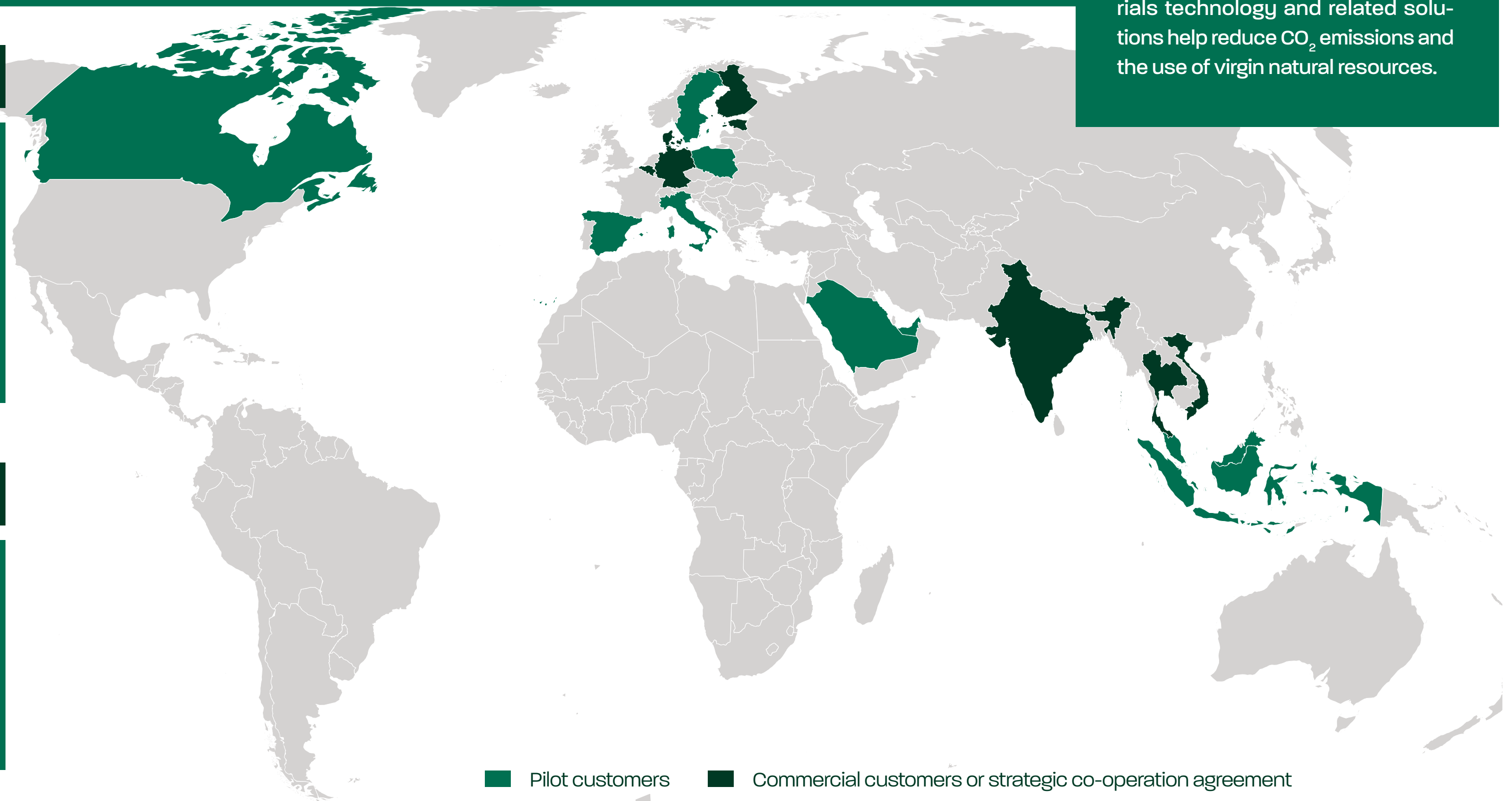
Betolar's cement replacement materials technology and related solutions help reduce CO_2 emissions and the use of virgin natural resources.

STRATEGIC FOCUS

- To be customer's number one choice for utilising alternative side streams
- Shifting the focus to larger customer applications in the mining and construction industries
- Focusing on four product segments: mining, waste upcycling, concrete elements and concrete products

BUSINESS MODEL

- Licensable Geoprime material technology solutions are offered with ongoing volume-based license and material fees.
- Non-recurring engineering fee (NRE) projects especially for the mining industry and side stream owners



BUSINESS OBJECTIVES (updated on 14 February 2024)

- Accelerating research and application development of alternative side streams
- Creating a stronger position and value creation potential in the value chain of side streams
- Global scaling of Betolar's solutions to high-volume and scalable customer segments
- Expansion into key markets based on demand for green transition, availability of side streams and Betolar's ability to deliver economic value through productised applications
- Building a data-driven business ecosystem
- Development of commercial platform services on Betolar's AI platform

FINANCIAL OBJECTIVES (updated on 14 February 2024)

MEDIUM TERM

- Net sales EUR 50-100 million at the end of 2026
- Achieving positive cash flow from operating activities during 2026

LONG TERM

- Net sales of EUR 1 billion and a 30 percent EBITDA margin by the end of 2033

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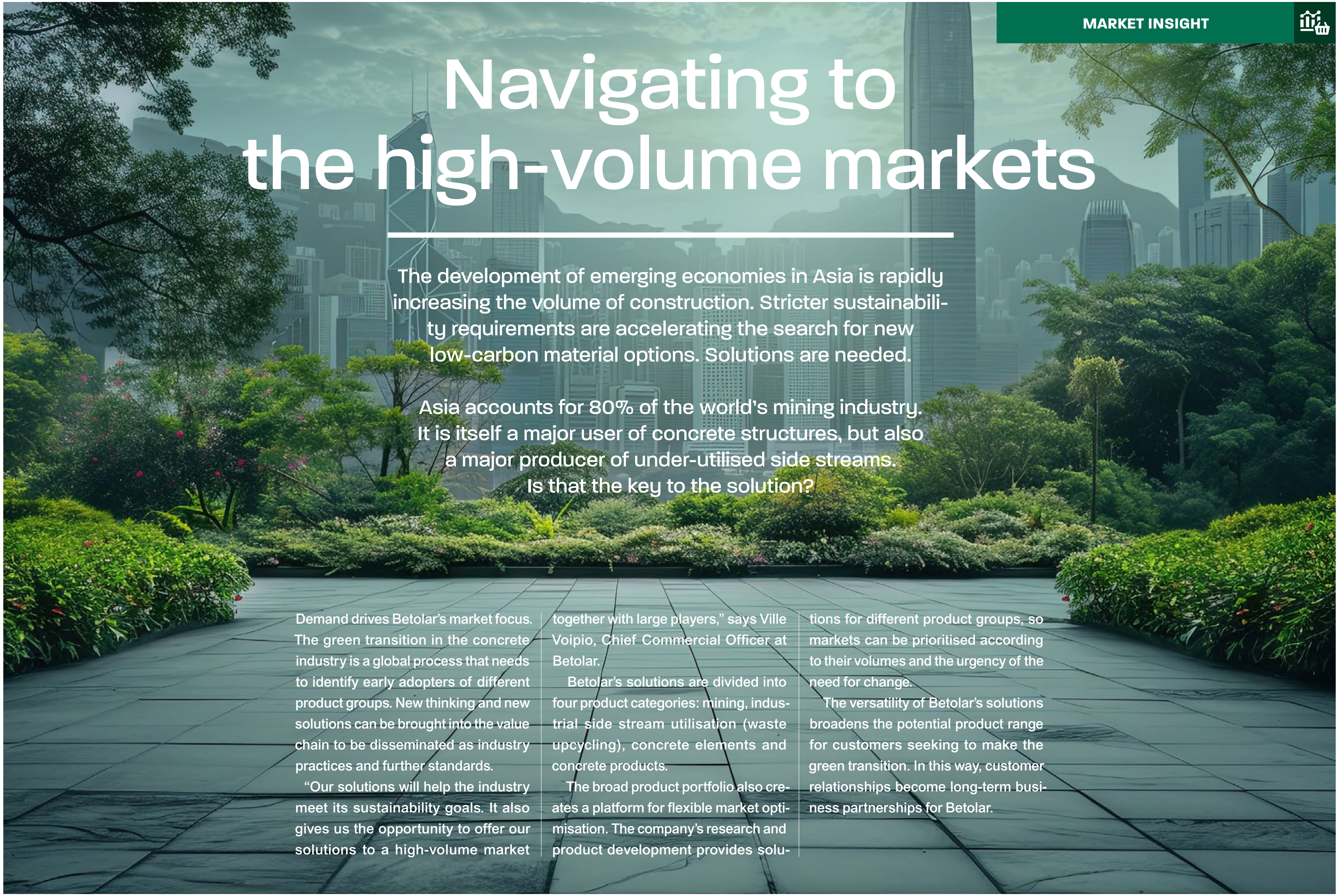

MARKET INSIGHT

Navigating to the high-volume markets

The development of emerging economies in Asia is rapidly increasing the volume of construction. Stricter sustainability requirements are accelerating the search for new low-carbon material options. Solutions are needed.

Asia accounts for 80% of the world's mining industry. It is itself a major user of concrete structures, but also a major producer of under-utilised side streams. Is that the key to the solution?

Demand drives Betolar's market focus. The green transition in the concrete industry is a global process that needs to identify early adopters of different product groups. New thinking and new solutions can be brought into the value chain to be disseminated as industry practices and further standards.

"Our solutions will help the industry meet its sustainability goals. It also gives us the opportunity to offer our solutions to a high-volume market together with large players," says Ville Voipio, Chief Commercial Officer at Betolar.

Betolar's solutions are divided into four product categories: mining, industrial side stream utilisation (waste upcycling), concrete elements and concrete products.

The broad product portfolio also creates a platform for flexible market optimisation. The company's research and product development provides solutions for different product groups, so markets can be prioritised according to their volumes and the urgency of the need for change.

The versatility of Betolar's solutions broadens the potential product range for customers seeking to make the green transition. In this way, customer relationships become long-term business partnerships for Betolar.

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The applicability of the solution creates market viability

The Geoprime solution has rapidly developed into a commercial product. Initially, low-carbon concrete has been produced for pre-fabricated concrete product groups. The performance of the solution has been demonstrated in a research and development projects in laboratories and industrial-scale pilot projects in Finland and elsewhere in Europe.

In Europe, Geoprime has been adopted commercially by concrete product manufacturers. IBF of Denmark has produced paving stones for Danish ports and Tubobel of Belgium has implemented sewer networks with recyclable alkali-activated geopolymer pipes based on the Betolar solution.

Product development and testing of properties will continue in cooperation with concrete manufacturers. Betolar is constantly developing design mix and offers its customers optimized solutions.

Demand for environmentally friendly concrete is growing in the Middle East

Betolar has opened up the market for pre-cast concrete products also outside Europe. For example, the United Arab Emirates has a clear and ambitious goal to achieve carbon neutrality goals in construction. The aim is to significantly reduce CO_2 emissions, among others, from cement.

Betolar and UAE-based concrete products manufacturer Fujairah Concrete Products (FCP) have launched low-carbon concrete paving products based on the cementless Geoprime solution.

"Environmental sustainability is a global concern. FCP has always developed sustainability in the construction industry by working with world-class players to implement tailor-made solutions. Betolar's solution will help us achieve our sustainability goals," says **Naser Al Mulla**, CEO of FCP.

Manufacturing of low-carbon hollow-core slabs starts in Malaysia

Following a successful pilot, Betolar has started commercialising low-carbon hollow-core slabs in Malaysia.

Geoprime hollow-core slabs use mainly industrial side streams from local areas as a binder instead of cement. The use of side streams saves natural resources, including the use of water.

"This is a good example of our updated strategy, where we are looking for scalability opportunities in large-scale volume products for the construction industry in emerging markets," says Betolar's Ville Voipio.

The Finnish Ministry for Foreign Affairs is supporting the commercialisation project with a €370,000 Finnpartnership business partnership grant. The purpose of the grant is to assist Finnish companies in their ambitions to create and develop new business and partnerships in emerging markets.

"The use of Business Partnership Support in countries like Malaysia requires direct development impact. This is very clear in the case of Betolar, which is moving to more environmentally friendly production," explains **Nikke Karjalainen**, Grant Financing Manager at Finnpartnership.

Vyara Tiles, the market leader in its region, has moved to Geoprime

Vyara Tiles, one of the largest manufacturers of landscape concrete products in its market, is the first company in India to adopt Betolar's design mix and liquid chemical dosing system after successful trials and product testing. It is rapidly expanding the use of Geoprime in its manufacturing operations.

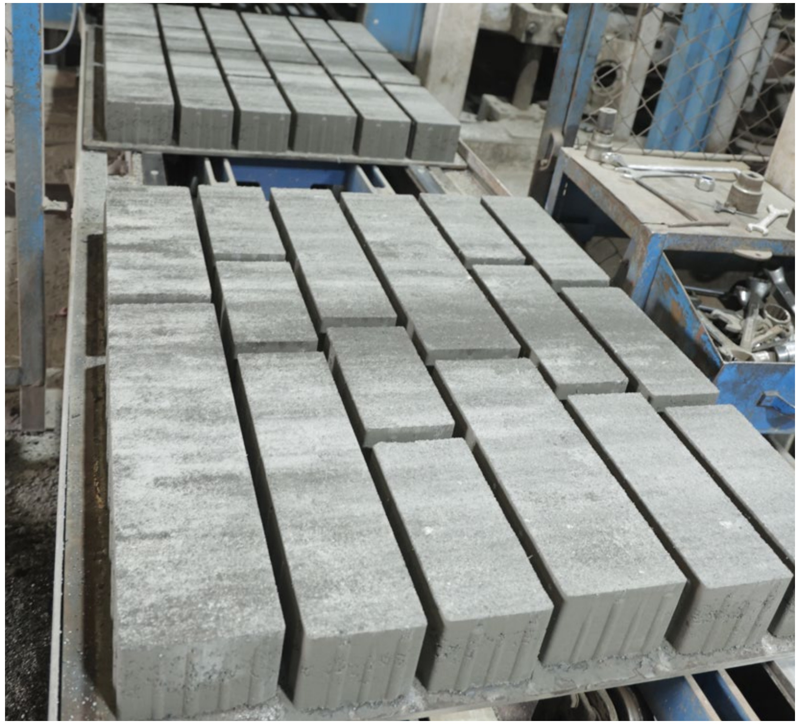
"Cement is one of the biggest emitters of CO_2. We have long been trying to find a solution to reduce emissions. Betolar's Geoprime solution allows us to completely eliminate cement from our production without compromising the quality of the product," says **Mehul Jain**, owner of Vyara Tiles.

In its first year of operation in India, Betolar has laid the groundwork in the western and southern parts of the country. The company has focused on precast concrete products such as paving and curbstones and sewer pipes. Successful pilot programmes have been carried out with partners.

"The low-carbon solution offers architects, developers and builders low-carbon paving materials that significantly reduce the carbon footprint of construction projects while meeting the industry's high quality standards," says Ville Voipio of Betolar.

The use of Geoprime in concrete products supports India's commitment to combating climate change and achieving the sustainable development goals.

> Betolar's solution helps to achieve sustainability goals.
>
> NASER AL MULLA, FCP, UNITED ARAB EMIRATES



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Industry side stream markets are global

More lightly regulated concrete products, such as paving stones and sewage pipes, are produced by local or regional concrete product companies. The transition from traditional concrete design mixes to radically low-carbon processes and products is slow due to the fragmented nature of the business landscape and therefore cannot be at the heart of Betolar's business growth.

"Our scaling is faster in product groups, where we can create our design mix solutions for large-volume operators," Ville Voipio outlines.

The projects will start with research into the side streams generated by the mining, energy and metals industries. Betolar will identify commercially viable side stream materials and its solutions will create value for side stream materials that currently have low or negative value to their producer.

The producers and users of side-stream materials will eventually form a circular economy ecosystem, adding value to the value chain and contributing to the green transition in construction. Based on the principles of the platform economy, Betolar is creating an AI-based marketplace for side-stream materials used in concrete production.

Industry side streams respond to explosive growth in construction

Side stream based materials will be used as a substitute for cement in large mass structures in the mining industry. The replacement of cement by existing side stream materials will significantly increase their demand and market price. At current consumption levels, replacing cement would require four billion tonnes of side streams globally every year.

"However, the total availability of standardised side-stream materials such as blast furnace slag and fly ash is only about a quarter of the quantities needed to replace cement. New sources of side streams need to be found. The availability of popular blast furnace slag and fly ash will also decrease significantly in the near future as a result of the green shift," says **Pasi Karekivi**, Director of Betolar's mining business.

In autumn 2023, Betolar started a commercial side stream research project in Thailand with real estate developer Pruksa Group.

"The collaboration is aimed at introducing geopolymer concrete on a commercial scale, in line with our commitment to sustainable development in the Thai real estate market," said **Porntep Suppataratarn**, CEO of precast concrete manufacturer Inno Precast.

> The purpose of the collaboration with Betolar is to introduce geopolymer concrete on a commercial scale.
>
> PORNTEP SUPPATARATARN, INNO PRECAST

Bringing oil shale ash into productive use

Betolar is starting a side stream study on behalf of Eesti Energia, the leading energy service provider in the Baltics, to investigate the use of ash from oil shale combustion as a binder for concrete.

A challenge is to deal with the oil shale ash that comes from the different production processes. One million tonnes of ash are created every year as a waste product of energy production and are stored in ash piles in Narva in the northeast of Estonia.

"We see a lot of value in our ash for the construction industry. Eesti Energia's cooperation with Betolar aims to find new uses for ash in the concrete industry. The new uses will support the goals of sustainable development," says **Veljo Aleksandrov,** Project Director of Eesti Energia.

International cooperation with Metso

Betolar and Metso have agreed to collaborate to offer Betolar's technology globally to customers in the mining and refining industry using Metso's lithium hydroxide process.

"Our sustainable circular economy solution can significantly increase the processing value of analcime sand. The three-year cooperation agreement with Metso will support our access to markets that are key to our strategy. The cooperation will strengthen our growth opportunities globally, especially in the mining and metals business, which focuses on new side streams," says Ville Voipio.

The production of lithium for electric mobility and energy storage batteries will produce increasing amounts of analcime sand as the green technology transition progresses. The battery industry is keen to find economically and environmentally sustainable downstream uses for the growing side streams.

"Demand for Metso's battery technology is in a strong growth phase. Together with Betolar, we can offer our customers a complete solution that can also take into account the circular economy use of side streams in an innovative and sustainable way," says **Mikko Rantaharju**, Vice President of Metso's Hydrometallurgy business.

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Back to the future of European mining

The Asian mining industry, which represents 80% of the global mining industry, creates exciting and large-scale opportunities for Betolar solutions. In 2024, Betolar's focus will be on mining customers. The aim is to find higher value-added uses for mining by-products.

"The orders already received demonstrate both the need for new low-carbon solutions in the mining industry and the potential of our patented and productised solutions to create added value for local side streams, which currently pose a waste problem," says Pasi Karekivi.

Europe returns to the minerals

In recent decades, industry has been outsourced from the EU to countries with lower production costs, especially Asia. The global carbon footprint has not necessarily decreased, even if the EU's carbon balance has improved. In particular, the mining industry activities have declined as a result of outsourcing.

New, green transition technologies are now enabling more sustainable solutions. They will benefit climate work on all continents. Tensions in trade relations have led EU countries and companies to bring the industry back to Europe.

The Nordic countries are a model for sustainable mining in Europe. Norway's new strategy for the mineral industry points the way to Nordic and European regulation.

The strategy aims to accelerate the uptake of solutions for the minerals industry. The Norwegian government's policy is that the mineral industry should promote the circular economy by increasing the use of resources and minimising the need for disposal. In Finland, the government programme also includes the creation of a minerals strategy in 2024.

"We are building growth through the intellectual property rights associated with our Geoprime solution. Our market-leading design mixes enable building materials technology solutions for a range of concrete products from paving stones to hollow-core slabs. Now, our mining solutions significantly expand the company's offering and enable the utilisation of mining side streams in the transition from a linear to a circular economy," defines Betolar's Ville Voipio.

> The Finnish Government Programme includes the creation of a minerals strategy in 2024.

Asia's mining industry opens up

Betolar started a commercial exploration project for the tailings from an East Asian mine which is to be reopened in early 2024. The side streams are intended to replace cement in mine fillings and in blocks used in the construction industry.

"The radical reduction of cement in large volumes is a major step forward in the green transition. Many Asian countries are promoting the green transition. With our productised model, we have already opened up the market for side-stream utilisation in Thailand," says Chief Commercial Officer Ville Voipio. ■

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COLUMN

The standards must be updated in line with the sustainability goals

The grey Geoprime block looks like ordinary concrete. It feels just as durable and heavy. However, according to standards, it is not concrete because it does not contain cement. European standards will have to be changed to make concrete made from an alternative material suitable for use as a building material. Fortunately, change is underway.

Concrete would be difficult to replace in the construction industry. Convenient and sustainable building material has solved many social problems. For example, concrete construction has improved housing conditions for the poor.

The use of concrete has increased 34-fold since the 1950s, while the world's population has increased 2.5-fold in the same period. Concrete is not bad, but its composition needs to be improved to achieve sustainable development ambitions.

So the grey mass will continue to be needed, that's clear. But if the cement used in concrete is not replaced by lower-carbon materials, emissions from concrete materials will rise to 30% of global CO_2 emissions by 2050, up from around 8% today.

This development is unsustainable. That is why we are focusing on the development of a more environmentally friendly concrete, which is already a commercialised product. In addition to the more familiar industrial side streams, we are also testing the suitability of ash from more exotic materials such as rice, coconut and shrimp shells as a substitute for cement.

Standards requiring cement are lagging behind

In the construction sector, standards are essential. They make the product safe in many ways. Standards also make competition much easier, because they make products, structures and buildings comparable.

The biggest bottleneck in the introduction of greener concrete is the backwardness of standards. According to current standards, our innovation is not considered concrete in Europe, because it lacks cement. It should contains at least 5% of cement, according to the standard.

We want to play our part in influencing the European standard so that concrete is defined by its performance rather than by its constituent materials. This would allow alternative raw materials to be used in the production of concrete, as long as the properties of the final product meet the minimum requirements for concrete.

Europe should take inspiration from countries such as Australia, the UK and the US, which are well advanced in their performance-based approach to concrete. A performance-based definition of concrete is the clearest way to achieve the goal of carbon neutral concrete by 2035.

Betolar influences standards and the development of the industry as a whole

There are buildings up to 70 years old around the world that were built using concrete without cement. The technology is not unprecedented, but now is the time to commercialise the solution we have developed.

At Betolar, we have an ongoing voluntary manufacturer-specific approval process for prefabricated concrete products. These include paving stones and slabs, concrete pipes and other infrastructural products. The aim is to have these products on the European market within a few years.

We know that the green transition will happen and that more resource-efficient solutions will have to be adopted. By participating in the Concrete standardisation group, we can influence standards. At the same time, we also get market intelligence for our product development needs.

It's time for a revolution in stone construction. The means are there, now we need standards that come with a level of ambition.

Article is based on a case article published by SFS Finnish Standards in February 2024.

HASSAN RAAD

Hassan Raad is Betolar's Director of Research and Development. He holds a Master of Science degree in engineering and an eMBA degree.

Hassan has worked his entire career in the construction industry – at the construction company NCC, as well as in the development of building materials and as a product manager at Saint-Gobain Finland.

Standardization has interested him throughout his career. In an interview, Hassan stated, "It creates peace of mind when you know that the system works."

Hassan has advocated in various decision-making and expert forums that standardization related to concrete should be developed to be performance-based.

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Ready to change the world

The mission is to develop world-class sustainable materials technology for construction. Sharing a vision for a new green era in concrete applications. A team of the best science and technology professionals in the field. Initial results that speak for themselves. What's next?

Betolar's CTO **Jarno Poskela** and his team are busy. A large amount of know-how and scientific solutions have been put to work to move the mountains. Getting things right seems to be just a small step away.

Betolar's geopolymer-based building materials research was launched in 2016 from the vision for an ultra low-carbon cement by of the company's founder Juha Leppänen. The pioneering research progressed quickly: the first patent applications were submitted the following year. In less than a decade, Betolar's technology has emerged as a viable candidate for the future of concrete construction as a whole.

"In long-term development work, there are phases of in-depth research and phases of putting the results into practice. The potential created by long-term research and development is redeemed when the fruits of this work are translated into product solutions. Our technology is now reaching this critical point," says Jarno Poskela.

Betolar's RDI (research, development, innovation) activities are based on research and analysis of industrial side streams, as well as the continuous development of Geoprime design mixes and low-carbon building materials. The technology developed is already being applied to many concrete applications in Europe and Asia. The next steps will be the mining construction solutions, as well as the concrete elements and other load-bearing structures.

Poskela argues that "the main obstacle to the use of fully cement-free concrete products in construction is the outdated, cement-focused concrete product standards. They served a purpose before, but now they are a hindrance to sustainable development".

The current objective of Betolar is to build the technical and scientific foundation required to reform concrete standards to make them material independent. A sustainable solution would be to move to performance-based standards. This means that different concrete products would be approved for their intended use on the basis of their studied and tested properties, rather than the raw materials used in them.

"We promote the reform of concrete standards to performance-based standards in international cooperation groups. It is legitimate to ask why we should not

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move to cementless concrete construction. Our role is to deliver scientifically and technically proven material solutions that demonstrate the justification for standardising cementless concrete products with equivalent or clearly better performance," says Jarno Poskela.

Novel side streams

In 2023, new, unutilised industrial side streams became a major focus of Betolar's research and development programme. Alternatives to traditional side streams, fly ash from the energy industry and blast furnace slag from the steel industry are needed. As a result of increasing demand, their price has risen. At the same time, their availability is expected to decline in the long term.

At the end of the year, Betolar's research programme on new non-commercial side streams covered more than 20 different industrial side streams. Examples include slags from steels production, fly ashes, battery mineral processing side streams and recycled building materials. A new feature that increases the impact of the programme is the projects Betolar is carrying out for customers looking for new uses for their side streams.

"The need for research into new side streams is widely understood. For example, Business Finland awarded us a significant research grant of EUR 2.7 million for research into side-stream materials. To bring new side streams and innovations into the value chain, we need to accelerate our research," says Poskela.

Betolar successfully completed field trials of stabilised slag material (vanadium-purified steel slag) together with Novana. Towards the end of the year, projects were launched with Eesti Energia on the use of oil shale ash as a binder and with Metso on the use of the by-products of its lithium hydroxide process technology.

Consolis Parma and Betolar carried out an extensive test programme for low-carbon hollow-core slabs in summer 2023. Harri Bergholm is responsible for the technical development of modern hollow-core slabs at Betolar.

> New construction standards are justified by science and testing.

CTO Jarno Poskela.

To new product areas

In 2023, the focus of product development shifted to load-bearing building elements and solutions for the mining industry. The shift to more demanding, higher volume and higher value-added product categories responds to the growing demands of Betolar's target markets to move to lower emission solutions.

"We are now hearing a lot about alternatives to cement for mining construction. The side streams from mineral processing also pose a growing challenge that needs attention. For example, we have to prevent the environmental impact of mining and processing battery minerals from offsetting the climate benefits of the transition to electric mobility. We develop solutions that can transform mining side streams into construction and other new applications, while drastically cutting down the use of cement," says Poskela.

The development of the first product applications for the mining industry, paste filling and shotcrete, progressed rapidly at Betolar in 2023. Laboratory studies proved that a solution based on cementless paste filler can meet product strength and long-term durability requirements with 40–80% lower CO_2 emissions.

Betolar also aims to bring its technology into the world of structural concrete solutions. In 2023, development work focused in particular on low-carbon hollow-core slabs, which were piloted in Finland with precast concrete manufacturer Consolis Parma and in Asia with a Malaysian customer developing a new hollow-core slab solution.

"In pilot projects, we have provided our customers with cementless or low-cement hollow core slab solutions that perform at or above the level of conventional slabs. The difference is the emissions, which are up to 75% lower with our solution," says Poskela.

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Betolar's research program for new, uncommodified side streams covered more than 20 different industrial side streams by the end of the year.

Increasing value from data

Betolar's ability to add value to its materials technology is based on a large amount of data and data processing. Data analytics is used to model how, for example, the properties of the side stream used, the activator chemicals, the properties required of the final product and the manufacturing process interact. Each study and each pilot or production batch carried out by a customer generates new data for Betolar. As the data accumulates, the ability to create ever better understanding and products grows.

"Our data platform is the knowledge base of our material solution. With accumulating data and advanced analytics, we accelerate our own development and improve our solutions at an accelerating pace. Data usability is our focus - data quality, availability and usability are vital to our growth," says **Olli Kilpeläinen**, Vice President, Data Platform at Betolar.

In addition to enhancing internal business operations, data plays a crucial role in driving sales growth. A development program initiated in 2023 aimed at creating data products for external customers. By early 2024, side-stream analytics service was introduced, designed to assist customers in uncovering opportunities for value creation by leveraging their side streams.

"We also continued to develop predictive AI models that speed up our product development. They allow us to better simulate the performance and long-term durability of our end products. All products produced under Betolar licences increase our data capital, which we can use analytically to support our research and development activities," says Kilpeläinen.

Radical innovations

Betolar is an innovator at heart and intends to remain so. Part of its RDI activities will focus on solutions that generate business in the long term. In 2023, for example, innovation activities focused on research into completely new binder solutions, the development of new types of side stream treatment methods and innovation in equipment solutions.

"Our patent portfolio was strengthened in 2023 with a new patent for electricity storage in Europe, India and the US. This demonstrates the breadth of our materials technology excellence that can be leveraged in new innovations. Our systematic development work with such a strong team will inevitably yield results," says Poskela.

A growing patent portfolio and otherwise protected intellectual property rights will increase Betolar's potential and value in the long term. By the end of 2023, Betolar had received approved patents for five inventions and nine other inventions were in the patenting process.

Quality over time

Unlike digital innovations, for example, construction materials must be ready for long-term use from day one. Building materials cannot be improved during their lifetime.

Betolar's testing programmes are very demanding and long-lasting. For example, a comprehensive long-term durability test programme can take 4-6 months.

"We have a responsibility to make sure that the solutions we create ourselves are not short-sighted, because their impact and benefits will last for decades and even centuries. We test our solutions to ensure their sustainability over time, even though our customers are urgently demanding low-emission solutions," Poskela emphasizes.

While Betolar calls for concrete standards to be updated for today, this will not be at the expense of quality, safety or durability. Adequate testing processes and quality assurance layers will be ensured both in-house and through customers' own pilots. New generation solutions must be proven to be better.

"We are ready to change the world. Our technology is ready to change the world. Our customers are ready to change the world. Our RDI work will continue in 2024, producing more and more evidence of this," concludes Poskela. ■

3 X THESIS OF THE CHIEF TECHNOLOGY OFFICER

Leading excellence in research, development and even in a world of radical innovation is demanding. If successful, it creates an environment for unique ideas, expertise development and hard results.

1. Ambitious clear goals in a clear mind
2. Freedom, responsibility and trust underpinning expertise
3. Support through coaching and solution-orientation. Coaching approach and solution-orientation at the core of supervisor work

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Mission possible: Turning data into business

COLUMN

Data, technologies and digital ecosystems are the most significant and complex business dimension of our time.

My years in global tech and growth companies have taught me the importance of approaching data-driven value creation from a business perspective and in a systemic way.

Betolar's cement replacement materials technology is constantly advancing based on scientific progress and ongoing data feedback from research, testing and production. The more data we accumulate, the more value we can create.

Data is a key business asset for us. We are not unique in this. Talking about data as a key resource, a new gold or crude oil, is becoming a fact of business life. Without belittling the fact, it is more important to consider how and in what environment data actually creates value for the business and the customer. In today's world, data quickly becomes waste if it has no actual or future viable use case.

Data quality unlocks business value

Betolar's data platform is uniquely distinctive and strong. The hard core of our data platform is the data generated from side stream research and testing. We continue to connect new data sources from our value chain and operating environment.

Interesting opportunities arise, for example, from data on manufacturing, raw materials and other resources, conditions, product requirements, markets and the supply chain. We see a world where analytics can be used to build ever deeper insights and optimise increasingly complex technology and business systems.

The volume of data and the complexity of data flows and processes are increasing at an accelerating pace. We ensure data quality within a digital architecture that scales to meet current and future business needs. Real value for business and customers will be created through analytical applications such as machine learning and concrete use cases and services that meet different customer needs.

Proprietary AI models integrate research and business

We develop and train our AI models to drive our data-driven competitive advantage and deliver customer value. Advanced side stream research, Geoprime binder formulation development, and design and modelling of cement replacement applications are key use cases. The handprint of AI is at the heart of every application we deliver to our customers.

Earlier this year, we launched a new commercial data service for side stream owners. The side stream analysis service provides an applicability and usability analysis of the customer's own side stream, based on Betolar's evolving materials insights. If the side stream proves to be useful in Betolar's or one of its customers' processes, we offer the opportunity to develop a commercial benefit for the customer.

Ecosystem benefits for value chain players

A data-driven ecosystem would not be complete without users of side streams or other service or technology providers in the value chain. Building an ecosystem opens up a wide range of opportunities for us to create new business where the whole value chain wins.

In the future, there are opportunities for manufacturers of non-cementitious materials and products to source various side streams, design mixes and production resources from Betolar's commercial platform.

Creating shared value from data, technology and ecosystems is a multi-level process that requires long-term commitment and innovation. It also requires continuous learning and adaptation. The potential is theoretically limitless and we intend to stay at the forefront of this evolution. ■

OLLI KILPELÄINEN

As the Vice President of Data Platform at Betolar since October 2023, Olli Kilpeläinen is responsible for developing and commercializing a data platform powered by AI that ultimately supports a business ecosystem that aims to lower carbon footprints across industries.

Olli has over 15 years of experience in software engineering and business, and he has a wide background in creating high-tech products and services in various fields such as consumer electronics, IoT, VR, and more.

Olli focuses on data as an enabler of the circular economy of materials and sustainable construction, with the aim of making the world a better place to live. Olli's passion for lifelong learning and his accomplishments in technology, business, and design highlight his innovative approach to product management and his dedication to driving sustainable solutions.

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The mission: a better tomorrow

Betolar is a workplace for concrete world changers. Positive uncertainty, rapid change and a strong hunger for achievement motivate Betolar employees. In 2023, the focus was on improving delivery capacity and continuous learning.

A growth company built around innovation is a remarkably dynamic working community. Creating something new requires open-mindedness, courage to act and the ability to take and manage risks. Since the early years, more systematic and structured management has also been brought to Betolar.

> Future direction and competencies are discussed together.

"Betolar is a technology player for which human capabilities are a vital driving force. However, even great technology experts are not enough, so it is equally important to show direction and create structures to leverage expertise," says **Antti Uski**, Betolar's Chief Human Resources Officer.

In 2023, operational structures and working and decision-making models were improved. A more systematic focus on business needs also became a key management priority. At the same time, care was taken not to cut back or undermine the start-up character of Betolar's operations. Flexibility, autonomy and a high degree of individuality were to be maintained.

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"In fact, it seems that the increase in systematics improved the effectiveness of freedom, courage and individual and team solution-orientation. A solid foundation and clear structures for action provide ample breathing space for agility," Uski describes.

From start-up to industrial player

To achieve the new is to give up the old. The guiding theme for Betolar in 2023 was to concentrate all efforts on implementing the newly updated strategy. Alongside the change in priorities, Betolar has strengthened its talent profile with experience in growing industrial operations and business into a international scale.

According to the updated strategy, there is now a greater emphasis on skills related to industrial operations as well as mining sector knowledge and experience. Additionally, the ability to manage projects and processes has been further enhanced.

"The strategy update also drew a new path forward for our skills map. Most of the competences acquired on the initial journey were up to date, but small changes of emphasis were also needed. These changes were discussed with staff, debated and solutions sought", Uski describes.

Betolar's capabilities are built in a world that is highly volatile, uncertain, complex and ambiguous. Management therefore emphasises a coaching approach, emphasising flexibility and autonomous expertise, and managing complexity by providing clear structures to guide and anchor activities to strategy and objectives.

"The importance of communication, collaboration and continuous learning

Chief Human Resources Officer Antti Uski

cannot be overemphasised. The structures and approaches we will put in place in 2023 are a good tool, but they must not limit our thinking. Only through shared meaning, a visionary worldview and learning from uncertainty will we be able to move forward effectively, even in our rather radical environment," Uski says.

Why invest in people?

Betolar relies on the individual and shared capabilities of its staff. The 2023 competency mapping of all employees will help to grow and enhance the strategic competencies at Betolar and individual level. Competencies related to commercialisation, operations, research, development and innovation are vital for Betolar now and in the future. The development of human competencies will involve both hiring and ongoing learning of the employees.

"People are the source of all skills and abilities, not the other way around. When we talk about what competencies and capabilities we have, there's a danger of seeing individuals and teams only in terms of what they can do for us. But we

KEY COMPETENCIES

Research, development and innovation

Commercialisation

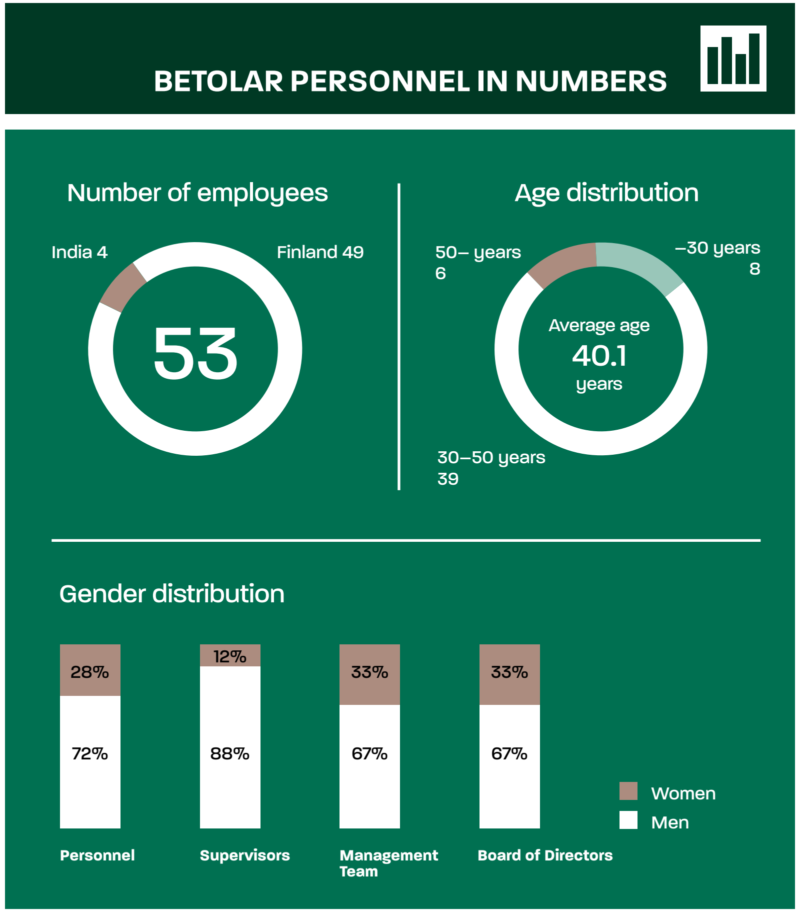
Operations

A clear direction and structures facilitate the sharing of individuals' excellence.

should actually start by focusing on the people themselves, caring for their well-being and nurturing their potential. This approach unlocks their talents for the good of the community and the company," explains Uski.

Security and well-being

Ensuring overall wellbeing and safety at work is the foundation on which we build the wellbeing of people at Betolar. This includes, for example, ensuring occupational safety in research, testing, production and office environments in a comprehensive way. The occupational safety programme implemented in 2023



includes an active model for continuous monitoring and maintenance.

Betolar provides comprehensive occupational health services and employment benefits, as well as benefits such as sick childcare and fitness testing to make everyday life easier and increase well-being.

Betolar has decided to invest in diversity, equity and inclusion management. Together, these are strengths that increase human capital, well-being, productivity and the ability to innovate. In 2023, diversity management was promoted through, among other things, training and the inclusion of diversity in Betolar's Code of Ethics. Betolar has the ISO 45001 standard for occupational safety and health management, the ISO 9001 standard for the quality management system and the ISO 14001 standard for the environmental management system.

Equity at Betolar means that all people are equal, regardless of their personal

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background, characteristics, thoughts, beliefs, opinions or any other personal factor. None of these factors should prevent or hinder an individual's success or potential at Betolar.

Why work at Betolar?

Working life offers many opportunities for the best professionals. Betolar offers current and future Betolar employees the opportunity to work to radically reduce CO_2 emissions from construction.

Betolar's attracts a wide range of professionals from different fields. A more sustainable world does not come by itself, and that is why Betolar is perceived as an employer with whom you can actively pursue your own dream or purpose in the world.

"One year in a growth company is equivalent to four years in a traditional company. This may seem demanding, but it motivates us. We offer a community where making a difference is making a difference. We share the feeling that now is the time to act," says Uski.

As Betolar grows, the importance of internal communication and culture becomes ever more important. Internal communication focuses on sharing and community. Talking about successes and failures is an important learning method. Active and accessible internal communication builds a common Betolar. A low-key organisation fosters a conversational and human working culture.

"Our journey is neither easy nor light, and decisions are not taken for granted. Sometimes we move forward by going backwards. Nevertheless, every success - and of course learning from failure - brings us great joy and meaning. Our vision is so big that any progress is rewarded," concludes Uski. ■

> Sometimes we move forward by going backwards. Nevertheless, every success brings us great joy.

Betolar's representatives at World of Concrete in October 2023. Abhishek Bhattacharya (left), Martta Valkola, Tuija Kalpala, Darshan Shah and Abhijit Ash.

NATIONALITIES

15

different nationalities

AVERAGE AGE

40.1

years

BETOLAR'S VALUES

COURAGE
- Determination to proceed and being innovative
- Open mind for opportunities, colleagues and partners

RESPONSIBILITY
- Respecting the environment and humanity
- Actions worthy of trust

TEAMWORK
- Mutual respect
- Friendly behaviour
- Security

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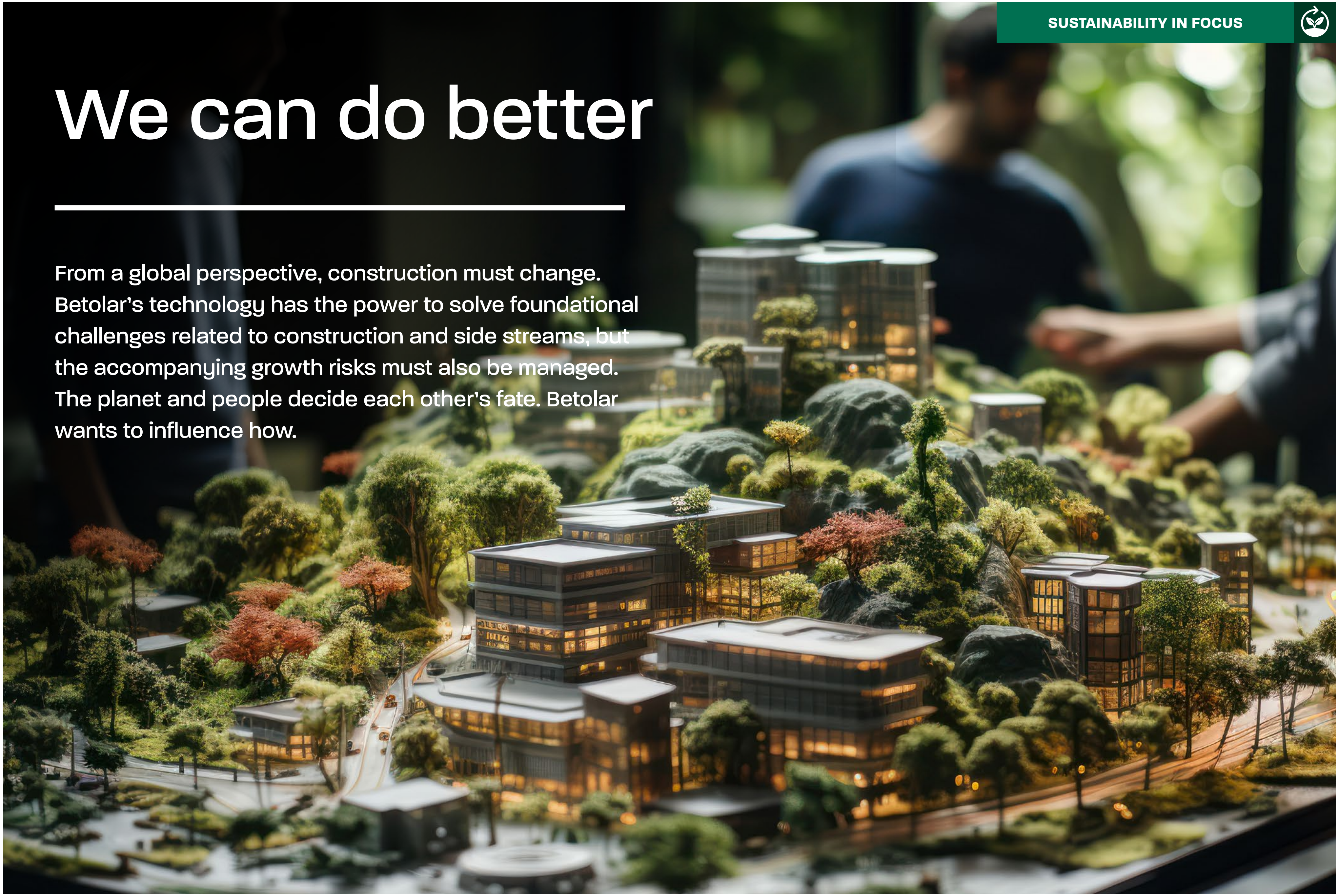

We can do better

From a global perspective, construction must change. Betolar's technology has the power to solve foundational challenges related to construction and side streams, but the accompanying growth risks must also be managed. The planet and people decide each other's fate. Betolar wants to influence how.

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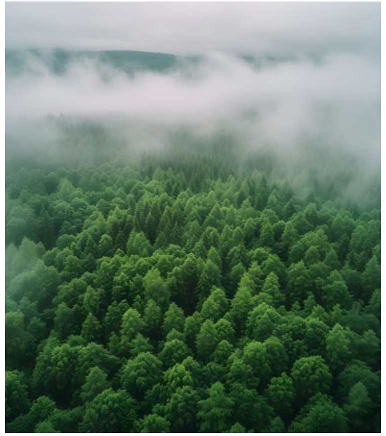

WHAT WE WILL FOCUS ON IN 2024

- **CO_2 emissions:** Continuing and expanding calculations by supporting customers to conduct life-cycle assessments (LCA)
- **Side streams and activator chemicals:** Building policies and practices to ensure the sustainability of side streams and chemicals
- **Reporting**
  - Assessing the eligibility with the EU Taxonomy
  - Updating double materiality assessment in preparation for EU's CSRD* requirements

*Corporate Sustainability Reporting Directive

685 t
CO_2-eq.

Geoprime solution carbon handprint 2023 (2022: 553 t CO_2 eq.)

IR & ESG Manager Melina Pinomaa.

"Betolar's impact is embedded in the core of our operations, cement replacement technology. I understand that we approach impact very differently than those who have been in the market for a long time," starts **Melina Pinomaa**, ESG and IR Manager at Betolar.

Companies that have been operating for a longer period of time have used various means to strengthen the impact of their traditional operations and their reporting on them. The sustainability of the business model and value chain has been increased, and clear structures have been created for the management of material sustainability themes.

Betolar grows and develops on the basis of its original innovation in sustainability. Sustainability is not an afterthought and introduced into an activity or mission. This allows Betolar to genuinely bring completely new solutions to the table of designers, producers and decision-makers.

"We cannot achieve this by ourselves. But we are not alone, because the shift to sustainability across sectors is progressing and creating opportunities for us. For instance, the UN's Sustainable Development Goals are being integrated into the goals of many companies, and financial markets are considering sustainability criteria in a different way. On a global level, countries are establishing carbon neutrality goals for the coming decades, according to the climate conferences", Pinomaa continues.

A responsibility strategy that dares to focus on the essentials

The level of sustainability management and reporting is continually improving. The development of materiality thinking is making companies recognize the main sustainability issues, including their economic aspects, and to report on them more transparently.

In 2022, we conducted a thorough assessment of our materiality, and we established three sustainability goals to make sure we are progressing. This was also especially significant because it considered both the opportunities and the risks that growth brings to us," Pinomaa goes on.

Betolar's sustainability strategy was defined in 2022, taking into account a wide range of perspectives from stakeholders in the construction value chain, from real estate investors to concrete manufacturers and policy makers.

From a sustainability perspective, Betolar focuses in particular on accelerating emission reductions in the construction sector, ensuring the sustainability of side streams and activator chemicals, and ensuring social responsibility in the value chain.

The objectives form the framework of Betolar's sustainability programme, which includes responsibilities, measures, targets and reporting.

"Alongside the significant sustainability opportunities, we anticipate and manage the risks associated with our value chain. In the context of the rapid growth we are aiming for, risk management cannot afford to lose momentum. Identified sustainability themes are embedded in all processes, from business to risk management," says Pinomaa.

Building on security and well-being

Sustainability is also about taking human aspects into account. Alongside sustainability in the construction value chain, Betolar is committed to continuously strengthening social responsibility in its operations. In a small community of individual excellence, the importance of work and well-being at work are of paramount importance.

"We are a vibrant and highly skilled community that fosters development. When we are seen as individuals and wholes, we unleash a lot of potential. I hope we achieve this every day. Our success is based on our respect for each other and our willingness to support each other towards a fair working community," says Pinomaa.

In addition to safety, wellbeing and development opportunities, diversity is a part of Betolar's everyday life. In 2023, a jointly defined Diversity, Equity and Inclusion (DE&I) Policy and an ethical code of conduct were introduced.

To manage its operations, Betolar has management system in place, certified to ISO 9001 quality standard ISO 14001 environmental standard and ISO 45001 occupational health and safety standard. Betolar strives to ensure the highest possible level of quality and safety in its own operations and those of its suppliers and customers. During the period, a periodic audit was carried out by Bureau Veritas.

"Effectiveness is the sum of many things. However, it is not just a combination of things, but a combination of things working together in a mutually reinforcing way. We take care of people who take care of the world. Only in this way can the world ultimately take care of us and future generations," concludes Pinomaa. ■

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BETOLAR'S SUSTAINABILITY PRIORITIES

	OBJECTIVE	KEY MEASURES 2023	RESULTS 2023
1	Accelerating CO_2 emission reductions	• Strengthened the ability to measure and communicate the environmental impact of the Geoprime solution. • First life cycle assessments launched for key product groups for paving stones and hollow-core slabs. • Customers started offering Environmental Product Declarations (EPDs) for their Geoprime concrete products. • For the first time, Scope 1, 2 and 3 GHG CO_2 emissions from own operations were calculated. • Value chain emission calculation and data collection process set up.	Geoprime's carbon handprint[1] increased to 685 tonnes of CO_2 equivalent (2022: 553t CO_2 eq.)
2	Ensuring the responsibility of side streams and activator chemicals	• The safety of side streams and activator chemicals was systematically ensured. • A Supplier Code of Ethics was developed for suppliers of activator chemicals. It defines the expectations and requirements for ethical and responsible behaviour of the supplier.	
3	Ensuring social responsibility in the construction value chain	• The well-being and safety of employees and others in the value chain is systematically ensured. • Code of Conduct defined and implemented. It guides every Betolar employee and stakeholder to act responsibly and ethically. • The ability to work as a diverse organisation was strengthened	

SDG	9	Building sustainable infrastructure and promoting sustainable industry and innovation.
	11	We guarantee safe and sustainable cities and communities.
	12	Ensuring the sustainability of consumption and production patterns.
	13	Urgent action against climate change and its impacts..

1) The carbon handprint refers to the reduction in emissions from the use of a product or service compared to a conventional product. Concrete, measured information on emission reductions is important for Betolar's customers, partners and investors who are implementing their own climate goals.The calculation is based on a third-party screening calculation comparing A1-A2 phase CO_2 emission reductions to a reference product in Betolar's key markets and products. The calculation is based on scenarios. The production, use and end-of-life phases were excluded from the assessment as they are assumed to be identical between Geoprime and conventional concrete.

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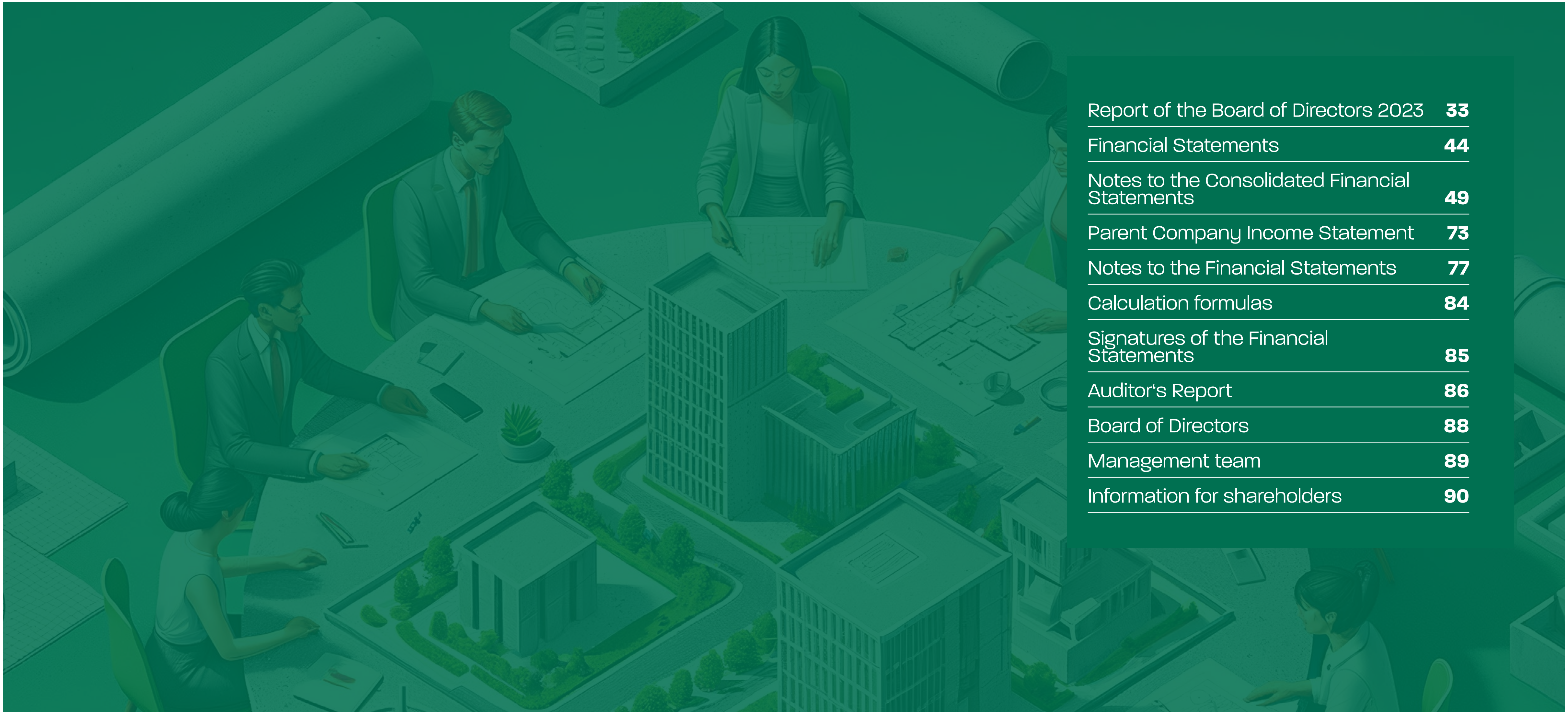
BETOLAR

Betolar

Report of the Board of Directors and Financial Statements 2023



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Report Of The Board Of Directors 2023

Betolar in brief and group structure

Betolar Plc is a Finnish materials technology company that enables sustainable and low-carbon concrete production with its Geoprime solution. The solution converts industrial side streams into cement substitutes.

Betolar's AI-based innovation can significantly reduce carbon emissions from cement use by optimising existing manufacturing processes, supporting solution development with advanced analytics and creating a global market for side streams. Betolar's mission is to help reduce CO2 emissions and the use of virgin resources.

The Betolar Group consists of the parent company Betolar Plc and the wholly owned subsidiary Betolar Chemicals Oy. In addition, the group includes a subsidiary, Betolar India Private Limited, in which Betolar Chemicals Oy has a holding of more than 99% and the parent company less than 1%.

The parent company Betolar Plc develops technology solutions and owns the company's IPR portfolio. At the end of the financial year, Betolar's business was centralised in the parent company.

Key events in the 2023 financial period

- On 29 March 2023, Betolar published an updated strategy to steer towards sustainable growth and a stronger position in the value chain.
- In accordance with the strategy update, the focus of development work was shifted from concrete products towards structural products with higher added value and mining solutions.
- Betolar's patent for electrical energy storage was expanded to the European and Indian markets.
- The construction phase of the expansion of the Innovation Centre in Kannonkoski was completed at the end of the second quarter.
- In the Waste upcycling product segment, the first agreements related to side stream research and utilisation were signed, such as a research project order from Inno Precast Company Limited in Thailand and Eesti Energia.
- On 19 September 2023, Betolar received a positive decision on a EUR 2.7 million grant from Business Finland for a research and development project on alternative side streams.
- To strengthen the implementation of its growth strategy, Betolar initiated measures to adjust its cost structure. The measures are estimated to generate annual savings of approximately EUR 5 million in 2024. As part of the package, Betolar commenced company wide change negotiations, which were completed at the beginning of October 2023.
- There were changes in the Management Team when Janne Rauramo, VP of Strategic Partnerships, and Ilkka Iittiläinen, COO, left the company. Tuija Kalpala (M.Sc. Econ.) was appointed as the new Chief Operating Officer and started in her position on 2 October 2023.

Key figures

KEY INDICATORS FOR THE GROUP

(EUR thousand, unless otherwise specified))	10–12/2023	10–12/2022	7–12/2023	7–12/2022	2023	2022
Net sales	217	222	385	267	515	287
Gross margin[1]			304	126	340	121
EBITDA[1,2]	-2,370	-2,756	-4,995	-5,471	-11,181	-9,988
Operating profit			-6,185	-6,523	-13,260	-11,518
Earnings before interest and taxes			-6,126	-6,422	-13,177	-11,873
Profit (loss) for the financial period			-6,122	-6,405	-13,153	-11,844
Earnings per share, basic and diluted, EUR[1,3]			-0.31	-0.33	-0.67	-0.61
Cash and cash equivalents and short-term fund investments[1,2] (at the end of the period)	14,315	26,624	14,315	26,624	14,315	26,624

OPERATIONAL INDICATORS

	10–12/2023	10–12/2022	7–12/2023	7–12/2022	2023	2022
Personnel (average number during the financial period)	57	60	58	60	60	51
Number of pilot customers[1,2]	1	6	6	11	24	25

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KEY FIGURES

KEY FIGURES PER SHARE

(EUR, unless otherwise stated)	2023	2022	2021	2020
Number of shares at the end of the financial period 31 Dec., pcs	19,606,882	19,531,757	19,444,024	7,853,868
Earnings per share, basic and diluted[1,2,3]	-0.67	-0.61	-0.53	-0.18
Equity per share	0.70	1.36	1.98	0.18
Lowest exchange rate, BETOLAR	0.90	2.52	5.95	-
Highest exchange rate, BETOLAR	3.44	6.30	6.88	-
Closing rate at the end of the financial year 31 Dec.	1.30	3.05	6.30	-
Average daily turnover of shares, pcs	12,600	10,068	53,287	-
Market value of shares at the end of the period 31 Dec, EUR million	25.4	59.6	122.5	-

1) Betolar uses a number of alternative indicators (sales margin, EBITDA, earnings per share, cash and cash equivalents, short-term fund investments and number of pilot customers) as half-yearly measures of operational profitability and business development. Definitions and formulae for these indicators are given in the annex to the financial statements.
2) The number of shares used in the calculation of earnings per share is as follows: 31.12.2023: 19,606,882 shares, 1-12/2023: 19,569,320 shares, 7-12/2023: 19,579,236 shares, 31.12.2022: 19,531,757 shares, 1-12/2022: 19,487,891 shares, 7-12/2022: 19,524,552 shares.
3) The calculation of earnings per share is based on IFRS for 2021-2023 and FAS for 2020.

Business review

Betolar's offering, as well as research and product development, are currently focused on four product segments: mining, waste upcycling, construction elements and concrete products.

In the mining segment, Betolar focuses on high-volume application areas where the core of the offering consists of paste backfilling, shotcreting and stabilisation of tailings.The company is benefiting from a positive trend in the mining industry, driven by the demand of critical metals in the EU, the geopolitical situation and the focus on sustainable development. In addition, new EU-driven mineral strategies in various countries are supporting the demand for solutions as they seek to ensure the availability of critical raw materials in a changing global environment. At the end of the year, Betolar became a member of Mining Finland, the mining industry's representative organisation, and continued the productisation of mining solutions.

In the waste upcycling product segment, Betolar signed its first contracts related to side stream research and recovery when a letter of intent was made with Metso for the utilisation of the side stream of the lithium hydroxide process. In addition, a research order was received from Eesti Energia for the utilisation of fly ash in energy production. Every year, a million tons of ash is produced as a side stream of energy production, which is piled up in Narva in northeastern Estonia. The aim is to research the utilisation of the side streams generated by the companies' operations as concrete binders and/or aggregates. Engagements with companies of this size will increase visibility, open new opportunities and strengthen growth potential globally in this segment.

In the construction elements product segment, Betolar continued its efforts in the commercialisation of hollow core slabs. In Europe, collaboration with Consolis Parma was continued, and in Southeast Asia, local tests for plant-scale Geoprime hollow core slabs were successfully completed with a local client after the period. In the urbanised areas of Southeast Asia, there is a strong orientation towards the production of locally prefabricated concrete elements. Another common method of construction in emerging Asian markets is in-situ casting, and Betolar is currently developing a product to meet these needs. By the end of the year, a set of suitable mix designs and technical work were well underway.

In the concrete products segment, Betolar's customers such as Vyara Tiles in India and IBF, the largest concrete producer in Denmark, continued to scale up production as planned. IBF expanded its portfolio from infrastructure concrete products to landscaping products. Progress was also made towards the end of the year in the Middle East, with Betolar launching low-carbon concrete products in the UAE with Fujairah Concrete Products (FCP) in December. FCP is a construction group majority owned by the Emirate of Fujairah and is the leading manufacturer of concrete blocks in the UAE. FCP produces more than 25 million building blocks and over 800,000 square metres of landscaping products annually. Products manufactured with the Geoprime solution meet the standards of the Abu Dhabi Quality and Conformity Council (ADQCC) and FCP received product approval for its paving stone products in November under the standards governing abrasion resistance (EN 1338, EN 1339 and EN 1340) for the United Arab Emirates market.

Operating environment

Betolar continued to focus sales and marketing on key markets based on the demand for green transition, the availability of side streams and the ability to deliver economic value through productised applications. Demand for low-carbon solutions is expected to remain strong, particularly in the mining and construction industries. In particular, mining will be driven by the increasing electrification of the society, which will increase the use of battery metals. Existing and new mining projects need more environmentally friendly solutions for extraction, in particular to avoid the generation of side streams. The company estimates that the green cement market for blended cements, geopolymers and alternative binders is expected to multiply in the long term. This will increase the size of Betolar's addressable market.

The availability and price of side streams play a key role in creating business value. Increased demand for current known sources of side streams, in particular blast furnace slag and fly ash, has led to rising prices for these raw materials, while production volumes of blast furnace slag and fly ash are declining globally over the longer term. Betolar is accelerating the development of alternative side streams to replace the use of cement in different customer segments.

Competitive landscape

Competing products and solutions can be divided into three main categories: traditional Portland cement, low-carbon blended

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cements and alternative binders such as alkali-activated materials or geopolymers. Conventional Portland cement meets local and international standards but faces increasing sustainability challenges due to high emission levels and high virgin raw material use. In lower-carbon blended cements, part of the cement clinker is replaced by mainly ground blast furnace slag (GGBFS), one of the by-products of the steel industry. However, the challenge of blended cement is that cement clinker can only be replaced by blast furnace slag up to a certain point. Increasing slag content impairs the properties of fresh concrete, such as the binding and strength development properties of concrete. Alternative binders can significantly reduce carbon dioxide emissions and reduce the use of fossil resources. Concrete standards based on the use of cement are currently slowing down the uptake and scaling-up of alternative binder-based building materials, especially in structural products. Betolar works in international groups to update the European concrete standards to be performance-based. Similar upgrading of standards has already been promoted in for example North America and the United Kingdom.

Betolar will focus on the identification and use of local alternative side streams, with a particular focus on the commercialisation of low-cost side streams. Betolar also has a strong IPR strategy, and an AI-based platform developed by the company. Together, these will strengthen Betolar's competitiveness as an innovative and sustainable pioneer.

Strategic, Business and Financial Objectives

The company aims to be the most attractive green transition partner for the construction, concrete, cement and mining industries. On February 14, 2024, Betolar's Board of Directors confirmed the company's updated mid-term business and financial objectives. The updated business and financial goals are based on the company's previously announced strategy, which remains unchanged.

Medium-term (2024-2026) business objectives:

- Accelerating research and application development of alternative side streams
- Creating a stronger position and value creation potential in the value chain of side streams
- Global scaling of Betolar's solutions to high-volume and scalable customer segments
- Expansion into key markets based on demand for green transition, availability of side streams and Betolar's ability to deliver economic value through productised applications
- Building a data-driven business ecosystem
- Development of commercial platform services on Betolar's AI platform

In addition to the business objectives, Betolar has the following medium and long-term financial targets based on its scalable business model:

- **Medium term:** Net sales of EUR 50–100 million at the end of 2026 and achieving positive cash flow from operating activities during 2026
- **Long term:** Net sales of more than EUR 1 billion and an EBITDA margin of 30% by the end of 2033

The targets are updated based on the business model in line with the strategy, which has been renewed to meet evolving customer needs. Betolar has decided to focus on four product segments: mining, waste upcycling, construction elements and concrete products.

The renewed business model highlights two priorities:

- Licensable Geoprime material technology solutions are offered with ongoing volume-based license and material fees.
- Non-recurring engineering fee (NRE) projects especially for the mining industry and side stream owners.

Betolar estimates that it is in a better position than other operators in the industry to meet the needs of research and commercialization of alternative binders. The company has a globally scalable operating model with light fixed asset needs, very strong side stream expertise and a data-driven business ecosystem platform as a competitive advantage. In the early stages, the company has focused on the systematic use of data in its product development processes. During the strategy period, the company will accelerate the creation of commercial services on Betolar's artificial intelligence platform. The success of the strategy highlights the rapid development and productisation of alternative side streams.

Betolar's updated operational key figures

- Number of new Non-Recurring Engineering (NRE) projects
- Personnel (average number during the period)
- Number of new pilot customers
- Betolar reports updated key figures from the first business review of 2024.

Financial review

Net sales

January – December 2023

The Group's net sales in January–December 2023 grew year-on-year and amounted to EUR 515 thousand (2022: 287 thousand).

Approximately 25% of net sales for the financial period consisted of license and chemical sales under the Geoprime concept. A larger part of the turnover for the financial year came from fees for customer pilots and research service projects. Introduction of piloting fees is in line with the company's growth strategy and commits the customer to future productions. Other operating income for the period consisted mostly of business grants.

Geographically, the net sales were distributed as follows: EMEA (Europe, Middle East, Africa) 64 % (69%), APAC (Asia Pacific) 19% (22%) and Americas 17% (9%).

Financial result

January – December 2023

Gross margin amounted to EUR 340 (121) thousand and EBITDA was EUR -11,181 (-9,988) thousand.

Personnel expenses increased from the comparison period to EUR 6,836 (4,352) thousand. After the active recruitment phase in 2022, Betolar started to focus on operational productivity growth during the review period.

Depreciation, amortisation, and impairment amounted to EUR 2,079 (1,530) thousand and other operating expenses to EUR 4,885 (5,896) thousand. Other operating expenses include expert costs related to research and development, building an AI platform and sales development. In the first half of the year, the company's administrative expenses focused on investments in business development.

The Group's operating profit for January–December 2023 amounted to EUR -13,260 (-11,518) thousand.

Net financial income and expenses amounted to EUR 83 (-356) thousand. The company uses short-term interest funds to hedge cash assets, which had a positive impact during the financial year.

Earnings before taxes and interest were EUR-13,177 (-11,873) thousand. The result for the financial year was EUR -13,153 (-11,844) thousand.

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Betolar is a growth-phase company whose investments in developing its Geoprime concept and its international commercialisation increased strongly during the financial period. The operating loss reflects the growth of personnel and related costs in accordance with the company's growth strategy, investments in research and product development as well as the building of other prerequisites and capabilities under the growth strategy.

Financial position and cash flows

Betolar's balance sheet total at the end of the financial period was EUR 21,236 (31 December 2022: 31,948) thousand. Equity amounted to EUR 13,786 (26,582) thousand. Equity ratio at the end of the financial period stood at 65 (83) per cent.

At the end of the financial period, the Group's net debt was EUR -9,128 (-24,104) thousand and the net gearing ratio was -66 (-91) per cent.

Cash flow from operating activities in January-December 2023 was EUR -11,676 (1-12/2022: -9,546) thousand. Net cash flow from operating activities was affected by an increase in personnel costs and other operating expenses.

The cash flow from investments amounted to EUR 9,228 (5,434) thousand, representing the company's tangible and intangible assets.

Cash flow from financing activities amounted to EUR 2,224 (1,922) thousand. Cash flow from financing activities includes EUR 2,500 thousand of long-term loan drawdowns, EUR -3 thousand of short-term loan repayments and EUR -273 thousand of lease repayments. In the last quarter of the financial year, Betolar drew down EUR 2,500 thousand of the Climate Fund loan.

Betolar's short-term fund investments at the end of the period were EUR 13,372 (25,457) thousand. Cash and cash equivalents at the end of the period were EUR 943 (1,167) thousand and the change in cash and cash equivalents was EUR -224 (-2,191) thousand. Total cash and cash equivalents and short-term fund investments were EUR 14,315 (26,624) thousand.

The company has taken active measures to secure the financial conditions to implement its strategy, which was updated in 2023. During the financial year, Betolar has made adjustments to its cost structure and applied for public business financing for research and development. As a result of the adjustment measures, the company will achieve cost savings of approximately EUR 5,000 thousand for 2024 compared to 12 months rolling costs at the end of Q3/2023. Business Finland granted Betolar EUR 2,700 thousand grant for a research and development project on alternative side streams during FY 2023. This grant will be drawn down as the research project progresses during 2024 and 2025. In addition, the company has withdrawn EUR 2 500 thousand of the EUR 7 500 thousand loan from the Climate Fund The loan drawdown is linked to development targets, some of which the company has already met in 2023. The loan will be withdrawn during 2024. After the financial year, Finnpartnership awarded the company a grant of EUR 370 thousand to pilot the prefabrication of hollow-core slabs in Malaysia.

Investments

Investments in tangible and intangible assets totalled EUR 3,205 (2022: 3,339) thousand. Investments accounted for 26 (31) per cent of total operating expenses. Tangible investments were mainly aimed at expanding Kannonkoski's innovation activities.

Technology development

The technology development activities at Betolar are based on the research and analysis of industrial side streams and the continuous development of Geoprime recipes and low-carbon building materials. Technology development has four focus areas; research and product development, data platform and digitalisation, innovation and laboratory.

Betolar continued its extensive research programme on side streams to find viable alternatives to ground granulated blast furnace slag (GGBFS) and fly ash that are typically used as a cement replacement. The research programme currently covers more than 20 different industrial side streams such as metal production slags, ashes and recycled construction materials. Some of these research projects are carried out on a non-recurring engineering fee basis with side stream owners. Betolar successfully finalized stabilized slag material (steel slag purified from vanadium) field trials (together with Novana). Analysing the use of ash from oil shale combustion (together with Eesti Energia) as a binding agent in concrete is the other example of these projects. The side streams research programme received significant additional resources from Business Finland's research funding. This grant enables even broader and more challenging side stream research activities.

Betolar shifted product development focus from precast concrete products towards structural solutions and mining applications. The goal of product development is to achieve significant CO2 emission savings in final products. Several successful pilots with precast concrete manufacturer Consolis Parma on the product development of low-carbon hollow-core slabs were made. Hollow-core slab solution was also successfully piloted first time with a customer in Asia. Using the Geoprime solution, it is possible to achieve up to 75% lower emissions than standard hollow-core slabs. Betolar successfully finalized a laboratory development phase also in another load-bearing structure development project, specifically targeted at the Asian market. The development of the first product applications for the mining industry, cemented paste backfill and shotcrete was continued. Completed laboratory studies indicated that cementless paste backfill can be created by fulfilling strength and long-term durability requirements and simultaneously reducing CO2 emissions 40-80% depending on side streams used.'

The development of the Betolar Platform Program (AI data platform) was continued. During Q2, Betolar started a development programme of developing data-driven value-added services. Side stream analysis service was the first launched product with the aim to support customers in identifying value creation opportunities to utilize their side streams. Successful piloting of the service was done in H2 while continuing data collection on side streams, customer pilots and Geoprime end-product characteristics in order to strengthen the data platform core. Betolar also achieved significant steps in utilizing AI in accelerating product development by creating several predictive models to simulate end product performance and their long-term durability. In addition, Betolar strengthened Data platform team with several key expert recruitments.

Betolar's innovation activities create completely new solutions that generate business in the long term and are focused on exploring new activators, developing new types of side stream treatment methods and advancing equipment solutions. The construction of the Innovation Centre extension was completed during summer enabling more diverse innovation programs, research of new side streams and also testing of larger construction elements. Through systematic development, Betolar's patent portfolio has also grown rapidly. The primary role of patents is to safeguard the business of Betolar and its customers based on material technology solutions. During the last year, Betolar's patent on electrical energy storage was extended to European, Indian and US markets. By the end 2023, Betolar had received approved patents for five inventions and further nine inventions were in the patenting process. The patent portfolio is expected to be a significant component of the company's value in the long term.

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Betolar's own laboratories provide the necessary analyses for research and product development. In response to the increased demand for material analyses, Betolar successfully launched a materials research laboratory at the Espoo site during the first quarter. The Innovation Centre investment enables also further enhancement of the laboratory activities at Kannonkoski.

Sustainability

Betolar contributes to the UN's Sustainable Development Goals (SDGs), and in particular to SDGs 9, 11, 12 and 13: it promotes positive change in infrastructure, cities, consumption patterns and climate action.

Betolar has identified and validated three key sustainability themes in the stakeholder dialogue. These themes are impactful for stakeholders and at the same time have economic relevance for the company. These themes will guide Betolar's mainstreaming of sustainability throughout the organisation.

1. Accelerating CO2 emission reductions:

- Betolar strengthened its internal processes and capabilities to measure and communicate the other environmental impacts of the Geoprime solution alongside carbon emissions. Betolar launched the first life cycle assessments for its key product groups, such as paving stones and hollow core slabs. In addition, Betolar's customers started implementing Environmental Product Declarations (EPDs) for Geoprime concrete products.
- For 2023, the carbon handprint of the Geoprime solution was 685 tonnes CO2 equivalent. The carbon handprint refers to the reduction in emissions from the use of a product or service compared to a conventional product. Concrete, measurable information on the emission reductions is important for Betolar's customers, partners and investors who are implementing their own climate goals. The calculation is based on a third-party screening calculation and comparing the CO2 emission reduction of the A1-A2 phase with a reference product in Betolar's key markets and products. The production, use and end-of-life phases were excluded from the assessment as they are assumed to be identical between Geoprime and conventional concrete.
- The carbon dioxide emissions of Betolar's own operations (scope 1, 2 and 3 categories) were calculated for the first time for 2022, and during 2023 the preparation of the value chain emissions calculation was continued and data collection processes were intensified. Although Betolar is currently not covered by the EU's Sustainability Reporting Directive (CSRD), the baseline calculation serves to set targets and support the company's preparedness for EU reporting obligations in the near future.

2. Ensuring the responsibility of side streams and activator chemicals:

- Ensuring that side streams and activator chemicals are safe to use is essential to Betolar's operations.
- For activator chemicals, a Supplier Code of Ethics was developed during the period, which defines the expectations and requirements for suppliers in terms of ethical and responsible behaviour.

3. Ensuring social responsibility in the construction value chain:

- At Betolar, ensuring social responsibility means ensuring the well-being and safety of employees and others in the value chain. In 2023, a Code of Conduct was published. The purpose of the Code of Conduct is to guide every Betolar employee and stakeholder to act responsibly and ethically.
- Betolar strengthened its ability to operate as a diverse team by training its staff in diversity, equity and inclusion (DE&I) related topics.

To manage its operations, Betolar has a quality management system in place that is certified to ISO 14001 environmental standard and ISO 45001 occupational health and safety standard. Betolar strives to ensure the highest possible level of quality and safety in its own operations and those of its suppliers and customers. During the period, a periodic audit was carried out with Bureau Veritas as the auditor.

Personnel and offices

The Group employed an average of 60 (1-12/2022: 51) people during the period. At the end of the period, the Group employed 53 (31 December 2022: 61), of whom 49 (56) worked in Finland and 4 (5) in other countries. In Finland, the company has offices in Espoo, Jyväskylä, Tampere and research and development facilities in Kannonkoski and Espoo. In addition to the Indian subsidiary, the company has operations in Indonesia.

Towards the end of 2023, the number of personnel decreased, due to the impact of the change negotiations, and recruitments were mainly replacement recruitments. Training was provided to develop IT skills and feedback skills, and researchers participated in international conferences. In addition, the development of safety at work and the conditions for a healthy and competent workplace culture were further developed. Betolar has strengthened its capacity to act as a diverse and inclusive organisation, including through the launch and training of an ethical code of conduct. In 2023, a job satisfaction survey covering all employees and a follow-up survey were also carried out for the first time, which were used to draw up team-level development plans. In addition, a competency mapping exercise was launched for everyone at the end of the year, which will contribute to strengthening professional development planning.

Governance

Betolar's decision-making and management are in compliance with the Finnish Limited Liability Companies Act, securities market legislation, the rules of the Nasdaq First North Growth Market, the company's Articles of Association and other provisions applicable to the company.

The company does not comply with the Code of Corporate Governance published by the Finnish Securities Market Association, which is voluntary for companies on the First North Growth Market, as the company does not consider it justified in view of the size of the company and the scope of its business.

Decisions of the Annual General Meeting

Betolar's Annual General Meeting held on 31 March 2023 approved the financial statements for the financial year 2022 and discharged the members of the Board of Directors and the President and CEO from liability.

Decision on the use of the loss shown in the balance sheet

The Annual General Meeting resolved to transfer the loss for the financial period to the profit (loss) account of previous financial periods and resolved not to pay dividend in accordance with the proposal of Board of Directors.

Board members and remuneration

The Annual General Meeting resolved, in accordance with the proposal of the Shareholders' Nomination Committee that the Board of Directors will consist of six (6) members and that Tero Ojanperä, Soile Kankaanpää, Kalle Härkki, Inka Mero, Juha Leppänen and Ilkka Salonen were re-elected as members of the Board of Directors. Mr. Ilkka Salonen was elected as the Chairman of the Board and

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Mr. Tero Ojanperä was recommended to be elected as the Deputy Chairman of the Board.

The Annual General Meeting resolved that the Chairman of the Board will be paid a fee of EUR 3,500 per month, Deputy Chairman of the Board a fee of EUR 2,700 per month and other Members of the Board each a fee of EUR 1,900 per month. Furthermore, the Meeting resolved that the Chairman of the committees founded by the Board of Directors will be paid EUR 600 per meeting of the committees and other members of the committees will be paid EUR 300 per meeting. Travel expenses will be reimbursed in accordance with the maximum amount of the respective travel allowance base approved by the Tax Administration.

Amendment of the Articles of Association

The Annual General Meeting resolved, in accordance with the proposal of the Board of Directors, to amend Article 4 of the Articles of Association. The maximum number of board members was increased from seven to eight members. The Annual General Meeting also resolved, in accordance with the proposal of the Board of Directors, to amend Article 8 of the Articles of Association. In the future, the Chairman of the Board will be elected by the Board from among its members. In addition, by decision of the Board, the General Meeting can also be held without a meeting place, so that shareholders can fully exercise their voting rights by means of telecommunication and technical assistance.

Resolutions on the authorisations of the Board of Directors

The Annual General Meeting decided to authorise the Board of Directors to decide on the issuance of shares as well as the issuance of options and other special rights entitling to shares, as proposed by the Board of Directors. The Annual General Meeting further decided to authorise the Board of Directors to decide on the repurchase of the company's own shares.

Both authorisations are valid until the next Annual General Meeting, however, until 30 June 2024 at the latest, and they cancel the corresponding authorisations granted by the Annual General Meeting of 23 March 2022.

These authorisations are described below in the section on the authorisations of the Board of Directors.

Rules of Procedure of the Shareholders' Nomination Committee

The Annual General Meeting resolved to amend the Rules of Procedure of the Shareholders' Nomination Committee in accordance with the proposal of the Nomination Committee. First Chapter of Section 2 of the Rules of Procedure was amended in its entirety and due to the amendment of the Section 4, the Shareholders' Nomination Committee will no longer propose to the Annual General Meeting the Chairman of the Board. In addition, the nomination right of the members representing the largest shareholders shall from now on be based on the list of shareholders on the first working day of August preceding the Annual General Meeting. The full text of the amended rules of procedure can be found on the company's website.

Board of Directors

The members of Betolar's Board of Directors on 31 December 2023 were Ilkka Salonen (Chairman), Tero Ojanperä (Vice Chairman), Inka Mero (member), Kalle Härkki (member), Soile Kankaanpää (member) and Juha Leppänen (member).

The Board of Directors of Betolar Plc held its organizational meeting after the Annual General Meeting. The Board elected from among its members the Vice-Chairman of the Board, the members of the Audit Committee and the members of the Personnel and Remuneration Committee.

Tasks of the committees

The role of the Audit Committee is to assist the Board of Directors in ensuring that the company's accounting and financial control is properly organised and that the company has a comprehensive and adequate internal control system covering all its activities. The Committee is also responsible for monitoring that the company's operations and internal controls are organised in accordance with the law, regulations, and good corporate governance, and for supervising the activities of the internal audit function.

The Human Resources and Compensation Committee is responsible for assisting the Board of Directors in the preparation of personnel matters related to the activities and remuneration of the CEO and the Executive Board, as well as the company's remuneration and incentive schemes. The Committee is also responsible for monitoring remuneration in the Company and in the industries relevant to the Company.

Composition of committees

The Board elected the committee chairs and members from among its members at its organisational meeting.

Audit Committee: chair Soile Kankaanpää, members Kalle Härkki and Ilkka Salonen. The members of the Audit Committee are independent of the company and its significant shareholders.

Personnel and Remuneration Committee: Tero Ojanperä, Chairman and members Kalle Härkki, Inka Mero and Ilkka Salonen. The members of the Personnel and Remuneration Committee are independent of the company and its significant shareholders.

Shareholders' Nomination Board

The composition of the Betolar Shareholders' Nomination Board was determined on 1 August 2023 based on the holdings entered in the shareholders' register and its composition was announced on 17 August 2023.

The Nomination Board consists of four members, of whom the four largest shareholders of the company are each entitled to nominate one member. The Nomination Board also includes the Chairman of the Board of Directors as an expert member.

Alexander Ehrnrooth, Chairman of the Shareholders' Nomination Board, representing the shareholder Nidoco AB, Juha Leppänen, shareholder Olli-Pekka Kallasvuo, representing the shareholder Ajanta Innovations Oy, and Annika Ekman, representing the shareholder Mutual Pension Insurance Company Ilmarinen, sat on the Shareholders' Nomination Board. The Nomination Board also includes Ilkka Salonen, Chairman of the Board of Directors of Betolar, as the expert member.

The Committee's task is to prepare and present annually to the Annual General Meeting and, if necessary, to the Extraordinary General Meeting proposals on the composition of the Board of Directors and remuneration. The Nomination Committee is also responsible for identifying candidates to succeed the members of the Board of Directors and for preparing the principles of Board diversity.

Management team

The members of the Betolar Management Team on 31 December 2023 were Riku Kytömäki (CEO), Riikka Ylikoski (CFO), Ville Voipio (Commercial Director), Jarno Poskela (CTO), Antti Uski (HR Director) and Tuija Kalpala (COO).

Tuija Kalpala was appointed as the company's Chief Operating Officer and a member of the Management Team on 31 July 2023. She took up her position on 2 October 2023. Ilkka Iittiläinen, previously the company's Chief Operating Officer (COO), announced in March that he was leaving the company and his employment ended on 2 June 2023.

Janne Rauramo, Director of Strategic Partnerships, announced on

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1 September 2023 that he would leave the company and his employment ended on 30 November 2023.The management of strategic partnerships was transferred to the company's commercial and operational functions.

Auditor

The company's auditor is PricewaterhouseCoopers Oy, with Janne Rajalahti, Authorised Public Accountant, as the responsible auditor.

Share-based incentive and retention schemes

Option schemes

Betolar has six share option incentive and engagement programmes, which are designed to encourage management and selected key personnel and employees to work over the long term to increase the value of shareholdings.

Betolar's existing share option schemes and the related outstanding share options are described in the table below.

Programmes	Subscription price	Number of shares to be issued with options	Subscription deadline
Options 2019			
2019-2A-D	EUR 0.64	31,252	31.12.2030
Options 2020			
2020	EUR 1.31	168,280	31.12.2030
Options 2021			
2021–1	EUR 1.31	552,920	8.9.2021 - 31.12.2030
2021–2	EUR 1.31	60,701	1.12.2021 - 31.12.2030
Options 2022			
2022	EUR 5.96	366,191	1.4.2025 - 28.2.2027
Options 2023			
2023	EUR 2.59	666,333	1.4.2026 – 28.2.2028
Total		**1,845,677**	

The 2019, 2020 and 2021 options were vested in connection with the IPO.

On 31 December 2023, the members of the Board of Directors held a total of 46,773 stock options, which entitle them to subscribe for a total of 477,573 shares in the company. On 31 December 2023, the members of the Company's Management Board held a total of 818,496 option shares entitling them to subscribe for a total of 834,696 shares in the Company. As of 31 December 2023, other employees held a total of 168,089 stock options entitling them to subscribe for a total of 221,489 shares in the company. The number of unsubscribed options issued represented 7.82% of the total number of shares in the company on 31 December 2023.

Betolar's share-based incentive and retention plan is described in note 19 of the financial statements.

Share-based payment scheme 2022-2026

The 2022-2026 Incentive Share Award Plan is based on a valid employment or management contract and the continuation of the employment or service relationship for a specified commitment period of at least 12 months, which may end on 31 August 2023, 2024, 2025, 2026 or 2027. The award will be distributed free of charge after the end of the specified commitment period. The scheme is only available to specifically designated key employees.

The fees will be paid partly in Betolar Plc shares and partly in cash. The cash portion of the remuneration is intended to cover taxes and statutory social insurance contributions for the remuneration paid to the participants. The total value of the awards to be allocated under the Incentive Share Award Plan is equivalent to a maximum of 100,000 Betolar Plc shares, including the cash portion.

As of 31 December 2023, 40,000 shares had been granted under the scheme and the vesting periods are still ongoing.

Shares and shareholders

At the end of the financial year on 31 December 2023, Betolar's share capital was EUR 80,000 and the company had issued 19,606,882 fully paid shares. The company has one class of shares with ISIN FI4000512587.

At the end of the financial period, Betolar had a total of 4,993 (4,486) shareholders. The table below shows Betolar's ten largest shareholders by number of shareholders, as of 31 December 2023. (Data source: Euroland.com)

TEN LARGEST SHAREHOLDERS 31 DECEMBER 2023

Position	Shareholders	Number of shares	% of shares
1	Nidoco AB	2,335,000	11.91
2	Leppänen Juha Markus	1,603,468	8.18
3	Ajanta Innovations Oy	1,600,463	8.16
4	Ahlstrom Invest B.V.	1,258,335	6.42
5	Ilmarinen Mutual Pension Insurance Company	1,080,139	5.51
6	Skandinaviska Enskilda Banken	1,051,597	5.36
7	Voima Ventures Fund II Ky	744,853	3.80
8	Investment Fund Danske Invest Suomi Share	641,828	3.27
9	Entrada Oy	591,150	3.02
10	Ylitalo Kari Tapani	550,919	2.81
	10 largest, total	11,457,752	58.48
	Other shareholders	8,149,130	41.52
	All shares, total	19,606,882	100.00

The members of the Board of Directors and Management Team and entities controlled by them held a total of 1,761,237 shares in Betolar at the end of the financial period, accounting for approximately 9.0 per cent of all shares and votes.

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LARGEST SHAREHOLDERS BY SECTOR 31 DECEMBER 2023

Position	Shareholders by sector	Number of shares	% of shares
1	Households	5,823,362	29.70
2	Private companies, total	5,740,218	29.28
3	Foreign, total	3,742,662	19.09
4	Public organisations	1,341,463	6.84
5	Financial and insurance institutions, total	1,150,453	5.87
6	Not-for-profit organisations, total	271,391	1.38
	Total	18,069,549	92.16
	Nominee-registered	1,537,333	7.84
	All shares, total	19,606,882	100.00

Of the shares, 7.84% were held by nominee-registered shareholders.

SHARE PORTFOLIO DISTRIBUTION 31 DECEMBER 2023

Position	Number of shares	Number of shareholders	% of shareholders	Number of shares	% of shares
1	1–100	2,662	53.31	145,501	0.74
2	101–500	1,492	29.90	381,535	1.95
3	501–1 000	407	8.15	315,878	1.61
4	1 001–5 000	309	6.19	702,410	3.58
5	5 001–10 000	39	0.78	268,418	1.37
6	10 001–50 000	45	0.90	1,001,045	5.11
7	50 001–100 000	7	0.14	522,787	2.67
8	100 001–500 000	21	0.42	4,811,556	24.54
9	500 001–	10	0.20	11,457,752	58.44
	Nominee-registered	6	0.12	1,537,333	7.84
	Total	4,999	100.00	19,606,882	100.00

The 100 largest shareholders are listed on Betolar's website https://www.betolar.com/investors

Price developments and trading

The highest quoted share price during the period was EUR 3.44 and the lowest was EUR 0.90. The volume-weighted average price was EUR 1.70. The closing price for the period was EUR 1.30, giving Betolar a market value of EUR 25,390,912. The total number of shares exchanged during the period was EUR 5,376,905 and the trading volume was 3,162,646 shares. The average daily turnover during the period was 12,600 shares.

Authorisations of the Board of Directors

BThe Board of Directors of Betolar has the following authorisations granted by the Annual General Meeting of 31 March 2023.

Authorisation to decide on the issuance of shares as well as the issuance of options and other special rights entitling to shares
The Annual General Meeting resolved to authorise the Board of Directors in accordance with the proposal of the Board to resolve on the issuance a maximum of 1,953,175 shares (including shares to be issued under special rights) in one or more tranches corresponding to approximately 10 % of all the shares in the company. The Board of Directors decides on all terms and conditions of the share issue and the issuance of option rights and other special rights entitling to shares within the limits of the authorisation. The issuance of shares and special rights entitling to shares, including options, may be carried out in deviation from the shareholders' pre-emptive right (directed issue). The total number of option rights or other special rights entitling to shares to be issued for the implementation of the company's incentive and commitment programs may not exceed 1,000,000 new shares and/or treasury shares held by the company, which amount corresponds to approximately five (5) per cent of the total number of shares in the company at the time of the convening of the Annual General Meeting. The number of shares to be issued for the implementation of the incentive and commitment programs is included in the maximum number of shares referred to in the aforementioned authorisation.

The authorisation is valid until the next Annual General Meeting, but not later than 30 June 2024 and the authorisation granted by the Annual General Meeting of 23 March 2022 to the Board of Directors was revoked.

Authorisation to decide on the repurchase of company's own shares
The Annual General Meeting resolved to authorise the Board of Directors in accordance with the proposal of the Board to resolve on the repurchase of a maximum of 1,000,000 shares, which corresponds to approximately five (5) per cent of the current number of all the company's shares. The company's own shares can only be repurchased with unrestricted equity and the shares can be repurchased on the repurchase date at a price formed in multilateral trading or otherwise at a price formed in the market. Shares may also be acquired outside public trading at a price that does not exceed the market price in public trading at the time of acquisition.

The Board of Directors decides how the shares are acquired. Own shares may be repurchased other than in proportion to the shares held by the shareholders (directed repurchase) if there is a compelling financial reason for doing so. The authorisation is valid until the next Annual General Meeting, but not later than 30 June 2024 and the authorisation granted by the Annual General Meeting of 23 March 2022 to the Board of Directors was revoked.

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Main risks and business uncertainties

Risks and risk management

The rapid development of Betolar's business and operating environment requires strong anticipation and management of the risk environment and internal risks. Betolar's risk management supports the implementation of the company's strategy, continuity of operations and achievement of objectives in accordance with the risk management policy approved by the Board of Directors.

The Risk Management Policy describes the basis of Betolar's risk management, the risk environment, the governance model and the key processes of risk management. Betolar's Board of Directors and management determine the level of risk that the company is willing and able to accept. The Board directs and oversees the planning and implementation of risk management.

Betolar's CEO is responsible for risk management as a whole, while the CFO is responsible for the risk management process, its development and guidance, and the monitoring and coordination of its practical implementation. Business management is responsible for the achievement of set objectives and for the management and mitigation of risks that threaten them. Operational management is also responsible for risk management activities and for ensuring that the risk management process is carried out and that adequate resources are available.

Risk management process

Step	Content / categories	Key decisions and assessments
Strategic process	The risk environment related to the strategy and its objectives and implementation.	• Risk appetite and tolerance
Business planning	Annual recurrent risk assessment	• Considering risks in the business plan
Risk identification, classification and assessment	• Strategic risks • Operational risks • Financial risks • Compliance risks	• Risk trend • Probability • Criticism
Mitigating risks	• Plan for active management • Avoid risk • Accept the risk	• Mitigation method • Responsibility
Risk reporting	• Internal reporting • External reporting	• The effectiveness of the risk management process • Evaluation of risk management results

Ongoing, active communication throughout the organisation reinforces risk awareness and culture.

Risk environment

Betolar's risk management policy divides risks into strategic, operational, financial and compliance risks. In addition, the risk map used in the risk management process takes a more granular view of risks from the perspective of different business areas and processes. This allows for operational accountability, monitoring, and reporting of risks.

Strategic risks: strategic risks are uncertainties that are mainly related to the operating environment and Betolar's ability to take advantage of or prepare for changes in the operating environment. These may include the general economic situation, the performance of strategic projects, intellectual property rights, the business model, the actions of competitors, legislation, or technological developments. Strategic risks can relate to both financial and non-financial objectives.

Operational risks: operational risks are circumstances or events that could prevent or impede the achievement of objectives or harm people, property, business, information, or other company activities. Operational risks associated with Betolar's activities relate in particular to the performance and capacity of its supply chains, the retention and attraction of the best workforce, the well-being and safety of its employees and those working in its supply chains. Information security and cyber risks related to the digital environment are an important risk category in Betolar's business model, which has recently gained importance.

Financial risks: financial risks are risks related to Betolar's financial position. These include liquidity, risks related to the availability and price of finance, exchange rate movements and investments. Compliance risks: compliance risks are the risks associated with exposure to legal sanctions, financial losses, and material losses that Betolar faces if it does not act in accordance with industry laws and regulations or internal practices. The main risks associated with the highly internationalised nature of operations are managing and complying with the requirements of the regulatory environment in the target markets.

Main business risks

The following section describes the main risks that Betolar considers to be significant, which may have an adverse effect on its business, financial position, operating results and market value.

Strategic risks

Risks related to the business environment: Economic cycles, and in particular the level of activity in the construction market, affect the demand for Betolar's products and services. High inflation, persistently high interest rates and supply chain disruptions have weakened the global economic outlook, posing a risk to the execution of Betolar's growth strategy. The changed security situation in Europe following the war of aggression in Russia has increased geopolitical risks and intensified disruptions to global supply chains, as well as increased uncertainty in European commodity and energy markets. The resulting scarcity, disruption and cost inflation could adversely affect the competitive or supply capacity, sales or profitability of Betolar's solution. However, the uncertainty in the operating environment is not expected to have a significant impact on the implementa-

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tion of plans and programs related to the green transition of societies, companies and financial markets.

Betolar assesses its operating environment as comprehensively as possible, aiming to anticipate and mitigate strategic risks and take advantage of emerging trends and opportunities. The global geographic diversification of the target markets of the business is also an important strategic choice.

Risks related to the commercialisation of the business As a technology company entering new markets, Betolar faces risks related to the commercialisation and scaling of its business, concepts, products, and services. The definition of strategic customer segments and markets, as well as market entry plans have been implemented at Betolar as part of commercial management. As part of the commercial process, an overall picture of the strategically targeted markets, customer loyalties, sales channel partnerships and market opportunities for Betolar's Geoprime and other productised concepts is created and maintained.

Changes in the regulatory environment: Betolar's strategic market and operating environment is affected by regulatory initiatives related to environmental sustainability at both supranational and national level. In Betolar's target markets in Europe and Asia, significant regulatory packages are being prepared and implemented to accelerate the uptake of green and other sustainable investment and financing models, reduce the environmental and climate impacts of different sectors, protect biodiversity, and increase the activity of the carbon allowance and credit market.

Betolar estimates that the Geoprime solution in particular will benefit from the requirements of the new regulatory projects and those in preparation. However, it is possible that the evolution of the regulatory environment is neutral for the Geoprime solution or that the regulatory environment may evolve in a direction that is unfavourable for the Geoprime solution and the associated value chain.

Operational risks

Success in delivering and selling a strong and scalable solution: Betolar is pursuing a large market for building materials as a substitute for cement, as well as creating new markets and commercial applications for non-utilised side streams. The strong commercialisation and growth of the business and the building of scalability in international markets will require significant growth investments, the development and acquisition of capabilities and the making of related strategic choices. In a rapidly opening global market, Betolar has decided to accept a higher level of risk in its strategic choices related to the definition and creation of a new market and the commercialisation of its innovation.

Betolar manages the risk of commercialising its technology and approach in new markets by being very proactive in reviewing its operating environment, value chain and strategic choices, and by making the necessary changes in a rapid but controlled manner. The lessons learned from the first pilot and commercial customer engagements will be analysed and used to refine the strategic focus of customer segments and to pursue ever larger customer engagements, sales channel partnerships and production volumes. Identifying and ensuring the availability of optimal side streams in terms of applicability, availability and price competitiveness will also be key.

Price competitiveness of the solution: the price competitiveness of the Geoprime solution is largely based on the price and availability of the industrial side streams, activator components and binders used. Betolar's formulation is currently dominated by the market-priced raw material blast furnace slag, which is also increasingly in demand from blended cements competing with geopolymer solutions. Betolar is progressively working to offer alternative, non-commercialised side streams and their recovery technologies for use alongside or instead of blast furnace slag. Examples of these include Stabilised Slag Material (SSM) from the steel industry and Ladle Slag. The aim is to establish long-term supply contracts with suppliers of such side streams.

Betolar also aims to strengthen its price competitiveness by increasing its position in both the construction and by-product value chains, especially in the mining industry. Based on its very high level of research expertise and experience, Betolar has significant pricing power in providing technology, research and development services for new markets such as downstream processing, commercialisation and exploitation of non-exploited side streams.

Betolar will continue to target its offerings to markets and customer segments where procurement is based on environmental and sustainability factors in addition to price, or where Betolar's solution offers a superior competitive advantage due to its technical or production characteristics.

Failure in large projects: the uptake of Betolar's Geoprime solution and ensuring profitability in target markets in Asia and Europe will require commercial, financial, and technical success, especially in projects with the largest potential volumes.

Betolar has decided to strengthen its risk management for the management and success of critical projects. Productisation of commissioning, clear phasing and the use of a steering model will substantially reduce the risk of failure, especially in larger and more large-scale commissioning projects. The governance model supports and strengthens project management, risk management and monitoring.

Through commissioning productisation and phasing, Betolar also aims to strengthen the customer's ability to carry out their own commissioning or similar project tasks efficiently, productively and on time together with Betolar.

Failure of continuous recipe management: a particular strength of the geopolymer recipe used in the Geoprime solution is the possibility of using several different types and qualities of industrial side streams. For Betolar to achieve the best possible continuous recipe management, the capacity to analyse variable side streams needs to be increased compared to the current situation.

Betolar is managing the risk of fluctuating side streams by increasing its laboratory capacity, which will increase the speed and capacity of side stream analysis compared to today. The increased laboratory capacity will also increase the possibilities to investigate an increasing number of new individual side streams. In addition, Betolar will use the AI-based platform it has developed to analyse new side streams.

Protecting intellectual property rights and trade secrets: An essential part of Betolar's strategic competitive advantage is based on its innovations, intellectual property rights and confidential information related to technologies, processes, and business operations. Betolar has a strong IPR strategy and IPR portfolio and management process to protect its rights through technical, legal, operational and commercial means.

However, there is a risk that those with access to the company's intellectual property and other confidential information, such as partners, employees, and consultants, may disseminate or otherwise use that information in ways that could harm 's competitive advantage. Betolar takes full account of the protection of intellectual property rights in all its contracts, as well as in the induction and ongoing training of its staff.

Key person risk: the success of Betolar is essentially based on its key people and the human capital they represent. If one or more key persons decide to leave the company, this could have a significant impact on Betolar's operations, at least in the short term. Betolar invests significantly in its ability to identify, attract, and retain the best talent in its fields. Betolar aims to provide an attractive engagement and reward model, well-being benefits and a diverse working environment. A strong, meaningful mission, a work community that

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combines excellence and technology, strong values and leadership based on them are strengths that will be nurtured and developed as the company grows and internationalises.

Digital infrastructure and environment risks: Betolar's business depends on a functioning digital infrastructure, strong data security and uninterrupted access to digital tools and systems. In recent years, cyber-attacks on public and private sector information systems and digital services have become increasingly common, due to the changed security situation in Europe and the rise of cybercrime, among other factors. Incidents can also be caused by human error, negligence, accidents, breaches or data breaches affecting either Betolar or its service providers' systems and data. Betolar manages the protection and availability of its digital infrastructure and data by maintaining both a high level of security and data protection infrastructure and policies, and a continuous readiness to respond to potential disruptions and attacks. Data management practices aim to ensure the highest possible reliability, integrity, timeliness, and security of data. Events in our information systems are monitored around the clock and anomalous events are immediately raised as alerts.

Conformity risks

Solution performance in line with customer and national requirements: the Betolar solution is based on customisation of technology, formulation, raw material chains and marketing. The objective is to enable the customer to manufacture, market and supply a superior and compliant uncemented concrete product to its own customers in terms of quality, sustainability and environmental impact.

The first customer engagements are key to the adoption of Geoprime, and therefore success in meeting customer requirements for their own and manufactured products is of paramount importance to Betolar.

Products manufactured with Betolar's Geoprime technology must meet the requirements for each product or product group, which vary depending on the country or region where the product is manufactured or used. Betolar manages the compliance risk of building products and materials based on its solution by actively and proactively managing the product development process. At the beginning of each pilot or deployment project, local regulations, standards, and other local requirements, guidelines and practices for the intended Geoprime end-product and its manufacturing are identified. Compliance definition, production, and reporting will be ensured in stages as the product development process progresses. Separately, Betolar will implement the necessary testing programs to ensure long-term durability as early as possible.

Financial risks

Liquidity risk: Betolar is dependent on external financing due to the low level of operating cash flow in the early stages of its growth strategy. The company's short- and long-term financing situation, capacity and needs are systematically monitored and forecasted monthly as part of the financial process by the management and the board. The Company has made adjustments to its cost structure during 2023. The impacts will be visible in 2024. In addition, the company has received grant funding for product development activities, which will be withdrawn in 2024 and 2025. New funding may be needed, for example, to secure operations and investments that are key to the implementation of the growth strategy. Betolar will ensure, through various means, a high level of readiness to seek and obtain new equity, debt and project financing on the most favourable terms to accelerate projects in line with its strategy. However, Betolar may not be able to raise the financing it needs or may have to raise financing at higher costs than in the past. The availability of financing may be affected by a number of factors, including the state of the financial markets, the general availability of credit, uncertainties related to the profitability of Betolar's business, and creditworthiness. The company manages the risk related to the availability of financing by actively exploring sources of equity and debt financing.

The company manages the risk related to access to finance by actively exploring sources of equity and debt financing and, in particular, by building its capacity to access green finance.

Estimate of probable future development

In the coming years, Betolar will focus on developing its business and financing its growth. The company does not expect to pay a dividend in the short or medium term.

Board of Directors' proposal for the distribution of profit

The parent company's distributable free equity at 31.12.2023 was EUR 9,641,902.62. The parent company's profit for the financial year was EUR -12,940,348.49.

The company does not expect to pay a dividend in the short or medium term. In addition, the terms of Betolar's financing agreements contain certain restrictions on Betolar's ability to pay dividends or otherwise distribute capital. For more information on the restrictions, please refer to the section entitled "Betolar's business financing" in the Betolar Listing Prospectus.

The Board of Directors proposes to the Annual General Meeting that no dividend be paid for the financial period 1 January 2023 – 31 December 2023 and that the loss for the financial period be transferred to the profit (loss) account for previous financial periods.

Events after the period under review

- On February 14, 2024, Betolar's board of directors confirmed the company's updated mid-term business and financial goals. The updated business and financial goals are based on the company's previously announced strategy, which remains unchanged.
- Betolar received a grant of EUR 370,000 from Finnpartnership for piloting a plant-scale production of low-carbon hollow core slabs in Malaysia.

Annual General Meeting

The Annual General Meeting of Betolar Plc is planned to be held on 27 March 2024. The notice of the Annual General Meeting will be published later.

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Financial Statements

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

EUR	Note	1 Jan.– 31 Dec. 2023	1 Jan.–31 Dec. 2022
NET SALES	3	515,274	287,425
Other operating income	4	201,006	139,455
Materials and services	5	-175,495	-166,428
Personnel expenses	6	-6,836,171	-4,351,828
Depreciation, amortisation and impairment	7	-2,079,020	-1,529,949
Other operating expenses	8	-4,885,347	-5,896,264
Operating profit (loss)		**-13,259,753**	**-11,517,590**
Financial income	9	294,028	124
Financial expenses	9	-211,436	-355,904
Profit (loss) before taxes		**-13,177,161**	**-11,873,369**
Income taxes	10	-5,333	0
Change in deferred taxes	10	29,417	29,578
Result for the financial year		**-13,153,077**	**-11,843,791**

EUR	Note	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
Other comprehensive income			
Items that may be reclassified subsequently to profit or loss			
Translation differences		1,838	4,435
Total comprehensive income		**-13,151,239**	**-11,839,356**
Profit for the period attributable to			
Shareholders of the parent company		-13,153,077	-11,843,791
Non-controlling interests		0	0
		-13,153,077	**-11,843,791**
Comprehensive income for the period attributable to			
Shareholders of the parent company		-13,151,239	-11,839,356
Non-controlling interests		0	0
		-13,151,239	**-11,839,356**
Earnings per share			
Earnings per share, basic and adjusted for dilution, EUR	11	-0.67	-0.61

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CONSOLIDATED BALANCE SHEET

EUR	Note	31 Dec. 2023	31 Dec. 2022
ASSETS			
Non-current assets			
Development expenses	12	4,309,011	3,656,455
Other intangible assets	12	0	30,403
Property, plant and equipment	13	1,050,259	299,009
Right-of-use assets	14	413,845	479,087
Other non-current receivables	16	209,270	201,444
Deferred tax assets	10	59,772	30,160
Non-current assets, total		**6,042,157**	**4,696,558**
Current assets			
Trade receivables	15	228,964	142,667
Other receivables	16	148,049	314,813
Accrued income and prepaid expenses	16	502,074	169,774
Investments	21	13,371,638	25,456,989
Cash and cash equivalents	17	942,937	1,167,078
Current assets, total		**15,193,661**	**27,251,320**
Total assets		**21,235,818**	**31,947,878**

EUR	Note	31 Dec. 2023	31 Dec. 2022
SHAREHOLDERS' EQUITY AND LIABILITIES			
Equity			
Share capital	18	80,000	80,000
Invested unrestricted equity reserve	18	45,172,417	45,086,315
Translation differences		6,274	4,435
Retained earnings		-18,319,480	-6,744,977
Profit for the financial period		-13,153,077	-11,843,791
Total equity		**13,786,134**	**26,581,983**
Non-current liabilities			
Capital loans	22	4,801,712	2,152,774
Loans from financial institutions	22	6,976	10,263
Government loan	22	374,610	353,894
Lease liabilities	14, 22	221,562	246,958
Deferred tax liabilities		187	0
Non-current liabilities, total		**5,405,047**	**2,763,889**
Current liabilities			
Loans from financial institutions	22	3,484	3,315
Lease liabilities	14, 22	197,538	243,056
Accounts payable	22	417,531	885,995
Other payables	23	145,845	141,236
Accruals and deferred income	23	1,280,238	1,328,405
Current liabilities, total		**2,044,637**	**2,602,007**
Total liabilities		**7,449,684**	**5,365,896**
Shareholders' equity and liabilities, total		**21,235,818**	**31,947,878**

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CONSOLIDATED CASH FLOW STATEMENT

EUR	Note	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
Cash flow from operating activities			
Profit for the financial period		-13,153,077	-11,843,791
Adjustments:			
Depreciation, amortisation and impairment	7	2,079,020	1,529,949
Net financial income and expenses	9	-82,592	354,145
Share-based payments	19	269,288	65,855
Other adjustments		17,492	-20,642
Income taxes	10	-29,426	-29,578
Cash flow before change in working capital		-10,899,295	-9,944,062
Change in working capital:			
Change in accounts payable and other payables	23	-257,719	-205,297
Change in trade receivables and other receivables	15	-512,021	634,245
Cash flow from operating activities before financing items and taxes		**-11,669,034**	**-9,515,114**
Interest paid and payments for other financial expenses	9	-6,610	-31,031
Net cash flow from operating activities (A)		**-11,675,645**	**-9,546,144**
Cash flows from investing activities			
Investments in tangible and intangible assets	12,13	-3,179,379	-2,978,505
Investments in other assets	21	12,403,671	8,412,590
Change in loan receivables		3,333	0
Net cash flow from investing activities (B)		**9,227,624**	**5,434,085**

EURO	Note	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
Cash flows from financing activities			
Share issues	18	0	56,778
Transaction costs of share issue	18	0	-5,069
Long-term loan disbursements	22	2,500,000	2,088,099
Short-term loan disbursements	22	0	568
Repayment of short-term loans	22	-3,315	-3,538
Repayments of lease liabilities	22	-272,806	-215,311
Net cash flows from financing activities (C)		**2,223,879**	**1,921,528**
Change in cash and cash equivalents (A + B + C) increase (+)/decrease (–)		-224,141	-2,190,531
Cash and cash equivalents at the beginning of the period		1,167,078	3,357,609
Change		-224,141	-2,190,531
Cash and cash equivalents at the end of the period		942,937	1,167,078

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STATEMENT OF CHANGES IN EQUITY

		Equity attributable to owners of the parent						
EUR thousand	**NOTE**	**Share capital**	**Invested unrestricted equity reserve**	**Share issue**	**Treasury shares**	**Translation differences**	**Retained earnings**	**Total equity**
Shareholders' equity 1 Jan. 2023		**80,000**	**45,086,315**	**0**	**0**	**4,435**	**-18,588,767**	**26,581,983**
Comprehensive income								
Profit (loss) for the financial period		0	0	0	0	0	-13,153,077	-13,153,077
Other comprehensive income								
Translation differences		0	0	0	0	1,838	0	1,838
Comprehensive income (loss) for the period, total		**0**	**0**	**0**	**0**	**1,838**	**-13,153,077**	**-13,151,239**
Transactions with owners								
Issues less transaction costs	18	0	0	0	0	0	0	0
Registration of shares	18	0	0	0	0	0	0	0
Cancellation of treasury shares	18	0	0	0	0	0	0	0
Share-based payments	19	0	86,102	0	0	0	269,288	355,390
Other adjustments		0	0	0	0	0	0	0
Total transactions with owners		**0**	**86,102**	**0**	**0**	**0**	**269,288**	**355,390**
Shareholders' equity 31 Dec. 2023		**80,000**	**45,172,417**	**0**	**0**	**6,274**	**-31,472,556**	**13,786,134**

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STATEMENT OF CHANGES IN EQUITY

		Equity attributable to owners of the parent						
EUR thousand	**NOTE**	**Share capital**	**Invested unrestricted equity reserve**	**Share issue**	**Treasury shares**	**Translation differences**	**Retained earnings**	**Total equity**
Shareholders' equity 1 Jan. 2022		**80,000**	**45,035,910**	**12,866**	**-14,170**	**0**	**-6,823,509**	**38,291,097**
Comprehensive income								
Profit (loss) for the financial period		0	0	0	0	0	-11,843,791	-11,843,791
Other comprehensive income								
Translation differences		0	0	0	0	4,435	0	4,435
Comprehensive income (loss) for the period, total		**0**	**0**	**0**	**0**	**4,435**	**-11,843,791**	**-11,839,356**
Transactions with owners								
Issues less transaction costs	18	0	51,709	0	0	0	0	51,709
Registration of shares	18	0	12,866	-12,866	0	0	0	0
Cancellation of treasury shares	18	0	-14,170	0	14,170	0	0	0
Share-based payments	19	0	0	0	0	0	65,855	65,855
Other adjustments		0	0	0	0	0	12,677	12,677
Total transactions with owners		**0**	**50,405**	**-12,866**	**14,170**	**0**	**78,532**	**130,241**
Shareholders' equity 31 Dec. 2022		**80,000**	**45,086,315**	**0**	**0**	**4,435**	**-18,588,768**	**26,581,983**

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NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

1. BASIC INFORMATION ABOUT THE GROUP

"The Group's parent company is Betolar Plc. Betolar Plc (hereinafter referred to as the "Company" or "Betolar") is a Finnish public limited company domiciled in Kannonkoski, Finland. The registered address of the company is Mannilantie 9, 43300 Kannonkoski, Finland.

Betolar is a Finnish materials technology pioneer that helps the construction industry reduce CO2 emissions, reduce the use of natural resources and achieve climate goals in practice.

2. ACCOUNTING PRINCIPLES

2.1. ACCOUNTING POLICY

The consolidated financial statements have been prepared in accordance with the International Accounting Standards (IFRS, IAS) and Interpretations Committee (IFRIC) issued by the International Accounting Standards Board (IASB) which are accepted for application in the EU. The consolidated financial statements for the financial year ended on 31 December 2023 have been prepared in accordance with the International Financial Reporting Standards (IFRS) and Interpretations Committee (IFRIC) in force on 31 December 2023. The notes to the consolidated financial statements have also been prepared in accordance with the requirements of the Finnish Accounting Act and the Limited Liability Companies Act.

The Group's financial statements are presented in euros, which is the company's functional and presentation currency. The figures presented in these financial statements have been rounded up or down, and therefore the aggregates for individual figures may differ from the total figures presented in the tables. Transactions denominated in foreign currencies are converted into the functional currency at exchange rates prevailing on the date of the transaction.

Betolar has not yet applied the revised standards already issued by the IASB, which are mandatory for the financial years beginning on or after 1 January 2024.

Betolar Group's accounting principles are described in each note to make them easier to understand. The following table summarises the notes that present each accounting principle and a reference to the relevant IFRS standard.

Accounting principle	Note	IFRS
Revenue recognition principles for sales	3	IFRS 15
Research and development expenses	12	IAS 38
Personnel expenses	6	IAS 19
Income taxes	10	IAS 12
Earnings per share	11	IAS 33
Intangible assets	12	IAS 38
Tangible assets	13	IAS 16
Leases	14	IFRS 16
Government grants	22	IAS 20
Trade receivables	15	IFRS 9
Share-based payments	19	IFRS 2
Financial assets and liabilities	21,22	IFRS 9

2.2. ACCOUNTING PRINCIPLES REQUIRING MANAGEMENT DISCRETION AND KEY UNCERTAINTIES RELATING TO ESTIMATES

Under IFRS, the preparation of financial statements requires discretion by the management regarding the selection and application of accounting principles. In addition, the management has had to make forward-looking accounting estimates and assumptions that may affect the amounts of assets, liabilities, income and expenses recognised during the reporting period, and the outcomes may differ from these estimates. The estimates and assumptions are based on historical experience and other justifiable assumptions considered reasonable when the financial statements are prepared. It is possible that actual outcomes differ from the estimates used in the financial statements

The discretionary decisions that Betolar's management has made when applying the accounting principles and which have the most significant impact on the figures presented in the financial statements concern the following areas:

- Revenue recognition: determination of performance obligations and stand-alone selling prices and method of revenue recognition over time (Note 3)
- Treatment of leases: estimates of lease term and incremental borrowing rate (Note 14)
- Deferred tax assets from losses (Note 10)

2.3. CONSOLIDATION PRINCIPLES

Subsidiaries

The consolidated financial statements include the parent company Betolar Plc and all of its subsidiaries over which the parent company has control. Controls arises when the Group is exposed, or has rights, to variable returns from its involvement with the investee and has the ability to affect those returns through its power over the investee.

Intra-Group shareholding has been eliminated using the acquisition cost method. Acquired subsidiaries are consolidated from the moment the Group acquires control and transferred subsidiaries are consolidated until control ceases. All intra-Group transactions, receivables, liabilities and unrealised gains and internal distribution of profit are eliminated in preparing the consolidated financial statements. Where necessary, the accounting policies of subsidiaries have been amended in the consolidation to reflect the accounting principles of the consolidated financial statements.

Items denominated in foreign currencies

The figures concerning the profit and loss and financial position of the Group's units are measured in the currency that is the currency in the principal operating environment of each unit ('functional currency'). The consolidated financial statements are presented in euros, which is the functional and presentation currency of the parent company.

Transactions denominated in foreign currencies are recorded in the functional currency using the exchange rates prevailing on the date of the transaction. Monetary items denominated in foreign currencies are translated into the functional currency at the exchange rates prevailing at the end of the reporting period. Gains and losses arising from foreign currency transactions and the translation of

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monetary items are measured through profit or loss.

The income and expense items of foreign Group companies are translated into euros at the average exchange rates for the reporting period and balance sheets at the exchange rate on the closing date. The translation of the result and comprehensive income for the period at different rates in the statement of comprehensive income and balance sheet results in a translation difference recognised in shareholders' equity on the balance sheet, the change in which is recognised in other comprehensive income.

2.4. NEW AND REVISED STANDARDS AND INTERPRETATIONS TO BE APPLIED IN FUTURE FINANCIAL YEARS

On the date when these financial statements were authorised for release, the Group has not adopted the following new and revised IFRS standards that have been issued but have not yet become effective. The management does not expect them to have a material impact on the consolidated financial statements in future reporting periods. They will be adopted from the date of their entry into force.

Amendment to IFRS 16 - Leases on sale and leaseback

(Effective for financial years beginning on or after 1 January 2024, early application is permitted)

These amendments include requirements for sale and leaseback transactions in IFRS 16 to explain how an entity accounts for a sale and leaseback after the date of the transaction.

Amendment to IAS 1 - Non-current liabilities with covenants

(Effective for financial years beginning on or after 1 January 2024, early application is permitted)

These amendments clarify how conditions with which an entity must comply within twelve months after the reporting period affect the classification of a liability.

Amendment to IAS 7 and IFRS 7 - Supplier finance

(Effective for financial years beginning on or after 1 January 2024, early application is permitted)

These amendments require disclosures to enhance the transparency of supplier finance arrangements and their effects on an entity's liabilities, cash flows and expsure to liquidity risk.

Amendments to IAS 21 - Lack of Exchangeability

(Effective for financial years beginning on or after 1 January 2025, early application is permitted)

An entity is impacted by the amendments when it has transactions of an operation in a foreign country that is not exchangeable into another currency at a measurement date for a specified purpose.

3. REVENUE FROM CONTRACTS WITH CUSTOMERS

Betolar Group's earnings model is based on the licensing of the Geoprime concept and the acquisition and resale of chemicals used as part of the Geoprime technology. Betolar's net sales consist of licence fees and separately charged resale prices of chemicals, which together form a complete solution. Betolar offers the chemicals used in its solution to its customer as part of the Geoprime concept. In Asia, where licence fees are not currently charged to customers, efforts are made to include licence fees in margins on future sales of chemicals.

SALES REVENUE DISTRIBUTION

EUR	Revenue recognition	2023	2022
	Over time	515,274	287,425
Sales revenue, total		**515,274**	**287,425**

BREAKDOWN OF SALES REVENUE BY MARKET AREA

The table below shows a breakdown of the Group's sales revenue according to the customer's domicile.

EUR	2023	2022
Finland	119,658	35,952
Europe	154,456	162,431
Other countries	241,160	89,042
	515,274	**287,425**

ASSETS AND LIABILITIES UNDER SALE AGREEMENTS

The following assets and liabilities arising from contracts with customers are included in the consolidated balance sheet:

EUR	2023	2022
Assets related to contracts with customers (receivables)	0	0
Liabilities under contracts with customers (advances received)	0	0

SIGNIFICANT CHANGES IN CONTRACTUAL ASSETS AND LIABILITIES

The Group's assets related to contracts with customers consist of trade receivables, no other contractual funds have been identified. The change in trade receivables is based on the growth in business volume.

REVENUE RECOGNISED IN RELATION TO CONTRACTUAL LIABILITIES

The table below shows the proportion of sales revenue recognised in the reporting period that relates to contractual liabilities that were carried over from the previous financial year.

EUR	2023	2022
Recognised revenue that was included in the contractual liabilities at the beginning of the period	0	0

ASSETS RECOGNISED FROM COSTS INCURRED IN PERFORMING THE CONTRACT

For the periods 2023 and 2022 the Group has not identified the costs incurred in fulfilling the contract for which an asset should be recognised.

	2023	2022
Asset recognised from costs incurred in performing the contract	0	0

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Accounting principle

Betolar Group applies IFRS 15 Revenue from Contracts with Customers. Revenue is recognised up to the amount expected to be received from customers in consideration for the transfer of the product or service. Revenue is recognised when either control of the product has been transferred or the service has been transferred to the customer. Revenue is recognised either at a point in time or over time. These principles are applied by following the five-step guide:
1) Identification of the contract,
2) Identification of performance obligations;
3) Determination of the transaction price;
4) Allocation of the transaction price to performance obligations and
5) Revenue recognition

Betolar Group's earnings model is based on the licensing of the Geoprime concept and the acquisition and resale of chemicals used as part of the Geoprime technology. Betolar's net sales consist of licence fees and separately charged resale prices of chemicals, which together form a complete solution. Betolar offers the chemicals used in its solution to its customer as part of the Geoprime concept. In Asia, where licence fees are not currently charged to customers, efforts are made to include licence fees in margins on future sales of chemicals.

Geoprime customer contracts consist of the following components:

- Licence maintenance fee: fixed licence fee. Gives the customer access to Betolar's Geoprime formulas. The formulas also include a service that helps the customer to optimise their production and the right to use the modified formulas, as a result of continuous development work. In accordance with IFRS 15.B56a, a licence is a right to access an entity's intellectual property as it exists for the entire period of the licence. All changes in the formulas are available to the customer throughout the contract period.
- Royalty fee: A royalty based on the customer's production volume. A licence agreement for the Geoprime concept, where net sales consist of a royalty per cubic metre of Geoprime material with which the customer manufactures products. All changes in the formulas and the total solution included in the trademark are available to the customer throughout the contract period.
- Sales of chemicals: Betolar offers the chemicals used in its solution to its customer as part of the Geoprime concept. The sale of chemicals is a resale product for Betolar. Betolar has the right to change the chemicals offered to customers in accordance with the formulas. The fee for sales of chemicals is based on the quantities of chemicals delivered.

Betolar has identified the sold total solution to include two performance obligations that are recognised over time. The pricing for the performance obligations is based on fixed stand-alone selling prices agreed in the agreements.

Compliance with IFRS does not lead to a materially different result for the Group compared to compliance with the FAS regulations, because the Geoprime solution was recognised over time in the FAS financial statements as well when the performance obligation was fulfilled and the company has therefore been entitled to consideration.

Betolar has not identified any additional costs incurred in obtaining the contracts or costs incurred in performing the contract.

Significant decisions based on management discretion

Revenue recognition involves management discretion. The determination of performance obligations and stand-alone sales prices, as well as the interpretation of the recognition method over time, involve significant discretion.

Determining whether the contract components of the Geoprime solution are separable, which is why the performance obligations must be treated separately, or whether they are not separate from each other and therefore part of a single performance obligation, requires significant consideration. Betolar has interpreted the Geoprime solution to include two performance obligations, licence sales and chemicals sales.

Separate sale prices are agreed with customers in the contract stage and this is based on the pricing policy that is based on management discretion.

In determining the recognition date, the management's judgement is supported by the interpretation of IFRS 15. The different components of the total solution support the interpretation that the total solution as a single performance obligation is recognised as revenue over time. The licence fees of the total solution have been identified as a form of right of access, in which case the entity must treat the promise to grant the licence as a performance obligation to be satisfied over time because the customer simultaneously receives and consumes the benefits of the entity's performance of providing access to its intellectual property as the performance is provided. Betolar's performance can also be seen as creating the customer an asset over which the customer therefore has control, this being Geoprime material produced with Geoprime technology, in which case the recognition of revenue also takes place over time.

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4. OTHER OPERATING INCOME

EUR	2023	2022
Grants received	184,994	138,237
Other income	16,012	1,218
	201,006	**139,455**

Accounting principle

Grants received include grants that have been earmarked for expensed projects. The grants received consist of Business Finland, EU and ELY-center project subsidies. Other operating income includes grants received as compensation for realised costs and recognised through profit or loss in the period during which the right to the grant arises.

5. MATERIALS AND SERVICES

EUR	2023	2022
Materials, goods and supplies		
Purchases during the period	-155,841	-152,536
External services	-19,654	-13,893
Total	**-175,495**	**-166,428**

Accounting principle

The Group's materials and services consist of purchases and external services. Expenses are recognised as expenses for the financial year in accordance with the accrual principle when they are incurred and when the related sales are recognised.

6. PERSONNEL EXPENSES

EUR	2023	2022
Salaries and fees	-5,449,800	-3,500,643
Pension expenses - defined contribution plans	-899,043	-515,303
Other social security expenses	-218,040	-270,027
Share-based payments	-269,288	-65,855
Total	**-6,836,171**	**-4,351,828**

	2023	2022
The Group's personnel on average during the financial year	60	51

Accounting principle

The Group's personnel expenses consist of short-term employee benefits, post-employment benefits (statutory defined contribution pension plans) and share-based remuneration. Current service cost is recognised through profit or loss and disclosed in personnel expenses for the period in which the related services are performed. A liability is recognised when a statutory or constructive obligation has arisen for the Group based on the work performed and the amount of the obligation can be estimated reliably. Information about the remuneration of the management is provided in Note 25 on related party transactions and information on share-based payments in Note 19.

Pension obligations

The Group currently has only defined contribution plans in place. Payments for them are recognised as expenses in the income statement for the financial period to which they relate. The Group has no legal or constructive obligation to pay additional contributions if the recipient entity is unable to pay the retirement benefits concerned.

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7. DEPRECIATION, AMORTISATION AND IMPAIRMENT

EUR	2023	2022
Depreciation and amortisation of development expenses	-1,649,625	-1,231,497
Amortisation of intangible assets	-30,403	-8,403
Depreciation of tangible assets	-150,658	-82,876
Amortisation of right-of-use assets	-248,333	-207,172
Total	**-2,079,020**	**-1,529,949**

8. OTHER OPERATING EXPENSES

EUR	2023	2022
Personnel-related expenses	-244,106	-542,774
Facilities expenses	-96,963	-205,719
Vehicle expenses	-12,507	-19,740
IT expenses	-431,612	-347,114
Other machinery and equipment expenses	-311,188	-340,816
Marketing and communication expenses	-278,799	-713,081
Travel and entertainment expenses	-475,006	-629,797
Research and development expenses	-831,526	-511,475
Administrative services	-1,874,939	-2,163,677
Other expenses	-328,699	-422,070
Total	**-4,885,345**	**-5,896,264**

Accounting principle

The Group's other operating expenses consist of voluntary personnel expenses, IT expenses and research and development expenses, which are not capitalised as part of balance sheet development expenses and administrative services.

Auditor's fees

EUR	2023	2022
PricewaterhouseCoopers Oy		
Audit fee	42,835	106,432
Tax advice	14,000	0
Other fees	38,456	19,257
Total	**95,291**	**125,689**

The other services included in the auditors' fees for 2023 mainly consist of IFRS conversion consulting and consulting on intra-group agreements.The other services presented in the auditor's fees for 2022 consist of consulting services related to subsidiary mergers.

9. FINANCIAL INCOME AND EXPENSES

Financial income EUR	2023	2022
Interest income and other financial income	288,568	124
Foreign exchange gains	5,460	0
Other financial income	0	0
Total	**294,028**	**124**

Financial expenses EUR		
Interest expenses	-149,848	-153,848
Exchange rate losses	-18,286	-22,021
Interest expenses on lease liabilities	-18,801	-22,017
Financial assets at fair value through profit or loss	0	-127,938
Other financial expenses	-24,502	-30,080
Total	**-211,437**	**-355,904**

Accounting principle

Interest expenses consist mainly of interest expenses on financial liabilities. In addition, the other most significant items of financial expenses consist of interest expenses in accordance with IFRS 16 and a change in the fair value of financial assets.

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10. TAXES

10.1. Income taxes

EUR	2023	2022
Tax through profit or loss	-5,333	0
Change in deferred taxes	29,417	29,578
Total	**24,084**	**29,578**

Reconciliation between the tax expense of the income statement and the taxes calculated at the company's domestic tax rate:

EUR	2023	2022
Profit before taxes	-13,177,161	-11,873,369
Income taxes calculated at the Finnish tax rate, 20%	2,635,432	2,374,674
Non-deductible expenses and tax-exempt income	-269,309	6,778
Share-based payments	-53,858	-13,171
Difference between foreign tax rates and Finnish tax rate	-9,566	0
Tax losses and temporary differences for which no deferred tax asset has been taken into account	-2,277,429	-2,335,911
Other items	-1,187	-2,791
Income taxes on the income statement	**24,084**	**29,578**

Accounting principle

The tax expense consists of current tax and deferred tax. Taxes are recognised through profit or loss, except when they relate directly to items recognised in equity or other comprehensive income. In this case, taxes are also recorded in these items. The Group has not recognised income taxes in other comprehensive income.

Current tax is calculated on the basis of the current tax rate in each country or the rate actually adopted by the closing date. The Group deducts current tax assets and tax liabilities if, and only if, the Group has a legally enforceable right to set off the recognised amounts and the Group intends either to settle on a net basis, or to realise the asset and settle the liability simultaneously.

Deferred taxes are calculated from temporary differences between the carrying amount and the tax base. However, a deferred tax liability is not recognised on initial recognition of goodwill or if it arises from initial recognition of an asset or liability, if it is not a business combination and if the transaction, at the time it takes place, does not affect accounting profit or taxable income.

10.2. Deferred tax

EUR Changes in deferred tax assets	1 Jan. 2023	Recognised through profit or loss	Recognised in equity	31 Dec. 2023
IFRS 16 accounting entries	2,185	-1,134	0	1,051
Other items	27,974	30,747	0	58,721
Total	**30,160**	**29,613**	**0**	**59,772**

EUR Changes in deferred tax assets	1 Jan. 2022	Recognised through profit or loss	Recognised in equity	31 Dec. 2022
IFRS 16 accounting entries	581	1,604	0	2,185
Other items	0	27,974	0	27,974
Total	**581**	**29,578**	**0**	**30,160**

EUR Changes in deferred tax liabilities	1 Jan. 2023	Recognised through profit or loss	Translation differences	Recognised in equity	31 Dec. 2023
Other items	0	195	-9	0	186
Total	**0**	**195**	**-9**	**0**	**186**

Tax losses and other temporary differences for which no deferred tax asset has been recognised	31 Dec. 2023	31 Dec. 2022
Confirmed losses	-32,688,443	-21,301,300
	-32,688,443	**-21,301,300**

Tax losses for which no deferred tax has been recorded are due to the Group's strong investments in technology development, commencement of commercialisation and acquisition of the necessary competencies.

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Significant decisions based on management discretion

Tax assets and liabilities are based on an estimate of the amount of tax payable or refundable on the basis of current taxable income. Long-term tax assets are not discounted.

The company has deferred tax assets and liabilities that are expected to be recognised in the income statement during certain periods in the future. The management has made assumptions and used certain estimates in relation to the tax consequences for the years to come resulting from differences in the carrying amounts of assets and liabilities recognised in the financial statements and their tax bases.

The main assumptions relate, for example, to the fact that the recovery period of the estimated deductible confirmed tax losses remains unchanged and that the current tax laws and tax rates will remain unchanged for the foreseeable future.

At each balance sheet date, the recoverability of the deferred tax assets is assessed, and if circumstances indicate that there will be no future taxable profit against which the temporary difference can be utilised, the deferred tax asset is written off to the available amount.

10.3. CONFIRMED LOSSES

Confirmed losses expire in 10 years. Tax losses expire as follows:

EUR	2023	2022
Due in 5 years	319,249	100,350
Due later than in 5 years	32,369,194	21,200,950
Total	**32,688,443**	**21,301,300**

11. EARNINGS PER SHARE

The basic and diluted loss per share is calculated by dividing the loss for the period by the weighted average of ordinary shares.

EUR	2023	2022
Profit for the financial period	-13,153,077	-11,843,791
Weighted average number of ordinary shares issued	19,606,882	19,506,730
Loss per share, undiluted and adjusted for dilution	-0.67	-0.61

Accounting principle

Earnings per share are calculated by dividing the profit for the financial year by the average number of ordinary shares outstanding during the year weighted by issuance dates. The Group's potential dilutive instruments consist of stock options issued in 2019, 2020, 2021, 2022 and 2023 as well as the convertible bond issued and converted in 2021. Since the Group has made a loss, the stock options and the convertible bond would not have a dilutive effect and are therefore not included in the calculation of the diluted loss per share. Therefore, there is no difference between the basic and diluted adjusted earnings per share. In the future, these options may have a dilutive effect on earnings per share.

12. INTANGIBLE ASSETS

EUR Intangible rights	Development expenses	Other intangible assets	Total
Acquisition cost on 1 January 2023	5,955,839	42,016	5,997,855
Increases	2,302,181	0	2,302,181
Deductions	0	0	0
Acquisition cost on 31 December 2023	**8,258,020**	**42,016**	**8,300,036**
Accumulated depreciation on 1 January 2023	-2,299,384	-11,613	-2,310,996
Accumulated depreciation of deductions and transfers	0	0	0
Depreciation for the financial period	-1,649,625	-30,403	-1,680,028
Impairment	0	0	0
Accumulated depreciation on 31 December 2023	**-3,949,009**	**-42,016**	**-3,991,024**
Book value on 1 January 2023	3,656,456	30,403	3,686,859
Book value on 31 December 2023	**4,309,011**	**0**	**4,309,011**

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EUR Intangible rights	Development expenses	Other intangible assets	Total
Acquisition cost on 1 January 2022	2,848,098	32,094	2,880,192
Increases	3,117,093	9,922	3,127,015
Deductions	-9,352	0	-9,352
Acquisition cost on 31 December 2022	**5,955,839**	**42,016**	**5,997,855**
Accumulated depreciation on 1 January 2022	-1,067,886	-3,209	-1,071,096
Depreciation for the financial period	0	0	0
Accumulated depreciation of deductions and transfers	-1,231,497	-8,403	-1,239,901
Impairment	0	0	0
Accumulated depreciation on 31 December 2022	**-2,299,384**	**-11,613**	**-2,310,996**
Book value on 1 January 2022	1,780,212	28,885	1,809,097
Book value on 31 December 2022	**3,656,456**	**30,403**	**3,686,859**

Accounting principle

The company’s intangible assets consist of development costs and other intangible assets, which mainly consist of computer software.

Development expenses and other intangible assets are recognised on the balance sheet at acquisition cost, if the cost can be reliably determined and it is likely that the expected economic benefit from the asset will flow to the Group. The residual values, useful lives and depreciation methods of assets are reviewed at the end of each financial period and, if necessary, adjusted to reflect the changes in the expected economic benefits.

Research and development expenses

Betolar recognises research expenses, such as the acquisition of new knowledge and the search for product and process alternatives, as expenses on an accrual basis, i.e. at the time the expenses are incurred.

Betolar capitalises development expenses in intangible assets if they are expected to generate income in several financial years. When the company classifies an intangible asset as development expenses, completion is technically feasible so that the asset is available for use or sale, the entity has the ability, intention and resources to complete the asset and use or sell it. The company estimates that an asset has probable future economic benefits that can be demonstrated and that the company can reliably measure the costs incurred from the intangible asset during its development phase.

At the end of each reporting period, the company evaluates whether there are indications that the capitalised development expenses have decreased in value. Estimates of capitalised development costs are subject to uncertainties and it is possible that, as conditions change, the expected return on development projects will change. The value of capitalised development costs may decrease if the expected economic benefits change. If the expected return on a capitalised asset is less than the sum of the development expenses recognised on the balance sheet, the value of the capitalised development expenses is adjusted by means of an impairment charge to correspond to the expected return.

Capitalised development costs are depreciated on a straight-line basis over their useful life of 5 years.

Borrowing costs

EUR 25 thousand of borrowing costs related to development expenses were capitalised during the financial year (2022: EUR 22 thousand). The interest rate used is the effective interest rate on loans.

Other intangible assets

Other intangible assets mainly include computer software. The amortisation period for other intangible assets with a limited useful life is 5 years.

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13. PROPERTY, PLANT AND EQUIPMENT

EUR Property, plant and equipment	Machinery and equipment	Buildings and structures	Other tangible assets	Right-of-use assets	Total
Acquisition cost on 1 January 2023	460,949	8,017	42,750	749,023	1,260,739
Increases	151,344	698,182	52,845	286,570	1,188,941
Deductions	0	0	0	-103,479	-103,479
Translation differences	-462	0	0	0	-462
Acquisition cost on 31 December 2023	**611,831**	**706,199**	**95,595**	**932,114**	**2,345,739**
Accumulated depreciation, amortisation and impairment on 1 January 2023	-210,255	-2,453	0	-269,936	-482,644
Depreciation for the financial period	-101,396	-49,262	0	-248,333	-398,991
Impairment	0	0	0	0	0
Accumulated depreciation, amortisation and impairment on 31 December 2023	**-311,651**	**-51,715**	**0**	**-518,269**	**-881,635**
Book value on 1 January 2023	250,694	5,564	42,750	479,087	778,095
Book value on 31 December 2023	**300,180**	**654,484**	**95,595**	**413,845**	**1,464,104**

Property, plant and equipment	Machinery and equipment	Buildings and structures	Other tangible assets	Right-of-use assets	Total
Acquisition cost on 1 January 2022	292,075	8,017	0	216,141	516,233
Increases	168,874	0	42,750	547,465	759,089
Deductions	0	0	0	-14,583	-14,583
Acquisition cost on 31 December 2022	460,949	8,017	42,750	749,023	1,260,739
Accumulated depreciation, amortisation and impairment on 1 January 2022	-128,063	-2,034	0	-62,764	-192,861
Depreciation for the financial period	-82,192	-419	0	-207,172	-289,782
Impairment	0	0	0	0	0
Accumulated depreciation, amortisation and impairment on 31 December 2022	-210,255	-2,453	0	-269,936	-482,644
Book value on 1 January 2022	164,012	5,983	0	153,377	323,372
Book value on 31 December 2022	**250,694**	**5,564**	**42,750**	**479,087**	**778,095**

Accounting principle

Property, plant and equipment consists mainly of machinery and equipment, buildings and structures and right-of-use assets subject to IFRS 16, which in the financial years 2023 and 2022 have concerned the company's premises leases and machine and equipment leases. These are set out in more detail in Note 14.

Tangible fixed assets are valued at cost less accumulated depreciation and impairment losses. Cost includes expenditure that is directly attributable to the acquisition of an item of property, plant and equipment. Assets are depreciated at the maximum residual depreciation rates for tax purposes.

The estimated useful lives are as follows:

- Machinery and equipment 5 years
- Buildings and structures 10–20 years
- Other tangible assets 5 years

The residual values, useful lives and depreciation methods of assets are reviewed at the end of each financial period and, if necessary, adjusted to reflect the changes in the expected economic benefits.

14. LEASES

Betolar Group acts as a lessee and has leased office premises and machinery and equipment through leasing agreements. A contract is considered to be, or contain, a lease if the contract conveys the right to control the use of an identified asset for a limited period of time in exchange for consideration.

Leases are recognised as a right-of-use asset and a lease liability. A right-of-use asset is recognised on the balance sheet at an amount that corresponds to the lease liability, advances paid and direct expenses of the lease. Subsequently, right-of-use assets are measured at the acquisition cost less any accumulated depreciation and impairment losses. It is adjusted for certain remeasurements of the lease liability. The lease liability corresponds to the present value of the lease payments at the reporting date. The income statement recognises depreciation that is related to lease assets and interest expenses that are related to the lease liability.

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At the commencement date, right-of-use assets that are capitalised under leases and the corresponding lease liability are measured at the present value of the minimum lease payments that are not paid at that date. The Group uses the incremental borrowing rate as the discount rate for lease payments.

For open-ended contracts that include an option to extend or terminate, the Group assesses whether the options will be used to determine the lease term. The lease period of contracts valid until further notice has been assessed whenever changes have occurred in the conditions related to the contracts. The assessment takes into account the fact that the Group has no prospect of terminating contracts of indefinite duration, but considering the operating environment of the company at the moment, making estimates of more than two years is challenging. For this reason, the company has decided to use a probable two-year extension option for contracts of indefinite duration.

IFRS 16 provides practical expedients for the derecognition of right-of-use assets and lease liabilities that relate to:

- short-term leases (lease term up to 12 months).
- leases of low-value assets (the value of each asset as new does not exceed approximately EUR 5,000).

Significant decisions based on management discretion

The Group's leases consist mainly of business premises, the leases of which remain in effect until further notice. The management has to assess the likelihood of exercising such an extension option, which will have a corresponding impact on the estimated duration of the lease term and the amounts of the right-of-use asset, lease liability, depreciation and interest expenses. The impact of the exercise of the options on the financial benefits received by the Group has been taken into account in the assessment. Extension options are included in the lease period until their exercise is reasonably certain.

The Group's management has estimated the incremental borrowing rate to be 5% + 12m eurobor 3.513%. The Group has estimated the incremental borrowing rate by using the indicative interest rate data on similar loans obtained from the bank.

Lease liabilities are presented on the balance sheet line Lease liabilities, divided into long-term and short-term items according to their maturity dates.

Right-of-use asset items on the balance sheet	31 Dec. 2023	31 Dec. 2022
Business premises	372,095	426,523
Machinery and equipment	41,750	52,564
Total	**413,845**	**479,087**

Amortisation of right-of-use assets	31 Dec. 2023	31 Dec. 2022
Long-term	221,562	246,958
Short-term	197,538	243,056
Total	**419,100**	**490,014**

Additions to right-of-use assets for the financial year 2023 amounted to EUR 295,077 (2022: EUR 532,882).

Items recognised through profit or loss	2023	2022
Interest expenses on lease liabilities (included in financial expenses)	-18,801	-22,017
	-18,801	**-22,017**

Amortisation of right-of-use assets	2023	2022
Business premises	-218,333	-185,273
Machinery and equipment	-30,000	-21,899
Total	**-248,333**	**-207,172**

Expenses of right-of-use assets	2023	2022
Expenses in the income statement that are related to leases of minor value	-11,876	-6,143
Expenses in the income statement that are related to short-term leases (less than 12 months)	-18,579	-2,822
	-30,455	**-8,965**

The outgoing cash flow from leases in 2023 totalled EUR 272,806 (2022: EUR 215,311).

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15. TRADE RECEIVABLES

Age distribution of trade receivables

EUR		31 Dec. 2023	Provision	31 Dec. 2022	Provision
Not due	0 %	126,333	0	132,628	0
1–30 days past due	0 %	80,963	0	2,145	0
31–60 days past due	5 %	1,759	88	8,309	415
61–90 days past due	10 %	5,144	514	0	0
91–180 days past due	25 %	20,488	5,122	0	0
181–360 days past due	50 %	0	0	0	0
Over 360 days past due	100 %	162	162	0	0
Total		**234,849**	**5,886**	**143,082**	**415**

Reconciliation for loss allowances of trade receivables

	31 Dec. 2023	31 Dec. 2022
Provision for credit losses 1 January	**415**	**0**
Net change in provision for credit losses during the period	5,470	415
Recognised as credit losses during the financial year	0	0
Credit loss allowance 31 December	**5,886**	**415**

Accounting principle

Trade receivables are recognised on the balance sheet at the original invoice value less any impairment losses. An impairment loss is recognised immediately through profit or loss. For the recognition of expected credit losses, the Group applies the simplified procedure set out in IFRS 9 for recognising expected lifetime credit losses on trade receivables. The expected credit loss is determined by estimating the impairment of the exposures of individually material clients on the basis of their probability of default. In the financial year 2023, the company recognised a credit loss allowance of EUR 5,886 (2022: EUR 415).

A trade receivable is derecognised as a final credit loss when it is not reasonably estimated to be recoverable. Such situations include the customer's bankruptcy, debt restructuring or other insolvency-indicating circumstances. The company has not had significant credit losses in recent history.

No realised impairment losses on trade receivables were recognised in the financial years 2023 and 2022.

16. OTHER RECEIVABLES AND ACCRUED INCOME AND PREPAID EXPENSES

Other non-current receivables **EUR**	**31 Dec. 2023**	**31 Dec. 2022**
Rental security deposits paid	48,115	51,448
Credit card guarantees paid	149,995	149,995
Financial leasing receivables	11,159	0
Total	**209,269**	**201,444**

Other current receivables **EUR**	**31 Dec. 2023**	**31 Dec. 2022**
VAT receivables	148,049	313,279
Other receivables	0	1,533
Total	**148,049**	**314,813**

Current accrued income and prepaid expenses **EUR**	**31 Dec. 2023**	**31 Dec. 2022**
Grant accruals	336,709	40,202
Other	165,365	129,572
Total	**502,074**	**169,774**

Accounting principle

Other accounts receivable and accrued income and prepaid expenses comprise accruals related to taxes and other expenses and securities paid.

17. CASH AND CASH EQUIVALENTS

EUR	31 Dec. 2023	31 Dec. 2022
Cash and bank accounts	942,937	1,167,078
Total	**942,937**	**1,167,078**

Accounting principle

Cash and cash equivalents are comprised of bank balances and liquid financial securities. Items classified as cash and cash equivalents have a maturity of three months or less from the date of acquisition.

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18. SHARE CAPITAL AND EQUITY RESERVES

	Number of outstanding shares (qty)	Treasury shares (qty)	Number of shares (qty)	Share capital (EUR)	Share issue (EUR)	Treasury shares (EUR)	Reserve for invested unrestricted equity (EUR)	Translation differences (EUR)
1 Jan. 2022	**19,444,011**	**13**	**19,444,024**	**80,000**	**12,866**	**-14,170**	**45,035,910**	**0**
Acquisition of treasury shares	0	-13	-13	0	0	14,170	-14,170	0
Registration of shares	13,823	0	13,823	0	-12,866	0	12,866	0
Convertible bond conversion	73,923	0	73,923	0	0	0	51,709	0
Share issue, less transaction costs	0	0	0	0	0	0	0	4,435
31 Dec. 2022	**19,531,757**	**0**	**19,531,757**	**80,000**	**0**	**0**	**45,086,315**	**4,435**
Cancellation of treasury shares	0	0	0	0	0	0	0	0
Registration of shares	75,125	0	75,125	0	0	0	86,102	0
Share issue, less transaction costs	0	0	0	0	0	0	0	0
Change in translation differences	0	0	0	0	0	0	0	1,838
31 Dec. 2023	**19,606,882**	**0**	**19,606,882**	**80,000**	**0**	**0**	**45,172,417**	**6,274**

Company shares
The number of the company's shares on 31 December 2023 is 19,606,882.

The company's shares are included in the book-entry system maintained by Euroclear Finland Oy. The company's share capital is EUR 80,000.

Share capital
The subscription price of the shares received in connection with the share issues is recorded in the share capital to the extent that the subscription price has not been decided to be recorded in the reserve for invested unrestricted equity.

Reserve for invested unrestricted equity
The reserve for invested unrestricted equity includes other equity investments and the subscription price of shares to the extent that it is not recognised in share capital according to an explicit decision.

Translation differences
Translation differences include translation differences arising from the translation of the financial statements of foreign operations. The Group's accumulated translation differences on 31 December 2023 totalled EUR 1,838 (31 December 2022: EUR 4,436)

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19. SHARE-BASED PAYMENTS

Betolar has option-based incentive and commitment plans, aimed to encourage the management and selected key persons and employees to work to increase shareholder value in the long term. The different option programs and their terms and conditions are presented in the tables below.

The option rights are measured at fair value at the date of issue and are recognised as expenses in personnel expenses and retained earnings/losses at a constant rate over the vesting period. The amount expensed for 2023 is EUR 252 thousand (2022: EUR 66 thousand). The change is explained by the new share and option awards granted during 2023 and the fact that in the comparison period, expenses were incurred only in the second half of the year.

The subscription price at the date of issue is determined using a modified Black Scholes model including a Monte Carlo simulation model that takes into account the exercise price, the duration of the option, the effect of dilution (if material), the share price at the date of issue and the expected volatility of the price, the expected dividend yield, the risk-free interest rate over the term of the option and the correlation with and volatility of the companies in the reference group.

The model used the following as inputs for options granted in 2023:

Plan	Option plan 2019	Option plan 2020	Option plan 2021	Option plan 2021	Option plan 2022	Option plan 2022	Option plan 2023	Option plan 2023
Type	OPTION	OPTION	OPTION	OPTION	OPTION	SHARE	OPTION	SHARE
Instrument	**2019-2A - 2019-2D**	**2020A - 2020G**	**2021-1A - 2021-1C**	**2021-2A - 2021-2B**	**Options 2022**	**Restricted stock option plan 2022–2024**	**Options 2023**	**Restricted stock option plan 2023-2025**
Grant date	5.6.2019	16 Septembeer 2020	5 June 2019, 16 September 2020, 23 February 2021, 27 July 2021	16 September 2020, 23 February 2021	23.3.2022	23.3.2022	21.6.2023	21.6.2023
Number of options/shares granted, qty	207	280	1,004	202	500,000	20,000	710,000	20,000
Subscription ratio, qty	601	601	601	601	1	n/a	1	n/a
Initial exercise price, EUR	382,00	790,00	790,00	790,00	n/a	n/a	n/a	n/a
Dividend adjustment	No	No	No	No	No	No	No	No
Initial exercise price after share split, EUR	0.635607	1.314476	1,314476	1.314476	5.96	n/a	2.59	n/a
Original allocation date	30.8.2019	22.11.2020	22.1.2021	26.9.2021	8.7.2022	1.11.2022	21.6.2023	21.6.2023
Release date	1 January 2020, 1 January 2021, 9 December 2021	22 November 2020, 1 January 2021, 1 April 2021, 1 July 2021, 1 October 2021, 9 December 2021	9.12.2021	1 December 2021, 9 December 2021	1.4.2025	31.8.2024	1.4.2026	21.6.2026
Release criterion	Obligation to work	Obligation to work	Obligation to work	Obligation to work	Obligation to work	Obligation to work	Obligation to work	Obligation to work
Expiration date	31.12.2030	31.12.2030	31.12.2030	31.12.2030	28.2.2027	n/a	28.2.2028	21.6.2026
Maximum duration, years	11.3	8.5	9.9	9.3	4.6	1.8	4.7	3.0
Running time remaining, years	8	8	8	8	4.2	1.7	4.2	2.5
Persons at the end of the financial year	2	1	9	2	14	1	16	1
Method	In shares	In shares	In shares	In shares	In shares	In cash and in shares	In shares	In cash and shares

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Plan	2019-2A - 2019-2D	2020A - 2020G	2021-1A - 2021-1C	2021-2A - 2021-2B	Options 2022	Restricted stock option plan 2022–2024	Options 2023	Restricted stock option plan 2023-2025
1 Jan. 2023								
Outstanding at the beginning of the period	83	280	970	202	486,788	20,000	0	0
Changes during the period								
Issued	0	0	0	0	10,000	0	723,333	20,000
Lost	0	0	37	20	130,597	0	57,000	0
Exercised	31	0	13	81	0	0	0	0
Expired	0	0	0	0	0	0	0	0
Weighted average exercise price, EUR	0.635607		1.314476	1.314476				
Average share value, EUR	3.118, 2.331		2,959	2.834, 2.465, 2.572, 2.82, 2.734				
31 Dec. 2023								
Exercised at the end of the period	155	0	37	81	0	0	0	0
Outstanding at the end of the period	52	280	957	101	366,191	20,000	666,333	20,000
Exercisable at the end of the period	52	280	957	101	0	0	0	0

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The model used the following as inputs for options granted during 2022:

Plan	Option plan 2019	Option plan 2020	Option plan 2021	Option plan 2021	Option plan 2022	Option plan 2022
Type	OPTION	OPTION	OPTION	OPTION	OPTION	SHARE
Instrument	**2019-2A - 2019-2D**	**2020A - 2020G**	**2021-1A - 2021-1C**	**2021-2A - 2021-2B**	**Options 2022**	**Restricted stock option plan 2022–2024**
Grant date	5.6.2019	16.9.2020	5 June 2019, 16 September 2020, 23 February 2021, 27 July 2021	16 September 2020, 23 February 2021	23.3.2022	23.3.2022
Number of options/shares granted, qty	207	280	1,004	202	500,000	20,000
Subscription ratio, qty	601	601	601	601	1	n/a
Initial exercise price, EUR	382.00	790.00	790.00	790.00	n/a	n/a
Dividend adjustment	Ei	Ei	Ei	Ei	Ei	Ei
Initial exercise price after share split, EUR	0.635607	1.314476	1.314476	1.314476	5.96	n/a
Original allocation date	30.8.2019	22.11.2020	22.1.2021	26.9.2021	8.7.2022	1.11.2022
Release date	1 January 2020, 1 January 2021, 9 December 2021	22 November 2020, 1 January 2021, 1 April 2021, 1 July 2021, 1 October 2021, 9 December 2021	9.12.2021	1 December 2021, 9 December 2021	1.4.2025	31.8.2024
Release criterion	Obligation to work	Obligation to work	Obligation to work	Obligation to work	Obligation to work	Obligation to work
Expiration date	31.12.2030	31.12.2030	31.12.2030	31.12.2030	28.2.2027	n/a
Maximum duration, years	11,3	8,5	9,9	9,3	4,6	1,8
Running time remaining, years	8	8	8	8	4,2	1,7
Persons at the end of the financial year	2	1	9	2	14	1
Method	In shares	In shares	In shares	In shares	In shares	In cash and in shares

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Instrument	2019-2A - 2019-2D	2020A - 2020G	2021-1A - 2021-1C	2021-2A - 2021-2B	Options 2022	Restricted stock option plan 2022–2024
1 Jan. 2022						
Outstanding at the beginning of the period	182	280	994	202	0	0
Changes during the period						
Issued	0	0	0	0	486,788	20,000
Lost	0	0	0	0	0	0
Exercised	99	0	24	0	0	0
Expired	0	0	0	0	0	0
Average exercise price, EUR	0.635607		1.314476			
Average share value, EUR	5.62. 5.68. 5.42. 4.70		4.58			
31 Dec. 2022						
Exercised at the end of the period	124	0	24	0	0	0
Outstanding at the end of the period	83	280	970	202	486,788	20,000
Exercisable at the end of the period	83	280	970	202	13,212	80,000

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Inputs used in the valuation of options

The tables below describe the inputs and fair values used to calculate the fair value of each option plan.

	2023	2022
Share value at the time of issue, EUR	2.56	3.76
Share value at the time of reporting, EUR	1.29	3.05
Subscription price, EUR	2.59	5.96
Expected volatility	36.04%	43.3%
Maturity, years	4.7	4.5
Risk-free interest rate	3.27%	1.50%
Expected dividends, EUR	0	0
Valuation model	Black-Scholes	Black-Scholes
Weighted fair value of options granted	0.86	0.90

Betolar has option-based incentive and commitment plans, aimed to encourage the management and selected key persons and employees to work to increase shareholder value in the long term. The plans have been approved by the Board of Directors. Persons participating in the plan are granted options not subject to special conditions. The Board of Directors decides who participates in the plan, and no one has a contractual right to participate in the plan or to receive any guaranteed benefits.

The options granted before 2022 expired in connection with the listing and their subscription period expires at the end of 2030. The subscription period for new options approved in 2023 is 1 April 2026–28 February 2028 and their vesting period ends on 28 February 2028.

The options are granted without consideration and do not carry any dividend or voting rights.

The expected volatility of the price is based on the realised volatility (based on the remaining maturity of options), adjusted, according to publicly available information, to reflect expected changes.

According to Finnish tax laws, Betolar Plc must withhold an amount equal to the employee's tax obligation related to the granting of options and remit it to the tax authorities on behalf of the employee. The amount withheld and remitted to the tax authorities in conjunction with the options granted in the financial year 2023 was EUR 0.

20. Financial risk management

In its normal business operations, the Group is exposed to a number of financial risks. The main financial risks are credit, solvency, currency and interest rate risks.

The Group's financial risk management focuses on the above-mentioned risks and aims to reduce the uncertainty that financial market changes may cause to the company's profit and cash flows. The aim is to secure continuous operations in different market conditions and to support the Group's long-term strategic development.

The Board of Directors and the CEO are responsible for the organisation and supervision of internal control and risk management. The CEO is responsible for the implementation of risk management together with financial administration.

20.1 Credit risk

Credit risk arises from the possibility that a counterparty may not be able to meet its payment obligations. The Group strives to cost-efficiently minimise losses caused by the non-performance of the counterparty's obligations. The Group manages credit risk already at the contract stage by assessing the creditworthiness of the counterparty. In addition, the company's financial administration continuously monitors customers' payment behaviour. The age distribution of trade receivables and the recognition of credit loss provisions are presented in Note 15.

The Group's fund investments are in a fund that is quoted on the public market

20.2 Liquidity risk

The Group's risk management objective in terms of liquidity risk is to secure a sufficient amount of liquid assets for financing operations and repaying maturing loans. The company aims to continuously assess and monitor the amount of financing required for business operations in order to achieve the above-mentioned goal.

Cash flows from operating activities and liquid assets (financial securities and cash equivalents), together with any new debt or equity financing, are the main source of funding for future payments.

Maturities of contractual financial liabilities at the end of 2023.

The company has taken active measures to secure the financial conditions to implement its strategy, which was updated in 2023. During the financial year, Betolar has made adjustments to its cost structure and applied for public business financing for research and development. As a result of the adjustment measures, the company will achieve cost savings of approximately EUR 5,000 thousand for 2024 compared to 12 months rolling costs at the end of Q3/2023. Business Finland granted Betolar EUR 2,700 thousand grant for a research and development project on alternative side streams during FY 2023. This grant will be drawn down as the research project progresses during 2024 and 2025. In addition, the company has withdrawn EUR 2 500 thousand of the EUR 7 500 thousand loan from the Climate Fund outstanding. The loan drawdown is linked to development targets, some of which the company has already met in 2023. The loan will be withdrawn during 2024.

After the financial year, Finnpartnership awarded the company a grant of EUR 370 thousand to pilot the prefabrication of hollow-core slabs in Malaysia.

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Maturities of contractual financial liabilities at the end of 2023

EUR	2024	2025	2026	2027 - later	Total	Book value on 31 December 2023
Loans from credit institutions	3,851	3,681	2,939	0	10,471	10,461
Subordinated loans	0	0	0	4,500,000	4,500,000	4,801,712
*Interest on subordinated loan **	*337,869*	*336,429*	*336,944*	*693,162*	*1,704,404*	*301,712*
Government loan	4,469	115,629	114,515	225,688	460,302	374,610
Accounts payable	417,531	0	0	0	417,531	417,531
Lease liabilities	225,191	215,663	0	0	440,854	419,100
Total	**988,911**	**671,402**	**454,398**	**5,418,850**	**7,533,561**	**6,325,126**

** The payment of interest on the subordinated loan is tied to the repayment terms of the subordinated loan in accordance with the terms and conditions of chapter 12 of the Limited Liability Companies Act. The principal and interest of the loan become payable in a situation where the company's unrestricted equity and all subordinated loans at the time of payment exceed the loss to be confirmed for the last ended financial period or the loss included in more recent financial statements, if the company's unrestricted equity is sufficient. The table shows the interest rates that would be payable annually if these conditions were met.*

Maturities of contractual financial liabilities at the end of 2022

EUR	2023	2024	2025	2026 - later	Total	Book value on 31 December 2022
Loans from credit institutions	4,018	3,851	3,681	2,939	14,489	13,579
Subordinated loans	0	0	0	2,000,000	2,000,000	2,152,774
*Interest on subordinated loan **	*184,037*	*184,543*	*184,037*	*568,248*	*1,120,865*	*152,774*
Government loan	4,457	4,469	115,629	340,204	464,759	353,894
Accounts payable	885,995	0	0	0	885,995	885,995
Lease liabilities	261,874	250,765	3,030	0	515,670	490,014
Total	**1,340,381**	**443,628**	**306,378**	**2,911,391**	**5,001,778**	**4,049,028**

** The payment of interest on the subordinated loan is tied to the repayment terms of the subordinated loan in accordance with the terms and conditions of chapter 12 of the Limited Liability Companies Act. The principal and interest of the loan become payable in a situation where the company's unrestricted equity and all subordinated loans at the time of payment exceed the loss to be confirmed for the last ended financial period or the loss included in more recent financial statements, if the company's unrestricted equity is sufficient. The table shows the interest rates that would be payable annually if these conditions were met.*

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20.3 Foreign exchange risk

Foreign exchange risk arises from transactions in currencies other than the functional currencies of the Group companies. The functional currencies of the Group companies are the euro and the Indian rupee. The majority of the Group companies' sales and purchase transactions are denominated in euros. The Group seeks to avoid foreign exchange risk by negotiating contracts in euros, as far as possible. Betolar India Private Ltd's operations include piloting and sales of the Geoprime solution and related purchases. All sales contracts in India are in INR. There are a few commercial agreements in India under which the Geoprime solution is sold. Betolar India's accounting currency is INR, so there is no foreign exchange risk in India. The only foreign exchange risk is between the parent and Betolar India (EUR/INR), which, due to the small volume of transactions, is seen as a minor risk and not a material risk for the Group.

The general objective of foreign exchange risk management is to limit the short-term negative effects of exchange rate changes on profit and cash flow, thereby increasing the predictability of earnings. The Group manages the effects of foreign exchange risk by regularly monitoring risk exposures and, if necessary, hedging relevant cash flows. The Group has not had currency hedges in the reporting or comparison periods.

The table below shows the currency breakdown of the Group's trade receivables, financial securities, cash and cash equivalents and trade payables. Assets and liabilities denominated in a foreign currency are translated into euros at the exchange rate prevailing at the end of the reporting period.

31 Dec. 2023	EUR	INR	Total
Trade receivables	222,345	12,504	234,849
Financial securities	13,371,638	0	13,371,638
Cash and cash equivalents	897,210	45,726	942,936
Accounts payable	399,074	18,457	417,531
Net position	**14,890,267**	**76,687**	**14,966,954**

31 Dec. 2022	EUR	INR	Total
Trade receivables	128,173	14,909	143,082
Financial securities	25,456,989	0	25,456,989
Cash and cash equivalents	1,114,770	52,308	1,167,078
Accounts payable	871,964	14,031	885,995
Net position	**27,571,897**	**81,247**	**27,653,144**

20.4 Interest rate risk

Interest rate risk is the risk that the fair values or future realised cash flows of a financial instrument fluctuate due to changes in market interest rates. The Group's income and operating cash flows are mainly independent of fluctuations in market interest rates. Any increase in interest rates as a result of changes in market interest rates may have a direct impact on the costs of available financing and the company's existing financing costs. The company has not had derivatives to hedge interest rate risk at the balance sheet date or during the comparison periods.

The Group had financial liabilities totalling EUR 5,187 thousand (2022: EUR 2,520 thousand), consisting of bank loans, subordinated loans and the Business Finland loan. All of the Group's financial liabilities are fixed-rate liabilities. The average interest rate on financial liabilities in 2023 was 7.18 per cent (2022: 8.10 per cent).

The Group's fund investments include a short-term interest rate fund. The fund is exposed to interest rate risk through fluctuations in fair value.

20.5 Capital management

The purpose of the Group's capital management is to ensure the continuity of operations in different market conditions and to support the company's long-term strategic development in all circumstances. The Company assesses the development and adequacy of its capital structure and equity ratio on a regular basis. There are no specific targets for the equity ratio. The equity ratio was 65 per cent (2022: 83 per cent).

21. FINANCIAL ASSETS

Betolar classifies its financial assets according to IFRS 9 as financial assets at amortised cost and financial assets at fair value through profit or loss. At initial recognition, financial assets are classified based on their business model and cash flow characteristics.

All purchases and sales of financial assets are recorded on the balance sheet on the trade date. Trade receivables are recorded at the transaction cost. Other financial assets are recognised on the balance sheet at their original cost, which corresponds to their fair value at the time of acquisition. In the case of an item that is not measured at fair value through profit or loss, transaction costs are included in the original book value of the financial assets. After initial recognition, these items are measured at amortised cost using the effective interest method.

A financial asset is derecognised when the Group no longer has a contractual right to cash flows or has transferred the material risks and rewards of the financial asset outside the Group. Financial assets are included in non-current balance sheet items when they have a maturity of more than 12 months

Financial assets at fair value through profit or loss include financial securities consisting of a short-term interest rate fund. These financial instruments are measured at fair value and any revaluation is recognised through profit or loss in the period in which they are incurred.

Financial assets at amortised cost include trade receivables and cash and cash equivalents. Trade receivables are measured at amortised cost less any impairment losses. Items classified as cash and cash equivalents have a maturity of three months or less from the date of acquisition. Cash and cash equivalents include cash and cash in bank accounts and financial securities.

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EUR	Fair value hierarchy	Book value on 31 December 2023	Fair value on 31 December 2023	Book value on 31 December 2022	Fair value on 31 December 2022
Financial assets at fair value through profit or loss					
Financial securities	1	13,371,638	13,371,638	25,456,989	25,456,989
Financial assets at amortised cost					
Trade receivables	N/A	228,964	N/A	142,667	N/A
Guarantees given	N/A	209,270	N/A	201,444	N/A
Cash and cash equivalents	N/A	942,937	N/A	1,167,078	N/A
Total financial assets		**14,752,809**		**26,968,178**	

The book values of trade receivables, guarantees and cash and cash equivalents correspond substantially to their fair values.

Accounting principle

Fair value items are defined according to hierarchy levels 1 to 3 as follows:

Level 1: The fair values of financial instruments are based on prices quoted for identical assets or liabilities in active markets.

Level 2: The fair value of financial instruments is calculated on the basis of inputs other than level 1 quoted prices that are observable for the asset or liability, either directly or indirectly.

Level 3: The fair value of financial instruments is calculated based on inputs that are not observable for the asset or liability

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22. FINANCIAL LIABILITIES

Betolar classifies its financial liabilities as financial liabilities at amortised cost. At initial recognition, the classification of financial liabilities is made on the basis of the purpose of the asset.

Financial liabilities at amortised cost are initially recognised at their original value, which corresponds to the amount of consideration received. Transaction costs are included in the original book value of the financial liability. Subsequently, financial liabilities are measured at amortised cost using the effective interest method. Financial liabilities are included in long-term and short-term liabilities. Borrowing costs are recognised as interest expense in the period when they are incurred. Borrowing costs are capitalised on the balance sheet to the extent that they relate to borrowed assets that have acquired an asset to be capitalised on the balance sheet.

The financial liability, or portion of it, is derecognised when the obligation identified in the contract has been settled, extinguished or terminated. A financial liability is classified as current unless the Group has an unconditional right to defer settlement of the liability for at least 12 months after the reporting period.

Financial liabilities measured at amortised cost include the Group's external financial loans, lease liabilities, trade payables and other interest-bearing liabilities."

EUR	Fair value hierarchy	Book value on 31 December 2023	Fair value on 31 December 2023	Book value on 31 December 2022	Fair value on 31 December 2022
Financial liabilities at amortised cost					
Loans from credit institutions	2	10,461	10,461	13,579	13,579
Subordinated loans	2	4,801,712	4,801,712	2,152,774	2,152,774
Government loan	2	374,610	374,610	353,894	353,894
Accounts payable	N/A	417,531	N/A	885,995	N/A
Lease liabilities	N/A	419,100	N/A	490,014	N/A
Total financial liabilities		**6,023,414**		**3,896,255**	

The book values of trade payables correspond substantially to their fair values.

Accounting principle

Fair value items are defined according to hierarchy levels 1 to 3 as follows:

Level 1: The fair values of financial instruments are based on prices quoted for identical assets or liabilities in active markets

Level 2: The fair value of financial instruments is calculated on the basis of inputs other than level 1 quoted prices that are observable for the asset or liability, either directly or indirectly.

Level 3: The fair value of financial instruments is calculated based on inputs that are not observable for the asset or liability

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Loans from credit institutions

The Group's loans from credit institutions include one instalment credit arrangement. The interest rate is 4.99% and the term of the loan is 5 years. The loan was drawn down in the 2021 financial year.

Government loan

The Group has one product development loan issued by the State Treasury. Two tranches of the total loan granted have been drawn down during the financial year 2021. The loan interest rate is 1% and the loan period is 7 years, of which the first four years are free of repayment. The loan is a government loan that meets the interpretation of IFRS because its interest rate is below the market rate. The benefit of a government loan at a rate lower than the market rate is treated as a government grant under IAS 20. The actual loan is recognised initially at its present value in accordance with IFRS 9 and subsequently measured at amortised cost. The benefit of a loan at a rate lower than the market rate, that is, a government grant, is determined as the difference between the present value of the loan at initial recognition of the loan, calculated in accordance with IFRS 9, and the cash payment receivable from the lender.

Subordinated loan

The Group has a subordinated loan of a total of EUR 7 million, of which the first tranche, EUR 2 million, was drawn down in February 2022, and the second tranche, EUR 2.5 million, was drawn down in November 2023. The loan can be drawn down for three years from the first drawdown. The maturity date of the subordinated loan is January 2029. Until the first reference date, 30 June 2023, the annual interest rate was 9.6%. In accordance with the loan agreement, the interest rate review was on 30 June and the new interest rate was 7.75%. The subordinated loan complies with the terms and conditions of a capital loan set forth in chapter 12 of the Limited Liability Companies Act, and Betolar has the right to repay the loan in part or in full, provided that the conditions set forth in the Limited Liability Companies Act for unrestricted equity are met. The subordinated loan has been amortised to its acquisition cost. The accrued interest on the loan, EUR 302 thousand, is amortised into interest expenses and interest liability.

Changes in liabilities arising from financing operations

The table below provides a reconciliation of the opening and closing balances of financial liabilities.

EUR	Loans from credit institutions	Subordinated loans	Government loan	Lease liabilities	Total
Balance on 1 January 2022	**16,231**	**0**	**277,100**	**156,284**	**449,614**
Cash flow	-2,970	2,000,000	88,099	-215,311	1,869,818
Conversion into equity	0	0	0	0	0
Other non-monetary changes	318	152,774	-11,305	549,040	690,827
Balance on 31 December 2022	**13,579**	**2,152,774**	**353,894**	**490,014**	**3,010,260**
Cash flow	-4,073	2,500,000	0	-272,806	2,223,121
Conversion into equity	0	0	0	0	0
Other non-monetary changes	956	148,938	20,716	201,892	372,502
Balance on 31 December 2023	**10,461**	**4,801,712**	**374,609**	**419,100**	**5,605,882**

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23. OTHER PAYABLES AND ACCRUALS AND DEFERRED INCOME

Other payables

EUR	31 Dec. 2023	31 Dec. 2022
Tax liabilities	0	996
Withholding tax liability	133,203	132,055
Other payables	12,643	8,185
Total	**145,846**	**141,236**

Accruals and deferred income

EUR	31 Dec. 2023	31 Dec. 2022
Payroll liabilities	508,466	520,719
Holiday pay liabilities	610,435	632,897
Other payables	161,337	174,790
Total	**1,280,238**	**1,328,405**

Accounting principle

Other payables and accruals and deferred income include accruals related to salaries, taxes and other expenses.

24. COMMITMENTS AND CONTINGENT LIABILITIES

Liabilities for which collaterals have been given

EUR	31 Dec. 2023	31 Dec. 2022
Loans from financial institutions	10,461	13,579
Business mortgages	0	0

The company has no other reportable collaterals or contingent liabilities.

Disputes and legal proceedings

The company's management is not aware of any open disputes or litigation that could have a significant impact on the company's financial position.

25. RELATED PARTY TRANSACTIONS

Betolar's related parties include the subsidiaries of the parent company Betolar Plc. Related parties also include the key employees of Betolar's management as well as their close family members and the entities under their control. The key management personnel are the members of Betolar's Board of Directors, the CEO and other members of the Management Team. Transactions with related parties are made on normal commercial terms. The transactions include consultancy services related to business development purchased from a member of the Board of Directors and a member of the Management Team. In addition, share subscriptions made by related parties have been identified as related party transactions during the financial period.

No loans or any other guarantees or securities were issued to any related parties.

Remuneration of key management personnel

EUR	2023	2022
Board of Directors		
Chair	38,500	37,500
Members	98,300	57,000
Total	**136,800**	**94,500**
CEO	**2023**	**2022**
Salaries and other short-term benefits	488,212	406,596
Post-employment benefits	0	86,061
Share-based remuneration	0	6,751
Total	**488,212**	**499,407,**
Key management personnel *)	**2023**	**2022**
Salaries and other short-term benefits	1,305,379	860,172
Post-employment benefits	0	0
Share-based remuneration	0	33,162
Total	**1,305,379**	**893,334**

*) The key personnel of the company's management include the members of the Board of Directors and the Management Team. In the financial year 2023, the Management Team consisted of 6 members (2022: 10 members and the Board of Directors consisted of 6 members (2022: 6 members).

Betolar Plc's Board of Directors for the financial year 2023 consisted of Ilkka Salonen (Chair), Kalle Härkki, Soile Kankaanpää, Juha Leppänen, Inka Mero and Tero Ojanperä.

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Management's shareholding	31 Dec. 2023	31 Dec. 2022
Number of shares (qty)	47,185	329,054
Shareholding, percentage	0.2%	1.7%

	31 Dec. 2023	31 Dec. 2022
Number of shares (qty)	1,714,052	1,741,698
Shareholding, percentage	8.7%	8.9%
Total number of outstanding shares (qty))	19,606,882	19,531,757

Related party transactions and outstanding balances

The following transactions have been concluded with related parties

Purchases from entities controlled by key management personnel

EUR	2023	2022
Sales management services	0	159,899
Consulting services	133,477	22,100
	133,477	**181,999**

EUR	2023	2022
Trade payables, consulting services	0	16,877
	0	**16,877**

26. GROUP STRUCTURE

Information about the Group companies Company name	Registered office	2023 Shareholding (%)	2022 Shareholding (%)
Parent company Betolar Plc	Finland		
Betolar Chemicals Ltd	Finland	100%	100%
Betolar India Private Limited	India	100%	100%

Changes in Group structure

Betolar Geotechnical Solutions Ltd, Betolar Green Building Technologies Ltd, Betolar Mining Solutions Ltd, SolidWatt Ltd and Betolar Element Ltd merged with Betolar Plc in August 2022.

27. NEAR-TERM RISKS AND UNCERTAINTIES

Betolar's most significant risks and business uncertainties are described in more detail in the Report of the Board of Directors of the financial statements. Risks and uncertainties related to the near future are described below.

Economic cycles and especially the level of activity in the construction market affect the demand for Betolar's products and services. High inflation, rising interest rates and supply chain disruptions have weakened the outlook for the global economy, posing a risk to the implementation of Betolar's growth strategy. The changed security situation in Europe resulting from the war in Ukraine has increased geopolitical risks, intensified disruptions in global supply chains and increased uncertainty in European product and energy markets. Shortages, disruptions and cost inflation resulting from the situation may adversely affect the competitiveness, delivery, sales or profitability of Betolar's solution.

However, uncertainty in the operating environment is not expected to have a significant impact on the implementation of plans and programmes related to the green transition in societies, companies and financial markets.

28. EVENTS AFTER THE END OF THE REPORTING PERIOD

The Group is not aware of any significant events after the financial period.

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PARENT COMPANY INCOME STATEMENT

EUR	Note	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
NET SALES	5.	500,385.53	273,962.91
Production for own use (+)		0,00	3,107,218.67
Other operating income	6.	200,973.08	139,454.99
Materials and services			
Materials, supplies and goods			
Purchases during the period		-120,303.36	-126,996.80
Increase (+) or decrease (-) in inventories		0,00	-6,128,36
External services		-19,654.05	-13,892.50
Materials and services, total		**-139,957.41**	**-147,017.66**
Personnel expenses			
Salaries and fees		-5,202,298.99	-4,212,418.83
Indirect employee costs		-1,032,706.49	-879,148.97
Pension expenses		-899,043.28	-644,092.00
Other social security expenses		-133,663.21	-235,056.97
Total personnel expenses	7	**-6,235,005.48**	**-5,091,567.80**

EUR	Note	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
Depreciation and impairment			
Depreciation according to plan		-1,828,459.25	-1,322,096.05
Depreciation and impairment, total	8.	**-1,828,459.25**	**-1,322,096.05**
Other operating expenses	9.	-5,699,567.19	-8,892,749.10
Operating profit (loss)		-13,201,630.72	-11,932,794.04
Financial income and expenses			
Other interest and financial income			
From others		287,678.11	116.88
Interest and other financial expenses			
To others		-26,395.88	-165,804.63
Total financial income and expenses		**261,282.23**	**-165,687.75**
PROFIT BEFORE APPROPRIATIONS AND TAXES		**-12,940,348.49**	**-12,098,481.79**
PROFIT FOR THE FINANCIAL PERIOD		**-12,940,348.49**	**-12,098,481.79**

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PARENT COMPANY BALANCE SHEET

EUR	Note	31 Dec. 2023	31 Dec. 2022
ASSETS			
NON-CURRENT ASSETS			
Intangible assets			
Development expenses	12.	4,330,469.69	3,695,827.81
Other capitalised long-term expenditures		33,240.29	70,902.48
	12.	**4,363,709.98**	**3,766,730.29**
Tangible assets			
Land and waters		52,845,.16	0,00
Buildings and constructions		654,483.86	5,564,34
Machinery and equipment		297,504.87	245,329.14
Other tangible assets		42,750.00	42,750.00
	12.	**1,047,583.89**	**293,643.48**
Investments			
Holdings in Group undertakings		0.00	0.00
	13.	**0.00**	**0.00**
NON-CURRENT ASSETS, TOTAL		**5,411,293.87**	**4,060,373,77**

EUR	Note	31 Dec. 2023	31 Dec. 2022
CURRENT ASSETS			
Inventories			
Materials and supplies		0.00	0.00
Work in progress		0.00	0.00
Finished goods		0.00	0.00
		0.00	**0.00**
Non-current receivables			
Receivables from Group companies		116,964.60	116,964.60
Other receivables		198,110.61	51,448,31
		315,075.21	**168,412.91**
Current receivables			
Trade receivables		222,345.47	128,173.31
Receivables from Group companies		25,109.72	211,200.00
Loan receivables		0.00	1,521.95
Other receivables		127,044.97	451,543.21
Accrued income and prepaid expenses		496,480.41	169,773.64
	14.	**870,980.57**	**962,212.11**
Financial securitiest			
Other shares and holdings		13,371,638.31	25,456,989.34
		13,371,638.31	**25,456,989.34**
Cash and cash equivalents		844,697.73	1,059,351.82
CURRENT ASSETS, TOTAL		**15,402,391.82**	**27,646,966.18**
TOTAL ASSETS		**20,813,685.69**	**31,707,339.95**

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SHAREHOLDERS' EQUITY AND LIABILITIES

EUR	Note	31 Dec. 2023	31 Dec. 2022
SHAREHOLDERS' EQUITY			
Share capital		80,000.00	80,000.00
Invested unrestricted equity reserve		48,113,754.33	48,027,652,33
Share issue		0.00	0.00
Retained earnings (losses)		-21,201,033.53	-9,102,551.74
Profit for the financial period		-12,940,348.49	-12,098,481.79
TOTAL EQUITY	15.	**14,052,372.31**	**26,906,618.80**

EUR	Note	31 Dec. 2023	31 Dec. 2022
LIABILITIES			
Non-current			
Loans from credit institutions		454,264.77	457,749.26
Subordinated loans		4,500,000.00	2,000,000.00
	16.	**4,954,264.77**	**2,457,749.26**
Short-term			
Loans from credit institutions		3,484.49	3,315.24
Accounts payable		398,731.22	871,177.44
Liabilities to Group companies		0.00	0.00
Other payables		143,555.24	140,074.00
Accruals and deferred income		1,261,277.66	1,328,405.21
	17.	**1,807,048.61**	**2,342,971.89**
TOTAL LIABILITIES		**6,761,313.38**	**4,800,721.15**
SHAREHOLDERS' EQUITY AND LIABILITIES, TOTAL		**20,813,685.69**	**31,707,339.95**

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PARENT COMPANY CASH FLOW STATEMENT

EUR	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
Cash flow from operating activities		
Loss before appropriations and taxes	-12,940,348.49	-12,098,481.79
Adjustments:		
Depreciation and impairment	1,828,459.25	1,322,096.05
Financial income and expenses	-261,282.23	165,687.75
Other adjustments	353,581.98	521,574.21
Cash flow before change in working capital	-11,019,589.49	-10,089,123.78
Changes in working capital:		
Change in trade receivables and other receivables	91,231.54	-384,582.49
Increase (-) / decrease (+) in inventories	0.00	3,999.28
Change in accounts payable and other liabilities	-536,092.53	614,977.35
Cash flow from operating activities before financing items and taxes	-11,464,450.48	-9,854,729.64
Interest paid and payments for other financial expenses	-6,197.75	-34,599.56
CASH FLOWS FROM OPERATING ACTIVITIES (A)	**-11,470,648.23**	**-9,889,329.20**

EUR	1 Jan.–31 Dec. 2023	1 Jan.–31 Dec. 2022
Cash flows from investing activities:		
Investments in tangible and intangible assets	-3,179,379.35	-2,972,458.67
Loans granted	-146,662.30	-35,848.52
Repayments of loan receivables	0.00	-73,295.68
NET CASH USED IN INVESTING ACTIVITIES (B)	**-3,326,041.65**	**-3,081,602.87**
Cash flows from financing activities:		
Paid increase in equity	0.00	56,778.00
Short-term loan disbursements	0.00	568.21
Repayment of short-term loans	-3,315.24	-3,468.39
Long-term loan disbursements	2,500,000.00	2,088,099.00
CASH FLOWS FROM FINANCING ACTIVITIES (C)	**2,496,684.76**	**2,141,976.82**
CHANGE IN CASH AND CASH EQUIVALENTS (A+B+C)	**-12,300,005.12**	**-10,828,955.25**
Cash and cash equivalents at the beginning of the period	**26,516,341.16**	**37,345,296.84**
Cash and cash equivalents at the end of the period (*	**14,216,336.04**	**26,516,341.16**

(* Cash and cash equivalents include financial securities

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NOTES TO THE FINANCIAL STATEMENTS

1 BASIC INFORMATION ABOUT THE ENTITY

Betolar Plc is the Group's parent company. It is a Finnish public limited company domiciled in Kannonkoski, Finland. The registered address of the company is Mannilantie 9, 43300 Kannonkoski, Finland. Betolar Plc has a subsidiary, Betolar Chemicals Ltd, which is 100% owned by Betolar Plc.

Betolar Plc's subsidiaries Betolar Element Ltd, Betolar Geotechnical Solutions Ltd, Betolar Green Building Technologies Ltd, Betolar Mining Solutions Ltd and Solidwatt Ltd merged with their parent company on 31 August 2022.

2 ACCOUNTING POLICIES

The financial statements have been prepared in accordance with the accrual basis, the going concern principle and the prudential principle independent of the result of the financial period. The financial statements have been prepared in accordance with Finnish accounting legislation.

3 MEASUREMENT AND ACCRUAL PRINCIPLES

Development expenses

Betolar Plc recognises research expenses, such as the acquisition of new knowledge and the search for product and process alternatives, as expenses on an accrual basis, i.e. at the time the expenses are incurred. The company recognises capitablisable development expenses in the income statement through the Capitalisation account of each account group. In 2022, alla capitalisations were made through the "Production for own use" account in the income statement.

Betolar capitalises development expenses in intangible assets if they are expected to generate income in several financial years. When the company classifies an intangible asset as development expenses, completion is technically feasible so that the asset is available for use or sale, the entity has the ability, intention and resources to complete the asset and use or sell it. The company estimates that an asset has probable future economic benefits that can be demonstrated and that the company can reliably measure the costs incurred from the intangible asset during its development phase.

At the end of each reporting period, the company evaluates whether there are indications that the capitalised development expenses have decreased in value. Estimates of capitalised development costs are subject to uncertainties and it is possible that, as conditions change, the expected return on development projects will change. The value of capitalised development costs may decrease if the expected economic benefits change. If the expected return on a capitalised asset is less than the sum of the development expenses recognised on the balance sheet, the value of the capitalised development expenses is adjusted by means of an impairment charge to correspond to the expected return.

Capitalised development costs are depreciated on a straight-line basis over their useful life of 5 years.

When distributable funds are presented, the residual amount of capitalised development expenses is deducted from unrestricted equity.

Capitalisation of development expenses

Personnel expenses and other operating expenses are capitalised in development expenses as follows:

EUR	2023	2022
Personnel expenses	-212,747.83	-994,564.71
Other operating expenses	-2,064,260.59	-2,112,653.96
Total production for own use	**-2,277,008.42**	**-3,107,218.67**

Intangible and tangible assets - depreciation according to plan

Intangible and tangible assets are expensed as depreciation according to plan over their estimated useful life. The depreciation periods according to plan are:

Development expenses	5 years
Other capitalised long-term expenditures / intangible assets	5 years
Buildings and structures	10–20 years
Machinery and equipment	5–10 years

Revenue recognition principles for grants received

Grants are recognised as income in other operating income to the extent that the project concerned gives rise to acceptable costs in accordance with the grant decision and terms and conditions. The income recognition of grants also takes into account any self-financing related to the grants.

4 MATERIAL EVENTS AFTER THE END OF THE FINANCIAL YEAR

There have been no significant events after the financial period.

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NOTES TO THE INCOME STATEMENT

5 NET SALES

	2023	2022
Sales domestic	119,658.33	35,952.00
Sales Europe	154,456.15	162,430.60
Sales in other continents	226,271.05	75,580.31
	500,385.53	**273,962.91**

6 SALES IN OTHER CONTINENTS

	2023	2022
Grants received	184,994.38	138,237.22
Other operating income	15,978.70	1,217.77
	200,973.08	**139,454.99**

Grants received include grants that have been earmarked for expensed projects.
The grants received consist of Business Finland, EU and ELY-center project grants.

7 PERSONNEL EXPENDITURES

Personnel expenses	2023	2022
Wages and salaries	-5,202,298.99	-4,212,418.83
Pension expenses	-899,043.28	-644,092.00
Other social security expenses	-133,663.21	-235,056.97
Total personnel expenses	**-6,235,005.48**	**-5,091,567.80**

Number of employees	2023	2022
Average number of persons employed during the financial year	55	48

8 DEPRECIATION AND AMORTISATION

	2023	2022
Development expenses	-1,642,366.56	-1,224,238.67
Other intangible rights	-37,662.19	-15,662.01
Buildings and structures	-49,262.22	-418.82
Machinery and equipment	-99,168.28	-81,776.55
Depreciation according to plan, total	**-1,828,459.25**	**-1,322,096,05**

9 OTHER OPERATING EXPENSES

	2023	2022
Voluntary personnel expenses	-316,780.86	-611,114.73
Facilities expenses	-337,399.35	-392,602.08
Vehicle expenses	-31,104.71	-30,487.69
IT expenses	-431,611.92	-367,517.42
Other machinery and equipment expenses	-322,219.98	-375,931.83
Marketing and communication expenses	-909,328.96	-854,934.66
Travel and entertainment expenses	-386,107.31	-582,584.10
Research and development expenses	-828,744.10	-2,405,029.92
Administrative expenses	-1,818,781.41	-2,187,531.19
Other expenses	-317,488.59	-1,085,015.48
Total other operating expenses	**-5,699,567.19**	**-8,892,749.10**

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NOTES TO THE INCOME STATEMENT

10 AUDITOR'S FEES

	2023	2022
Assignments referred to in section 1.1,2 of the Auditing Act	40,000.00	75,707.00
Tax advice	14,000.00	0.00
Other services	38,456.00	34,257.00
Total auditor's fees	**92,456,00**	**109,964.00**

The other services presented in the 2023 auditors' fee consists mainly of IFRS conversion consultancy and consultancy on intra-group contracts. The other services presented in the 2022 auditors' fees consist of consulting services associated with the company's listing and the merger of subsidiaries.

11 FINANCIAL INCOME AND EXPENSES

	2023	2022
Other interest and financial income	287,678.11	116.88
Other interest and financial income, total	**287,678.11**	**116.88**
The financial income for the financial period consists mainly of capital gains and impairment reversals related to the mutual fund investment		
Other interest and financial expenses	-26,395.88	-165,804.63
Interest expenses and other financial expenses, total	**-26,395.88**	**-165,804.63**
Financial income and expenses, total	**261,282.23**	**-165,687,75**

The financial expenses for the financial period mainly consist of interest on the loan and management costs related to the fund investment.

NOTES TO THE ASSETS ON THE BALANCE SHEET

12 INTANGIBLE AND TANGIBLE ASSETS

	2023	2022
Development expenses 1 January	5,959,212.91	2,851,994.19
Increases	2,277,008.44	3,107,218.72
Deductions	0.00	0.00
Cost on 31 December	8,236,221.35	5,959,212.91
Accumulated depreciation and impairment on 1 January	-2,263,385.10	-1,039,146.43
Depreciation for the financial period	-1,642,366.56	-1,224,238.67
Development expenses - Book value on 31 December	**4,330,469.69**	**3,695,827.81**
Intangible rights 1 January	114,563.65	104,641.65
Increases	0.00	9,922.00
Deductions	-28,302.58	0.00
Cost on 31 December	86,261.07	114,563.65
Accumulated depreciation and impairment on 1 January	-43,661.17	-27,999.16
Depreciation for the financial period	-9,359.61	-15,662.01
Intangible assets - Book value on 31 December	**33,240.29**	**70,902.48**
Land and waters 1 January	0.00	0.00
Increases	52,845,15	0.00
Deductions	0.00	0.00
Cost on 31 December	52,845.15	0.00

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	2023	2022
Buildings and constructions on 1 January	8,016.99	8,016.99
Increases	698,181.74	0.00
Deductions	0.00	0.00
Cost on 31 December	706,198.73	8,016.99
Accumulated depreciation and impairment on 1 January	-2,452.65	-2,033.83
Depreciation for the financial period	-49,262.22	-418.82
Buildings and constructions - Book value on 31 December	**654,483.86**	**5,564,34**

	2023	2022
Machinery and equipment on 1 January	455,169.02	292,075.05
Increases	151,344.01	163,093.97
Deductions	0.00	0.00
Cost on 31 December	606,513.03	455,169.02
Accumulated depreciation and impairment on 1 January	-209,839.88	-128,063.32
Depreciation for the financial period	-99,168.28	-81,776.56
Machinery and equipment - Book value on 31 December	**297,504.87**	**245,329,14**
Other tangible assets on 1 January	42,750.00	0.00
Increases	0.00	42,750.00
Deductions	0.00	0.00
Cost on 31 December	42,750.00	42,750.00
Other tangible assets - Book value on 31 December	**42,750.00**	**42,750.00**

13 INVESTMENTS

	2023	2022
Holdings in Group undertakings on 1 January	0.00	232,865.71
Increases	0.00	0.00
Deductions	0.00	-232,865.71
Book value on 31 December	**0.00**	**0,00**

14 CURRENT RECEIVABLES

	2023	2022
Trade receivables	222,345.47	128,173.31
Loan receivables	25,109.72	212,721.95
Other receivables	127,044.97	451,543.21
Accrued income and prepaid expenses	496,480.41	169,773.64
Total current receivables	**870,980.57**	**962,212.11**

Accrued income items	2023	2022
Grant accruals	336,709.02	40,201.50
Purchase accruals	159,771.39	129,572.14
Total	**496,480.41**	**169,773.64**

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NOTES TO THE SHAREHOLDERS' EQUITY AND LIABILITIES ON THE BALANCE SHEET

15 SHAREHOLDERS' EQUITY

	2023	2022
Share capital on 1 January	80,000.00	80,000.00
Increases	0.00	0.00
Share capital on 31 December	**80,000.00**	**80,000.00**
Reserve for invested unrestricted equity on 1 January	48,027,652.33	47,958,008.33
Increases	86,102.00	69,644.00
Acquisition of treasury shares	0.00	0.00
Invested unrestricted equity reserve on 31 December	**48,113,754.33**	**48,027,652.33**
Share issue on 1 January	0.00	12,866.00
Increases	0.00	0.00
Registration of shares	0.00	-12,866.00
Share issue on 31 December	**0.00**	**0.00**

	2023	2022
Retained earnings/losses on 1 January	-9,102,551.74	-1,967,819.36
Transfers retained earnings/losses	-12,098,481.79	-7,134,732.38
Adjustment of error in previous financial year	0.00	0.00
Retained earnings (losses) on 31 December	**-21,201,033.53**	**-9,102,551.74**
Result for the financial year	-12,940,348.49	-12,098,481.79
Total equity	**14,052,372.31**	**26,906,618.80**

Calculation of the distributable unrestricted equity of the parent company

	2023	2022
Reserve for invested unrestricted equity	48,113,754.33	48,027,652.33
Share issue	0.00	0,00
Retained earnings/losses	-21,201,033.53	-9,102,551.74
Profit for the financial period	-12,940,348.49	-12,098,481.79
Total unrestricted equity	13,972,372.31	26,826,618.80
- Capitalised development expenses	-4,330,469.69	-3,695,827.81
Distributable equity, total	**9,641,902.62**	**23,130,790.99**

The Board of Directors' proposal on the use of distributable unrestricted shareholders' equity

The Board of Directors proposes that the loss of EUR 12,940,348.49 for the financial period be transferred to retained earnings and that no dividend be paid.

Number of shares of the Company by share class and the main provisions of the Articles of Association for each class

The number of the company's shares on the closing date 31 December 2023 is 19,606,882.

All the decisions of the Annual General Meeting, the authorisations of the Board of Directors and the decisions of the Board of Directors mentioned below have been registered in the Trade Register during the financial period. "

Shares and share capital:

The company's shares are included in the book-entry system maintained by Euroclear Finland Oy. The company's share capital is EUR 80,000.

Valid authorisations of the Board of Directors

Betolar's Board of Directors has the following authorisations issued by the Annual General Meeting on 31 March 2023. Authorisation to issue shares, stock option rights and other special rights entitling to shares

The Annual General Meeting resolved to authorise the Board of Directors in accordance with the proposal of the Board to resolve on the issuance a maximum of 1,953,175 shares (including shares to be issued under special rights) in one or more tranches corresponding to approximately 10% of all the shares in the company. The Board of Directors decides on all terms and conditions of the share issue and the issuance of option rights and other special rights entitling to shares within the limits of the authorisation. The issuance of shares and special rights entitling to shares, including options, may be

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carried out in deviation from the shareholders' pre-emptive right (directed issue). The total number of option rights or other special rights entitling to shares to be issued for the implementation of the company's incentive and commitment programs may not exceed 1,000,000 new shares and/or treasury shares held by the company, which amount corresponds to approximately five (5) per cent of the total number of shares in the company at the time of the convening of the Annual General Meeting. The number of shares to be issued for the implementation of the incentive and commitment programs is included in the maximum number of shares referred to in the aforementioned authorisation.

The authorisation is valid until the next Annual General Meeting, but not later than 30 June 2024 and the authorisation granted by the Annual General Meeting of 23 March 2022 to the Board of Directors was revoked.

Authorisation to acquire treasury shares

The Annual General Meeting resolved to authorise the Board of Directors in accordance with the proposal of the Board to resolve on the repurchase of a maximum of 1,000,000 shares, which corresponds to approximately five (5) per cent of the current number of all the company's shares. The company's own shares can only be repurchased with unrestricted equity and the shares can be repurchased on the repurchase date at a price formed in multilateral trading or otherwise at a price formed in the market. Shares may also be acquired outside public trading at a price that does not exceed the market price in public trading at the time of acquisition.

The Board of Directors decides how the shares are acquired. Own shares may be repurchased other than in proportion to the shares held by the shareholders (directed repurchase) if there is a compelling financial reason for doing so. The authorisation is valid until the next Annual General Meeting, but not later than 30 June 2024 and the authorisation granted by the Annual General Meeting of 23 March 2022 to the Board of Directors was revoked.

Option decisions:

The Board of Directors has decided on 21 June 2023 to issue up to 710,000 options on the basis of the authorisation granted by the General Meeting of Shareholders on 31 March 2023.

Articles of Association:

The Annual General Meeting resolved, in accordance with the proposal of the Board of Directors, to amend Article 4 of the Articles of Association. The maximum number of board members was increased from seven to eight members. Annual General Meeting also resolved, in accordance with the proposal of the Board of Directors, to amend Article 8 of the Articles of Association. In the future, the Chairman of the Board will be elected by the Board from among its members. In addition, by decision of the Board, the General Meeting can also be held without a meeting place, so that shareholders can fully exercise their voting rights by means of telecommunication and technical assistance.

16 NON-CURRENT LIABILITIES

	2023	2022
Loans from financial institutions	454,264.77	457,749.26
Subordinated loans	4,500,000.00	2,000,000.00
Total	**4,954,264.77**	**2,457,749.26**
Loans due in more than five years	**4,500,000.00**	**2,110,234.00**

Subordinated loan

The Climate Fund has granted Betolar Plc a subordinated loan of a total of EUR 7 million, of which the first tranche of EUR 2 million was drawn down on 8 February 2022, and the second tranche, EUR 2.5 million, was drawn down on 29 November 2023. The final tranche, of EUR 2.5 million, can be withdrawn at the earliest of 1 July 2023. The loan is due on 1 January 2029. The interest rate on the loan depends on Betolar Plc's credit rating, the reference period is annually on 30 June. Until the first review on 30 June 2023, the annual interest rate on the loan was 9.6%. During the period 1 July - 31 December 2023, the interest rate was 7.75%. The accrued interest not recognised as an expenses at 31 December 2023 is EUR 377,784.90. Interest is not has until the loan is repaid. The loan has priority over other subordinated loans to the company.

17 CURRENT LIABILITIES

	2023	2022
Loans from financial institutions	3,484.49	3,315.24
Accounts payable	398,731.22	871,177.44
Liabilities to Group companies	0.00	0.00
Other current liabilities	143,555.24	140,074.00
Accruals and deferred income	1,261,277.66	1,328,405.21
Total	**1,807,048.61**	**2,342,971.89**

Significant items in accruals and deferred income	**2023**	**2022**
Salary expenses, bonus salaries	369,407.34	520,718.88
Holiday pay expenses	610,434.94	632,896.82
Other accruals and deferred income	281,435.38	174,789.51
Total	**1,261,277.66**	**1,328,405.21**

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18 GUARANTEES GIVEN, CONTINGENT LIABILITIES AND OTHER LIABILITIES

	2023	2022
Lease liabilities (incl. VAT 24%)	71,325.25	121,564.33
Business mortgages	208,335.29	0.00
Other liabilities, total	**279,660.54**	**121,564.33**

19 TRANSACTIONS WITH RELATED PARTIES

Betolar Plc's related parties include Betolar Plc's subsidiary Betolar Chemicals Ltd. Related parties also include the key employees of Betolar Plc's management as well as their close family members and the entities under their control. The key management personnel are the members of the Board of Directors, the CEO and other members of the Management Team. Transactions with related parties are made on normal commercial terms. The transactions include consultancy services related to business development purchased from a member of the Board of Directors and a member of the Management Team. In addition, share subscriptions made by related parties have been identified as related party transactions during the financial period.

No loans or any other guarantees or securities were issued to any related parties.

The following transactions were carried out with related parties

	2023	2022
Income statement		
Purchased services	133,477.03	181,999.30

	2023	2022
Balance sheet		
Subordinated loan to Betolar Chemicals Ltd	116,964.00	116,964.60
Accounts payable	0.00	16 877.00

Management salaries and fees	2023	2022
Remuneration to the members of the Board of Directors	136,800.00	94,500,00
CEO		
Salaries and fees	404,048.32	406,595.63
Pension expenses	73,334.77	76,033.38
Indirect employee costs	10,828.49	10,571.49
	488,211.58	**493,200.50**
Other Management Team		
Salaries and fees	1,080,343.62	860,171.79
Pension expenses	196,082.37	160,852.12
Indirect employee costs	28,953.21	22,364.47
Total	**1,305,379.20**	**1,043,388.38**

During the financial periods 2023 and 2022, management has been granted options (qty) as follows:

	2023	2022
Members of the Board of Directors		
CEO	280,000.00	145,000.00
Other members of the Management Team	278,333.00	195,733.00
Total	**558,333.00**	**340,733.00**

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Calculation formulas for certain financial indicators and operative indicators

Measure	Definition	Purpose of use
Gross margin	Net sales – materials and services	Gross margin is a measure of the Group's profitability. Gross margin measures profitability after reducing the costs of materials and services.
EBITDA	Operating profit (loss) before depreciation, amortisation and impairment	EBITDA is a measure of the Group's performance.
Earnings per share, basic, EUR	Operating profit (loss) before depreciation, amortisation and impairment	The measure reflects the distribution of the Company's earnings for each individual share.
Earnings per share, adjusted for dilution, EUR	Profit for the financial period / weighted average number of outstanding shares during the financial period + diluting potential shares	The measure reflects the distribution of the Company's earnings for each individual share, taking dilution into consideration.
Cash, cash equivalents and short-term fund investments	Cash and cash equivalents + current investments	Cash and short-term fund investments describe the company's liquid assets.
Number of pilot customers	Number of new customers in the plant pilot phase.	The measure illustrates new customers in the plant pilot phase of the Company's sales process

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Signatures to the Financial Statements

Place: Kannonkoski
Date: 16.2.2024

Riku Kytömäki
CEO

Ilkka Salonen
Chair of the Board of Directors

Soile Kankaanpää
Member of the Board of Directors

Juha Leppänen
Member of the Board of Directors

Tero Ojanperä
Member of the Board of Directors

Inka Mero
Member of the Board of Directors

Kalle Härkki
Member of the Board of Directors

Auditor's note

Our auditor's report on the audit was issued today. .

Plave: Helsinki
Date: 16.2.2024

PricewaterhouseCoopers Oy
Audit firm

Janne Rajalahti
APA

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Report on the Audit of the Financial Statements

To the Annual General Meeting of Betolar Oyj

Opinion

In our opinion

- the consolidated financial statements give a true and fair view of the group's financial position and financial performance and cash flows in accordance with International Financial Reporting Standards (IFRS) as adopted by the EU
- the financial statements give a true and fair view of the parent company's financial performance and financial position in accordance with the laws and regulations governing the preparation of the financial statements in Finland and comply with statutory requirements.

What we have audited

We have audited the financial statements of Betolar Oyj (business identity code 2800638-3) for the year 1 January 2023 - 31 December 2023. The financial statements comprise:

- the consolidated balance sheet, consolidated comprehensive income statement, statement of changes in consolidated shareholders' equity, consolidated cash flow statement, and notes to the consolidated financial statements, including a summary of significant accounting policies
- the parent company's balance sheet, income statement, cash flow statement and notes.

Basis for Opinion

We conducted our audit in accordance with good auditing practice in Finland. Our responsibilities under good auditing practice are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the parent company and of the group companies in accordance with the ethical requirements that are applicable in Finland and are relevant to our audit, and we have fulfilled our other ethical responsibilities in accordance with these requirements.

Responsibilities of the Board of Directors and the Managing Director for the Financial Statements

The Board of Directors and the Managing Director are responsible for the preparation of consolidated financial statements that give a true and fair view in accordance with International Financial Reporting Standards (IFRS) as adopted by the EU, and of financial statements that give a true and fair view in accordance with the laws and regulations governing the preparation of financial statements in Finland and comply with statutory requirements. The Board of Directors and the Managing Director are also responsible for such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Board of Directors and the Managing Director are responsible for assessing the parent company's and the group's ability to continue as a going concern, disclosing, as applicable, matters relating to going concern and using the going concern basis of accounting. The financial statements are prepared using the going concern basis of accounting unless there is an intention to liquidate the parent company or the group or to cease operations, or there is no realistic alternative but to do so.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with good auditing practice will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with good auditing practice, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the parent company's or the group's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of the Board of Directors' and the Managing Director's use of the going concern basis of

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accounting and based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the parent company's or the group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the parent company or the group to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events so that the financial statements give a true and fair view.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Other Reporting Requirements

Other Information

The Board of Directors and the Managing Director are responsible for the other information. The other information comprises the report of the Board of Directors and the information included in the Annual Report but does not include the financial statements and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. With respect to the report of the Board of Directors, our responsibility also includes considering whether the report of the Board of Directors has been prepared in accordance with the applicable laws and regulations.

In our opinion the information in the report of the Board of Directors is consistent with the information in the financial statements and the report of the Board of Directors has been prepared in accordance with the applicable laws and regulations.

If, based on the work we have performed, we conclude that there is a material misstatement of the other information, we are required to report that fact. We have nothing to report in this regard.

Helsinki 16 February 2024
PricewaterhouseCoopers Oy
Authorised Public Accountants

Janne Rajalahti
Authorised Public Accountant (KHT)

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Board of Directors

ILKKA SALONEN

Chairman of the Board since 2023
Member of the Audit Committee and the Personnel and Remuneration Committee
Member of the Board since 2022

M.Sc. (Econ.) born 1965, Finnish citizen

Independent of the company and significant shareholders

Positions of trust
- Antilooppi Oy, Chairman of the Board
- Metsäliitto Group, Member of the Board and Chairman of the Audit Committee
- Nordea Mortgage Bank Plc, Member of the Board and Chairman of the Audit Committee
- NADMED, Vice Chairman of the Board

Work history
- YIT Corporation, CFO, Deputy to the CEO 2018–2021
- Lemminkäinen Group, CFO 2014–2018
- Forest BtL Oy, Advisor to the Board 2013–2014
- Neste Oil Plc, CFO 2009–2012
- Pohjola Bank Plc, CFO 2006–2008
- Pohjola Group Oy, CFO 2003–2005
- Comptel Corporation, various managerial positions 2000–2003

Holding in Betolar Plc
-

JUHA LEPPÄNEN

Member of the Board
Member of the Board since 2016
Betolar's founder

Technician in Electronics, born 1976, Finnish citizen

Dependent on the company and a significant shareholder

Positions of trust
-

Work history
- Betolar Ltd, CTO 2019–2021
- Betolar Ltd, CEO and Chairman of the Board 2016–2019
- Entrepreneur 2000–

Holding in Betolar Plc
1,603,468 shares and 46,055 options

SOILE KANKAANPÄÄ

Member of the Board
Chairman of the Audit Committee
Member of the Board since 2021
CEO, Quuppa Oy

M.Sc. (Econ.), born 1970, Finnish citizen

Independent of the company and significant shareholders

Positions of trust
-

Work history
- ISS Services Ltd, Chief Commercial Officer 2018–2024
- Uponor Infra Ltd, Vice President, Sales and Marketing 2016–2018
- Outotec Plc, Senior Vice President, Account Management & Sales Development 2013–2016
- Konecranes Plc, Director, Global Account Management and Development 2010–2013
- Nokia Networks, various managerial positions 1997–2010

Holding in Betolar Plc
101 stock option rights, number of shares granted with options 60,701

TERO OJANPERÄ

Deputy Chairman of the Board
Member of the Board
Chairman of the Personnel and Remuneration Committee
Member of the Board member since 2020

M.Sc. (Tech.), D.Sc. (Tech.) born 1966, Finnish citizen

Independent of the company and significant shareholders

Positions of trust
- Silo AI, Chairman of the Board and Founding Partner
- Visionplus Ltd, Chairman of the Board
- Fintraffic Ltd, Chairman of the Board
- OP Cooperative, Member of the Board
- Siili Solutions Plc, Member of the Board

Work history
- Silo AI, CEO 2017–2019 and Co-Founder
- Visionplus Ltd, CEO, 2012–2017, and Co-Founder
- Nokia Corporation, CTO and Chief Strategy Officer, Senior Vice President of Nokia Research Center and Vice President of Nokia Networks as well as other executive positions and member of the Board 1990–2011

Holding in Betolar Plc
516 option rights, number of shares granted with options 310,116

INKA MERO

Member of the Board
Member of the Personnel and Remuneration Committee
Member of the Board since 2020
CEO and co-founder, Voima Ventures venture capital fund

M.Sc. (Econ.) 1976, Finnish citizen

Independent of the company and significant shareholder

Positions of trust
- KoppiCatch Inc., Chairman of the Board
- Voima Ventures Ltd, Chairman of the Board
- KuvaSpace Ltd, Chairman of the Board
- Adamant Health Ltd, Member of the Board
- Dispelix Ltd, Member of the Board
- Elfys Inc., Member of the Board
- Tacto tek Ltd, Member of the Board
- Musti Group Plc, Member of the Board
- Sooma Medical Ltd, Member of the Board

Holding in Betolar Plc
Voima Ventures VC Fund holds 744,853 shares (31 Jan 2024)

KALLE HÄRKKI

Member of the Board
Member of the Audit Committee and the Personnel and Remuneration Committee
Member of the Board since 2021
CEO of Resand Ltd

D.Sc. (Tech.) 1969, Finnish citizen

Independent of the company and significant shareholders

Positions of trust
- UPCAST Ltd, Chairman of the Board
- Cupori Ltd, Chairman of the Board
- JS-Group Ltd, Chairman of the Board
- Kolmen kaverin jäätelö Oy, Member of the Board

Work history
- Outotec Corporation, President, Metals, Energy & Water, Minerals Processing and Services 2008–2020
- Outokumpu and Outokumpu Copper 2000–2008

Holding in Betolar Plc
110,584 shares and 101 stock options, number of shares granted with options 60,701

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Management Team

RIKU KYTÖMÄKI
CEO
Member of the Management Team since 2022

M.Sc. (tech.) born 1971, Finnish citizen

Work history
- Exel Composites Plc, President and CEO 2014–2022
- ABB Corporation, several business management and supervisor positions 2001–2013
- Sonera Plc, Development Manager 2000–2001
- ABB Corporation, expert and managerial positions in product development 1996–2000

Holding in Betolar Plc
22,562 shares, 425,000 options. In addition, the potential share rewards of 20,000 + 20,000 shares under the restrict ed share plan, the vesting period ending in 2024 and 2026.

RIIKKA YLIKOSKI
CFO
Member of the Management Team since 2021

M.Sc. (econ.) born 1978, Finnish citizen

Work history
- Cargotec Corporation, various leadership positions in finance and financing, 2008–2021
- Boliden Harjavalta Oy, Controller, 2005–2008
- Kemira Plc, financial expert positions, 2000–2005

Holding in Betolar Plc
23,439 shares and 111,082 stock options, number of shares granted with options 127,282

VILLE VOIPIO
Chief Commercial Officer
Member of the Management Team since 2022

D.Sc. (Econ.) born 1975, Finnish citizen

Work history
- Stora Enso Plc, Head of Sales and Marketing, 2017–2022
- Annalect Oy, Head of B2B and Consulting, 2013–2017
- Nokia Corporation, Markets Division, Manager, 2008–2021
- Family Inc &; TBWA, Partner, Account Director and Planner 2003–2008
- Done Software Solutions, Partner, 1998–2001

Holding in Betolar Plc
1,184 shares and 76,513 options

TUIJA KALPALA
Chief Operating Officer
Member of the management team since 2023

M.Sc. (Econ.) born 1980, Finnish citizen

Work history
- Neste Corporation, senior positions in procurement, logistics and strategic development 2004–2023

Holding in Betolar Plc
33,333 options

JARNO POSKELA
Chief Technology Officer
Member of the Management Team since 2022

D.Sc. (Tech.) born 1973, Finnish citizen

Work history
- Neste Corporation, Head of Development and Processes, 2019–2022
- Innotiimi Oy, various expert and managerial positions, 2007–2019
- BIT Research Center, researcher positions, 2003–2007

Holding in Betolar Plc
76,513 options

ANTTI USKI
Chief Human Resources Officer
Member of the Management Team since 2022

PhD, EMBA, born 1973, Finnish citizen

Work history
- University of Tampere, Senior Vice President, Human Resources, 2020–2021
- Kiilto Family Oy, Director and managerial positions in Human Resources Management 2007–2020

Holding in Betolar Plc:
96,055 options

Changes during the year
During the year, Ilkka Iittiläinen left the company to pursue new position outside the company. He served as the company's Chief Operating Officer (COO) until June 2023. Janne Rauramo, Vice President, Strategic Partnerships, left the company to pursue new position outside the company in 2023. The management of strategic partnerships was transferred to the company's commercial and operational functions.

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Information to shareholders

Betolar Investor Relations

Betolar's Investor Relations are the responsibility of the CEO, CFO and ESG and Investor Relations Manager. Our email addresses are in the format firstname.lastname@betolar.com

Riku Kytömäki
CEO
Riikka Ylikoski
CFO
Melina Pinomaa
ESG and Investor Relations Manager

Appointment and call requests

melina.pinomaa@betolar.com

Objectives and principles of investor communications

The objective of Betolar's investor communications is to provide reliable, timely and accurate information to support the correct valuation of the company's shares in accordance with the disclosure policy approved by the company's Board of Directors.

In investor relations and related communication situations, Betolar's principle is to ensure equal service for stakeholders, good availability and quick reaction of the company's representatives, high ethics and compliance with the guidelines and regulations concerning listed companies.

The disclosure policy approved by Betolar's Board of Directors is available in full at www.betolar.com/disclosure-policy

Annual General Meeting

The Annual General Meeting will be held on Wednesday 27 March 2024. The notice of the Annual General Meeting and the proposals of the Board of Directors to the Annual General Meeting will be published as a company release and also on Betolar's website.

Further information: www.betolar.com/general-meeting

Dividend proposal

In the years ti come, Betolar will focus on financing its growth and developing its business in line with its strategy. The company does not expect to pay a dividend in the short or medium term.

The Board of Directors proposes to the Annual General Meeting that no dividend be distributed for the financial year 1 January 2023 – 31 December 2023 and that the loss for the financial year be carried over under retained earnings.

Financial reports in 2024

Betolar will publish the following financial reports in 2024

- Business Review 1–3/2024 will be published on 30 April 2024
- Half-year financial report 2024 will be published on 27 August 2024
- Business Review 1–9/2024 will be published on 1 November 2024

Betolar share

Betolar Plc's share is listed on Nasdaq First North Growth Market Finland maintained by Nasdaq Helsinki Ltd. The trading code of the share is BETOLAR and the ISIN code is FI4000512587.
The company has one class of shares and each share carries one vote. At the end of the financial year 31 December 2023, Betolar's registered share capital of EUR 80,000 and the number of shares was 19,606,882.

Share information 31 December 2023

- Highest paid: EUR 3.44
- Lowest paid: EUR 0.90
- Volume weighted average price: EUR 1.70
- Total turnover in 2023: 3,162,646 shares
- Closing price: EUR 1.30
- Market capitalisation: EUR 25.4 million

The shares have been entered into the book-entry securities system maintained by Euroclear Finland Ltd. The company's shareholder register is maintained, and the list of shareholders is available at Euroclear Finland Oy at Urho Kekkosen katu 5 C, 8th floor, Helsinki.

Silent period and closed window

Betolar observes a 30-day silent period in its investor and media relations prior to the publication of business reviews, half-year financial reports or financial statements releases. During the silent period, the company does not comment to the media or other parties on the company's financial situation, markets or future prospects. During the silent period, the company also does not meet with representatives of the capital markets.

Betolar observes a closed window of 30 days, during which persons discharging managerial responsibilities in Betolar may not trade, on their own account or on behalf of a third party, in the company's shares or debt instruments or related derivatives or other financial instruments or engage in any other transaction. Betolar also applies the closed window to persons who participate in or have access to the financial reporting information during the preparation phase.

Certified Advisor

The company's certified adviser in accordance with the First North Rulebook is Aktia Alexander Corporate Finance.

BETOLAR

Betolar Plc
FI-43300 Kannonkoski, Finland
contact@betolar.com