SIBELCO

INTRODUCING

Olivine & Åheim

A highly-versatile mineral mined & processed at the world's largest commercial deposit.

HIGH-PURITY **OLIVINE**

Sibelco olivine is a high-purity magnesium–iron silicate mineral with the chemical formula $(Mg, Fe)_2 SiO_4$. Its two main components are iron-rich fayalite and magnesium-rich forsterite.

KEY CHARACTERISTICS

- naturally-occurring and silica-free
- high melting point
- high specific density
- fast weathering

OFFERING INCREDIBLE **VERSATILITY**

Sibelco high-purity magnesium olivine is a highly versatile mineral, delivering benefits across a wide range of applications including:

BALLASTING

OLIDENSE is a natural, high-density aggregate for specialist ballast and concrete applications, offshore & onshore.

BLAST FURNACE

OLIFLUX MgO as an additive for sinter, pellets and as a blast furnace direct charge material in iron production.

CARBON DIOXIDE SEQUESTERING

As the fastest-weathering mineral, olivine is highly effective in capturing CO_2 in a range of developing applications.

FOUNDRY

Olivine is used as sand for cores and mould construction in both ferrous and non-ferrous metal casting .

THERMAL HEAT STORAGE

High density combined with high heat capacity make olivine perfect for storing heat energy.

REFRACTORY

Olivine is excellent as a raw material in refractories for steel and non-ferrous applications.

WATER FILTRATION

BLUEGUARD® has high specific surface and high absorption capacity for many different heavy metals.

MADE IN **NORWAY**

Whilst abundant in the earth’s mantle, high-quality industrial-grade olivine deposits can be difficult to find.

Sibelco high magnesium olivine is mined and processed at Åheim, on the west coast of Norway. Åheim is the world’s largest commercial olivine operation with up to **150 years of reserves**.

From here, our products are exported to customers worldwide.

PRODUCED WITH **MAXIMUM EFFICIENCY**

The proximity of our mine, processing facility and shipping terminal enables us to run a highly efficient operation with **minimal transport** or **double-handling of materials**.

FAST / GREENER TRANSFER OF MATERIALS

Quarried olivine is moved via conveyor through a 4km tunnel to the processing plant where it is crushed, dried and screened into different grades.

HIGH PRODUCTION CAPACITY

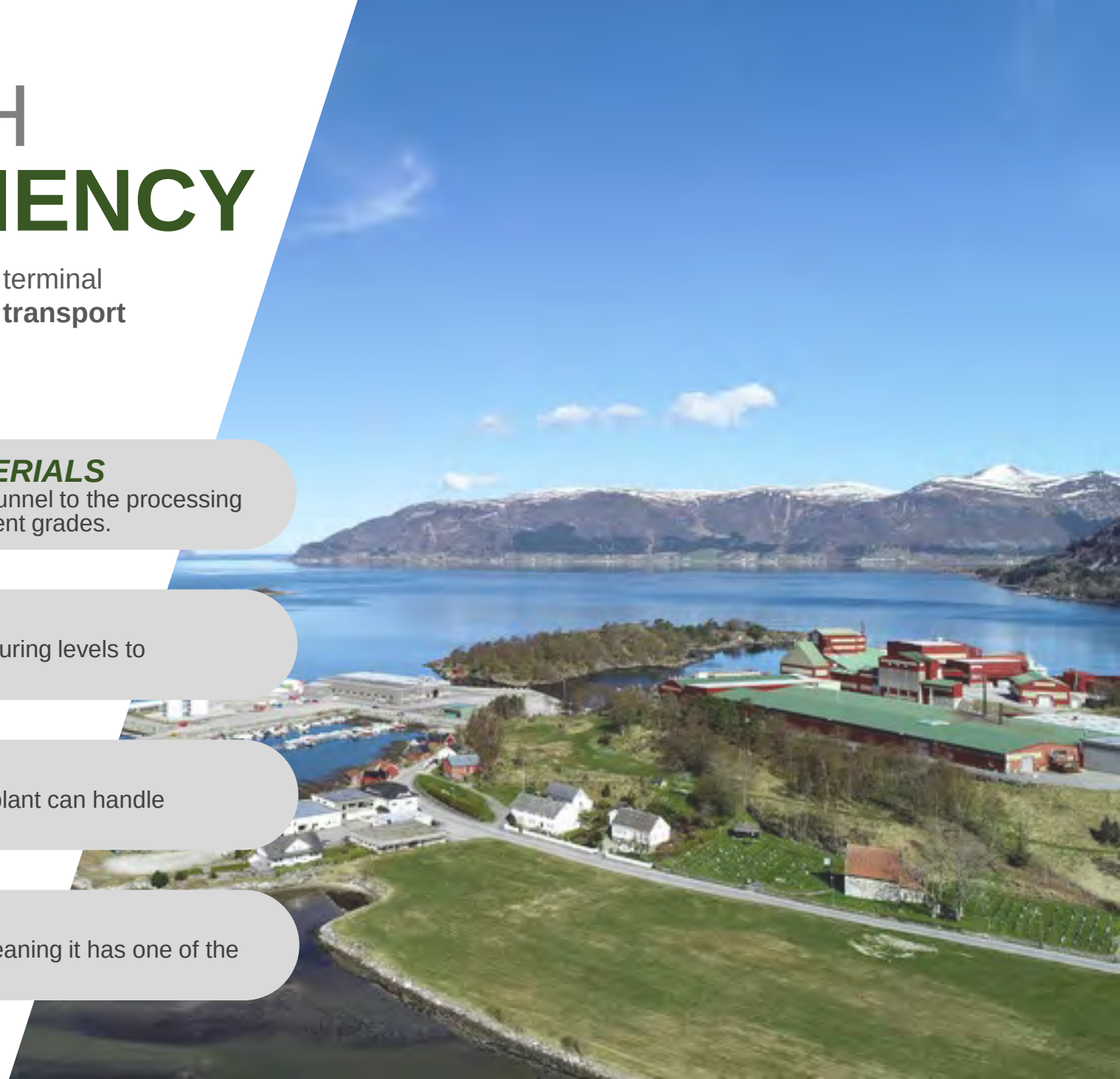
High production capacity enables us to adjust manufacturing levels to meet customers' changing requirements at short notice.

DEEP-WATER TERMINAL

The deep-water terminal sitting next to the processing plant can handle various types of vessels up to Panamax size.

CLEAN ENERGY

Åheim is powered predominantly by hydroelectricity, meaning it has one of the lowest carbon footprints of any Sibelco site.



PARTNERSHIPS BUILT ON **TECHNICAL KNOWHOW**

We have in-depth experience across all of the markets we serve. Our understanding of the challenges you face is reflected in the consistent quality of our products, the reliability of our logistics and the responsiveness of our service.

CONSISTENT QUALITY
All products are rigorously tested at our on-site laboratory to ensure that nothing is left to chance.

DEDICATED CUSTOMER SUPPORT
Our technical team will work with you from the outset to understand your project's unique requirements before recommending the optimal solution.

GLOBAL LOGISTICS
Our experienced shipping and chartering department can organise deliveries anywhere in the world at competitive rates.

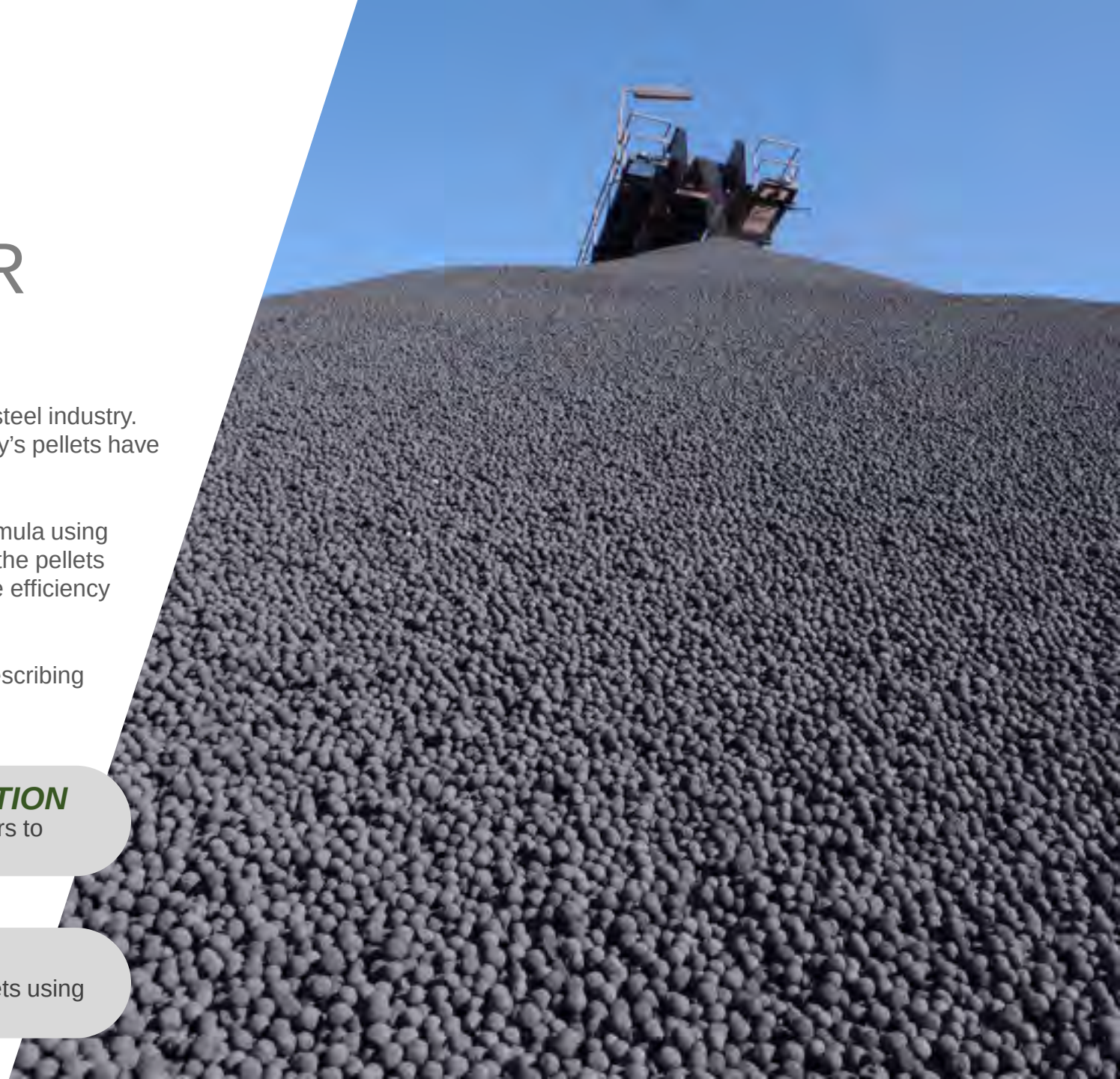
CASE STUDY

HELPING LKAB TO PRODUCE GREENER **IRON ORE PELLETS**

LKAB is the third largest producer of iron ore pellets for the global steel industry. Made from magnetite and with a high iron ore content, the company's pellets have a lower environmental impact than competitor products.

To make even greener pellets, LKAB recently developed a new formula using Åheim high-purity olivine as a specialist additive. The olivine gives the pellets higher refractoriness and burden permeability, further improving the efficiency of the blast furnace process with fuel consumption up to 7% lower.

The new olivine pellets were immediately in demand, with LKAB describing their development as its greatest sales success in recent times.



DRIVING DOWN ENERGY CONSUMPTION

The addition of high-purity olivine enables steel makers to reduce blast furnace fuel consumption by up to 7%

GREENER PELLET PRODUCTION

LKAB recently produced the world's first iron ore pellets using 100% fossil-free fuels, instead of coal and oil

CASE STUDY

GREENER, MORE EFFICIENT **TUNDISH REFRACTORY LININGS**

The tundish is an essential part of the continuous casting system in steelmaking, feeding a controlled flow of molten steel to the moulds. Tundish refractory linings need to be tough enough to withstand extreme thermal shock whilst preventing heat loss and oxidation. They must also be made from pure materials to prevent contamination of the liquid steel.

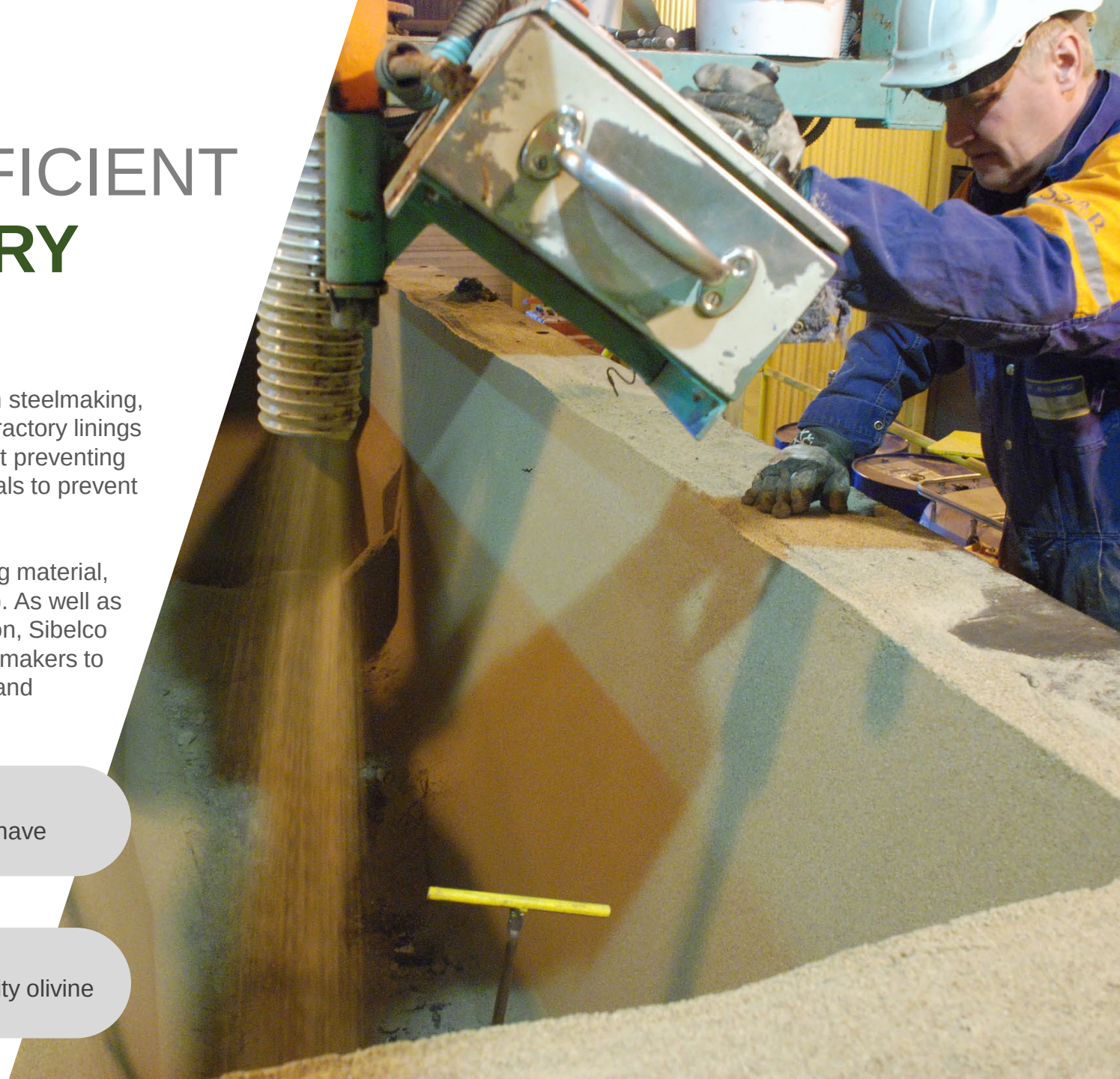
Åheim's high-purity olivine is widely used as tundish refractory lining material, either replacing or alongside dead-burned magnesium oxide (MgO). As well as reducing the lining's thermal conductivity and improving its insulation, Sibelco olivine has a much lower carbon footprint than MgO, enabling steelmakers to reduce environmental impact whilst maintaining high performance and quality levels.

INDUSTRY STANDARD

Tundish lining mixes with 60% MgO content or lower have become the standard across Europe's steel industry

EUROPE'S LEADING PROVIDER

Sibelco is today Europe's leading supplier of high-purity olivine for tundish lining mixes



CASE STUDY

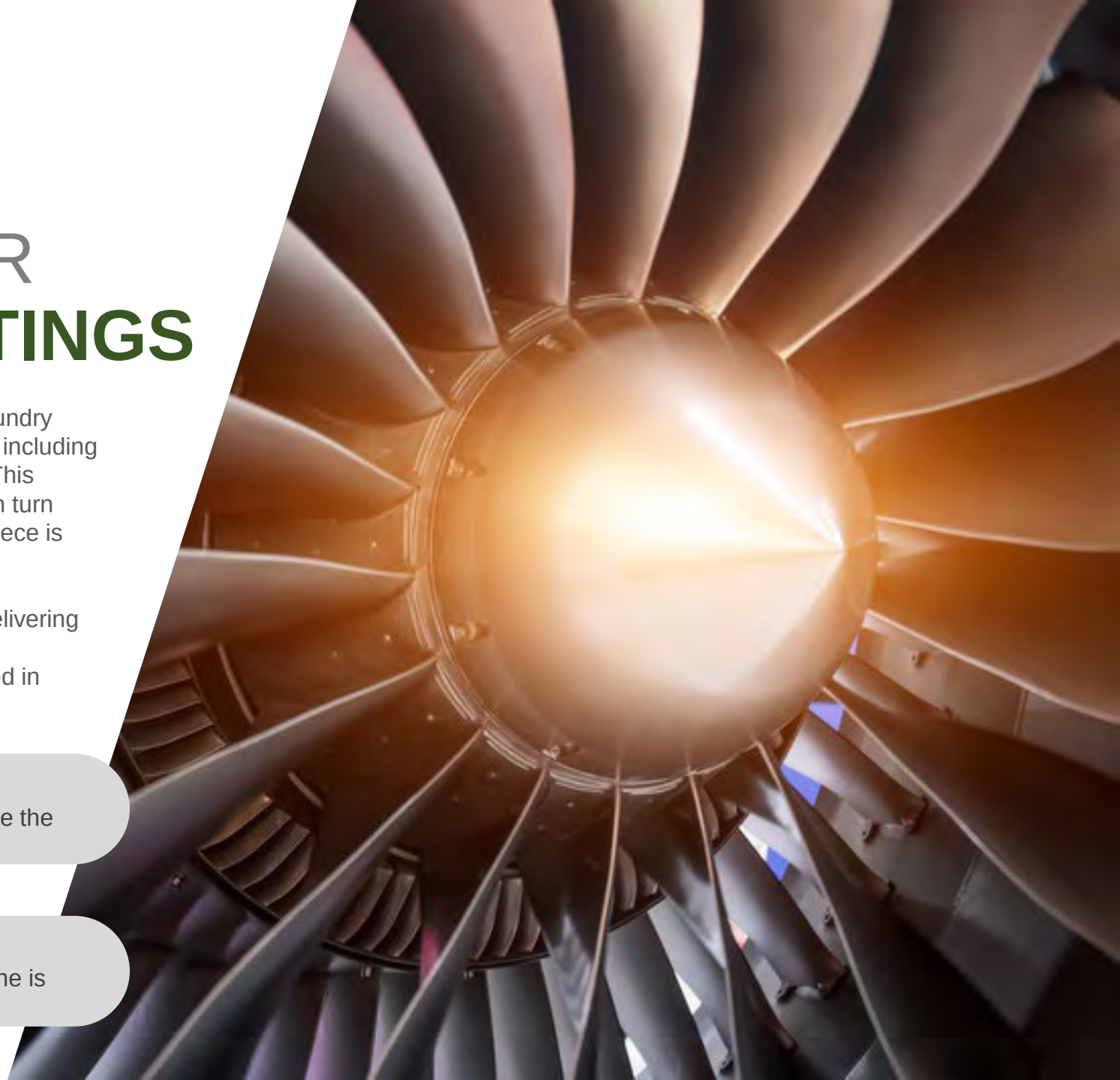
THE PERFECT FOUNDRY SAND FOR **LARGE METAL CASTINGS**

High-purity olivine from Åheim has been used as a performance foundry sand for 75 years. It offers a range of beneficial physical properties including low thermal expansion, high refractoriness and low wetting ability. This provides greater casting accuracy and a smoother surface, which in turn saves manufacturers time and money as less grinding of the end piece is needed.

Our low-expansion olivine foundry sands are today sold globally, delivering precision and smooth finishing - perfect for large castings such as manganese steel parts used in mining and stainless steel parts used in marine and aviation.

1948
Åheim's olivine has been used as a foundry sand since the formation of the company A/S Olivin back in 1948

SAFE IN USE
Unlike quartz, the silica component of high-purity olivine is bound within the crystal lattice, meaning no free silica



CASE STUDY

BALLASTING THE WORLD'S LARGEST OFFSHORE FLOATING WIND FARM

Hywind Tampen is an **88 MW floating wind power project** created to provide green electricity for the Snorre and Gullfaks offshore field operations in the Norwegian North Sea. Once operational in 2022, it will be the world's largest offshore floating wind farm and the first to power oil and gas platforms.

Sibelco **OLIDENSE** high-performance **ballast** was used to create the foundations for the project's **11 floating wind turbines**.

82,000 TONNES
of OLIDENSE 0-40 were delivered via 15 shipments

A TIGHT DEADLINE
delivery within short timeframe over summer holiday period

CASE STUDY

RETURNING CONTAMINATED LAND **TO NATURE**

Sibelco **Blueguard**® olivine helped to restore a former military range in the mountains of Oppland, Norway, into a nature conservation area.

We worked with the Norwegian Defence Estates Agency to research and develop the use of Blueguard® to support the clean up of the former Hjerkinn firing range, covering 165 sq km of land.

Blueguard 63 was used for permanent landfill for contaminated soil, whilst Olivine G1-3 was used as a filter material to clean heavy metals from contaminated water.

130 SQ KM
of the restored land has now been incorporated within the national park.

A MAJOR CLEAN-UP OPERATION
nearly 5,000 unexploded bombs and grenades were removed along with 550 tonnes of scrap metal

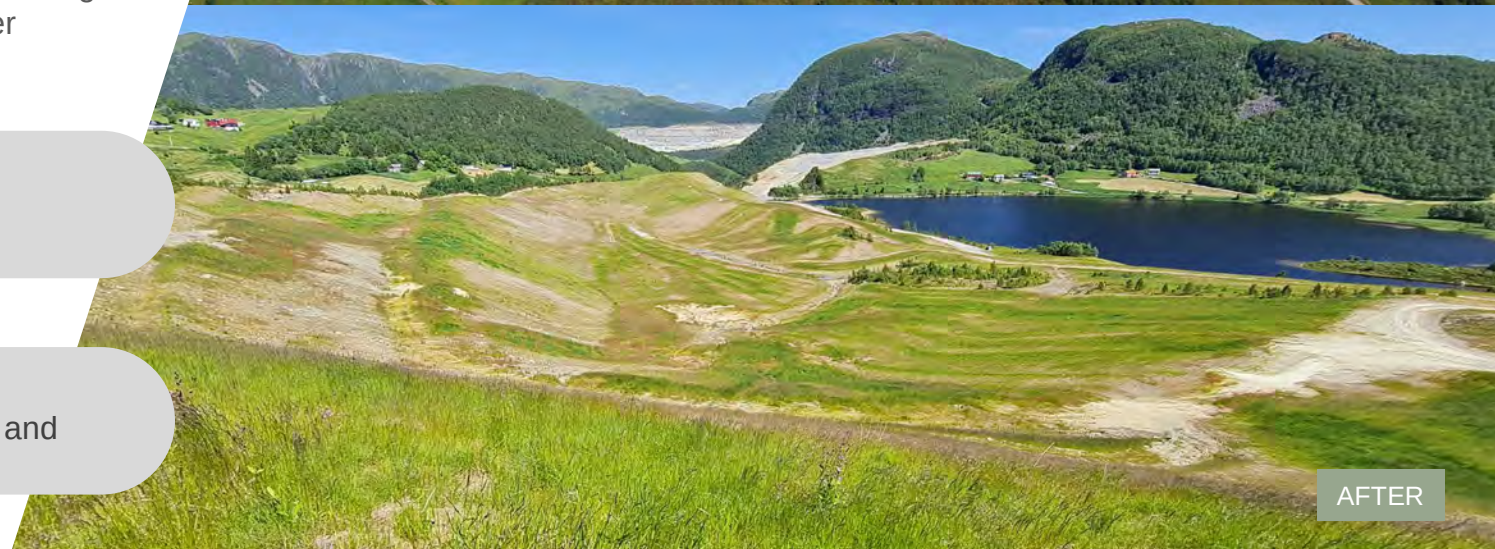
CASE STUDY

RESTORING LAND **TO NATURE**

Mine restoration is a key part of Sibelco's sustainability strategy. We develop detailed plans for each mine's closure before mineral extraction even begins. This ensures that we minimise the environmental impact of our operations and leave a positive legacy.

At Åheim, any rock extracted that is unsuitable for commercial sale (which accounts for just 3.6% of total production) is stored along with top soil and plant fibres removed during mining. This overburden material is then used to restore the land when olivine extraction finishes.

Sibelco's approach to mine closure planning is amongst the most advanced in the minerals industry. We adhere to a 'constructive obligation', meaning we look beyond what is legally required and consider all stakeholder expectations.



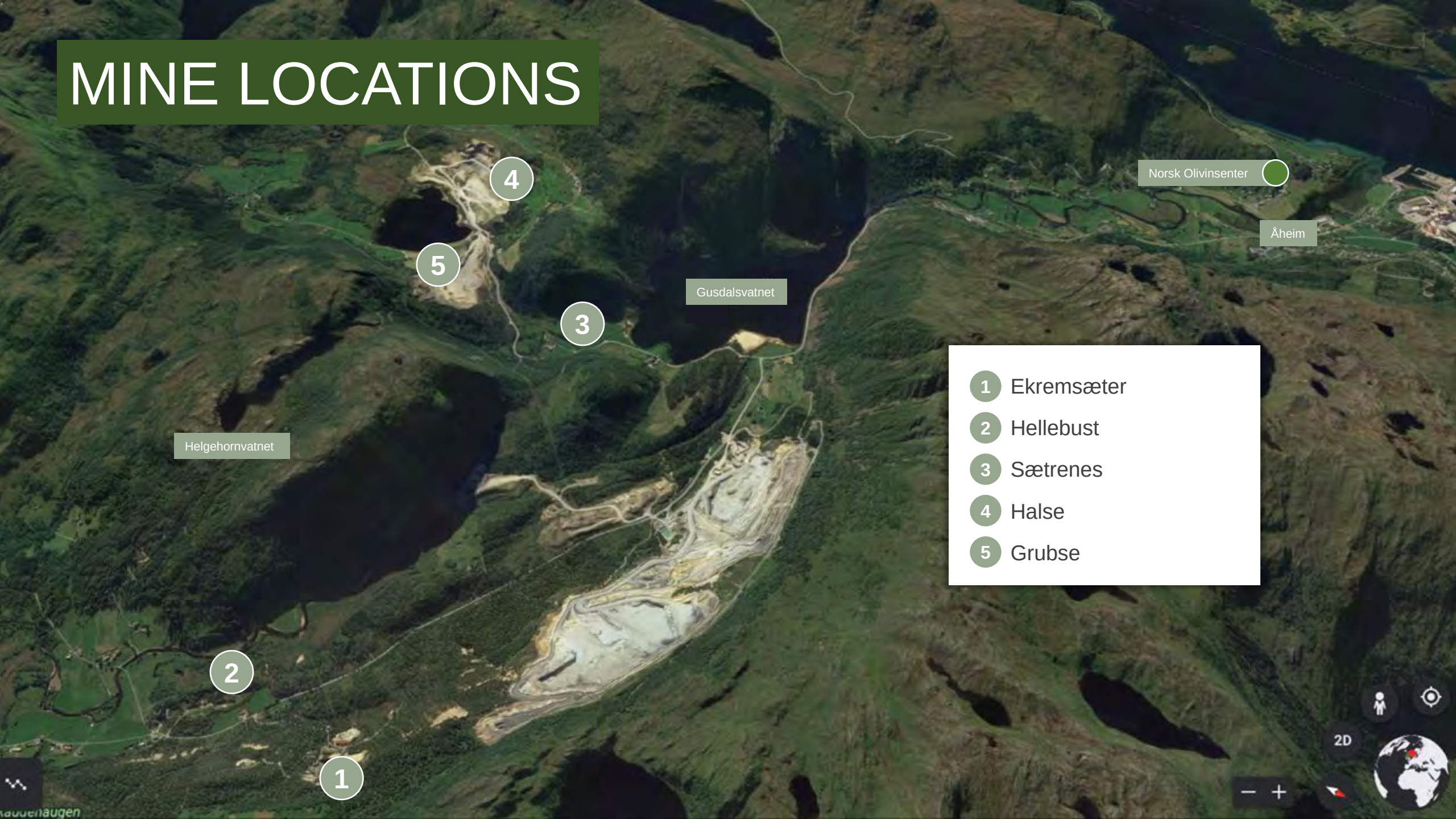
AWARD-WINNING

Many of Sibelco's mine restoration projects have won environmental awards

A MAJOR LAND OWNER

Sibelco owns over 15,000 hectares of land worldwide and leases a further 3,000

MINE LOCATIONS



1. Ekremsæter
2. Hellebust
3. Sætrenes
4. Halse
5. Grubse

ABOUT SIBELCO

Founded in Belgium in 1872, Sibelco is today one of the world's leading providers of industrial minerals.

PEOPLE
5,100

REVENUE
€1.7 BN

COUNTRIES
31

PRODUCTION SITES
120

TECHNICAL CENTRES
6

We offer a broad range of high-specification products, derived from a core group of five minerals:

- SILICA
- FELDSPATHICS
- CLAYS
- RECYCLED GLASS
- OLIVINE

LEADING IN **SUSTAINABILITY**

Our target is to reduce Scope 1 and 2 emissions intensity (tonnes CO_2 / revenue) by **5% per year** from 2021 to 2030 – cumulatively a **reduction of 37%**.

This target is in line with best practices promoted by the Science Based Targets initiative and is aligned with the Paris Agreement and its goal to limit global warming to well below 2°C compared to pre-industrial levels.

our target is one of the toughest set by any business in the industrial minerals sector

we will invest approx **€90 million** in new technologies & operational excellence initiatives over the next 9 years