Factsheet

Decarbonisation of Eigenrieden Quarry

Mineral Baustoff GmbH is gradually reducing its CO_2 emissions

STRABAG pilot project for climate-friendly raw material extraction

With a pilot project on decarbonisation, Mineral Baustoff GmbH's Eigenrieden limestone quarry (Thuringia) aims to become an industry-wide pioneer in sustainability, environmental protection and innovation: in a multi-stage process, the STRABAG subsidiary intends to progressively reduce CO_2 emissions from raw material extraction and the production of building material mixtures and grit. The goal is to operate Germany's first climate-neutral quarry by the end of the current decade. In the long term, the project is intended to set a precedent and serve as a model for the conversion of other raw material sites belonging to the STRABAG Group.

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The Eigenrieden limestone quarry has been a raw materials site for the STRABAG Group since 2009. It currently has reserves of approximately six million tonnes of rock in the lower Muschelkalk layers; Mineral Baustoff GmbH produces around 220,000 tonnes of building material mixtures and grit per year at this site. Before the pilot project started, the plant technology and construction machinery in the quarry were conventionally powered by diesel, resulting in annual CO_2 emissions of around 490 tonnes. By 2030, carbon dioxide emissions in Eigenrieden are to be gradually reduced to almost zero through several sub-projects.

Eigenrieden quarry: Roadmap to decarbonisation

2020	2021	2023	2025	2026	until 2030	until 2030	until 2030
CO_2 emissions at the quarry at 490 tonnes per year	Optimisation of extraction and mining infrastructure	Conversion of processing from diesel to electric	Power supply via photo-voltaic system	Operation of dump trucks and construction machinery with HVO	**Goal:** Excavators and wheel loaders with hybrid or electric drive	**Goal:** Electric dumper for raw stone transport	**Goal:** Use of CO_2-neutral explosives

Digitalisation minimises environmental impact

STRABAG has already taken the first steps towards more sustainable and efficient raw material extraction in Eigenrieden: the switch to a selective, sole-separated mining concept has increased occupational safety and product quality while reducing environmental impact. The use of modern software tools for long-term digital mining planning now enables the efficient use of the entire deposit within its geological and approved boundaries – in particular, targeted deep mining. Digitalisation thus minimises land consumption and thus ecological impact. In order to make logistics in the quarry sustainably efficient and safe, Mineral Baustoff GmbH has consistently separated plant and customer traffic. A traffic management system with new ramps and access roads creates short distances and increases occupational safety.

To decarbonise limestone mining in Eigenrieden, Mineral Baustoff GmbH is focusing on switching from diesel-powered technology to electricity or electric drives and climate-friendly fuels – across all three stages of the production process: extraction, processing and loading.



1 Bird's eye view: CO_2 emissions at the Eigenrieden limestone quarry are to be gradually reduced in order to extract raw materials in a climate-friendly manner. The site's own solar panel system (in the foreground) supplies the electricity for the treatment process.
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New processing plant: PV modules for sustainable solar power

At the end of 2023, a highly efficient, electrically powered, stationary processing plant replaced the previously used diesel-powered mobile equipment. The energy requirements of the new crushing and screening plant are now largely met by solar power generated by the quarry's own photovoltaic system. STRABAG commissioned the plant, which includes an energy storage system on an adjacent 1.4-hectare open space, in March 2026. Dust and noise emissions from the processing plant are minimised by a high-performance dust extraction system and the sound-insulating enclosures around crushers, screeners and conveyors.

Depending on how energy demand develops at the site, the company also intends to examine the possibility of gradually filling in the neighbouring quarry, which is no longer used for mining, in a second step so that the area can also be used for solar modules. Any surplus electricity produced from solar energy could be fed into the general power grid.



2 A modern stationary processing plant has replaced the diesel-powered mobile crushers and screening machines. Its energy requirements are covered by solar power generated by the quarry's own photovoltaic system. © Mineral Baustoff GmbH /
3 Heavy-duty dump truck in a quarry: Operations are to be converted from fossil diesel to HVO. © Mineral Baustoff GmbH



Switch to HVO diesel reduces CO_2 emissions by up to 90 percent

To reduce CO_2 emissions in raw material extraction, STRABAG is initially focusing on converting the refuelling of dumpers and construction machinery in the quarry to climate-friendly fuel: the two heavy-duty dumpers for transporting raw stone in Eigenrieden will be powered by HVO diesel from hydrogenated vegetable oils instead of conventional diesel from fossil petroleum in the future. The same applies to two large wheel loaders used to load the produced building material mixtures and also to the heavy excavator that loads the dump trucks with limestone. The aim is to switch to plant-based fuel for refuelling by the end of 2026. HVO (hydrotreated vegetable oil) is a synthetically produced biodiesel that consists mainly of old vegetable oils and other fatty raw materials and can be used 1:1 to power modern diesel engines.

And the climate impact is considerable: replacing conventional diesel with HVO can reduce CO_2 emissions by up to 90 percent. The reason for this becomes clear when looking at the life cycle: the plants in HVO have already absorbed the carbon dioxide produced during combustion from the atmosphere during their growth. In an environmental comparison with fossil diesel, HVO also scores points for cleaner combustion. Since HVO does not contain any sulphur or nitrogen compounds, its combustion produces fewer emissions of nitrogen oxides and particulate matter.

Quarry focuses on electric dumpers with articulated joints for the future

STRABAG is gradually replacing fossil diesel fuel with HVO in its construction machinery, not only in Eigenrieden but across the entire group. This is a first step towards significantly reducing CO_2 emissions from the operation of excavators, wheel loaders and other machinery. The aim is to bridge the gap until electric drives or hybrid solutions have also established themselves on the market for heavy machinery. This also applies to Eigenrieden: Mineral Baustoff GmbH continues to rely on electric drives in its construction machinery to decarbonise operations in the quarry. Autonomously operated electric dump trucks had already been extensively tested in Eigenrieden for the ELMAR (Electrification of Heavy Transport Machines in the Raw Materials Industry) research project. The originally planned switch to this model failed because the manufacturer Volvo will not be bringing this prototype to market.

In order to decarbonise raw stone transport, STRABAG now plans to use articulated dump trucks with electric drives in the quarry as soon as they become available on the market. This is not yet the case, but manufacturers are already planning to test such prototypes. Articulated dump trucks are better suited to the needs at Eigenrieden because they are lighter and more manoeuvrable than dump trucks with rigid frames. The two wheel loaders and the excavator in the quarry are also to be converted to electric models as soon as possible. Another conceivable alternative could be a heavy-duty excavator with fuel-efficient hybrid drive and energy recovery.



4 Wheel loaders, excavators and dump trucks at the Eigenrieden quarry are to be fuelled with HVO biodiesel from hydrogenated vegetable oil in future. © Mineral Baustoff GmbH

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