

Building with CO₂- enriched RC concrete **made easy**



Industry: Property
developers, architects



 **neustark**[®]
Removing CO₂ permanently

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Summary

In the canton of Zurich, Switzerland, a building complex is under construction where 75 tons of CO₂ have been permanently stored thanks to neustark's technology. Except for the precast concrete components, all the concrete structures in the project are made of carbonated recycled concrete (RC concrete), which KIBECO produced and supplied. The building owner, Bereuter Holding AG, has decided to claim the climate benefits generated by this innovative construction method.

«Bellis» property

Residential and commercial development with 44 apartments, commercial and office space, and business apartments.

City

Effretikon ZH

Building owner and general contractor

Bereuter Holding AG

Architectural practice

Stauer & Hasler Architekten AG

Concrete supplier



Preliminary project: Sustainable construction as a challenge

The requirements of the municipality of Effretikon in the canton of Zurich for the project were clear from the start: Sustainability was the highest priority. To meet the high requirements, the decision was made to build according to the SIA 2040 standard.

The building contractor, Bereuter Holding AG, determined that the building should be made out of concrete. Finally, the subsidiary Bereuter Bau AG, with many years of experience in concrete building construction, would build it.

But how can the high demands on sustainability be met without resorting to classic materials such as wood? This is where building materials manufacturer KIBAG came into play with its sustainable KIBECO product range. The Staufer & Hasler Architekten AG architectural practice sought advice from KIBECO early in the planning process.

Part of the solution was to use low-CO₂ cement. Another element was the enrichment of concrete granulate with CO₂ using the technology of the Swiss scale-up neustark. This material was then used to produce RC concrete. KIBECO demonstrated that 10 kg of CO₂ can be permanently stored per cubic metre of concrete. The required data sheets for the performance characteristics were also provided.

«We are realising that there is an increased demand for sustainable building materials. The project in Effretikon was optimal in terms of the procedure. As the aim was to supply sustainable building materials, we were contacted as early as the planning phase. We were able to present our products to the planners early and demonstrate how they contribute to achieving the desired sustainability standard.»



Philippe Peter
Head of KIBECO

In 2011, the SIA (Swiss Society of Engineers and Architects) introduced the «SIA Energy Efficiency Path» building standard, which sets targets for greenhouse gas emissions in construction, operation, and mobility. The background was the realisation that the building sector can significantly contribute to climate protection. Similar labels in the UK/US are issued by LEED or BREEAM.

Concrete production with neustark technology

The 7500m³ of RC concrete required was produced at the KIBAG site in Bassersdorf, near Zurich. During the production of this RC concrete, recycled concrete granulates previously treated using neustark technology are added. This is how it works:

- The neustark CO₂ storage plants are installed at the building materials recycler's facility and can be seamlessly integrated into the existing processes.
- In the reaction chamber, the core of the plant, biogenic CO₂ is put into contact with the demolition granulate.
- The carbon dioxide reacts with the residual cement in the demolition granulate and turns into limestone within a few hours.
- This reaction binds the carbon dioxide for hundreds of thousands of years.



Regensdorf CO₂ storage plant



Execution: There is hardly any difference when compared to primary concrete

KIBECO was able to produce carbonated RC concrete in such a way that all compressive strength requirements were met. This meant that, except for the prefabricated elements, all concrete structures – from the walls and floors to the floor slabs and ceilings – could be constructed using sustainable KIBECO concrete.

Foreman Florian Baumert from Bereuter Bau AG was responsible for the shell construction work, completed in December 2023. Building with carbonated material went just as smoothly as with conventional primary concrete. The consistency and workability left nothing to be desired. Even the basement ceilings were finished using RC concrete without extra work or human resources.

«There are no differences to the primary concrete in terms of finishing and final appearance.»

Florian Baumert
Polisher, Bereuter Bau AG



Where do the **climate benefits** go?

Thanks to the neustark technology and the delivered quantity of 7500m³ of carbonated RC concrete, 75t of CO₂ could be permanently removed from the atmosphere. Certificates confirm that this carbon dioxide has been removed.

A certificate can be used in one of two ways:



The certificate is sold to a third party that has ambitious climate targets.

One example of a buyer is Microsoft. The company buys carbon credits to offset its hard-to-avoid emissions. In addition to their own comprehensive reduction measures, they will achieve their net zero target in 2030. In this case, the climate benefit can only be credited to the third party. Consequently, the construction project may only state that carbonated material was used, without specifying the exact quantity of CO₂ removed. The concrete producer receives a refund from the sale of certificates. The more tons of CO₂ are stored, the more financially attractive it is for the concrete producer.



The building owner buys the carbonated material with the certificate.

In this case, the price for the storage capacity is agreed between the building owner and the concrete producer. The certificate is credited to the building owner, who can show exactly how many tons of CO₂ have been bound in the project. This will help the building owner to obtain certain certifications or achieve defined target values, such as the quantity of CO₂ emitted per cubic metre of living space built.

Bereuter Holding chose the second option for the construction project in Effretikon. Sustainable construction with RC concrete is a development that they want to support. And as a company certified in environmental protection, its aim is to build as sustainably as possible.

Conclusion

The building complex in Effretikon is an outstanding example of how sustainable construction is already being realised today and should be further developed in the future. To achieve our climate targets, all possibilities in the construction sector

must be exploited. This project shows that sustainable construction can be realised using innovative technologies and materials as well as comprehensive, forward-looking planning – without compromising on quality or functional requirements.

Your contacts to discuss how we can work together



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atmosphere – and store it
permanently.**

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Note: All data and information in this case study
come from KIBECO, Bereuter and neustark.
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