

Building & Industry

**NOVENCO**

SCHAKO Group

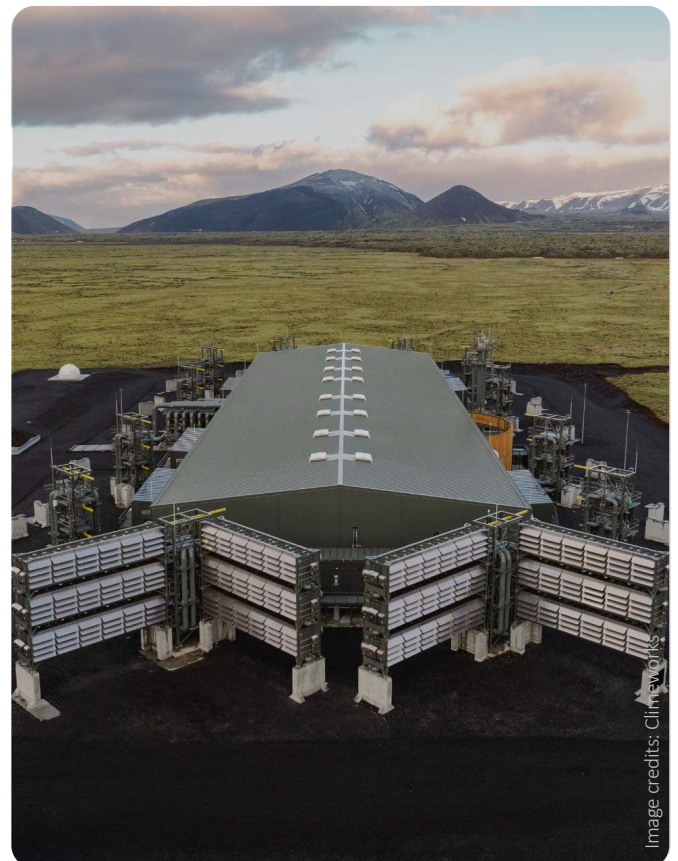
# Supporting the next generation of direct air capture: ZerAx<sup>®</sup> fans at Climeworks' Mammoth facility

## The project

Mammoth, located at Hellisheidi in Iceland, is Climeworks' largest direct air capture facility to date and serves as a large-scale platform for producing carbon removals while generating the real-world operational learnings that improve performance and strengthen future generations of direct air capture technology.

From the early development stages, NOVENCO collaborated closely with Climeworks to support the project.

The Mammoth Project is equipped with 864 NOVENCO ZerAx<sup>®</sup> AZN fans integrated into large fan walls that continuously draw atmospheric air into the DAC process.



Impressive view of the Mammoth site featuring large-scale CO<sub>2</sub> direct air capture technology



The Mammoth facility, where 864 ZerAx fans support continuous direct air capture in extreme operating conditions

## The challenge

Mammoth is located in one of the world's most demanding operating environments. The ventilation system must withstand low temperatures, strong winds, snow, volcanic activity and corrosive conditions while operating continuously 24 hours a day, 365 days a year.

Reliability was critical. Any downtime could directly impact carbon capture performance. At the same time, Climeworks required highly energy-efficient and low-noise operation to minimise operational costs and environmental impact.

The project also introduced changes to its performance requirements. After approximately half of the fans had been delivered, Climeworks requested an increase in static pressure from 400 Pa to 600 Pa. Meeting this requirement without changing the fan, motor or drive configuration was essential to maintain the project schedule.

*"For Mammoth, reliability and efficiency were essential. NOVENCO delivered a robust fan solution that met our demanding performance requirements, operated reliably in Iceland's harsh climate and provided the flexibility needed as the project evolved."*

*Douglas Chan,  
Chief Operating Officer, Climeworks*



Two CO<sub>2</sub> collector containers, each equipped with 12 ZerAx fans

## The solution

NOVENCO developed a tailored solution based on ZerAx® AZN Ø800 axial fans with integrated drives and a specially designed inlet cone for wall-mounted installation. The compact design, with an installation length of only 400 mm, was developed to meet the project's shipping restrictions.

The fan solution delivered the required performance and low sound levels while ensuring reliable operation in harsh outdoor conditions.

Extensive testing was carried out to evaluate long-term resistance to corrosion. Two test fans operated outdoors in Iceland for a full year and showed virtually no visible deterioration, demonstrating the robustness of the selected design and materials.

The corrosion-resistant design extends to key components throughout the fan system. The integrated frequency converter is rated to corrosion category C4 according to EN ISO 12944. The motor also meets corrosion category C4 requirements and has successfully passed a 140-hour salt spray test, supporting reliable long-term operation in harsh outdoor environments.

When the pressure requirement increased from 400 Pa to 600 Pa, NOVENCO successfully adapted the performance using the same fan, motor and integrated drive platform. This flexibility enabled the project to continue without redesigning the installation.

To maintain low noise levels at the higher operating point, the original short diffuser was

replaced with a duct silencer. This reduced the overall sound power level from 93 dB(A) to 91 dB(A) at 600 Pa. The silencer itself reduced the sound power level by approximately 10 dB, from 101 dB(A) to 91 dB(A).

The ZerAx® technology also offers low total cost of ownership through high efficiency, minimal maintenance requirements and proven operational reliability.

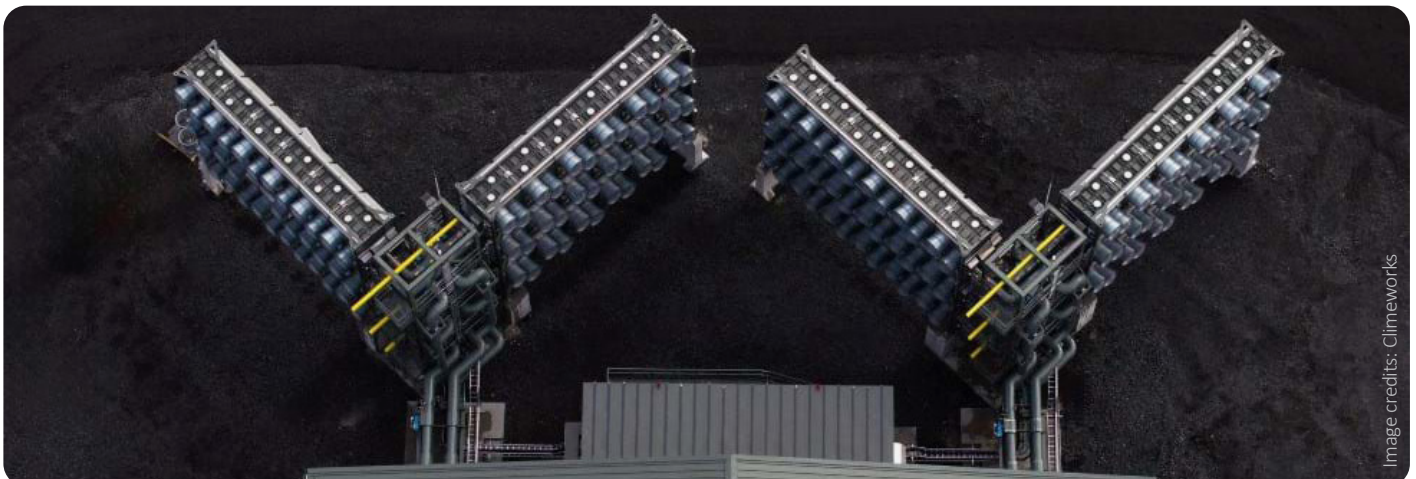
## The results

The fleet of collector containers for the Mammoth project is now equipped with 864 NOVENCO ZerAx® fans as part of one of the world's most ambitious carbon removal projects.

The solution delivers:

- Continuous 24/7 operation in extreme conditions
- High energy efficiency
- Low noise levels even after increasing the operating pressure from 400 Pa to 600 Pa
- Minimal maintenance requirements
- Proven corrosion resistance in harsh outdoor environments

By combining operational reliability, energy efficiency and design flexibility, NOVENCO helps ensure that Mammoth can support Climeworks' mission to permanently remove CO<sub>2</sub> from the atmosphere at an industrial scale.



Advanced Climeworks CO<sub>2</sub> collector containers featuring a highly engineered ventilation layout for efficient air capture