

Zurich, 19.09.2022

DAC+S certification methodology validated by DNV – developed and implemented by Climeworks and Carbfix as partners for permanent carbon removal

- Climeworks and Carbfix developed and independent quality and assurance leader DNV validated the world's first full-chain certification methodology dedicated to carbon dioxide removal via direct air capture and underground mineralization storage.
- It provides the requirements for stringent standards by which measurement and reporting of Climeworks' carbon dioxide removal and Carbfix's permanent mineralization can be third-party verified.
- With this methodology, Climeworks and Carbfix aim to contribute to the standardization and scale-up of high-quality, permanent removals



Methodology for direct air capture ([download](#))

Methodology for underground mineralization storage ([download](#))

A robust assessment of carbon dioxide removal (CDR) methods is needed to provide high-quality services to private and corporate customers, as well as to make contributions toward a carbon market that is regulated and better understood.

Climeworks, Carbfix, and DNV have partnered to develop the world's first full-chain certification methodology dedicated to CDR via direct air capture (DAC) and underground mineralization storage. The methodology has been validated in line with ISO 14064-2 and verifies the integrity of Climeworks' CDR, thus enabling the delivery of certified CDR, and leading industry action with high environmental integrity.

The two modular methodologies focusing on 1) DAC, and 2) storage through permanent underground mineralization provide the requirements for stringent standards by which measurement and reporting of Climeworks' CDR can be third-party verified and communicated to customers. With these much-needed methodologies, Climeworks and Carbfix aim to contribute to the standardization and scale-up of high-quality, permanent removals.

The methodologies set criteria for high environmental integrity CDR and take a rigorous stance on safeguarding quality. They were validated by DNV, a global leader in quality assurance, by advising on the principles of methodology development and ensuring robustness and accuracy of the approach.

DNV then conducted an onsite audit, where a review of documentation, interviews with staff, and site inspection verified that Climeworks is producing CDR, and Carbfix is mineralizing CO₂ underground, in accordance with those methodologies.

DNV concluded the audit by certifying Climeworks' CDR via Climeworks' DAC and Carbfix's mineral storage technologies, to be:

- Reported accurately, avoiding any chance of double counting or inclusion of removals that cannot be supported by measured data,
- Measured accurately and reflecting the net emissions removed after adjusting for emissions resulting from plant construction, operation, and disposal in compliance with ISO 14064-2 Standards,
- Strict, transparent, and accountable to the monitoring procedure in place to detect any involuntary release of CO₂ and changes within the storage reservoir that may risk the permanence of CO₂ storage.

Climeworks and Carbfix are proud to have developed and implemented the first full-chain certification methodology for CDR via DAC+S, in close consultation with and validated by DNV.

Climeworks welcomes public and industry experts to contribute to the conversation about high-quality standards by reviewing and commenting on the validated methodologies at certification@climeworks.com

"Today, we are happy to share the first full-chain methodology to measure, report and verify CDR produced via DAC+S. We aim for our contribution to lead the way to the industry-wide application of high standards. On the road to gigaton capacity by 2050, it is critical to ensure the robustness and transparent verification of CDR."

Christoph Gebald, co-CEO and co-founder of Climeworks

"Together with our CO₂ storage partner Carbfix, we have developed a methodology to certify CDR that meets the highest standards. By setting this unique precedent in the DAC industry, we want to push for standards towards higher integrity. The release of the first full-chain methodology for CDR produced via DAC+S represents a major milestone, made possible by the real-world learnings from our Orca plant."

Jan Wurzbacher, co-CEO and co-founder of Climeworks

"Climate action and policy are only as effective as the rigor with which the implemented solutions are measured, reported, and verified towards climate goals. Certification is an essential step to allow DAC+S to enter carbon markets. It allows our technology to become even more actionable as a climate solution, opening the door for new considerations beyond the voluntary market. I see here a tremendous opportunity not only for Climeworks but for the whole DAC industry to strengthen its voice in the policy sphere."

Christoph Beuttler, Chief Climate Policy Officer at Climeworks

"Even after ten years of successfully operating subsurface mineralization of CO₂, and with over one hundred peer-reviewed scientific articles published on our approach, it is a major milestone to have established an independently validated methodology. It is the first validated methodology to address subsurface mineralization, a mature and robust technology we have developed to use nature's way of storing CO₂ by transforming it into stone. I'm proud of our team and collaborators for this important achievement."

Edda Aradóttir, CEO of Carbfix

"In order to achieve our climate goals, we need to find scalable solutions for CO₂ storage. Only rigorous carbon accounting can ensure the environmental integrity of such projects. Our first carbon capture and mineral storage methodology provides the tools to ensure its safe application

while making the climate benefits transparent, measurable, and permanent.”
Thomas Ratouis, Measurement, Monitoring & Verification at Carbfix

“We were pleased to be involved in this significant project with Climeworks and Carbfix, the first time that the removal capacity of a DAC+S installation has been validated and verified using ISO 14064-2. DNV performed a training and pre-assessed the early drafts of the developed methodology in order to enable a smooth validation process. Following the successful validation of the methodology and project design documents, DNV was able to successfully verify the implementation of the project and the production of CDR at the Orca plant.”

Edwin Aalders, Senior Principal Scientist at DNV Supply Chain & Product Assurance

About Climeworks

Climeworks empowers people and companies to fight global warming by offering carbon dioxide removal as a service via direct air capture (DAC) technology. At Orca, Climeworks’ DAC facility in Iceland, the CO₂ is permanently removed from the air by capturing and geologically storing it for thousands of years by Climeworks’ storage partner Carbfix. Climeworks’ DAC facilities run exclusively on clean energy, and our modular CO₂ collectors can be stacked to build machines of large-scale capacity.

Founded by engineers Christoph Gebald and Jan Wurzbacher in 2009, Climeworks is on a journey to climate impact at scale. To do so, we strive to inspire 1 billion people to act and remove CO₂ from the air.

Climeworks is spear-heading the DAC industry globally, with the world’s largest DAC facility and storage installation in operation and a team of over 200 Climeworkers determined to contribute to a net-zero future. Our growing customer base includes over 160 companies, including multinationals such as Microsoft, BCG, UBS or Swiss Re, as well as more than 15,000 individual Climate Pioneers.

Climeworks: <https://climeworks.com/>

About Carbfix

Carbfix is the world’s first CO₂ mineral storage operator, having mineralized 80 thousand tons of CO₂ underground in Iceland since 2012 using proprietary technology. Carbfix injects CO₂ dissolved in water into basaltic rocks, where it turns into stone in under two years through accelerated natural processes. This proven, safe, permanent, and cost-effective carbon storage solution is ripe for significant upscaling both in Iceland and worldwide.

Carbfix: <https://www.carbfix.com/>

About DNV

DNV is an independent assurance and risk management provider, operating in more than 100 countries. Through assessment and digital assurance solutions, DNV helps companies build trust and transparency around products, assets, supply chains and ecosystems.

Whether certifying products, sharing claims or optimizing and decarbonizing supply chains, DNV helps companies manage risks and realize their long-term strategic goals, improving ESG performance and generating lasting, sustainable results.

Combining sustainability, supply chain and digital expertise, DNV works to create new assurance models enabling interaction and transaction transparency across value chains. Drawing on our wide technical and industry expertise, we work with companies worldwide to bridge trust gaps among consumers, producers and suppliers.

Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world’s most successful and forward-thinking companies.

DNV: <https://www.dnv.com/>