NEGATIVE EMISSIONS PLATFORM

EVENT REPORT

Certification of carbon removals: a first step towards an EU market mechanism for negative emissions

April 2021

Context

The European Commission's scenarios show that the EU will have to rely on a substantial amount of carbon removals to reach climate neutrality by 2050, and achieve net-negative emissions thereafter. This is why the Commission is now designing an EU-wide carbon removal certification mechanism covering both nature-based and technological solutions. Removal of atmospheric or biogenic CO2 requires a GHG methodology and a regulatory framework that is formally separated from that used for emissions reduction measures supporting capture, use and storage of point source CO2. This is an important first step towards providing adequate mandates and incentives for the much-needed market take-up of carbon removal solutions. We are hoping that contributions from our speakers can support the Commission in the challenge of developing regulation that will enable the EU to take a global leadership in carbon removal.

You can access all the presentations on our website www.negative-emissions.org

Introduction and definition of carbon removal

Anna Dubowik, Secretary General, Negative Emissions Platform

Ms. Dubowik introduced the panel and presented the definition of carbon removal as a starting point for the discussion about certification framework.

"The separation between removals and emission reductions should apply at all levels starting with carbon accounting methodologies through national and corporate target setting, down to carbon pricing and trading, and financial incentives for novel technologies."

Following the definition provided by Tanzer and Ramirez (2019), carbon removals can be qualified as such only if CO2 is physically removed from the atmosphere to be stored in a manner intended to be permanent, with all downstream and upstream emissions duly estimated and leading to a negative balance. This simple definition allows us to categorise DACS, BECCS, mineralisation in long-lived materials or biochar as carbon removal solutions, and CCS on fossil point sources or use of atmospheric or fossil CO2 in fuels and other short-lived materials as cases falling outside of the scope of removal.

Delivering the EU's ambition to become net-negative after 2050

Fabien Ramos, Policy Officer, DG Climate, European Commission

Mr. Ramos stressed that carbon removals will be indispensable to compensate for around 400 - 500 MtC02eq/year of residual emissions by 2050 and listed a number of policies in place that can support their deployment such as the Climate Law with the goal of carbon negativity after 2050, the upcoming revisions of the EU ETS directive and the LULUCF and Effort Sharing regulations, the Carbon Farming initiative or the recent calls of the Innovation Fund.

"The scheme we want to put in place should last. We don't want to realise in 5-10 years that it is not fit for purpose. We have to put in place a framework that can limit uncertainty. It is very important to developers and investors."

In addition to that the Carbon Removal Certification Mechanism is a completely new initiative to support development and deployment at scale of nature-based and engineered solutions with a specific focus on ensuring a robust supply side. The Commission believes that demand for carbon removals is already there and it would not be a problem to use the certificates when they are ready.

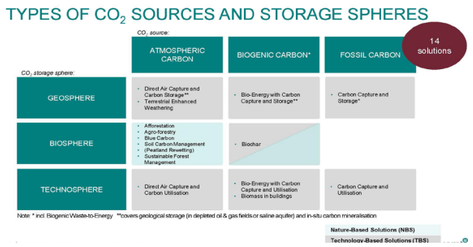
The challenge is to provide robust certificates with a common standard that will allow trading of carbon removals across Member States. That is why the Commission's focus is not that much on the speed of finalising the project, but on ensuring robustness of monitoring and accounting system, including aspects of emissions leakage or permanence of physical storage.

Mr. Ramos concluded by saying that the technology and economics behind the carbon removal solutions were constantly evolving, and very likely in a couple of years the solutions that were successful today would be accompanied by new methods ready to be integrated into the certification scheme.

Carbon Removal Certification Mechanism - the devil is in the details

Christian Heller, Austrian Environmental Agency (UBA)

Carbon Removal Certification Mechanism (CRC-M) is an 18-month-long project launched by DG Climate in the framework of the Circular Economy Action Plan, with the end goal to propose design options for certification mechanism and to launch a pilot mechanism by 2023. The UBA is working in a consortium with Ecologic Institute, Carbon Counts and Ramboll.



Mr. Heller explained that the background for this work are the scenarios of 'Clean Planet for All' Communication which show that the gap to reaching net-zero with residual emissions from agriculture, some heavy-duty transport, and industrial processes will need to be closed by nature-based and technological carbon removals.

The consortium is running now a stocktaking exercise by reviewing a number of existing certification mechanisms and assessing a range of carbon removal solutions and technologies. Heller clarified that they are looking at different CO2 sources - atmospheric, biogenic or fossil carbon - that is then stored in the geosphere, biosphere, or techno-sphere.

"If we look at system boundaries, for example at a certain point of time where carbon would have been released into the atmosphere from a point source in a fossil power plant, carbon capture and utilisation within that system could also qualify as carbon removal. It doesn't necessarily mean we will include it in that certification mechanism, but we will take it into consideration as something where the EU policy might need a closure of the gap."

The overall aim is to ensure consistent, high-quality removal and facilitate the uptake of various solutions. Mr. Heller concluded his presentation by listing a number of open-ended questions that the consortium is dealing with such as the solutions to be covered and system boundaries, the eligible participants, the co-benefits and relative weak points of various solutions and how to weigh them against one another, the mechanism's regulating bodies or the question of reliance on public and /or partly private procurement.The public will see first results of this work in early 2022 which will then feed into the political process on the Commission's side.

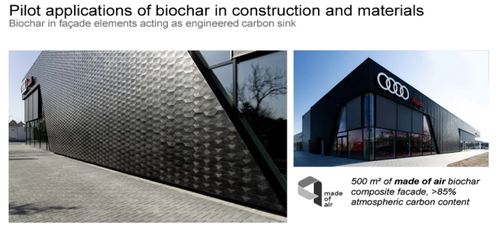
Biochar, its role as a negative emissions technology and growth potential

European Biochar Industry consortium, Hansjörg Lerchenmüller, Chairman of the Board

Biochar is carbonised biomass obtained by pyrolysis and a highly carbon-binding solution with carbon content of up to 90%. It is easy to produce, harmless to the environment, easy to transport and has wide a range of applications. Production of biochar itself offers the added value of generating heat and electricity with negative emissions. Biochar science shows enormous dynamics, 80% of all research on the topic has been published in the last 5 years and so referring to most recent studies is key to understand the sector.

"According to calculations of the European Biochar Industry Consortium at least 30% of carbon removals required by 2050 - or 225 of 850 Mt CO2 eq/year, could be delivered by biochar, and the industry has the capacity to deliver these volumes."

The biochar market has grown substantially between 2018 and 2020, with global production capacity doubling during that time. In agriculture biochar offers important co-benefits when used as a feed additive, a fertiliser enhancing plants growth, and a quality-enhancing component of compost.



Other successful projects around the globe also demonstrate a variety of biochar applications in construction and production of materials such as asphalt or elements of buildings.

Financing and bringing trust into carbon sinks

Dr. Hannes Junginger, CEO Carbonfuture

Carbonfuture runs a platform to document biochar production processes that lead to carbon sinks to enable financing of these activities. In comparison to other carbon removal technologies biochar is a market-ready 'no-regret' solution - available and scalable today, on top of being persistent and easily measurable. Biochar has been endorsed by the IPCC and the science community and benefits from an advanced voluntary industry standard (the European Biochar Certficate).

"We enable financing of carbon removal activities by putting it on a rock solid accounting framework, this is key to scale these activities."

In order to provide the highest level of trust to buyers, Carbonfuture has developed a blockchain-based tracking system for biochar applications.

To further develop a certification market for biochar, Carbonfuture recommends to incentivise individual sink creators, such as farmers, with direct remuneration, as well as to promote biochar as a modular solution using local biomass sources.

Carbonfuture also advocates for the separation of removals from emission reductions in targets setting and for differentiation between removal by soil organic carbon which is reversible, and by biochar which is a permanent carbon removal solution.

Project Carbdown: demonstrating enhanced weathering on farmland

Dirk Paessler, Founder and CEO Carbon Drawdown Initiative

Dirk Paessler presented his Carbon Drawdown Initiative GmbH which is investing in direct air capture company Climeworks, in the CO2 storage firm 44.01, as well as in enhanced weathering technology through the start-up Project Vesta. The company is also developing its own mineral-based carbon removal project called Carbdown.

Enhanced weathering speeds up the Earth's natural CO2 control system, which would normally take place over centuries through the process of basalt rocks reacting with atmospheric CO2 to create stable carbonates. To accelerate this natural process, the developers of Carbdown apply the mixes of ground basalt and olivine into top soil to tests and measure CO2 capture rates.

Carbon Drawdown Initiative

What we do

1. Invest in Direct Air Capture (Climeworks) and Storage (44.01)
2. Invest in and enable development of mineral based capture (enhanced weathering), Projects: Carbdown and Vesta
3. Invest in science, policy and public awareness (co-founder NEP)

Activities are enabled by Paessler Family Foundation

Such tests are taking place both in-lab and in the field in two German and one Greek locations. Different combinations of basalt and olivine as well as biochar are being tested and the results are measured with sensors implanted in the soil to track the rates of capture in various conditions. First results are expected by fall 2021.

"We need the kind of policies that attract entrepreneurs into the area negative emission technologies."

From an investor's perspective, Mr. Paessler emphasises the need for adequate R&D funds to attract more entrepreneurs into the field of carbon removal, noting that while many innovative projects benefit from great academic expertise, there is a persistent lack of funding for research and practical pilot demonstration for these types of activities.

DACS: a scalable solution for negative emissions

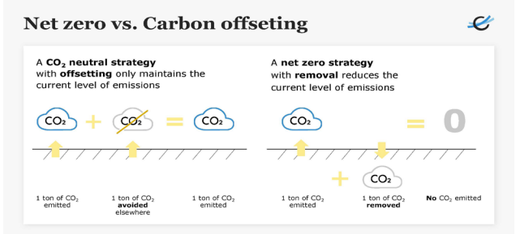
Christoph Beuttler, Head of Climate Policy, Climeworks

Climeworks currently has 15 small-scale direct air capture, or DAC, plants in operation across Europe. Its largest plant Orca is being developed in Iceland using CarbFix's subsurface mineralisation process as the safest and most permanent storage option. When completed Orca will have a CO2 capture capacity of 400,000 tonnes/year.

Still, to get to the gigatonne scale by 2030 in line with the IPCC pathways, Climeworks and other carbon removal developers would need to increase this capacity exponentially.

"The challenge is to achieve volumes needed in time, to scale and bring the costs down."

It is expected that the cost of DAC will decrease with economies of scale, whilst costs of mitigation and biomass based removal will be rising in the long run due to increased demand for removals as we approach 2050. Scaling DAC technologies well before that would help in managing that problem.

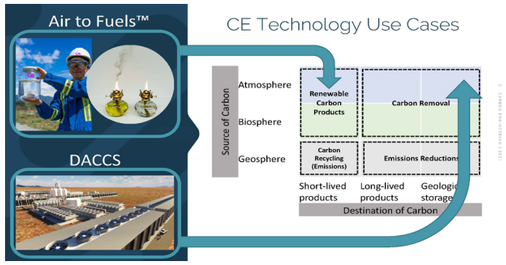


Lack of consistent demand is the main problem as high-quality high-value permanent carbon removal credits still are a niche market. Like other presenters, Mr. Beuttler advocates for separation of removals and emission reductions targets and introduction of tailored policies, such as Contracts for Difference, public procurement and dedicated R&D&I support such as a separate track for carbon removal technologies in the EU Innovation Fund.

Direct air capture developments in the US and Canada

Geoff Holmes, Business Development, Carbon Engineering

Carbon Engineering works on direct air capture for fuel synthesis combining CO2 and renewable hydrogen, as well as geological sequestration, in a joint venture with Occidental Petroleum. The plant developed by the joint venture will become operational in 2024-25 and will be able to capture 1 million tonnes of CO2 per year, the equivalent of 50,000 cars or 40 million trees.



In the USA, DAC facilities can benefit from various revenue streams such as Low Carbon Fuel Standard (LCFS) credits from the California Air Resources Board (CARB) worth around 200$/t which can be topped up with around 50$/t of a tax credit from the US federal government. In Canada credits of 250 Canadian dollars per tonne are in design and there has been a recent announcement by the government regarding the design of an investment tax credit for DAC.

These current developments could eventually enable a multi-hundred dollars per tonne price from regulated markets in North America. This has resulted in a proliferation of point source projects and direct air capture projects in the region.

"One way to do things is to 'pre-pay' to grow a CDR industry available at our fingertips as we really start to need it when we are going up more challenging parts of the abatement curve."

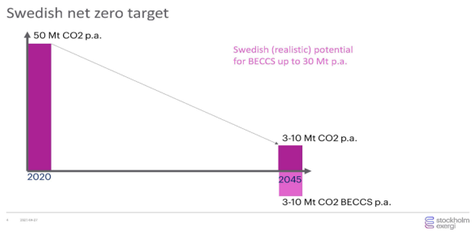
Carbon Engineering recommends direct inclusion of DAC in high-value markets such as fuels for transportation, as well as in lower-value markets through contracts for difference (CfD).

CTBO, public procurement policy instruments and certification are other categories of solutions which Carbon Engineering advocates for.

Bioenergy with carbon capture and storage (BECCS)

Fabian Levihn, Head of R&D, Stockholm Exergi

The Swedish government's inquiry into how to reach net-zero by 2045 estimated the country's remaining emissions at 10 megatons. There is a potential for up to 30 megatons of carbon to be removed at that date by using Bio-CCS in already existing point sources, which would at the same time make the best out of Sweden's big bioenergy sector.



Stockholm Exergi is developing a unit for large scale BECCS to be launched by 2025, based on a governmental enquiry that came to the conclusion that Sweden will need 3 to 5 such projects by 2030 to make its decarbonisation pathway viable.

This could be financed through reversed auctioning for CO2 removal enabling for 1,8 Mt CO2 to be removed each year by 2030, while reducing the cost to get the project started and incentivising the market for negative emissions.

"The right way of using biomass is to remove carbon from the atmosphere to store it underground."

Mr. Levihn made the point that while there were many ways of harvesting biomass, some of which were bad for the climate, using residues from some sources offered many benefits. In that framework biochar and BioCCS are complementary, as they are adapted to different sources of biomass.

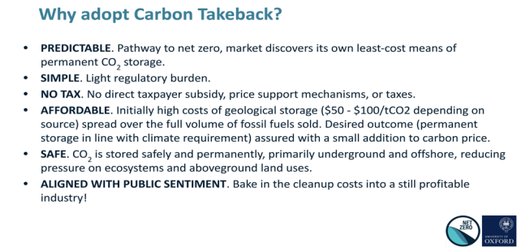
Introducing the Carbon Take-back Obligation (CTBO)

Eli Mitchell-Larson, Oxford NetZero Initiative

All scenarios to achieve the goals of the Paris Agreement include the scale-up of permanent storage. In a reverse viewpoint, the carbon take-back obligation asks: what percentage of carbon that we extract are we storing?

Applying CTBO in climate policy would require all fossil fuels suppliers to store a rising fraction of the CO2 contained in their products increasing to 100% by 2050.

Compliance with the Paris agreement would require the storage of 10% of extracted CO2 by 2030 and 50% by 2040.



That stored fraction would be imposed on both extractors and importers or suppliers of fossil fuels. A Carbon Storage Unit representing 1t/CO2 permanently stored could then be traded among the obliged entities. The outcome would be the early deployment of carbon storage solutions at an initially relatively low cost.

"In all the scenarios that meet Paris goals, one needs to be storing 10% of the carbon that we are extracting by 2030."

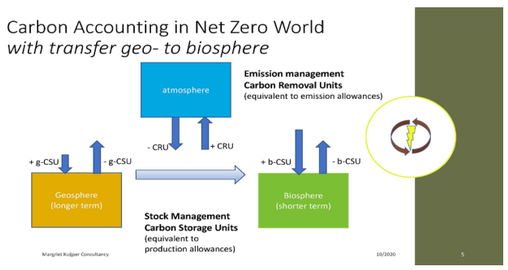
A projection of costs of permanents storage in that framework would see an increase from 100$/t of carbon today towards a long-term price lower than 250$/t. The stored fraction is relatively low in the early years, while the cost of compliance gradually approaches the cost of deploying DACs.

The cost of compliance with CTBO would be under 50$/t throughout the 2020s and mid-2030s, a very low additional carbon price which would have little impact on the economy, but ensuring that storage is happening and that the required technologies are deployed.

Responsibility Scheme on the Way to a Climate-Neutral Energy System

Margriet Kuijper, Margriet Kuijper Consultancy

The concept of a carbon take-back obligation, or CTBO, which Magriet Kuijper designed for the Dutch Government, would make it compulsory for oil and gas companies to directly or indirectly finance currently underdeveloped technologies allowing to permanently remove CO2 from the atmosphere. This system would be simple enough to garner public support and avoid industries gaming it.



CTBO would make it mandatory for an entity managing a carbon stock to store a tonne of carbon for each tonne of carbon extracted. Fossil fuel emitters would need Carbon Removal Units to offset their emissions, and producers of GHG would require Carbon Storage Units from biogenic or atmospheric carbon to meet their carbon take-back obligation.

"Today carbon accounting in the oil and gas industry is geared towards emission reduction and that is a very different way of thinking than thinking about Net Zero."

On the other side of the equation, DAC and storage, mineralisation, BECCS and possibly biochar would generate both storage units and removal units.

This system effectively combines carbon stock management and emissions management, but at the same time storage units would not be exchangeable for removal units under CTBO. In that context, the value of storage units is separate and additional to removal units.

With the carbon take-back obligation, removal units would effectively be emission allowances and storage units would be production allowances, while ideally only activities that allow for the sequestration of carbon for a very long time, more than 1000 years, would be allowed to generate storage units. The sale of storage units and removal units would only be allowed to entities with Paris-aligned net-zero targets, and which do not need to offset their own emissions. On the other side, purchase would be only allowed for hard to mitigate emissions.

Please refer to this report as: Negative Emissions Platform (2021). EVENT REPORT Certification of carbon removals: a first step towards an EU market mechanism for negative emission

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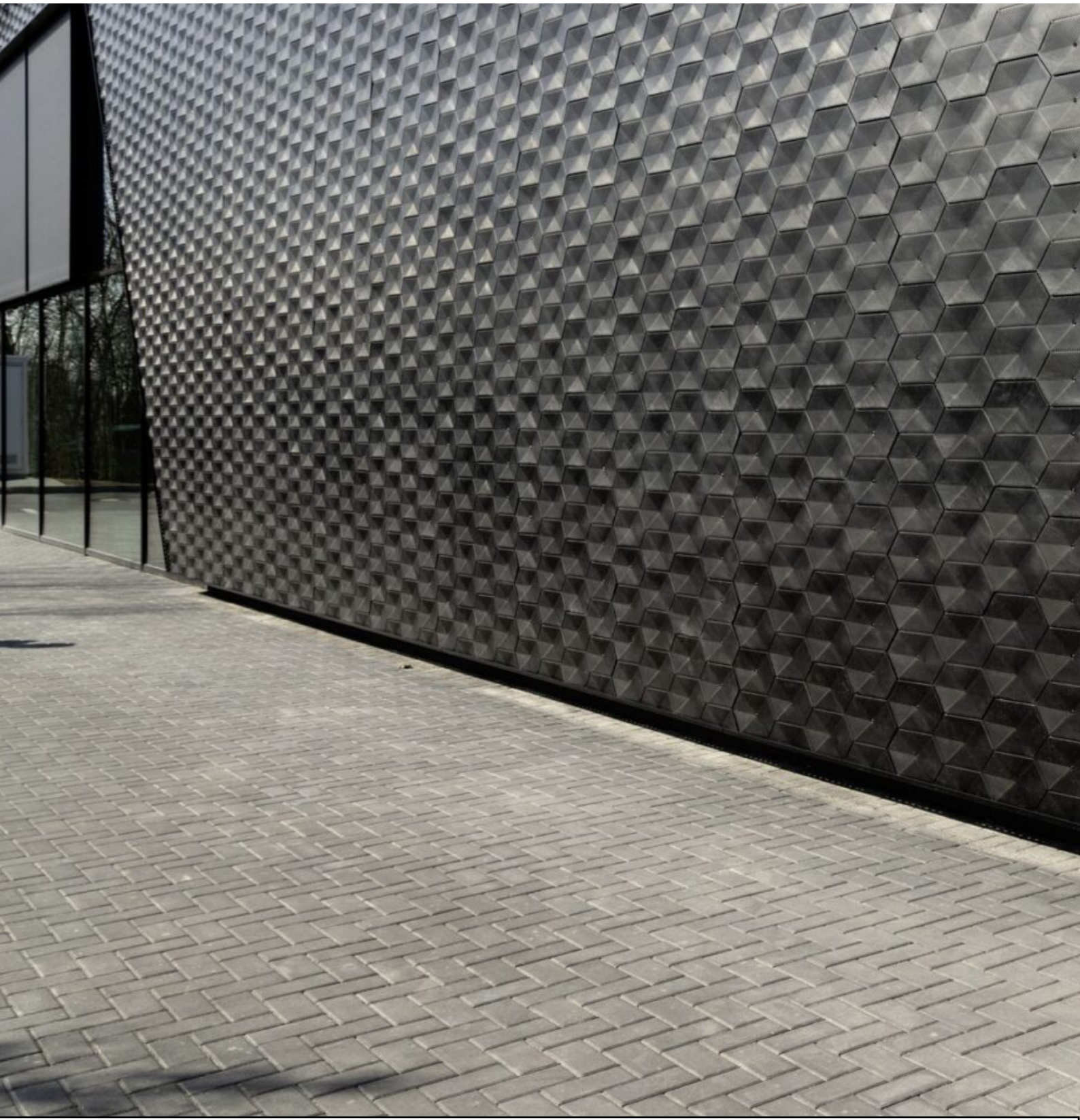

Supported by Breakthrough Energy and the Carbon Drawdown Initiative. Picture courtesy of Audi.