RBC BlueBay Asset Management

Carbon capture and storage

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Kilian Niemarkt
Client Portfolio Manager, Global Equity team

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We look at how the development of carbon capture technologies should benefit the energy industry – and the climate.

The transition to renewable energy solutions is underway...

Global energy-related CO_2 emissions grew by 0.9% in 2022, reaching a new all-time high of over 36.8 gigatons[1], according to the International Energy Agency (IEA). It is not surprising, therefore, that the most recent UN Intergovernmental Panel on Climate Change (IPCC) Synthesis Report 2023, highlights that CO_2 emissions need to nearly halve if we are to limit global warming to 1.5 degrees above pre-industrial levels, by the end of the century. With fossil fuels accounting for over half of global greenhouse gas emissions, there is an urgent need to accelerate the transition to renewable energy solutions.

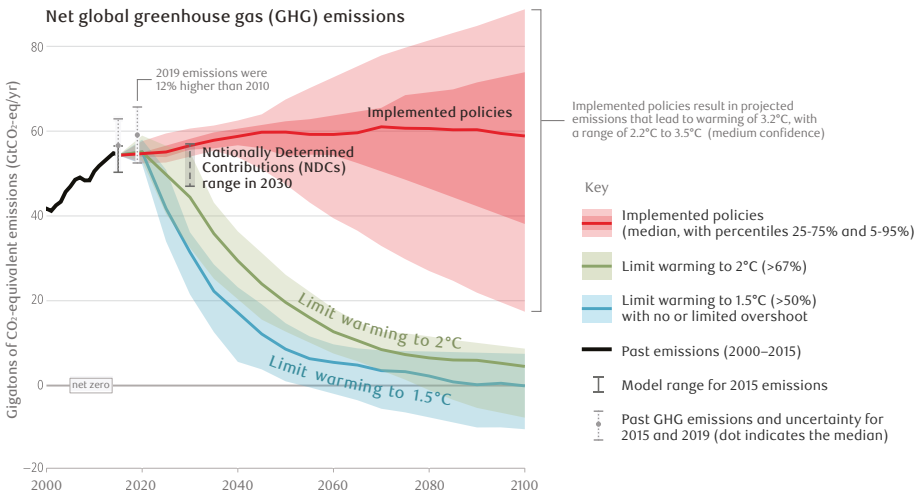
However, even then, renewable energy may not be sufficient by itself to reduce global net emissions to zero by 2050. As the IPCC has made clear, carbon dioxide removal technologies will be crucial in reaching this target.

> "With fossil fuels accounting for over half of global greenhouse gas emissions, there is an urgent need to accelerate the transition to renewable energy solutions."

...and CCS forms part of the solution

Carbon Capture & Storage (CCS) technologies – where CO_2 emissions from industrial processes are captured and sequestered underground in geological formations – will form a crucial part of the solution. Indeed, IPCC's own 'Mitigation Pathways' model shows that such technologies will remove between 100-1,000 gigatons of CO_2 over the 21st century, en route to limiting global warming to 1.5 degrees.

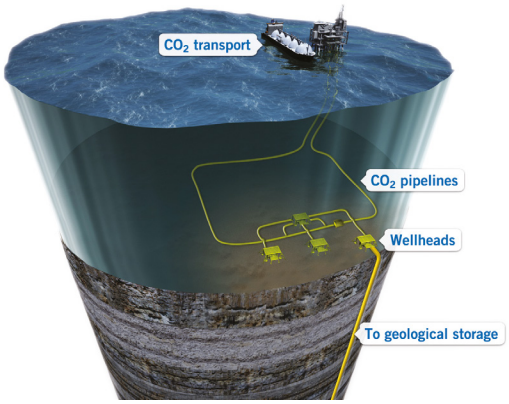
Chart 1: Pathway until 2100



Source: UN Intergovernmental Panel on Climate Change, March 2023.

[1] CO_2 Emissions in 2022 – Analysis - IEA.

Chart 2: Carbon Capture & Storage



Source: Global CCS Institute.

Given the evident importance of this method of managing emissions, many of our recent engagement activities have centered around this promising technology.

In practice, CCS comprises capturing CO_2 directly at the emission source, for instance at a power plant, refinery or an industrial facility, and compressing it into a liquid state, which allows for its transportation via pipeline or ship to an injection facility, where it is permanently stored in deep geological formations, such as depleted oil and gas reservoirs.

Encouragingly, the amount of geological storage capacity that has been identified as being technically suitable exceeds that required to limit global warming to 1.5 degrees by 2100, with the Norwegian continental shelf particularly well-positioned. The Norwegian Petroleum Directorate has mapped a potential storage capacity of more than 80 billion tonnes of CO_2[2], equivalent to the current level of Norwegian emissions for 1,000 years, providing Norway with the potential to become a focal point for carbon storage for the broader European region.

Northern Lights: innovating for the future

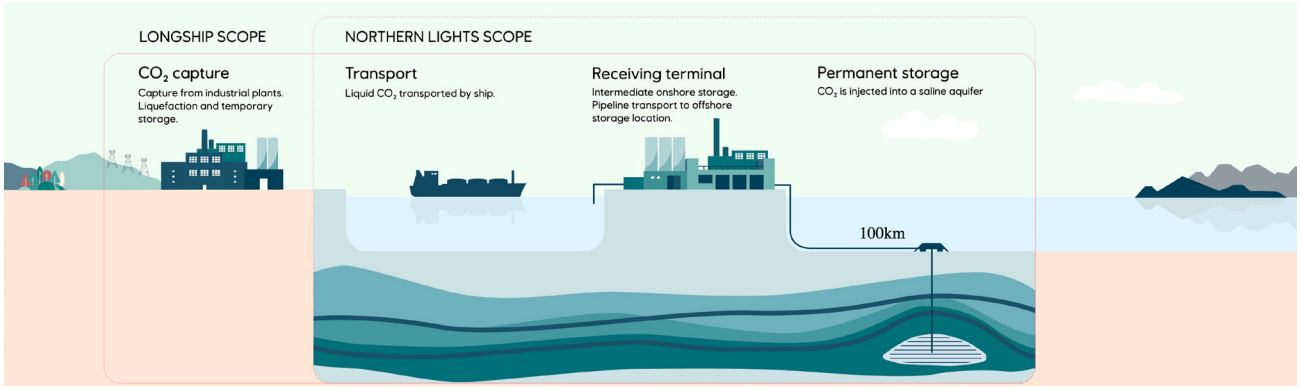
Equinor is one of Europe's largest energy companies and is ideally situated to play an important role in the development of CCS technologies. The company has the geological knowledge necessary to successfully manage the sequestration, and importantly, already has regional infrastructure in place. Equinor already has ambitious plans to dedicate 50% of its capital expenditure towards renewables and low carbon solutions, and to become a net zero company by 2050. CCS plays a crucial role in achieving these targets, with the company aiming to develop capacity to transport and store 15-30 mega tonnes of CO_2 per year, by 2035.

The first step towards achieving this target is the 'Northern Lights' project, the world's first cross border transport and storage network[3], of which Equinor is a key investor. This project involves transporting the CO_2 captured from industrial plants by ship to Øygarden, a municipality in Western Norway, pumping it via a pipeline to a structure on the seabed, and finally injecting it into a geological formation around 2,500 metres below the North Sea seabed for permanent storage.

The network will be fully operational by 2024, with the project winning its first commercial CCS agreement – Norwegian fertiliser business, Yara, has bought capacity to permanently store CO_2 produced by its Netherlands-based factories.

Beyond the Northern Lights project, Equinor has also made a number of other CCS investments. In December 2022, SSE Thermal and Equinor announced that the first U.K.-based CCS project has received planning permission for a carbon capture-enabled power station in the Humber, one of the U.K.'s largest emission sites. In addition, Equinor is working in collaboration with U.S. Steel to explore the option of developing CCS and hydrogen plants in Ohio and West Virginia.

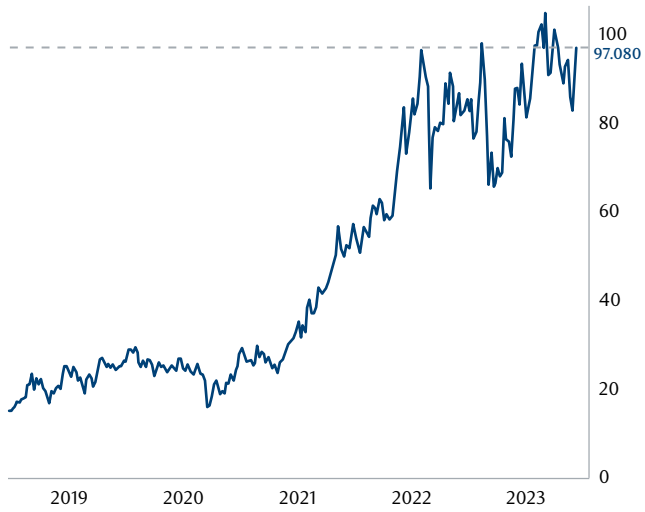
Chart 3: Northern Lights project



Source: Equinor, 2022.

[2] Carbon storage - The Norwegian Petroleum Directorate (npd.no).
[3] Northern Lights – CCUS around the world – Analysis - IEA.

Chart 4: EU carbon permits price evolution



Source: Trading Economics, as at 23 March 2023.

A world of possibility

These projects, and especially the Northern Lights project, will be a significant step towards the validation and application of CCS technology at scale. However, the development of a sustainable CCS market needs more than this; it needs a business case.

Europe is well-positioned in this regard already, having in place tradeable EU carbon permits which create a very visible price signal. This price reached an all-time high in late February, surpassing EUR105 per tonne. Carbon intense industries, such as cement or steel, will be particularly incentivised by the high price of carbon permits to consider potentially cheaper CCS solutions and so achieve both a positive financial and environmental outcome.

> **"Equinor already has ambitious plans to dedicate 50% of its capital expenditure towards renewables and low carbon solutions."**

In contrast, the absence of a single market price for carbon in the U.S. has arguably inhibited the development of the business case for carbon capture in that market. However, the passing of the Inflation Reduction Act (IRA) last year and the adjustment of Section 45Q of the U.S. internal revenue code, which provides tax credit for carbon dioxide sequestration, has created a lot of interest. The IRA has significantly increased the tax credit from carbon storage to USD85 per tonne of CO_2. Although not a carbon marketplace in the same way that the EU scheme is, the Act for the first time puts a price on carbon and creates the possibility that new CCS business models can be developed.

Two methods, one goal

This is attracting a lot of interest from traditional energy companies, such as EOG Resources. The company already has ambitions to become the lowest emission producer of natural gas and crude oil, and to reach net zero by 2040 – 10 years ahead of the Paris target.

EOG has made very encouraging progress in its reduction efforts, reporting a 50% reduction in methane emissions and a 72% reduction in emissions from pneumatics since 2019 , with an aim to pilot its first CCS project in 2023. This project will form a key part of our engagement activities throughout the second half of the year, and it is particularly interesting to note and compare EOG's approach to CCS with that of Equinor:

- **Equinor** enjoys a dominant position on the Norwegian continental shelf with scale infrastructure on hand. It is consequently perhaps not surprising that it considers CCS to also be a scale solution, envisaging that existing pipelines may be re-purposed to move captured carbon dioxide from Europe's industrial heartland (which grew up around the legacy coal fields of the Ruhr during the industrial revolution) and to be sequestered deep underneath the North Sea.

- In contrast, **EOG** sees CCS technology being applied in a 'fee for service' model, where high carbon emitters will be able to access the value of the tax credit, by employing firms to implement specific carbon capture projects suited to a particular emitting site, such as a cement or fertiliser plant. This provides a local solution to the specific needs of the customer.

Both approaches take advantage of the synergies between CCS technology and the exploitation of fossil fuels in terms of geology, fluid technology and project management. However, the visions behind the development of CCS are strikingly different.

There are regional differences to how value is attributed to carbon storage, with geography and geology playing a major role, so at the moment it seems quite possible that both the large-scale 'systems' approach envisaged by Equinor, and the more targeted specific solutions discussed by EOG, may be successful.

[4] Sustainability – EOG Resources, Inc.

Positive change through engagement

As investors, we are encouraged that such companies are actively pursuing the opportunity CCS presents but also appreciate that in these early days of the industry's development, the exact profile of competitive advantage has yet to become apparent.

From an investment point of view, therefore, we believe in considering more than one approach and we will continue to encourage and actively engage with both companies on this development, which is important for the industry and, hopefully, for the climate.

Seeking out companies with winning business models is how we seek to add value. Ultimately, investing in these great businesses should generate long-term value for shareholders that significantly exceeds the return on the average company or the market.

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