COMMON MYTHS ABOUT CARBON CAPTURE AND STORAGE

Carbon capture and storage (CCS) projects and technologies are poised to play a very critical part in the energy transition to more sustainable living. It's essential that the momentum for these projects increases if we have any chance of meeting net-zero targets by 2050.

6 MINUTE READ

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As energy demands continue to rise globally and as threats of climate change become more real every day, carbon reduction has never been more critical. However, there is still considerable resistance to CCS for various reasons. There have been long-held myths and beliefs that it's too expensive, it just doesn't work and so on. At RPS, however, we are currently receiving several enquiries from clients for support in this area, more than ever before. So, where do the facts lie, and how effective can CCS be in mitigating the worst effects of climate change? We'd like to explore this by first tackling a few of the more common myths surrounding CCS.

Myth 1: CCS is not economically feasible

One reason this myth of economic unfeasibility continues to persist is the (relatively) recent financial conditions of most countries that were championing it. In 2008-09, CCS was poised for a major expansion. However, given the emerging global financial crisis, less than 30% of funding allocated towards these projects actually went ahead. The political and economic will to pursue ventures of this kind simply didn't exist at the time, and the momentum stalled.

To dismiss a CCS project out of hand for being economically unviable could be considered irresponsible without delving deeper into where those costs really lie. The **IEA suggests** that if we don't retrofit power and industrial manufacturing plants

to capture CO_2, some of these industries may well continue to emit **over 8 billion tonnes of it by 2050**. So let's talk facts.

CCS projects do not have a single heavy fixed price tag across all industries. Let's look at the capture stage first. The global power-generating industries are amongst the highest CO_2 emitters in the world. The fact remains that we will need the levels of energy they produce for many years to come. In comparison, manufacturing sectors such as chemicals, steel and cement produce less CO_2. For example, cement production accounts for between 5% and 7% of global CO_2 emissions per year. But these industries also have very little in terms of an alternative, cheaper way to reduce their emissions other than CCS, a fact that **the International Energy Agency (IEA) has acknowledged**.

Looking at the transport, storage or sequestration stages, there are more cost differences. Each country or region has its own specific set of permitting and consent requirements for the storage and transport of carbon. What that creates is a difference in complexity for each of these regions. The level of complexity can contribute to very different cost modelling for onshore or offshore pipeline transport or subsurface sequestration. At RPS, **we have experience** and have assisted developers in negotiating these unique processes, working directly with our clients and regulators to ensure a successful permitting or consenting outcome.

It's also important to point out that CCS costs are falling in sectors **like power generation in the United States**. We're seeing more interest in producing low-carbon hydrogen through CCS projects. There has also been an increased investment in CCS projects and legislative approvals from governments across 25 countries, to the tune of over $25 billion since the start of this decade.

We are definitely seeing a renewed confidence in CCS investment that we believe is here to stay.

Norcem Carbon Capture and Storage project

The cement industry accounts for 5-7% of global CO_2 emissions annually. Granted Government funding in 2020, Norcem will build a full-scale carbon capture and storage facility at their factory in Brevik. The aim of this project will be to reduce emissions by 400.000 tonnes of CO_2 every year, accounting for almost 1% of the total emissions in Norway.

Read the case study

Myth 2: We've tried CCS before and it just doesn't work

One of the reasons this myth has kept perpetuating is a lack of understanding of the history and background of CCS. Also, some very public setbacks in popular CCS projects have likely led to increased scepticism. Let's address both of these issues independently.

The history of CCS

In 1972, several natural gas processing plants in Texas began carbon capture to supply CO_2 for Enhanced Oil Recovery (EOR) operations. Since then, over 200 million tonnes of CO_2 have been captured and successfully stored underground. Looking towards Europe, in the early 1990s, Norway instituted a tax on CO_2 emissions that prompted its largest oil company Statoil (Equinor today), to begin capture operations for its Sleipner oil and gas field in the North Sea.

Related Read: **Sleipner West Carbon Capture and Storage 4D Seismic Monitoring by RPS**

As the first commercial example of CO_2 storage in a deep saline aquifer, the success of the Sleipner project generated much interest from around the world, leading to a further rise in CCS technology and applications. Today, CCS projects are operating or in development in over 25 countries. **Europe and the United States currently lead the field** with two-thirds of all projects. A CCS strategy is also under development in Canada, which will be complemented by actions taken at the provincial level. In 2021, **more CCS projects were announced** than at any other time in its history. From 75 million tonnes a year (MTPA) at the end of 2020, the capacity of projects in development grew to 111 MTPA in September 2021.

At RPS, we are currently active in supporting several projects across the CCS value chain. Some examples of these include:

- a pre-FEED feasibility study we're conducting in Ireland
- planning and permitting services delivered in UK and
- baseline seismic acquisition for two dedicated saline aquifer stores in the UK and Norway, respectively.
- perspective storage resources report in the US
- red-flag analysis of CCS project in the North Sea
- injectivity modelling project for a UK depleted field

The setbacks from the Gorgon project

One of the more famous case studies of perceived failures of CCS projects is **the Gorgon project** in Australia, a flagship scheme conducted by Chevron at the liquified natural gas field of the same name. It received some heavy criticism and potential fines for failing to meet emissions targets of at least 80% over the first five years, and Chevron is currently working with regulators to make up the shortfall.

Not everything that occurred in this project has been a failure. Despite these challenges, this project has secured over 6 million tonnes of CO_2 sequestration since injection started in 2019. Furthermore, the lessons learnt regarding injection well drilling and completion design will inform and influence better production methods in future CCS projects.

In a **recent article** Kory Judd, Chevron Australia's director of operation, told Reuters, "What we're doing is trying to learn our way through how you inject CO_2 into the reservoirs, how do they respond, then how do you do that reliably and how do you do that and get to the point to meeting the commitments that you've got.

"Despite the setbacks of the Gorgon project, Chevron is continuing to invest in CCS, **recently announcing the launch of a CCS project** at their Kern River Eastridge cogeneration plant in Kern County, in the San Joaquin Valley, California. From the press release Chris Powers, vice president of Carbon Capture, Utilization, and Storage (CCUS) for Chevron New Energies, stated, "At Chevron, we believe the future of energy is lower carbon. Reducing the carbon intensity of the energy people rely on day-in and day-out is well-aligned with the ambitions of the Paris Agreement".

CCS is a technology that has been tested and does work for several decades. The technological spikes that we can come to expect from newer capture models like direct air capture will also become more viable as we progress towards 2050.

Myth 3: With renewable energy on the rise, we don't need to invest in CCS anymore

We are unquestionably using more renewable energy than ever before. Moving further away from coal, power plants over the last two decades have also undoubtedly helped to reduce our carbon emissions. However, reducing greenhouse gas emissions (GGEs) to net-zero levels by 2050 cannot be accomplished without tackling CO_2 emissions from the power (fossil fuels) and manufacturing industries. Therefore, investing in carbon capture technology has a vital part to play here and cannot be ignored.

As the saying goes, we can also walk and chew gum at the same time. Investing in CCS can happen alongside other measures we can take for carbon net neutrality, such as investing in hydrogen. Creating a hydrogen economy can help store energy long-term,

covering the inevitable lulls we may expect from wind or solar generation. Low carbon hydrogen can either be produced by using renewable electricity and electrolysis to split the H atom from H_2O (water) to create what is known as green hydrogen. Or you could produce it from natural gas and capture the CO_2 by-product (blue hydrogen). Green hydrogen is unfortunately not yet at an economically viable position for some countries but until it is, focussing on blue hydrogen is a road forward.

RPS' expertise in **environmental risk mitigation**, **water** and **project management**, and **CO_2 subsurface storage evaluation** renders us well placed to support this growing effort for further decarbonisation.

As we move towards net zero carbon targets, we're going to need every tool in our toolbelt to mitigate the worst effects of climate change. Capturing carbon safely, storing or sequestering it and implementing a robust and measured utilisation process for it later is a potent weapon we should be investing in. CCS technology is available now, can demonstrably be improved and should therefore not be excluded from conversations about the energy transition and net zero emissions targets. Doing nothing is a step we can ill afford to take.