

Focusing on decarbonisation

Effective use of carbon capture technology will ensure that the world's harmful emissions are minimised, transforming the global economy and the ways we approach the issue of climate change



INTERVIEW WITH
Aniruddha Sharma
CO-FOUNDER AND CEO,
CARBON CLEAN SOLUTIONS

Just over six years ago, the idea to launch Carbon Clean Solutions (CCSL) was conceived by Aniruddha Sharma and Prateek Bumb in their university dormitory in Delhi. In the years since, the company's patented technology – which is capable of capturing up to 90 percent of industrial carbon dioxide emissions – is already at work in five large-scale plants across the world. The firm's growth has been partially propelled by partnerships with leading world institutions and research bodies, including the US Department of Energy, Imperial College London and TNO, the Dutch Organisation for Applied Scientific Research.

"It is a source of satisfaction that our technology has been so well received in such a relatively short space of time", Sharma told *World Finance*. "It sounds quite grand when I think back to our university days, but we genuinely believed that our ideas could make a difference and help the world tackle the challenge of climate change. It's great to see that our efforts are having an impact, because fossil fuels will continue to play a pivotal role in helping the world meet its energy needs. It means that an effective, commercially scalable carbon capture for re-use solution is more necessary now than it ever has been."

Industry-wide changes

Acknowledgement that CCSL's breakthrough technology has the potential to change the way that carbon capture and storage (CCS) is viewed recently came from the World Economic Forum, which recognised the group as a Technology Pioneer for 2015. "We are immensely proud to have been included on such a prestigious list", Sharma said of the recognition. "It shows that the work we are doing is having an impact and really has the power to make a difference to the way we decarbonise the world's energy."

"Our technology can drive down the operating expenses of power plants by as much as 30 percent, while capital expenditure can be as much as 20 per cent lower when compared to

existing technologies. The lower corrosiveness of our proprietary chemical and the operating cost reduction that this allows leads to a payback period of less than one year for existing CO₂ capture plants in the oil and gas industry, once retrofitted with our technology – the shortest amortisation timeframe in this industry."

In addition to the five plants that CCSL's technology is currently installed in, the firm recently announced that in November 2015, it also became operational at the world's largest CO₂ capture demonstration plant in Mongstad. This test is part of CCSL's plans to further develop its patented APBS chemical solvent, which can remove up to 50 percent more CO₂ with the same energy requirement when compared with existing carbon capture offerings. Results to date have shown that CCSL's technology has significantly improved energy efficiency and reduced solvent loss and degradation to a far higher degree than its competitors. "Our drop-in solvent technology has the potential to dramatically reduce high corrosion and high energy demand", said Sharma. "Having demonstrated the technology at the National Carbon Capture Centre in the US, we believe that this latest demonstration can bring the technology to commercial readiness, benefiting generations to come."

Global network

"The carbon capture industry has sometimes been accused of being long on promises and short on commercially relevant output", according to Sharma. "So we have put proof at the very heart of our offering – the numbers tell the story, and will continue to tell the story in the coming months."

Sharma points to proven tests at EON-TNO in the Netherlands, the Southern Company Services-run National Carbon Capture Centre in the US, PACT plant in the UK, and HZI plant in Germany. Furthermore, CCSL is currently building the world's largest CO₂ capture and re-use commercial project in India.

"As an organisation, we have benefited from working with great partner institutions, and this will continue to play a significant part in the way we develop the business going forward", said Sharma. Such partnerships have included



Carbon Clean Solutions aims to significantly reduce the amount of CO₂ emissions released by industrial plants

a close relationship with the UK's Department for Energy and Climate Change (DECC). Since 2012, this institution has provided CCSL with a total of £3.6m in financing. "We were recently awarded a second competitive funding grant from DECC on the basis of having developed a breakthrough CO₂ capture process, plus a solvent that will effectively capture CO₂ at \$10 per ton", said Sharma. "But we recognise that behind any industrial revolution, there's a financial industry: for the carbon capture industry to prosper, we need openness and creativity in financing large projects. The desire to decarbonise is there, but the support mechanisms are sometimes lacking."

The scale of the market opportunity in front of CCSL is best illustrated by the fact that an estimated 80 percent of the world's energy continues to come from fossil fuels, and fossil fuels will keep playing an important role for the foreseeable future, meaning the global CO₂ emissions are likely to continue rising if serious

changes are not made. Sharma noted, "In my home country of India, electricity demand will triple over coming decades. Over the next 25 years, electricity demand is forecast to grow over 4 percent a year. Even after adding 175gW of renewables by 2030, this will be 40 percent of the total demand."

"Under the International Energy Agency's 2°C scenario, two-thirds of the world's coal capacity, 20 percent of its gas and 20 to 40 percent of its steel, cement and chemical plants are to be equipped with carbon capture and storage by 2050. It is estimated that \$3.6trn will be required to achieve this target, by operationalising 2,000 to 3,000 projects. Carbon capture will play a critical role in helping the world meet its environmental challenges in the years and decades to come (see Fig. 1)."

Support from all sides

CCSL benefits from a high-quality advisory board, which includes James Cameron, Chairman of the UK's Overseas Development Institute and a member of the HM Treasury Infrastructure UK advisory council. "It is important to have passion for what you do. The investors who support us and the operational team we have assembled all share our desire and aim to make commercially viable carbon capture a reality", said Sharma. "The firm was founded upon three fundamental principles: breakthrough innovation, constant teamwork and carbon capture that makes business sense. These values remain critical to the business."

This approach is embodied in the creation of the Carbon Lab Programme, an ideas hub intended to promote a culture of driving new thought in order to improve the business. "The best ideas can sometimes emanate from the places you least expect", said Sharma. "The Lab Programme is a way for all of our staff – from the leaders of the firm to the junior employees and those connected to the organisation in any way – to feed in thoughts that will help to improve what we do. This will ultimately support our customers and drive the growth of our business."

A significant pipeline of growth opportunities exist in the traditional carbon capture market. CCSL plans to complement its offering in markets where CO₂ capture and reuse or sequestration is already operating; for example, in natural and biogas gas treatment industries in the US, Middle East, Germany and Sweden.

"The scale of the growth opportunity for carbon capture is huge", Sharma concluded. "The technology that we have developed is fundamental and has a huge range of applications in traditional industries as well as new ones, such as production of fuels, polymers, plastics and chemicals from CO₂."

"We also have plans to sell our solvent as a retrofit or drop-in replacement in existing amine solvent-based carbon capture plant fleets. It is an exciting prospect: further growing our business, and simultaneously helping the world to meet the dual challenges of decarbonisation and climate change." ■

