# Ascon pivots carbon capture to coal and steel plants

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Ascon Group, in a 7 June interview with McCloskey, said its proprietary carbon capture technology, originally developed to capture fugitive emissions from coal mines, can also be deployed for coal-fired power stations and steel plants.

Carbon capture and storage (CCS) technology has loomed sharply into focus in Australia, as reforms to the Safeguard Mechanism for regulating the country's 220 largest emitters take effect on 1 July.

From this date, business units including dozens of coal mines that emit more than 0.1 mt/y of greenhouse gases, will be subject to stricter emissions limits with financial penalties for exceeding these.

Certain key details of the reforms are still to be settled though, according to Australian coal producer Stanmore Resources, whose Poitrel and South Walker Creek mines are within the mechanism.

"Key elements of the Safeguard Mechanism are yet to be finalised, and the company continues to be involved in consultations with the government about the details as they affect our business," said Stanmore Resources Chairman, Dwi Suseno, in his address to the coal producer's annual meeting.

But Ascon's CCS offers some potential solution to the sector. Central to its technology is its Versatile Advanced Methods of Cleaning Offtake Gases (Vamco) platform for which a demonstration plant exists at the University of Newcastle in New South Wales.

"The technology was originally designed for fugitive methane gas emissions in underground coal mines and oil and gas infrastructure," said Ascon director, Nate Macmillan, who leads the company's decarbonisation and green innovation business from the United Kingdom.

"The carbon capture evolution allows a paradigm shift for 'blue' hydrogen value chains utilising fossil fuels for feedstock and/or power generation," he said.

Hamburg, Germany-based Ascon started off in oil trading nearly 40 years ago and has evolved into a broad-based commodities trading group with a range of bespoke emissions technology solutions.

"The working principle of the Ascon Vamco technology is incredibly simple, involving the cyclic reduction and oxidation of metallic oxide particles Fe203/Fe304 as a means of oxidising the methane content of ventilation air in underground mines," said Macmillan in an emailed response to McCloskey's questions.

Ascon's Vamco technology can be deployed to capture fugitive emissions including methane from coal mines, or to capture flue gas emissions depending on the type of reagent used.

For ventilated air methane (VAM) emissions from underground coal mines, the Vamco technology uses metal oxide as a reagent which converts the methane to carbon dioxide. In capturing emissions from flue gas streams, the Vamco technology uses lime as a reagent which has a strong affinity to CO2.

"The technology uses a metal oxide reagent and the evolution to carbon dioxide capture was achieved using a lime-based reagent, an element with an affinity to carbon dioxide," Macmillan said.

Economic analysis revealed the total capital investment for an Ascon Vamco unit is about A$985m (US$657.8m), about 14% less than that of an equivalent amine-based system with the same level of carbon capture, Macmillan stated. Amine is an organic compound derived from ammonia.

Ascon Group first showcased its emissions reduction technology, which is available to license, in a presentation to attendees at McCloskey's Southern African Coal Conference (https://www.opisnet.com/southern-african-coal-conference/) in Cape Town in May 2022.

## South African and Indonesian trials

Vamco technology is also being trialed at a steel plant in South Africa and several power plants in Indonesia where the company has projects at the pre-feasibility stage. Data from the projects will be fed into computer simulations to measure and model greenhouse gas emissions and to further refine the technology.

Ascon Vamco is more energy efficient and up to 60% less costly than amine-based processes, said Macmillan who joined Ascon in 2016 and studied climate change for his Masters degree.

"Under the ambit of the Australian Trailblazer for Recycling and Clean Energy (ATRaCE) program, the Australian government and Ascon have jointly funded an extensive research and development project at the University of Newcastle, Australia, to expand the Ascon VAMCO family of chemical looping processes for point source emissions to direct air capture (DAC) for fugitive methane gas at sites such as opencast mines," said Macmillan.

Captured carbon dioxide from the Vamco process can be monetised as food-grade CO2, or converted to a solid feedstock for industry, sequestered into underground mines or gas wells, or used for enhanced oil recovery, and synthesized into e-fuels such as ethanol or methanol.

"The fluid bed technology in Ascon Vamco can operate over a wide range of flow rates, carbon dioxide and methane concentrations," said Macmillan.

Additionally, Ascon has its Bioenergy with Carbon Capture and Storage technology (BECCS) project, that utilises Invasive Alien Plant Species (IAPS) or abundant sustainable biomass for conversion into biochar, which is then gasified to product island pathways for hydrogen, methanol and long-chain hydrocarbons such as sustainable aviation fuel.

"For example, in Indonesia we will use palm plantation residues," added London-based Macmillan.

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