

Carbon capture proven: research chief

Philip Hopkins

JAPAN'S \$2.35 billion commitment to the Latrobe Valley brown coal-to-hydrogen project is "huge", sequestering carbon dioxide under Bass Strait is safe and secure, and Exxon-Mobil's study into storing CO2 in this process can play a big role in Gippsland and Australia's energy future.

Those were some of the key messages made by the chief executive of the CO2CRC, Dr Matthias Raab, in an interview with the *Gippsland Times*.

Dr Raab, born in Germany, has an international research career spanning more than 25 years in academia, government, industry and the not-for-profit sectors.

The CO2CRC (Co-operative Research Centre), operating since 2003 and based in East Melbourne, is a world leader in carbon capture utilisation and storage (CCUS) research.

Dr Raab, who was speaking after the coal-to-hydrogen project's commitment last week to proceed to the commercial stage, was particularly scathing on claims that CCUS was "unproven".

"Storing CO2 underground has been done since the '70s. (It) has been proven for some time but not considered in the mainstream as such. There is unfortunately deliberate and sometimes stupid rhetoric cropping up and creating uncertainty," he said.

"We have been storing a lot of other gases underground for longer than CO2 - natural gas for 100 years. There are about 800 very large-scale natural gas storage facilities in the world, millions of cubic metres underground at Paris, Berlin, Los Angeles, densely populated areas," he said.

"In the context of energy security, no one is saying it is unproven. This is an important statement. I do not accept the term 'unproven' by anyone. It is simply wrong, and they have not done their homework, or are deliberately manipulating the debate on how we can get serious on emissions reduction - going deceitfully against genuine progress we can make as a society."

Storing gas underground was "well understood and well operated".

"It goes underground and it stays there," he said. "The gas is being stored in front of our eyes. We have long passed the point of even asking."

Dr Raab said the CO2CRC's activities ranged from blue sky research to demonstrations.

"We are the practitioners, we are doing it," he said. Proving CCUS was safe was important to gaining a social licence to operate.

"We have developed technologies that allow us to measure by metres the carbon in a deep subsurface, deeper than one kilometre. It goes into the pore space of sandstone; they can have up to 30 per cent of space in between the grains, it's

an enormous amount. That gives vast volumes of available potential storage space," he said.

Dr Raab said a key point was the need to have an impermeable cap rock on top of the sequestered CO2 to ensure it does not escape.

"That is certainly the case where we extract oil and gas, creating a depleted reservoir space. We know it held fluids and gas for millions of years," he said.

Dr Raab said CO2CRC had been working with the most credible research organisations in Australia and internationally: GeoScience Australia; CSIRO, the universities - Curtin, Monash, Melbourne, Queensland, Deakin; the Department of Energy laboratories in the US; the German geo-research centre; and national research bodies in Japan and Korea.

"They are all funded to attract the most credible research scientists," he said.

"Further evidence of our rigour and science credibility - we have published more than 400 journal review papers, educated more than 60PhDs; we have at any time 60-100 researchers on our books doing research on some aspect of the CCS value chain.

"We are not making big headlines, we are not a marketing and lobbying group; we do the science, people know us for the credibility of the work we do."

Dr Raab said the CRC had broken world records several times in detecting small amounts of CO2, "immaterial amounts of substance we can measure".

This did two things: to safeguard the environment and secondly, to provide guidelines for carbon accounting and crediting.

"Ultimately, we have to know how much carbon goes in the ground and does it stay there," he said.

"We just completed last year a \$50m project that lasted 10 years. It set completely new thresholds; we are at a point where we have the highest level of confidence and evidence that even very small quantities of CO2 can be safely monitored and accounted for, we know they stay there for millions of years."

In the very long-term - thousands, tens of thousands of years, the CO2 would solidify as carbonite minerals, but initially under pressure it would dissolve in water like a carbonated drink - "like mineral water, Coke, champagne, carbon dioxide makes it bubbly!"

"Understanding all these dynamics at an incredibly small scale gives us an enormous amount of confidence with geological carbon storage; we have a safe, permanent and immediate climate benefits," he said.

Dr Raab praised ExxonMobil's study into CCS in the Gippsland Basin as "very significant".

"Ultimately, every project needs experienced operators and Exxon Mobil, one of the most

experienced operators in the entire world, together with the other large oil and gas majors - they have highly competent people, an immaculate safety record and very high integrity standards in how they operate," he said.

The oil and gas industry were vital for emissions reduction.

"They are the ones who operate underground storage facilities," he said.

Some companies wanted to capture CO2 directly from the air capture.

"Great! But where do we put it? Direct air capture developers must partner with someone who can operate utilisation at scale or sequestration at even larger scale," he said.

Regarding Japan's \$2.3b investment from its Green Innovation Fund, "Japan clearly sees CCS and production of hydrogen from coal, if done responsibly, with an emissions reduction pathway, as a green technology".

A recent CSIRO study concluded that hydrogen from coal was still much cheaper than green hydrogen from renewables.

"That is still the case. We need to walk away from giving hydrogen colour codes. We need to look at two things - the cost, to get the hydrogen economy started; secondly, what is the actual emission footprint of the amount of hydrogen being produced," he said.

"It then makes sense if the production of hydrogen from coal or gas, if done properly with CCS, gives a low cost, low CO2 footprint of hydro, which will be far more efficient than not doing it; it will also kickstart a not yet existing hydrogen economy."

Dr Raab said green hydrogen was not just more expensive.

"We are putting it to the litmus test with our activities. We are operating the Otway international test centre; we are the practitioners," he said.

"Storage of hydrogen underground is part of our R&D portfolio. Hydrogen at large scale had only been handled by the NASA space program, which has the largest storage facility, 1000 tonnes of hydrogen. Australia and some companies talk about 15-18 million tonnes of hydrogen by the end of this decade. There is no way this can be put anywhere for export quantity."

Suggestions included co-locating at large mining companies, or in salt or engineered mine shafts.

The Otway underground hydro storage trial had over the past two years called for a supply of two tonnes of green hydrogen per day for at least for one year.

"No one - not a single kilogram is available for us, and not in the foreseeable years," he said.

"It will come, it has to come, but the investment by the Japanese to get going will probably get us faster at scale with many collateral benefits."

"Coal to hydrogen... it is the lowest carbon



CO2CRC chief executive Dr Matthias Raab.

Photo: Contributed

footprint to hydrogen at the lowest cost, it attains a highly skilled workforce in the onshore and offshore sectors, it provides a domestic and internationally much needed energy supply," Dr Raab said.

"Gasification technology has existed for a long time but building facilities where the global experience is more advanced. Coupled with CCS, in Victoria - one of the best regions in the world - we have the emissions sources onshore close to large-scale and proven offshore sinks or basins with only 50-200km of pipeline distance. This saves costs in terms of steel and pipeline."

Was it expensive to use energy to pump the CO2 to aquifers and then store it?

"The operators have done the economics; the CCS component only plays a minor part in the total cost of the facility full scale coal-to-hydro facility... the CCS component of pipe and pump, either Carbon Net or Exxon's offshore facility, is only 3-5 per cent of the cost - very low."

"The concerns are lower than one would think unless people do the numbers."

Dr Raab described Japan's announcement as "huge".

"It positions Australia with its energy resources, its basin resources, engineering... importantly, it puts a focus on Victoria for production, solutions, engineering, science, energy security with domestic and international uptake. It will provide hydro to Japan and to the Australian economy," he said.

AGL firm on waste extension and Loy Yang A closure

Phillip Hopkins

AGL, reaffirming the need to extend its ash landfill and leachate storage pond for up to 20 years, has emphasised its intention to close the Loy Yang A power station by 2035.

The public was given until today (Friday) to make a submission on AGL's bid to extend the ash landfill and leachate storage pond, which the company says is required because the waste landfill area is running out of room.

"The current landfill is utilised for the disposal of ash removed from the ash pond for both Loy Yang A and B. While AGL Loy Yang is scheduled to close by the end of 2035, Loy Yang B (owned by Alinta) is not scheduled to close until 2047," an AGL spokeswoman said.

About 500,000 cubic meters of ash per year is deposited in the ash landfill. This ash, which is the incombustible solid residue from the combustion of coal, is dried in purpose-built ash ponds and then placed in the dedicated ash landfill.

The ash landfill and associated leachate storage pond are now nearing capacity, says AGL, which has proposed the extension to meet future demand.

The proposed landfill extension is located within the same area as its current ash landfill. AGL wants six new landfill cells as part of the extension, which will provide a total of 9,730,000 cubic meters of landfill space.

"This is enough landfill space for a 19.4 year period," the company says.

Leachate is the liquid (rainfall etc.) that passes through the landfill and therefore may contain dissolved contaminants. The proposed leachate pond is proposed to be located alongside the existing leachate pond of the ash landfill. It will have a total capacity of 10,400 cubic metres of leachate.

An AGL spokeswoman said the company recently released its climate transition action plan that detailed the targeted closure of Loy Yang A power station by 2035. "This application does not indicate a change to this commitment. Progressing permitted processes are a standard part of operations," she said.

The volume has been designed to accommodate both AGL Loy Yang and Loy Yang B.

"The maximum allowed volume may not be Page 4 - Times-Spectator, Friday, 17 March, 2023



Ash disposal is needed at Loy Yang.

Photo: File

required if closure dates change," the spokeswoman said.

"The design in this application meets EPA's design criteria. AGL Loy Yang's experience and competency in performing ash landfilling, rehabilitation and aftercare management activities are considered and the ash landfill is subject to routine environmental monitoring and statutory environmental audits by an EPA-appointed auditor every two years."

The application, she said, also included the planned rehabilitation of the ash pond and was unrelated to the Japanese Hydrogen Energy Supply chain project, which last week announced it would proceed to a \$2.35 billion commercial stage.

Environment Victoria and lawyers from

Environmental Justice Australia said EPA Victoria should reject AGL's plan, which they alleged entailed expansion of toxic coal ash dumps.

Environmental Justice Australia lawyer Ally McAlpine said the new coal dumps would be six times the size of the MCG.

"If AGL is serious about closing Loy Yang A within 12 years, it shouldn't need a permit to dump coal ash for almost 20 years. Something doesn't add up. At the bare minimum, these coal ash dumps must be properly engineered, managed, and monitored to make sure these toxins don't seep into our waterways."

Environment Victoria policy and advocacy manager, Bronya Lipski, said the expansion of the Loy Yang ash dam made no sense, and was

inconsistent with the state government's target of achieving 95 per cent renewable energy by 2035, and emissions reduction targets of net zero by 2045.

A community perception study last year by Federation University for AGL made three key recommendations on rehabilitating Latrobe Valley mine sites.

It included taking into accounts costs, resources, impacts, feasibilities and timelines, with these options to be reviewed and recommended by a panel of independent qualified assessors. These recommendations should include concerns and the diversity of views, and then be presented to the community for public feedback.