

## **GAMECHANGING ZERO EMISSIONS TECHNOLOGY GETS GREEN LIGHT**

Low Emission Technology Australia (LETA) has committed to invest up to US\$5 million to test technology that would see power and hydrogen generated with near-zero to negative carbon emissions while producing feedstocks for other critical industries.

The Allam-Fetvedt (Allam) Cycle Syngas Combustor Project will design, build and test a technology that has the potential to produce electricity at a lower cost than conventional fossil fuel generation — with inherent carbon capture and zero air emissions.

The Allam Cycle Syngas Combustor Project was awarded to Parametric Solutions Inc. through a cooperative agreement with the US Department of Energy (US DoE) with LETA as a cost-sharing partner.

LETA Chief Executive Officer Mark McCallum said the decision to invest in developing a revolutionary zero-emissions power and hydrogen plant was an important milestone on Australia's — and potentially the world's — path to a net-zero carbon emissions future.

“Renewables are playing an increasingly significant role in Australia's energy mix, however their variability means that it's critical that we develop partner technologies that can generate this electricity in a cleaner way,” he said.

“While we can look to hydro power or batteries, this technology gives us another partner for renewables.

“The Allam Cycle can deliver electricity from coal that, unlike conventional coal-fired power, co-produces clean hydrogen, captures its CO<sub>2</sub>, and can quickly ramp up and down at a similar rate to natural gas, enabling the grid to manage higher levels of intermittent renewable sources.

“Using our available, diverse sources of power, we end up with clean, affordable, reliable electricity, on-demand, whenever we need it and want it.”

Traditional power plants use hot steam — produced by burning fossil fuels mixed with air — to spin turbines and generate electricity. The Allam Cycle instead uses high-pressure fluid CO<sub>2</sub> — created by burning a mixture of natural gas or syngas from coal or biomass with pure oxygen. No water is needed.

A natural gas-based Allam-Fetvedt Cycle — the NET Power project — was demonstrated at La Porte, Texas. The Allam Cycle Syngas Combustor Project will develop a commercially applicable syngas sCO<sub>2</sub> combustor, allowing the technology to be applied beyond natural gas and run on syngas fuel from coal and biomass.

Mr McCallum said the Allam Cycle could help Australia meet its international climate commitments and transition to a low-carbon economy.

“While there are immediate domestic applications for this technology given that Australia is one of the world's largest exporters of both coal and natural gas, there is significant value in investing in this zero-emission technology as Australia's trading partners look to meet their own emission reduction obligations and energy needs,” said Mr McCallum.

“This is a strategically important project with the potential to unlock a revolutionary technology that can not only benefit today's emissions-intensive sectors, but help create new, clean industries of the future.

“Clean hydrogen is one, and ammonia for fertiliser is another. This fits very well with Australia’s opportunity to develop new manufacturing industries and become a world-leader in clean energy exports.”

The combustor test is complemented by another LETA-8 Rivers Capital project exploring the feasibility of deploying the Allam Cycle technology to Australia for near-zero emission energy and hydrogen generation from Australian coal sources.

“Together, these two Allam Cycle projects aim to prove that this technology’s use at scale would introduce near-zero emission hydrocarbon and biomass power for Australia — complementing renewables’ increasing role in the energy mix — and that competitive, zero-emission industries like hydrogen and fertiliser can be created using CCUS, coal and even natural gas,” said Mr McCallum.

Mr Bill Brown, CEO of 8 Rivers Capital said “8 Rivers is grateful for the support from LETA and the US DoE to accelerate the deployment of zero-emission technologies aimed at ensuring the world can meet every climate target at a price of electricity that every human being can afford.

“This combustor project will allow Australia and the rest of the globe to generate both hydrogen and electricity from syngas with every zero-to-negative carbon emissions.”

## #ENDS

### Notes to editor:

1. The Allam-Fetvedt Cycle is an advanced supercritical CO<sub>2</sub> power cycle that burns fuel with pure oxygen and uses the CO<sub>2</sub> by-product to drive a turbine, allowing for high efficiencies to be reached with inherent CO<sub>2</sub> capture, near-zero air emissions, high flexibility, and zero required water use.
2. The Zero-Emission Supercritical Carbon Dioxide Syngas Oxy-Combustor Development and Testing project (the **Allam-Fetvedt (Allam) Cycle Syngas Combustor Project**) will design, build and test the world’s first syngas-fuelled supercritical carbon dioxide (sCO<sub>2</sub>) combustor for the Allam-Fetvedt Cycle. Specifically, it will develop a syngas-fuelled 50 MWth combustor designed to be utilised with high-pressure, high-temperature, oxy-fuel, supercritical carbon dioxide (sCO<sub>2</sub>) power cycles, with particular focus given to the conditions required by the Allam-Fetvedt Cycle, in order to lower the cost of coal power with near-100 per cent carbon capture below that of current state-of-the-art power systems
3. This allows for clean hydrogen production, as hydrogen is separated from syngas for export, before the syngas enters the combustor for power generation.
4. The Allam Cycle Prefeasibility Study will explore exploring the feasibility of deploying the Allam Cycle technology to Australia and establishing a business case for:
  - a new power station that must co-exist in a renewable energy dominant grid
  - an ammonia and urea production-focused facility that also generates electricity, and
  - a ‘blue’ hydrogen facility that generates electricity.
5. There are strong synergies between the Allam Cycle projects and LETA’s plans to establish a carbon hub in Queensland.
6. Carbon storage is a critical part of the equation when it comes to enabling a net-zero emissions future and establishing new, clean industries, including hydrogen.
7. Queensland has world-class carbon storage sites capable of permanently and safely storing potentially billions of tonnes of CO<sub>2</sub> from many sources. Access to this and the infrastructure needed for world-class export industries in Gladstone makes Queensland an ideal site for a multi-industry carbon hub and regional hydrogen export hub.

### **About LETA**

LETA is a \$550 million fund established by the Australian black coal industry to invest in technologies that can significantly reduce emissions and support the transition to a low emission global economy, in line with the Paris Agreement. We partner with government and industry locally and internationally to develop projects that reduce and remove carbon emissions from large-scale industrial processes such as power generation, steel and cement manufacturing, mining, and future energy sources such as hydrogen. Our investment in low-emissions technologies demonstrate and support global action to lower industrial emissions in Australia and overseas.

### **About LETA projects**

LETA's projects include Australia's first carbon hub in Queensland, the Carbon Transport and Storage Company CCUS project, clean hydrogen production and the Allam Cycle – a near-zero emission power generation technology for coal.

### **About the Allam Cycle Syngas Combustor Project**

Parametric Solutions Inc. (PSI) will partner with 8 Rivers Capital to design, build, a test the world's first syngas-fuelled supercritical carbon dioxide (sCO<sub>2</sub>) combustor for the Allam-Fetvedt Cycle. This cycle has the potential to produce electricity at a lower cost than conventional fossil generation with inherent carbon capture and near-zero air emissions.

This test will develop a commercially applicable syngas sCO<sub>2</sub> combustor, allowing the Allam-Fetvedt Cycle technology to be applied beyond natural gas fuel to run on syngas fuel from coal and biomass.

This syngas test will advance PSI's sCO<sub>2</sub> combustor technology such that it can be rapidly deployed in commercial-scale Allam-Fetvedt Cycle Power Plants running on syngas.

### **About 8 Rivers Capital**

8 Rivers Capital, LLC is a Durham, NC-based firm leading the innovation of sustainable, infrastructure-scale technologies. As the inventor of the Allam-Fetvedt Cycle, 8 Rivers is also focusing on developing economic and sustainable production of hydrogen, as well as direct air capture, retrofit carbon capture and uses for the CO<sub>2</sub> captured by the cycle, including the production of ethylene and other valuable products and the removal of sulfur impurities from gas streams.

### **About Parametric Solutions Inc. (PSI)**

PSI is a privately owned technology development, engineering and manufacturing firm, based in Jupiter, FL, specializing in both aerospace and industrial gas turbine markets. The company, in its 27 years, has developed the expertise to provide the same capabilities as a large OEM. PSI's most recent accomplishments include: clean sheet design, manufacturing, assembly and delivery of a 60MW power turbine module (in operation today), and having successfully designed, built and tested the world's first sCO<sub>2</sub> combustor which is fully compatible with the Allam-Fetvedt Cycle.