

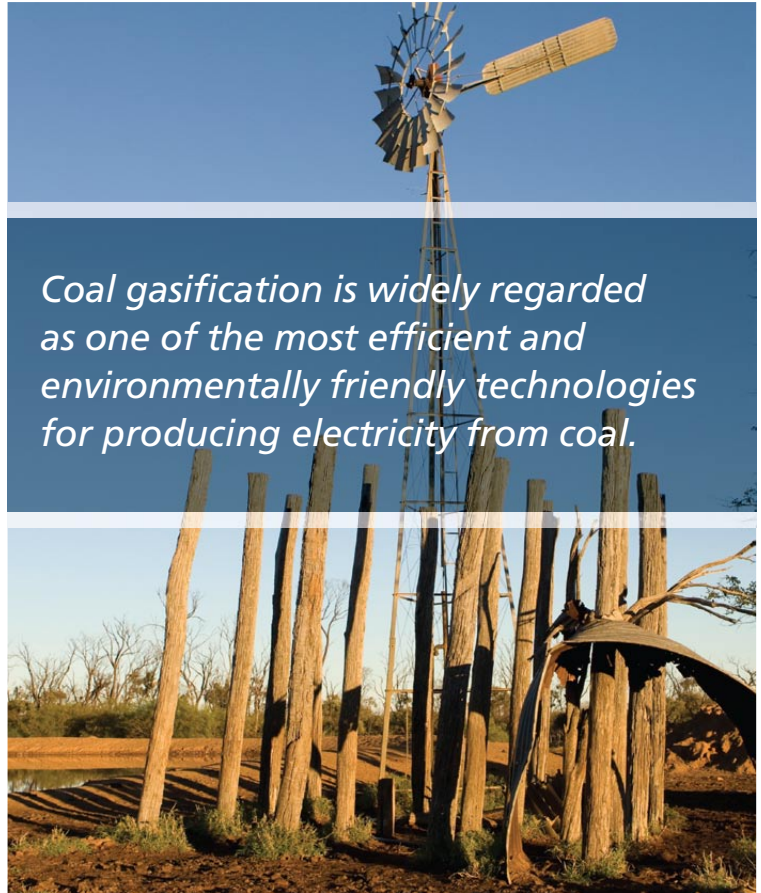
## What is gasification?

Gasification essentially refers to a process of converting coal to a gas, rather than burning it, to then produce electricity with significantly less greenhouse gas emissions.

Through the gasification process, CO<sub>2</sub> and other impurities can be removed, making the technology one of the most efficient and environmentally friendly technologies for producing electricity from coal.

ZeroGen will use Integrated Gasification Combined Cycle (IGCC) technology for its 530MW commercial-scale plant. IGCC is a power generation process that integrates coal gasification with a combined cycle power plant. The process allows CO<sub>2</sub> and other impurities to be separated and captured before combustion in gas turbines, thereby preventing their release into the atmosphere.

See overleaf for a more detailed overview of ZeroGen's IGCC process.



*Coal gasification is widely regarded as one of the most efficient and environmentally friendly technologies for producing electricity from coal.*

## Technology partner

ZeroGen will utilise IGCC technology from Japan-based Mitsubishi Heavy Industries (MHI). MHI is a world-leader in IGCC technology and has gained extensive experience over the past 25 years through the deployment of pilot and demonstration plants. It has successfully constructed and started the operation of a 250 MW IGCC demonstration plant in Nakoso, Japan. MHI will provide the gasifier and gas turbine for the ZeroGen IGCC power plant.

The partnership with MHI significantly reduces the technical integration risks for ZeroGen, and was a key factor in allowing the project to proceed directly to commercial-scale.

## Benefits

Compared to conventional coal-fired power stations, IGCC's benefits, include:

- Enables better capture of CO<sub>2</sub> (has potential to capture up to 90 percent of emissions for full sequestration)
- Higher power plant efficiencies
- Creation of usable by-products, such as environmentally-inert mineral matter and sales-grade sulphuric acid, which can be profitably sold and used in other industries.

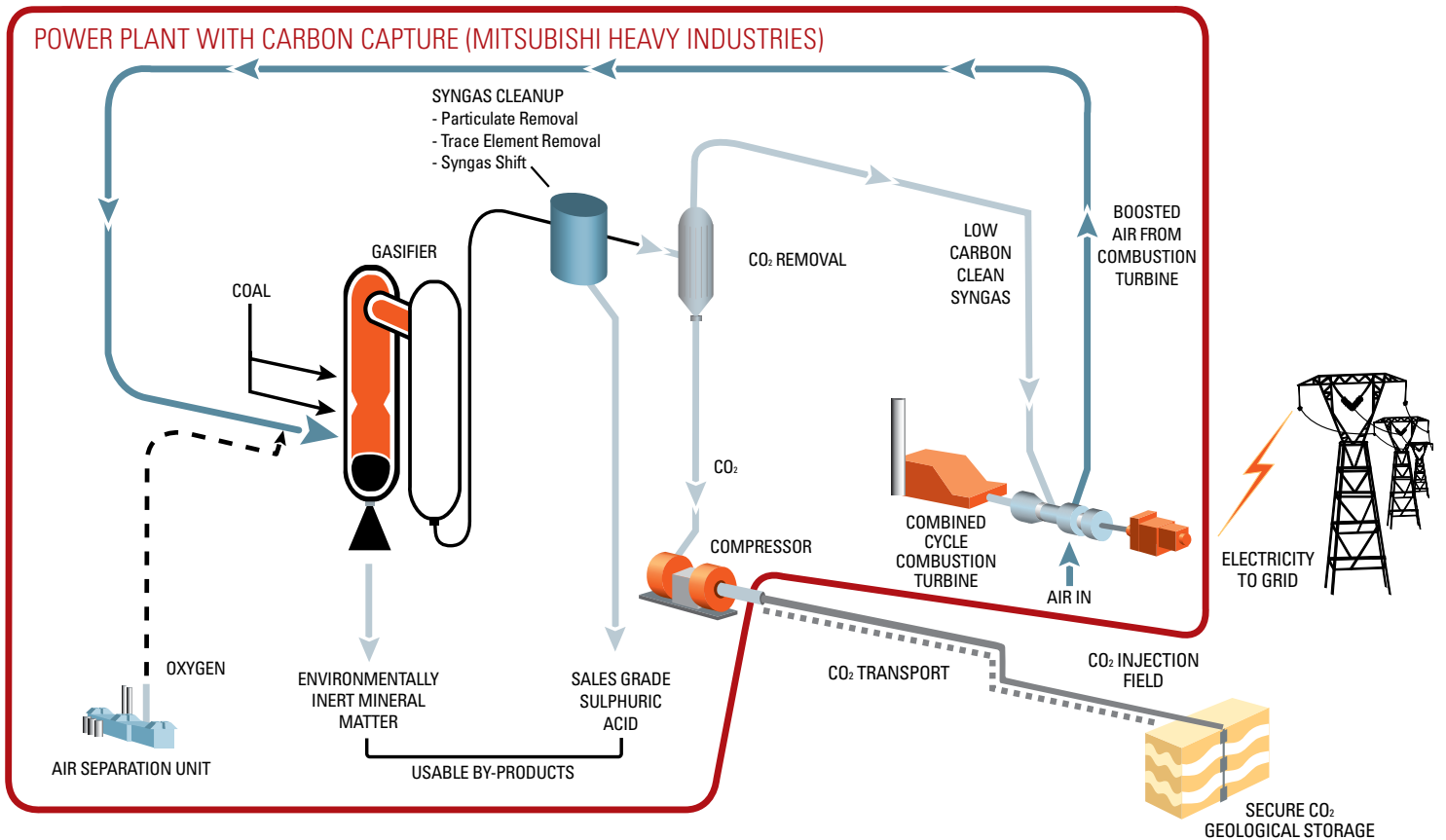
## Definitions

**IGCC:** a process of converting coal into a gas fuel (syngas) that drives combustion turbines to generate electricity. CO<sub>2</sub> is captured and removed from the syngas prior to combustion in turbines, thereby preventing its release to the atmosphere.

**CCS:** involves separating CO<sub>2</sub> from the syngas produced in the power plant, compressing the CO<sub>2</sub>, then transporting and safely storing it underground in deep underground reservoirs.



# HOW WILL IGCC WORK FOR ZEROGEN?



The IGCC process combines coal with a mixture of oxygen-enriched air and steam under pressure, where it undergoes a chemical change to produce synthesis gas (syngas) which is comprised mainly of carbon monoxide and hydrogen.



The syngas stream produced in the gasifier undergoes a shift conversion where the carbon monoxide is converted to hydrogen and carbon dioxide. The carbon dioxide is then separated from the shifted syngas, producing a clean, low-carbon, high-hydrogen fuel. This fuel powers the combined cycle gas turbine to produce power.



The separated carbon dioxide stream is then dehydrated and compressed for transportation and sequestration. The separation process also removes sulphur compounds as a separate stream, allowing these compounds to be converted to a valuable high-purity sulphuric acid by-product.

## About ZeroGen

ZeroGen is at the forefront of global efforts to produce smarter, cleaner power from coal. The first-of-a-kind project is integrating the technologies of Integrated Gasification Combined Cycle (IGCC) and Carbon Capture and Storage (CCS) to produce low-emission, baseload electricity.

It will develop a 530 megawatt (MW) commercial-scale IGCC power plant with CCS, to be deployed in Queensland in 2015. The project is a world first, and will play a crucial role in

demonstrating the technology at commercial scale to accelerate its uptake in Australia and around the world.

The widespread deployment of IGCC with CCS has the potential to deliver significant cuts in greenhouse gas emissions from coal-based power generation. At maturity, the technology has the potential to capture up to 90 percent of carbon dioxide (CO<sub>2</sub>) emissions for safe storage underground.

