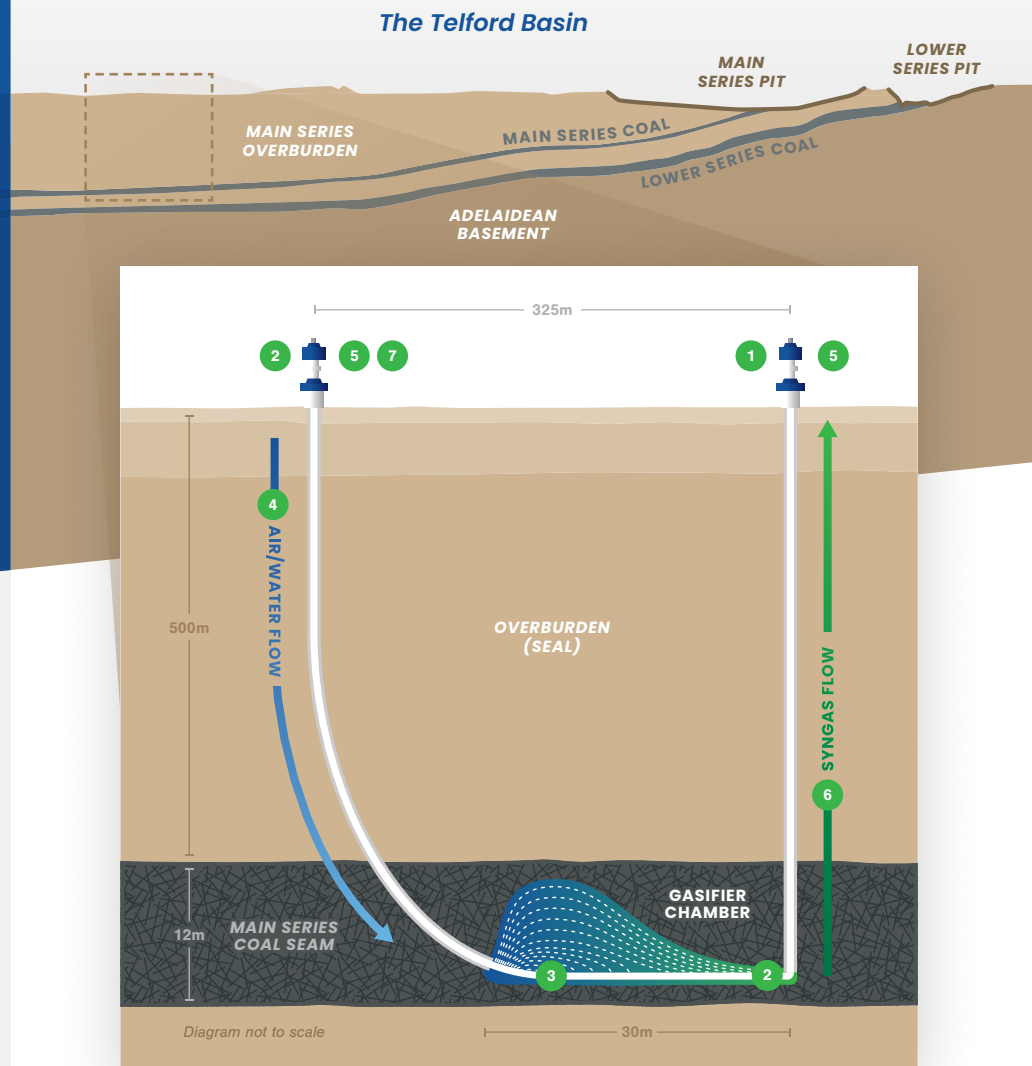


In Situ Gasification (ISG)



Leigh Creek Energy's in situ gasification (ISG) project sits within the Telford Basin of the Leigh Creek Coalfield.

ISG is also known as underground coal gasification (UCG), however the terms 'in situ gasification' or 'ISG' are used in South Australia's *Petroleum and Geothermal Energy Act 2000* to describe the process.



How does the ISG process work?

The ISG process converts coal, through a chemical reaction, from its solid state into a gaseous form, resulting in the generation of syngas. Syngas comprises methane, hydrogen and carbon monoxide energy gases with variable amounts of inert gases, carbon dioxide and nitrogen.

1. Outlet well is drilled to intersect coal seam.
2. Inlet well is drilled and steered to link up with Outlet well.
3. Initiation tool is placed down the inlet well to heat the coal and starts the gasification process.
4. Addition of air and water creates a series of chemical conversions transforming coal to syngas.
5. Process is controlled by using inlet and outlet wells to manage the flow of air and water.

How is the process controlled and stopped?

The process is controlled by using the inlet and outlet wells to manage the flow of air and water in the gasifier chamber. The process can be stopped at any time by turning off the air and water supply from the inlet well.

6. Syngas will flow up through the outlet well and is analysed on the surface.
7. Process is stopped by turning off air and water supply from the inlet well.

**ISG
Demonstration
Quick Facts**



There will be no fracture stimulation (fracking)



ISG is not the same as coal seam gas (CSG)



The coal will not be on fire underground



Short term, small scale, low impact demonstration

What is Syngas?

The ISG process converts coal from its solid state into a gaseous form, resulting in the production of synthesis gas (syngas). Syngas comprises methane, hydrogen and carbon monoxide energy gases with variable amounts of inert gases, carbon dioxide and nitrogen. It can be used for a variety of downstream applications, such as power generation, or as a feedstock for recognised chemical products like methanol, ammonia, fertilizers, synthetic natural gas and liquid fuels.

Syngas is comprised of:

CH₄ Methane	H Hydrogen	CO Carbon Monoxide	CO₂ Carbon Dioxide	N Nitrogen
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Plus, variable amounts of inert gases:



Site selection is key for ISG

The project location at the Leigh Creek Coalfield was initially chosen as a result of a screening process that evaluated potential sites around the world for an ISG project.

- A closed basin that is defined in size
- The coal resource is deep (over 500m) and thick (10-20m thick)
- The geology is suitable (coal at depth with thick mudstone overburden)
- The hydrogeology is suitable (no aquifers or users of groundwater) – Low permeability in the coal seam and surrounding rocks
- It is distant from residents or towns (greater than 7km to Copley and Leigh Creek)
- Existing infrastructure (roads, power, accommodation)
- Distant from environmentally sensitive areas (National Parks, Great Artesian Basin)
- No land use conflicts

**ISG
Demonstration
Site**

The demonstration plant was located in the heavily modified Telford Basin in the Leigh Creek Coalfield, between the Main Series and Upper Series pits and waste rock stockpiles.

To obtain information for the design for a commercial facility, Leigh Creek Energy successfully constructed, operated and decommissioned a small-scale ISG demonstration plant during 2018/19. This demonstration facility involved the construction of an above ground plant (and associated service infrastructure) and the establishment of a below ground single ISG gasifier chamber. The demonstration plant successfully produced syngas, proving that the technical and environmental performance of the process could be successfully confirmed at Leigh Creek.

Leigh Creek Energy acknowledges and respects the Adnyamathanha people, the Traditional Owners of the land on which our operations occur and pays our respects to their Elders past and present.

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