

South Australian coal potential - CSM, ISG, CTL and CTG

Authors: E M Alexander, A Sansome and J Davies, PIRSA Petroleum & Geothermal Group
Co-Contributors: G Kwitko, Felix Resources Ltd., Altona Resources Ltd., Syngas Energy Ltd., Energy Exploration Ltd.

PART 2

MESOZOIC BASINS

Introduction

In SA, Mesozoic basins either overlie older Palaeozoic-Neoproterozoic intracratonic basins or are developed on the rifted southern continental margin of Australia. These include onshore, the Eromanga, Simpson and Berri basins (Renmark Trough area) and the intramontane Telford, Springfield and Boolcunda basins. Offshore are the Bight and Otway basins, which also extend onshore, and the onshore Poldas Basin.

Coal deposits occur in the Telford, Poldas, Springfield and Boolcunda basins. Coal measures occur below mineable depths in the SA Eromanga Basin (Early Cretaceous Winton Formation, Early Jurassic Poolowanna and Middle Jurassic Birkhead formations) and in the Simpson Basin (Mid-Late Triassic Peera Peera Formation) and may have potential for CSG.

TRIASSIC

Leigh Creek

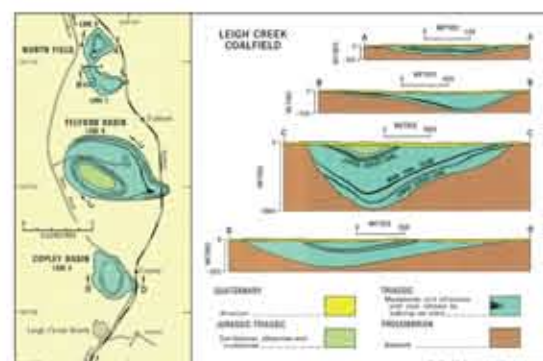
The Middle – Late Triassic Leigh Creek Coalfield has been mined since 1943. There are five discrete basins in the area: North Field (Lobes D and C), Telford Basin (Lobe B), Copley Basin (Lobe A) and Lobe E. Lobe D has been mined out.

Lobe B, the largest of the five basins, is currently being mined around the margins, where the overburden is as thin as 10 m and reserves are estimated to exceed 500 Mt, of which ~100 Mt are recoverable. Approximately 3 Mt are mined each year for the 240 MW Thomas Playford B Power Station and 2x250 MW Northern Power Station. Heating values are up to 15 MJ/kg.

The seams have a moderate dip (10–30°) and the depth to coal reaches up to 1000 m in the centre of the basin. The coal is low rank Sub-bituminous C, and the moisture content is quite high (33%), which may have a negative effect on the amount of gas that could be stored within the coal, but the other characteristics of the deeper sections of Lobe B have good potential for CSG.

Licensing

Reserved Mining Area – Flinders Power operate.



Springfield and Boolcunda basins

The Triassic Springfield and Boolcunda basins contain thin discontinuous low grade sub-bituminous Triassic coal seams. Overburden does not exceed 77 m, so it would be unlikely for economic gas volumes to be found in the seams without extreme hydrological conditions. Coal measures in the Springfield Basin are up to 250 m thick. The seams of the Springfield Basin rarely reach >0.3 m in thickness (although the thickest section is found at the greatest depth – 3.6 m at 77 m). The coals of the Boolcunda Basin are thin, discontinuous and of poor quality.

Licensing

Planet Gas Ltd operate PELA 145 to explore for coal seam methane, the PELA covers both basins.

JURASSIC

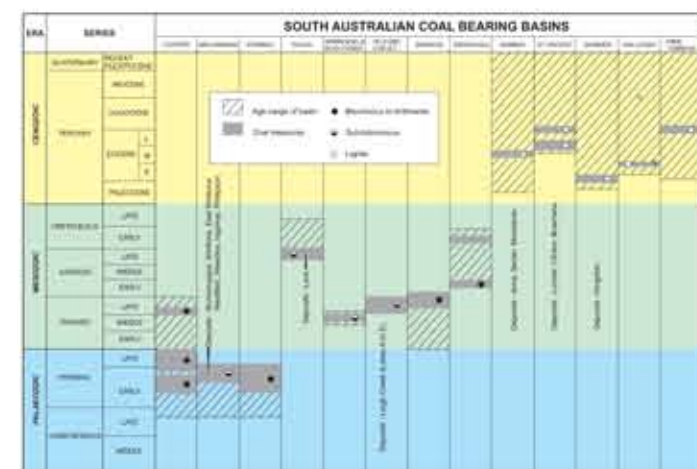
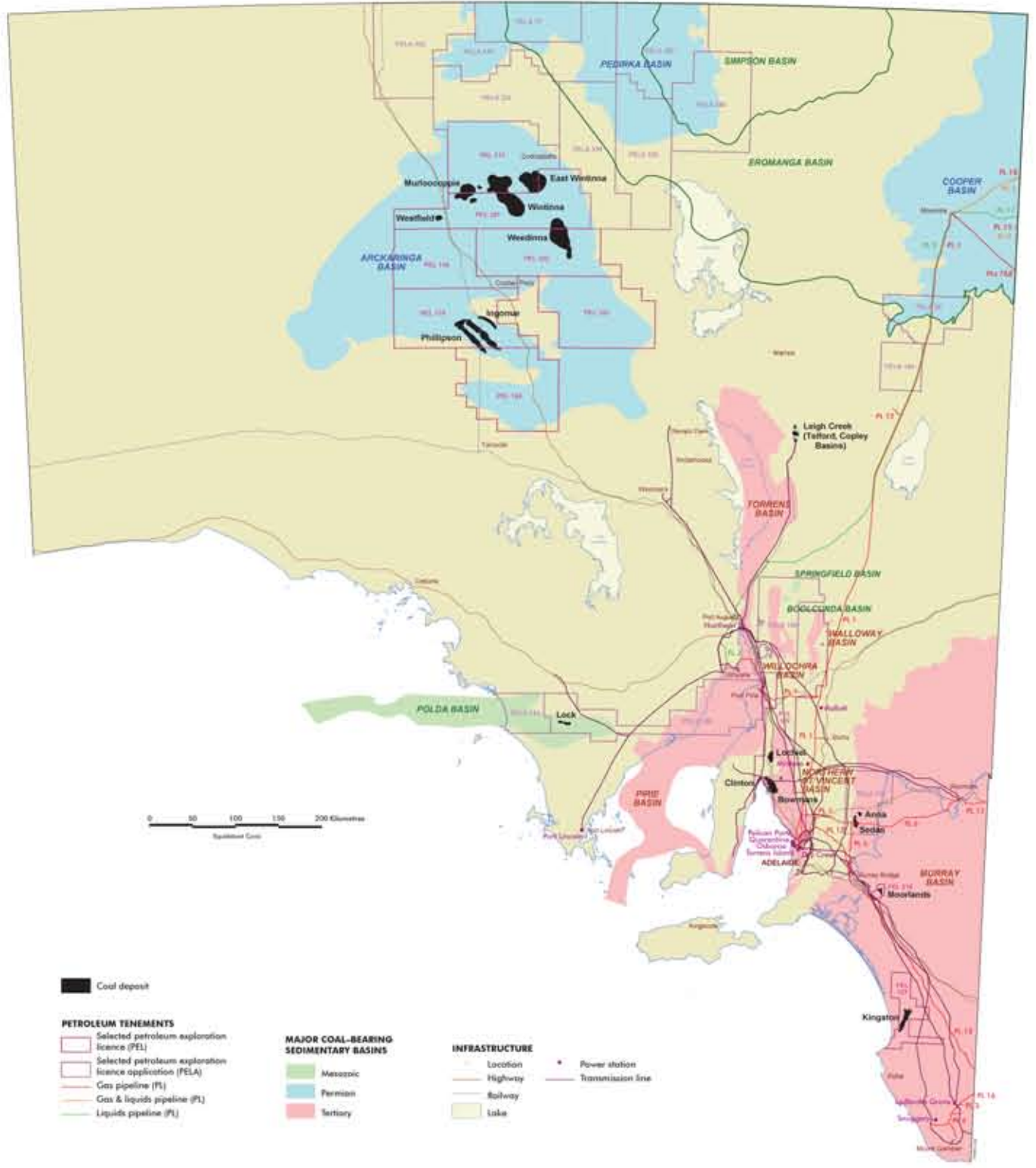
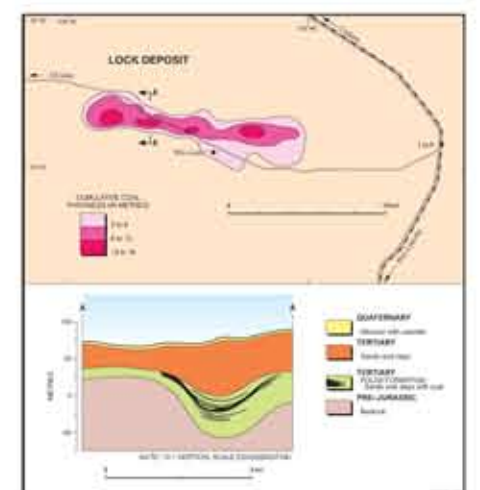
Poldas Basin

The Jurassic Lock and Mullaquana coal/oil shale deposits occur at mineable depths in the Poldas Basin. Overburden ranges from 35 to 230 m but is generally between 50 and 130 m, which may be too shallow to store significant amounts of gas. The sub-bituminous coal has low levels of inertinite and higher levels of liptinite. The cumulative coal thickness is typically between 5 – 15 m and individual seams range from 0.5 – 6 m in thickness. This makes the composition of the coal very similar to the Walloon Coal Measures of Queensland, which are being successfully exploited for CSM (but typically at greater depths).

Licensing

Energy Exploration Ltd operate PELAs 126 and 153 to explore for coal seam methane. The company also operates EL 3130 targeting coal, in situ gasification and potential coal to gas and coal to liquids projects. Energy Exploration estimate reserves (non-JORC) of 260-500 Mt at Lock (high volatile present) and 250 Mt at Mullaquana (gas and oil known) – their conceptual target in the Poldas Basin is 7.8 – 25.8 Bcf or 8-27 PJ.

Energy Exploration are planning a review of geophysical data, drilling stratigraphic wells and coring, then permeability tests.



TERTIARY

Introduction

South Australia has significant amounts of very low-grade lignite found in shallow Tertiary basins. Tertiary lignites are typically high in moisture, sulfur, sodium and chlorine and are overlain by unconsolidated Tertiary and surficial sediments. Although thick seams are developed in some deposits, all Tertiary coals are generally shallower than 100 m and this limits reservoir pressure and likely gas content.

Since all of the coal is low-grade Lignite B, biogenic activity would be required to generate CSM. Hydrological conditions may provide the trapping and overpressure required to store economic amounts of biogenic gas in some of the coal seams, which have other appealing properties (thickness, continuity etc.).

Eastern Star Gas Limited has investigated the CSM potential of similar low-grade brown coal deposits (Maddingly Seam) at ~100 m depth in Victoria. Problems have been encountered in dewatering the coal seams due to low permeability and the future of the pilot project is uncertain.

Gambier Basin

Low rank Lignite B Coal in the Late Palaeocene-Middle Eocene Dilwyn Formation forms the Kingston coal deposit. The overburden varies from 28 to 75 m in thickness and the coal occurs as a single seam from 5 to 12 m thick.

Total moisture: 55%
Raw Ash: 7%
Volatile matter:
Total sulphur: 1.3%
Calorific value: 10.35 MJ/kg
Relative density: 21.1g/cc

Reserves

Coal: 578 Mt (523 Mt measured resources/55Mt indicated resource)

Coal to Liquids: 10 000 barrels of petroleum liquids per day

Power: 40 MW export

Proposed work: pre-feasibility study, coal sampling using large diameter coring, samples to be used for lignite gasification experimentation program. (from Hybrid Energy Australia Pty Ltd)

Licensing

Hybrid Energy Australia Pty Ltd operate PEL 127 and ELs 3385, 3623. The project involves coal mining and coal to liquids.

Murray Basin

Late Palaeocene - Middle Miocene Olney Formation contains Lignite B Coal seams (Moorlands Lignite Member and lignite in the Sedan and Anna coal deposits).

Sedan

Overburden depths ranging from 32 to 55 m and the lignite occurs as two seams averaging up to 6 m in thickness with a cumulative thickness of 8 m.

Anna

Overburden depths from 60 to 85 m and the lignite occurs as a seam up to 8 m thick.

Licensing

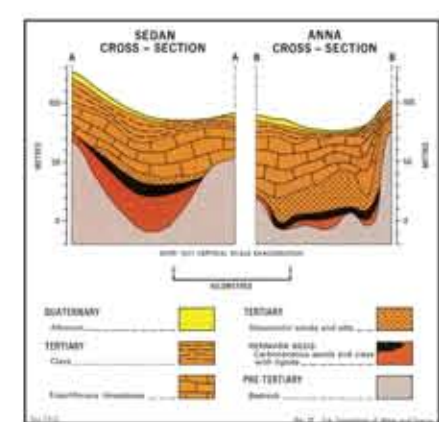
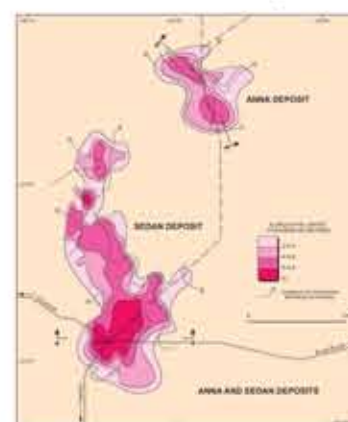
Energy Exploration Ltd have applied for PELA 174 (Anna and Sedan deposits) to explore for coal seam methane and in situ gasification. The project involves reviewing gravity and aeromagnetic data, drilling and permeability testing of the coal.

Reserves

231 Mt and the target size is 4-6 Bcf (Sedan) and 08-1.3 Bcf (Anna). (from Energy Exploration Ltd)

Northern St Vincent Basin

Carbonaceous members of the Clinton Formation and Kooliata Coal Member contain reserves of brown coal exceeding 3 Gt.



Five deposits of Tertiary Low Rank Lignite B Coal have been discovered: Lochiel, Bowmans, Clinton, Whitwarta and Beaufort. The Bowmans and Lochiel deposits are the largest and have been extensively investigated for power generation.

Bowmans

The overburden varies from 55 to 100 m in thickness and seam thickness varies from 0.5-15m, with a cumulative thickness of 25 m.

Lochiel

The overburden varies from 20 to 70 m in thickness and coal occurs in three seams in the Kooliata Formation averaging 1.8, 6.5 and 2.6 m in thickness. The resource is estimated as 629 Mt. (from Drexel and Pries, 1995)

Clinton

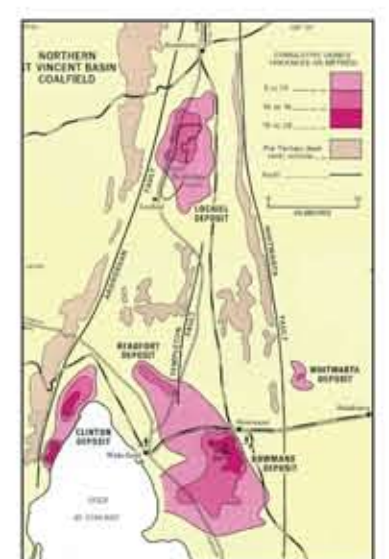
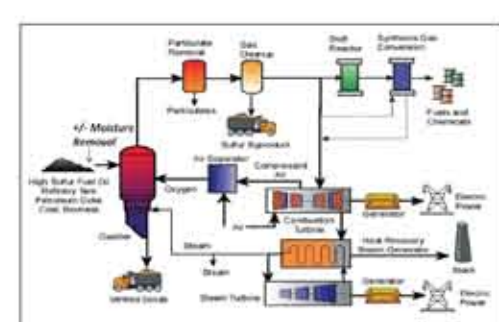
The overburden varies from 50 to 100 m in thickness, the resource quality is 10.1 MJ/kg. (from Syngas Energy Limited)

Whitwarta

Resource quality is 9.2 MJ/kg. (from Syngas Energy Limited)

Licensing

SAPEX Ltd operate PEL 120 to explore for coal seam methane over the region. Flinders Power operate ELs 3155, 3560 over the Lochiel and Bowmans deposits. Syngas Energy (a wholly owned subsidiary of GulfX) operate EL 3896 and 3585 for coal to liquid projects at Whitwarta and Clinton deposits.



PIRSA Petroleum & Geothermal Group

Level 6, 101 Grenfell St.,
GPO Box 1671
ADELAIDE SA 5001
Email: pirs.petroleum@saugov.sa.gov.au
Phone +61 8 8463 3204
Fax +61 8 8463 3329
www.petroleum.pir.sa.gov.au

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Altona Resources www.altonaresources.com/
Anglo Coal Australia Pty Ltd www.anglocoal.com.au/wps/wcm/connect/AngloCoal/Babcock & Brown Power (Flinders Power) www.bbpower.com.au/
Energy Exploration Ltd chrispc@xtra.co.nz
Felix Resources www.felixresources.com.au/
GulfX (Syngas Energy Ltd) www.syngas.com.au/index.php?option=com_content&task=view&id=285&Itemid=227
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HOT PROSPECTS



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