

# COAL

The main coal occurrences in Western Australia can be grouped into three depositional ages as shown on the map on the right.

## Permian (250–300 Ma)

- Collie, Wilga, Boyup, Vasse Shelf, Irwin River (Perth Basin), Carnarvon Basin, Canning Basin (Livingina, Duchess-Paradise)
- These typically classify as sub-bituminous with some bituminous on the Vasse Shelf.
- Specific energy values typical range from 14–25 MJ/kg (3350–5970 kcal/kg), up to 31 MJ/kg on the Vasse Shelf (7400 kcal/kg).

## Jurassic (165–200 Ma)

- Hill River, Eneabba, Bookara (Perth Basin), with several occurrences in the Canning Basin
- Mostly sub-bituminous (14–25 MJ/kg)

## Eocene (35–60 Ma)

- Salmon Gums, Scaddan, Balladonia (Eucla Basin)
- Lignite ~7 MJ/kg (1675 kcal/kg)
- The recently discovered lignite deposit at Kazput along the southern edge of the Pilbara may be Miocene

## Collie

Located approximately 150 km south-southeast of Perth and 50 km east of Bunbury, Collie is the only producing coalfield in Western Australia.

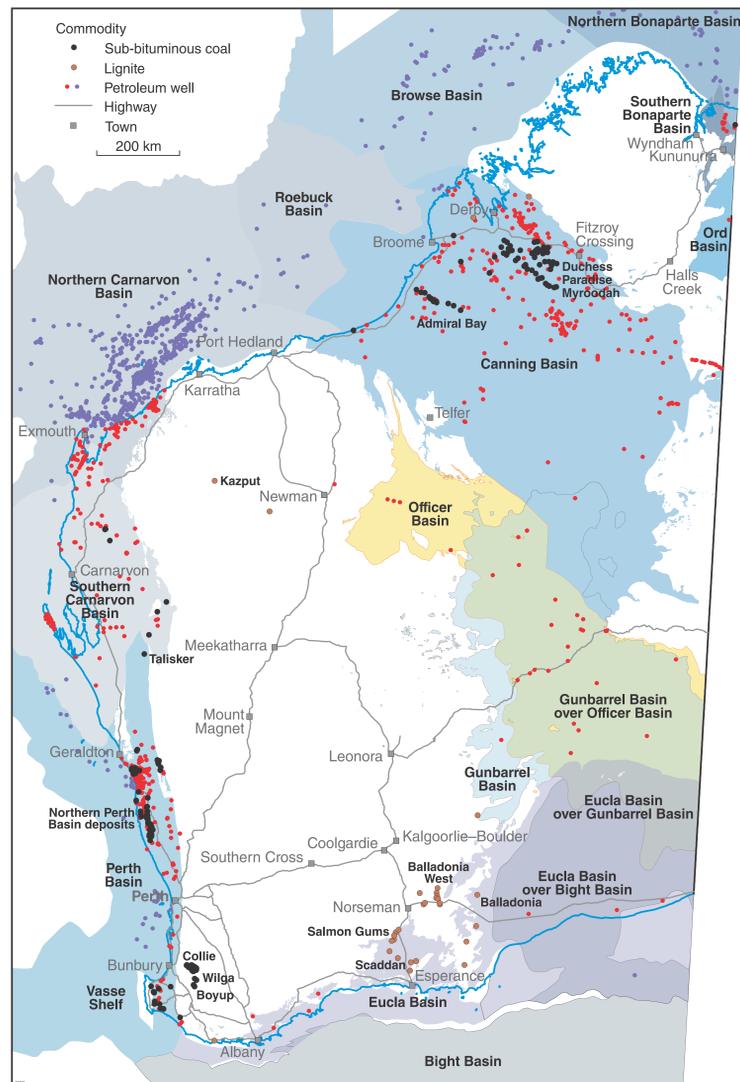
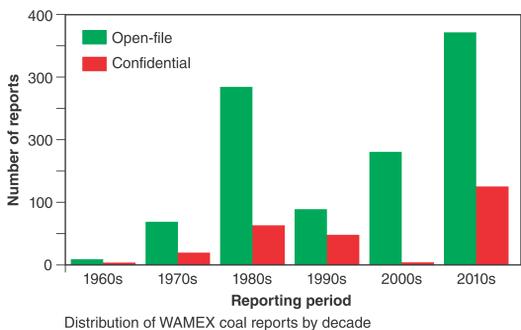
Two companies mine coal in the sub-basin. The Griffin Coal Mining Company Pty Ltd (Griffin Coal) established in 1923 as a private syndicate to develop coal leases to the south of Collie and supply coal to the Western Australian Government Railways. Griffin Coal is now owned by Indian company Lanco Resources and supplies coal to both Synergy and privately owned power stations at Collie. The second company, Premier Coal was established in 1950 as Western Collieries, passing through a number of joint ventures and ownership changes and now managed by Yancoal on behalf of its majority shareholder Yanzhou Coal Mining Ltd.

Combined production from the two companies was 6.9 Mtpa in 2015–16, used mainly for electricity generation in adjacent power stations. About 10% of coal is used for metallurgical purposes by the mineral sands industry to transform ilmenite to synthetic rutile while a small amount is used to reduce silica sand to silicon.

Collie coals typically classify as sub-bituminous and have vitrinite reflectance values ranging from 0.43 to 0.60%. The coals generally have a high moisture content, about 25% as mined. The ash values are low, typically 3–10% as mined, but it may be as low as 0.3% within individual coal plies. Volatile matter ranges from 22% to 37% as a rule, but methane content is relatively low indicating little scope for extraction of coal seam methane. Sulfur tends to be low, typically 0.3 to 0.5% and specific energy values are 18–22 MJ/kg on an as received basis, making the coal ideal for electricity generation. Collie coal provides approximately 48% of the electricity generated for the South West Interconnected System (SWIS).



Lignite core from the Scaddan Project split along bedding plane showing woody plant fossils. (Photo courtesy of Blackham Resources Ltd)



## Current project

With coal generating about 50% of the electricity for the SWIS security of supply is essential. Based upon a combination of published and unpublished data the Collie Sub-basin has a total Economic Demonstrated Resources<sup>1</sup> (EDR) of about 950 Mt. Although this is more than 100 years supply at current consumption levels supply uncertainties exist and there is a need to document all known coal resources.

The project currently being undertaken within the Energy and Basins Group is to locate historical reports and data and document all exploration completed for coal, lignite and oil shale. The majority of reports are stored in the Western Australian Mineral Exploration (WAMEX) database although some reports, for examples those covering 1980s oil shale exploration are stored in the Western Australian Petroleum and Geothermal Information System (WAPIMS). All openfile reporting is available online via the DMP website.

For the entire State there are:

- ~1270 coal reports in WAMEX and about 10 related reports in WAPIMS
- ~1000 open-file, 270 confidential reports
- ~50% of reports are pre-compulsory digital reporting (2006)
- ~3860 additional holes relating to coal exploration identified to-date

Reports range in size from a single page to a 7 volume, 5218 page treatise

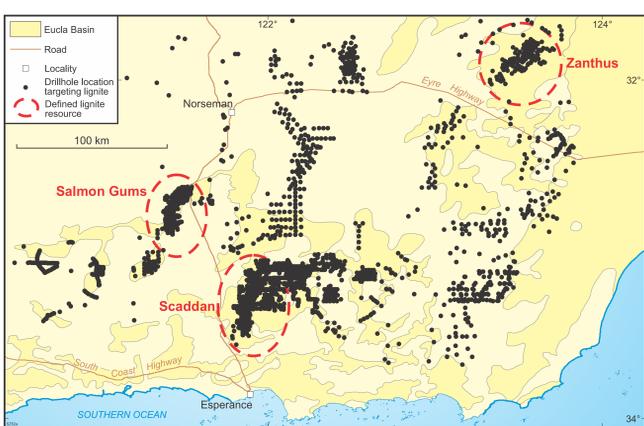
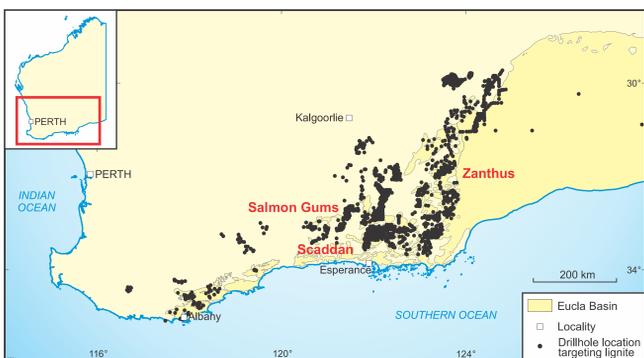
Report quality ranges from limited value through to scientific master piece

## Eucla Basin lignite

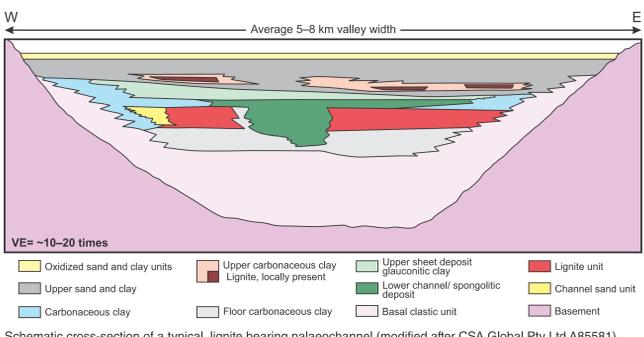
Eucla Basin ligniteresources have

- High moisture content of 50–55%
- Variable ash yield of 6–50%
- Specific energy values of 5–12 MJ/kg
- High sulfur content 2–5%
- High salt (NaCl) content 1.5 – 20%
- High oil yield 40–240 L/t with an average of 120 L/t

JORC Category	Measured (Mt)	Indicated (Mt)	Inferred (Mt)	Total (Mt)
Scaddan	80	490	470	1040
Salmon Gums		406.1	470	876.1
Zanthus			350	350



Location of the three main lignite deposits within the Eucla Basin with estimated resources (JORC 2004)



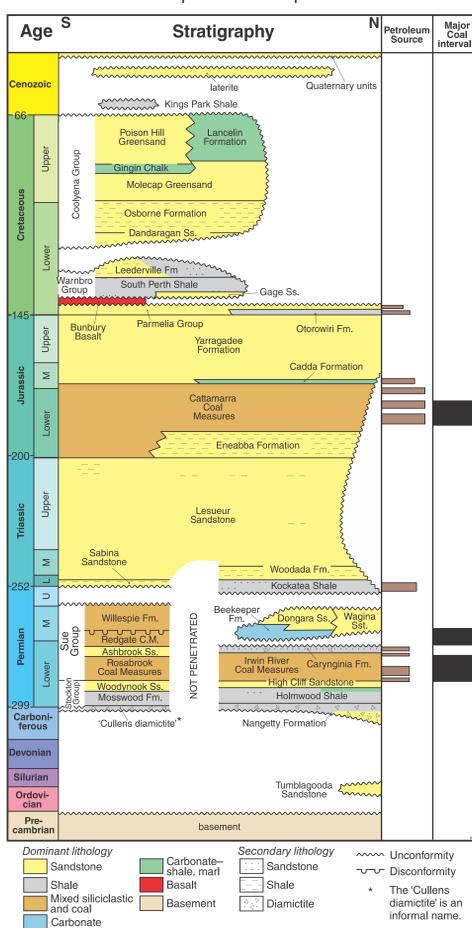
Schematic cross-section of a typical lignite bearing palaeochannel (modified after CSA Global Pty Ltd A85581)

GSWA Records covering the northern Perth and Eucla Basins are currently undergoing peer review and editing and due for release in July 2017. These reports collate available data on the geology, exploration and evaluation history. Drillhole locations and summary geological data will be included as GIS files along with references to the original data sources.

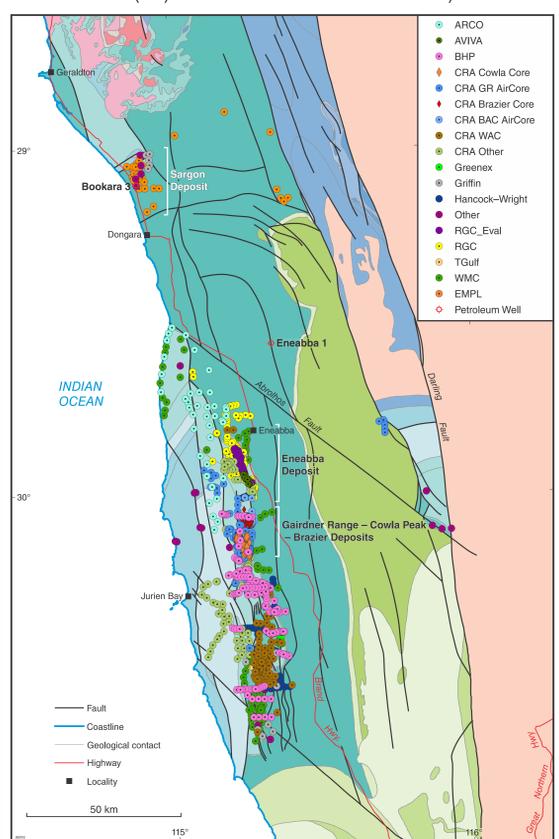
Work has already commenced on documenting data for the remaining coal basins in Western Australia, with the Canning, Carnarvon and the Permian of the northern Perth Basins nearing completion. Following completion of the individual basin datasets a collated Mineral Resource Bulletin will be produced.

<sup>1</sup> An EDR is the combination of Measured and Indicated Resources and Proved and Probable Reserves (JORC Code) as defined in the National Classification System for Identified Mineral Resources (2009 ed.). See Appendix D in Geoscience Australia and ABARE, 2010 Australian Energy Resource Assessment. ([http://www.ga.gov.au/metadata-gateway/metadata/record/gat\\_70142](http://www.ga.gov.au/metadata-gateway/metadata/record/gat_70142))

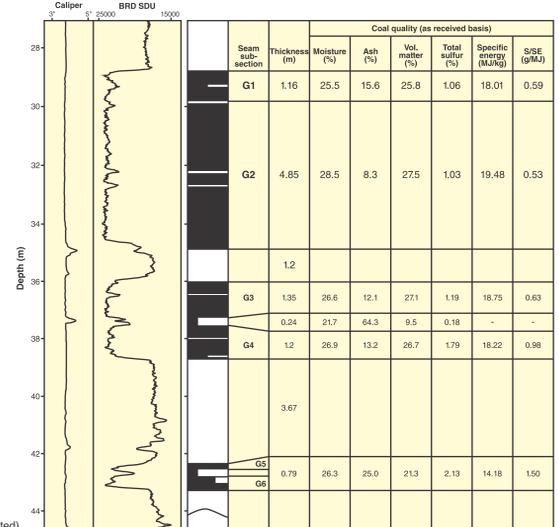
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Stratigraphic section of the Perth Basin highlighting the position of the main coal bearing units



Location of drillholes targeting Mesozoic coal in the northern Perth Basin, coloured by company and main drilling method. Background image GSWA 1:500 000 geology



Combined plot of short spaced density (uncalibrated) and caliper logs alongside a simplified coal lithology log and summary coal quality data for the main seam (Seam G) for drillhole CPCH 23, Gairdner Range – Cowla Peak Deposit