

Southern Carnarvon Basin

WESTERN AUSTRALIA, OFFSHORE

Reservoir:
 Birdrong Sst, Wogatti Sst, Kennedy Group, Tumblagooda Sst

Seal:
 Lyons Group, Faure, Gneudna formations, Dirk Hartog Group

HYDROCARBON POTENTIAL

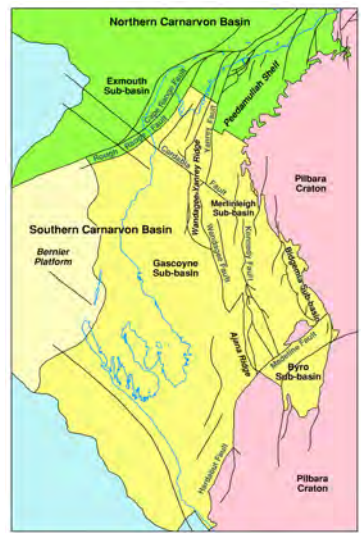
CATEGORY 1 and 2 (OGRA 2005)

Crude oil	MMBL	1135.68
Condensate	MMBL	1058.08
LPG	MMBL	767.06
Sales gas	Tcf	81.79

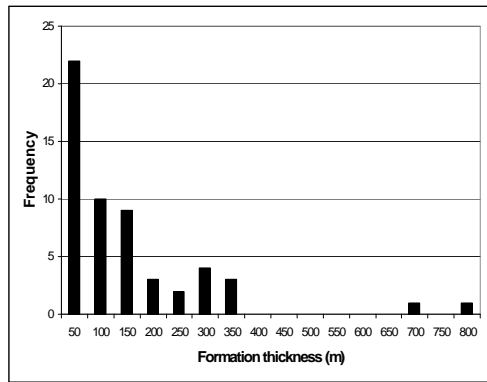
*data from entire basin



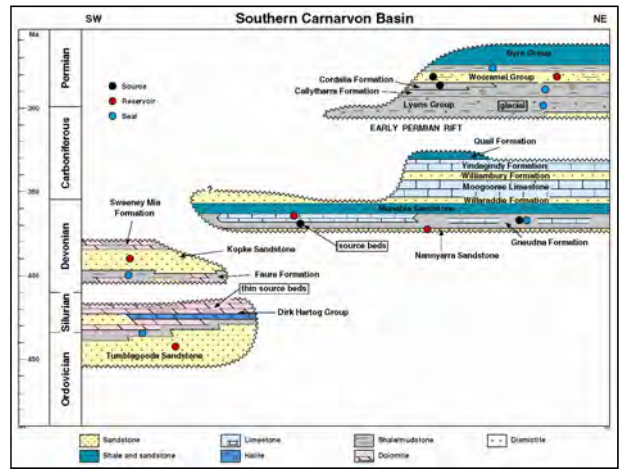
STRUCTURAL ELEMENTS



RESERVOIR THICKNESS

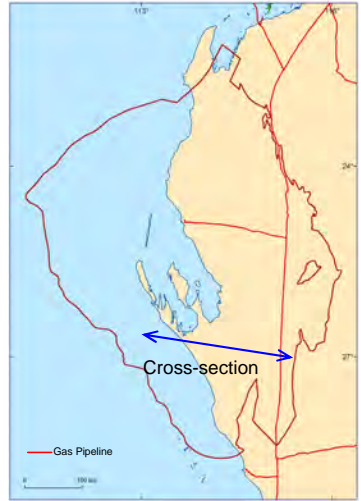


STRATIGRAPHY



(Geol. Surv. WA, 2007)

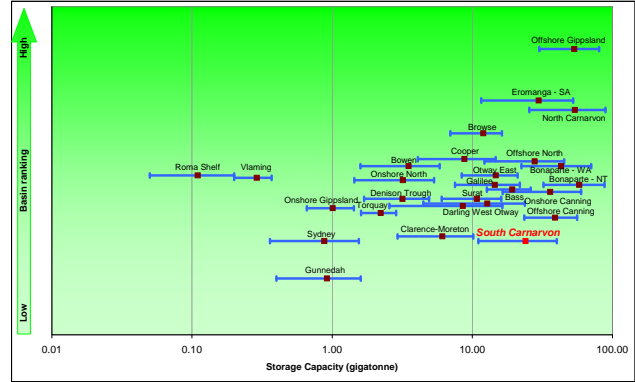
OIL AND GAS FIELDS



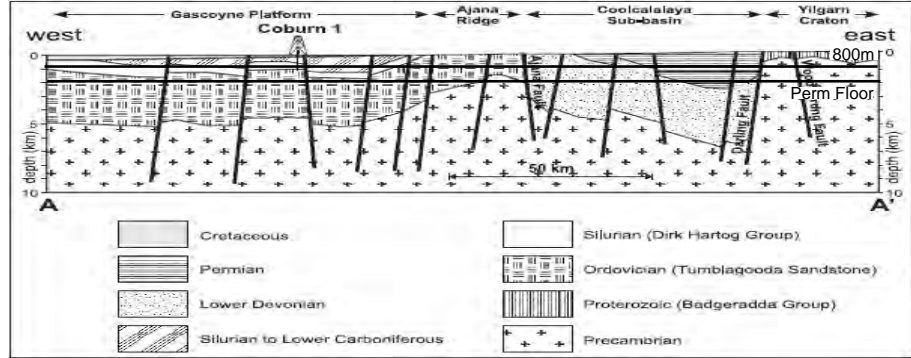
WELLS AND SEISMIC COVERAGE



BASIN RANKING VS. CAPACITY



REGIONAL CROSS SECTION (LOCATION IN OIL AND GAS FIELDS MAP)

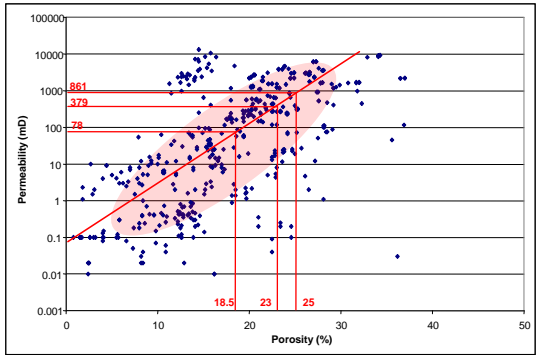


(After Beardmore, 2005)

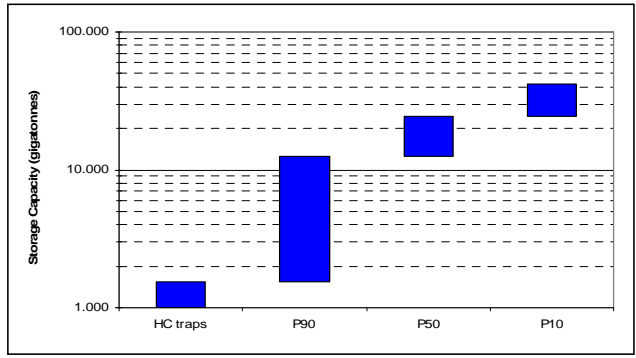
Insufficient data for the following items:
 •Regional Seal Area Figure
 •Top Seal Potential

Southern Carnarvon Basin

POROSITY VS. PERMEABILITY *Values from basin-wide dataset



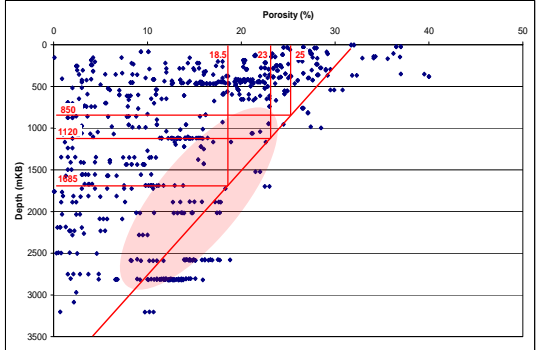
STORAGE CAPACITY



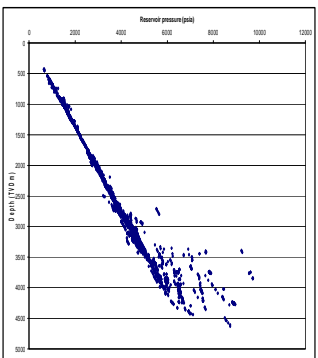
BASIN RANKING

Category	Description	Score	Weighting
Tectonics (Seismicity)	Medium/Low	4	0.00
Size	Very Large	4	0.06
Depth	Intermediate	3	0.10
Type	Non-marine and Marine	2	0.04
Faulting intensity	Moderate	2	0.14
Hydrogeology	Good	3	0.04
Geothermal	Warm Basin	1	0.05
Hydrocarbon potential	Medium	3	0.05
Maturity	Exploration	2	0.05
Coal and CBM	None	1	0.00
Reservoir	Poor	3	0.16
Seal	Poor	3	0.18
Reservoir/Seal Pairs	Excellent	4	0.03
Onshore/Offshore	Onshore	3	0.00
Climate	Temperate	5	0.00
Accessibility	Easy	4	0.00
Infrastructure	Minor	2	0.00
CO ₂ sources	None	1	0.00
Knowledge level	Good	3	0.05
Data availability	Moderate	2	0.05
Overall Ranking			30

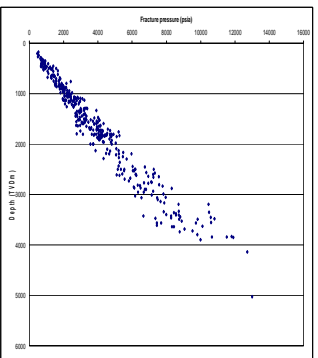
POROSITY VS. DEPTH



RESERVOIR PRESSURE VS. DEPTH *CSIRO PressurePlot



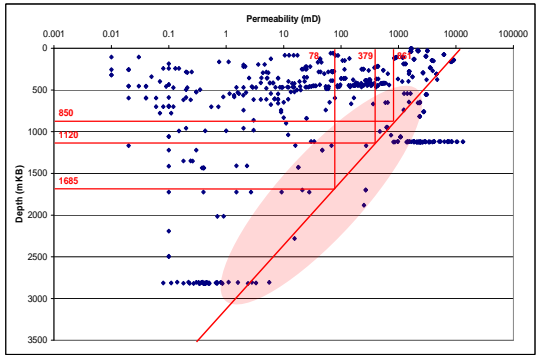
FRACTURE PRESSURE VS. DEPTH *CSIRO PressurePlot



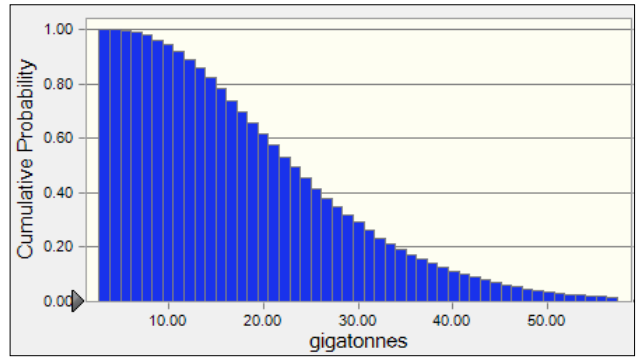
STORAGE CAPACITY ESTIMATE

Parameter	Unit	Score (P90)	Score (P50)	Score (P10)	Distribution
Area of storage region	km ²	10000	50000	115000	Triangular
Gross thickness of saline formation	m	50	100	200	Triangular
Average porosity of saline formation over thickness interval	%	12	15	18	Triangular
Density of CO ₂ at average reservoir conditions	tonne/m ³	0.5	0.6	0.7	Triangular
E-storage efficiency factor (% of total pore volume)	%	4	4	4	
Calculated storage potential	gigatonnes	11.1	22.8	40.1	

PERMEABILITY VS. DEPTH



STORAGE CAPACITY CURVE



POTENTIAL INJECTION PARAMETERS

Parameter	Unit	Shallow	Mid-Depth	Deep
Depth base seal	m	800	1020	1485
Formation thickness	m	50	100	200
Injection depth	m	850	1120	1685
Porosity	%	25	23	18.5
Absolute permeability	mD	861	379	78
Formation pressure *	psia	1245	1640	2465
Fracture pressure	psia	1960	2580	3880

* Includes data from Northern and Southern Carnarvon basins data

DISCLAIMER

The purpose of these montages is to aid a high level evaluation of the geological storage potential of Australia's sedimentary basins for future CO₂ emissions. The evaluations are based on core analysis and other data derived from Geoscience Australia and other sources. However due to time constraints, it has not been possible to carry out the detailed evaluation of the data, which will be required for the next phase of analysis.

In this exercise, we sought to recognise a range of characteristics within each basin by identifying three sets of parameters at different locations and depths in the basin. The intent is to generate an indication of a range of storage capacity and potential injection rates. These capacities and rates are being used in high level reservoir modelling work to generate injection tariffs* and capacity estimates. All of this work feeds into a process that provides indicative, conceptual transport and storage tariffs for CO₂ emissions captured in various parts of Australia.

This 'top down', simplistic approach seeks to describe the magnitude and range of potential costs for transport and storage in Australia, at a 'conceptual' level of accuracy. Clearly, any final investment decision would call on an increased understanding and level of accuracy through the usual project development process.

* Cost per tonne of CO₂ avoided, calculated using the net present value of cash flows over a 25 year asset life.

REFERENCES

- Beardsmore, G.R., 2005. High-resolution heat-flow measurements in the Southern Carnarvon Basin, Western Australia. *Exploration Geophysics*, 36, 206-215.
- Geological Survey of Western Australia and Petroleum and Royalties Division, 2007. Summary of petroleum prospectivity, Western Australia 2007: Bonaparte, Bight, Canning, Officer, Perth, Northern Carnarvon, and Southern Carnarvon Basins: Western Australia Geological Survey, 32pp.
- Petroleum and Marine Division, Geoscience Australia, 2007. Oil and Gas Resources of Australia 2005. Geoscience Australia, Canberra.