Surat Basin

CENTRAL EASTERN AUSTRALIA, ONSHORE

Reservoir:

Precipice, Pilliga and Hutton sandstones

Seal:

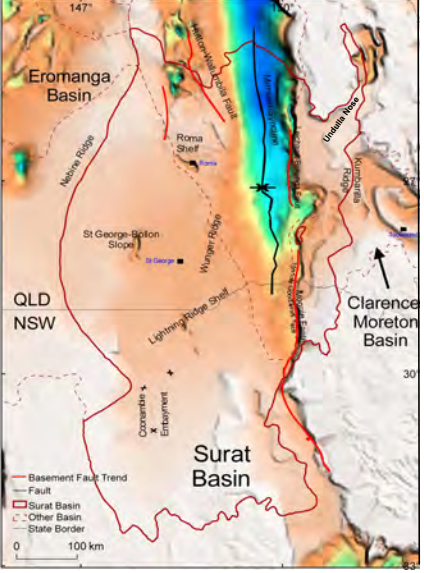**Evergreen**, Orallo, and Pulawaugh formations

HYDROCARBON POTENTIAL

CATEGORY 1 and 2 (OGRA 2005)

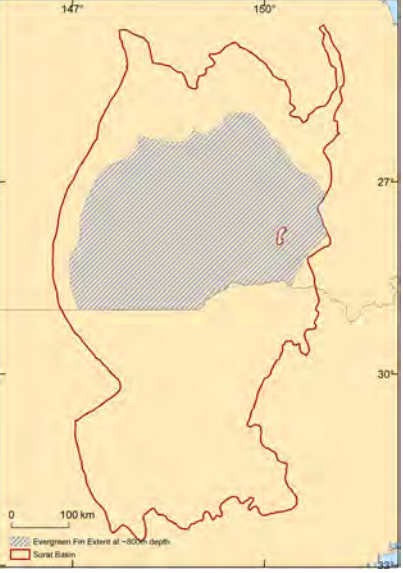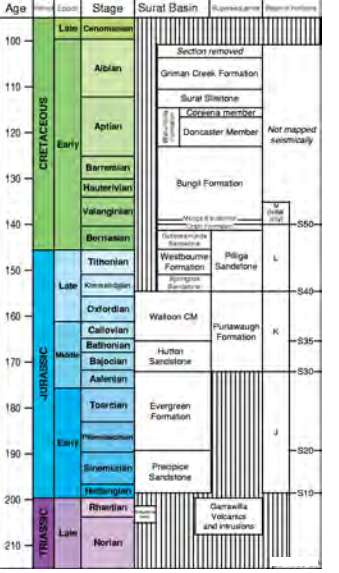|		
Crude oil	MMBL	0.21
Condensate	MMBL	0.04
LPG	MMBL	0.10
Sales gas	Tcf	0.03

STRUCTURAL ELEMENTS

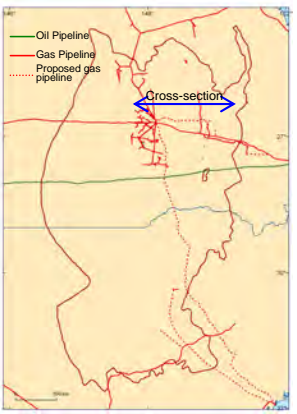Modified OZ SEE-BASE™ (2005) image

REGIONAL SEAL AREA
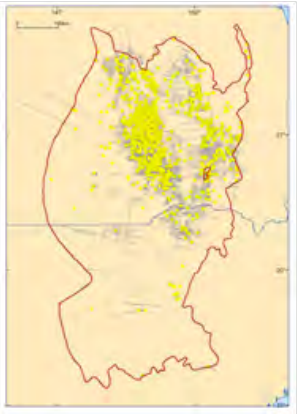

STRATIGRAPHY

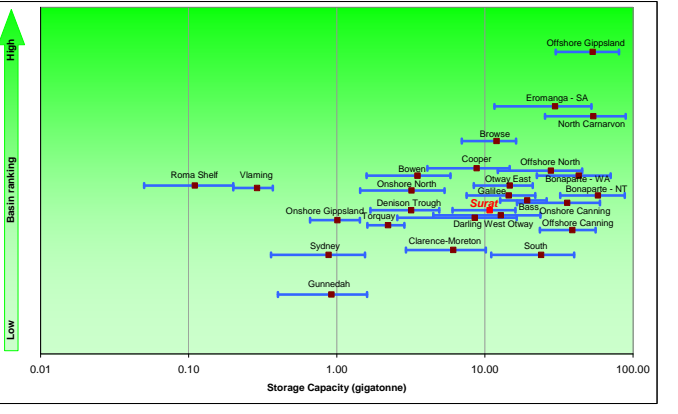

(After Totterdell et al., 2009)
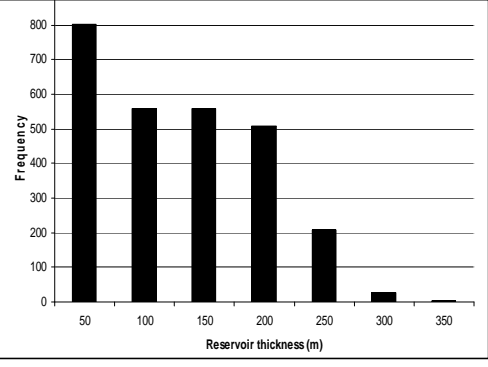
OIL AND GAS FIELDS

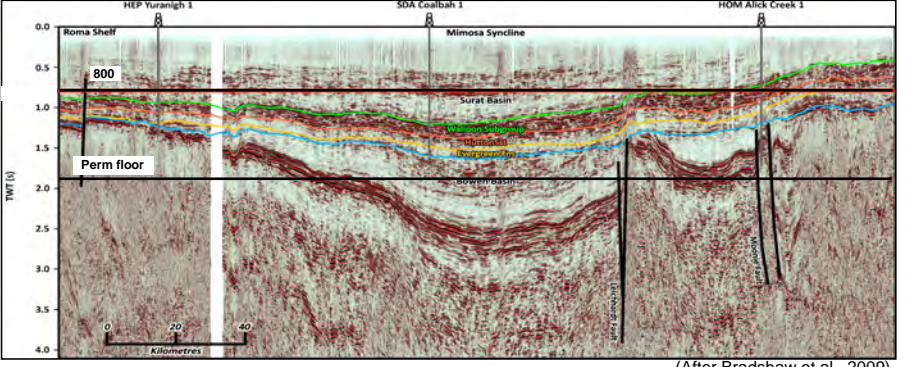## WELLS AND SEISMIC COVERAGE

BASIN RANKING VS. CAPACITY
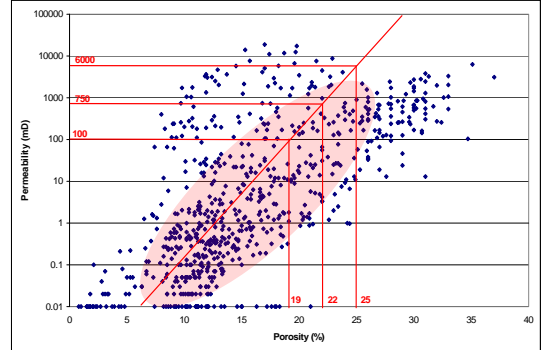

RESERVOIR THICKNESS

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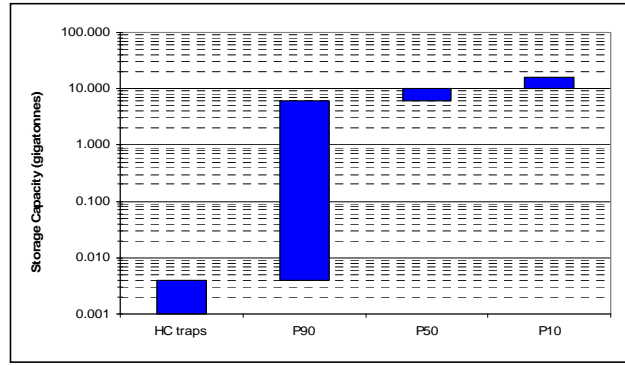

(After Bradshaw et al., 2009)

Surat Basin

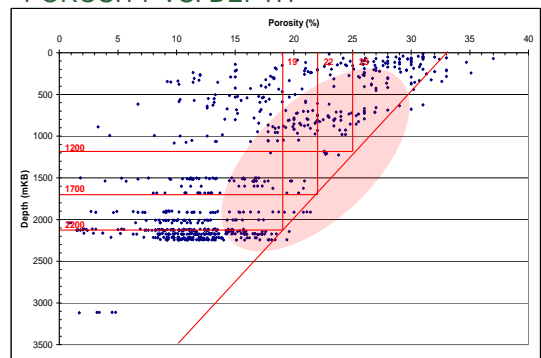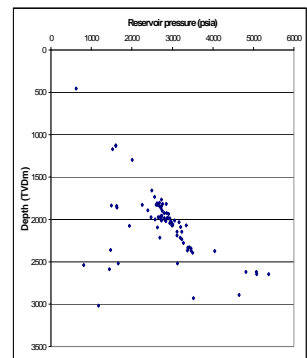## POROSITY VS. PERMEABILITY *Values from basin-wide dataset

POROSITY VS. DEPTH

PERMEABILITY VS. DEPTH

STORAGE CAPACITY

RESERVOIR PRESSURE VS. DEPTH *CSIRO PressurePlot

*based on Bowen and Surat basins

FRACTURE PRESSURE VS. DEPTH *CSIRO PressurePlot

*based on Bowen and Surat basins

STORAGE CAPACITY CURVE

BASIN RANKING

Category	Description	Score	Weighting
Tectonics (Seismicity)	Medium/Low	4	0.00
Size	Large	3	0.06
Depth	Intermediate	3	0.10
Type	Non-marine and Marine	2	0.04
Faulting intensity	Extensive	1	0.14
Hydrogeology	Good	3	0.04
Geothermal	Moderate	2	0.05
Hydrocarbon potential	Small	2	0.05
Maturity	Mature	4	0.05
Coal and CBM	Deep	3	0.00
Reservoir	Good	4	0.16
Seal	Good	4	0.18
Reservoir/Seal Pairs	Excellent	4	0.03
Onshore/Offshore	Onshore	3	0.00
Climate	Subtropical	4	0.00
Accessibility	Acceptable	3	0.00
Infrastructure	Moderate	3	0.00
CO_2 sources	Moderate	3	0.00
Knowledge level	Good	3	0.05
Data availability	Good	3	0.05
Overall Ranking			**21**

STORAGE CAPACITY ESTIMATE

Parameter	Unit	Score (P90)	Score (P50)	Score (P10)	Distribution
Area of storage region	km^2	30000	40000	65000	Triangular
Gross thickness of saline formation	m	20	60	120	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	6.1	10.3	16.1	

POTENTIAL INJECTION PARAMETERS

Parameter	Unit	Shallow	Mid-Depth	Deep
Depth base seal	m	1170	1625	2070
Formation thickness	m	30	75	130
Injection depth	m	1200	1700	2200
Porosity	%	25	22	19
Absolute permeability	mD	6000	750	100
Formation pressure	psia	1760	2500	3230
Fracture pressure	psia	2890	4100	5300

Insufficient data for the following items:

•Top Seal Potential Graph

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 CO_2 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 CO_2 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 CO_2 avoided, calculated using the net present value of cash flows over a 25 year asset life.

REFERENCES

Bradshaw, B.E., Spencer, L.K., Lahtinen, A.C., Khider, K., Ryan, D.J., Colwell, J.B., Chirinos, A. and Bradshaw, J., 2009. Queensland carbon dioxide geological storage atlas.

OZ SEEBASE™ STUDY, 2005. OZ SEEBASE™ structural GIS, version 2. FrOG Tech Pty Ltd, project code GA703.

Petroleum and Marine Division, Geoscience Australia, 2007. Oil and Gas Resources of Australia 2005. Geoscience Australia, Canberra.

Totterdell, J. M., Moloney, J., Korsch, R. J. and Krassay, A.A., 2009. Sequence stratigraphy of the Bowen-Gunnedah and Surat Basins in New South Wales. Australian Journal of Earth Sciences, 56 (3), 433-459.