SOUTH AUSTRALIAN DEVELOPMENTS

EXCELLENCE IN OIL AND GAS 2014

Elinor Alexander
Director  Geology & Exploration Branch
Energy Resources Division
DMITRE
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Petroleum tenements

- Cooper CO2013 bid round open
- Most prospective acreage currently taken but farm-ins available

Frontier and mature basins, plays include:
- Neoproterozoic-Mesozoic oil
- shale, tight and BC gas
- deep coal seam gas
- coal gasification plays

Work program bidding – Cooper & Otway
Frontier onshore basins - over the counter applications at any time
Average Royalty 6.7%
Drilling and production trends

SA oil production is currently the highest of the states and NT. SA is the only jurisdiction with growing oil production. Driven by new oil discoveries on the Cooper western flank.

“Cooper Basin production rose by 3.5 MMbbl yoy to 12.2 MMbbl. Quarterly production increased by 1.3 MMbbl to 3.6 MMbbl, due to higher production by Drillsearch, Beach and Cooper Energy.

Cooper Basin production was higher than each of Gippsland and NWS production for the year and quarter.”

EnergyQuest Quarterly, February 2014
Cooper Basin - background

- Commercial gas discovered 1963, oil in 1978
- >1,800 O&G wells, 29 unconventional gas wells
- Largest onshore O&G producer, SA cum. production 5.43 TCF sales gas (1970), 934 mmbbl oil (1983)
- 50% success rate in finding average 2.5 mmbbl oil post 3D, fields as small as ~1-200,000 bbls economic
- Proven 1,000+ metre gas columns can be developed with a mix of (mostly) verticals and (fewer) horizontal wells
- High initial unconventional resource estimates:
  - EIA potential sales gas (shales): 93 TCF
  - Rough estimate sales gas (composite play) ~300 TCF
  - Company 2C contingent unconventional gas resources: ~5 TCF
- Infrastructure – oil and gas pipelines, gas plant
- Effective activity approval and land access regimes
- Exploration and appraisal ramping up, new participants (Chevron, Origin etc.), gas customers (e.g. Orica) now participating.
Cooper Basin who’s who

Operators in Cooper Basin
- Ambassador Exploration
- Beach Energy
- Discovery Energy
- Drillsearch Gas
- Holloman Petroleum
- Tellus Resources
- Santos
- SAPEX
- Senex Energy
- Strike Energy
- Terra Nova Energy
- Victoria Oil

Cooper PEL areas
Cooper Basin - World Class Success

<table>
<thead>
<tr>
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<th>New entrants</th>
<th>Santos JV</th>
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<tr>
<td>Exploration wells drilled</td>
<td>215</td>
<td>43</td>
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<td>Commercial success rate (%)</td>
<td>40</td>
<td>49</td>
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<tr>
<td>Technical success rate (%)</td>
<td>46</td>
<td>51</td>
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<tr>
<td>Appraisal &amp; development wells drilled</td>
<td>102</td>
<td>389</td>
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<tr>
<td>Commercial success rate (%)</td>
<td>93</td>
<td>94</td>
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Cooper-Eromanga Basin Oil Discoveries

New exploration phase: long offset seismic, new entrants, 3D

Cooper Basin Gas Discoveries

New exploration phase: new plays (deep coal, shale & tight gas)
Cooper Basin unconventional gas plays

- Huge unconventional resource play in the deep troughs.
- Tight sands, siltstones, shales & deep coals in Composite Gas Resource accumulations.
- Initial unconventional resource estimates are high:
  - Company 2C contingent unconv. gas resources: ~5TCF
  - EIA potential sales gas (shale): 85TCF
  - Rough estimate of sales gas in composite play: ~175TCF
- Exploration and appraisal drilling ramping up, pilot projects underway.
Cooper Basin deep gas

**Beach Energy: PEL 218:** Potential 300 TCF gas in place in just PEL 218 (Nappamerri Trough, SA) ~100 TCF in shales and >200 TCF in sands. Chevron now partner in SA and Qld.

**Santos:** High-side 200+ TCF recoverable raw gas. Moomba 191, 194 (successful vertical wells). Santos – Beach – Origin JV have domestic and export markets.

**Senex Energy:** Est. 75-110 TCF gas in place in tight sandstone, shales & coals. Origin now a partner in PEL 514, 516 and 115.

**Strike Energy:** Est. 9 TCF gas resource in deep coal in PEL 96 and has attracted a major gas customer (Orica) to back its appraisal program versus terms for 142 bcf.
Composite Resource Play

Moomba

Continuous basin centred gas

Base Patchawarra depth structure map showing unconventional gas wells

Figure sourced from Beach Energy
Moomba Central Decline Curve Analysis

3 decline curves fit to production data based on the first 5 years after peak.

- $b = 0$ (exponential), best for conventional reservoirs, but doesn’t account for extended period of low rate decline from year 17 onwards);
- $b = 0.5$ and $1$ (hyperbolic), best fit for tight gas and shale gas - suggests gas production has been supplemented by tight lithologies and possibly coal seams.
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Roadmap for Unconventional Gas

Designed to inform industry strategies, government policies, and regulations to facilitate unconventional gas projects in ways that SA communities welcome.

Available for free download OR via 2014 USB card (please see me, limited copies here)

5 working groups formed:
• Training hub for deep unconventional gas operations
• Cooper Basin supply hubs, roads and air strips;
• Cooper Basin water use;
• Transport with reduced red tape;
• GHG detection.

‘High Notes’ from working groups

Working Group 1 (Training) - Paul Goiak (DMITRE Industry Participation Office). Leading Operators in the Cooper Basin (Santos, Beach and Senex) have agreed to contribute an aggregate of > $1million in cash and in kind to establish shared training facilities at Tonsley. (New Core Library to be located at Tonsley.)

Working Group 2 (supply hubs, infrastructure) - Use Roadmap to model transport scenarios for road, rail and air for minimum 6,000 PJ Cooper gas to supply a 15 year gas contract. Special facility licences are/will enable additional depots, airstrips and petroleum handling facilities. Both parties supporting sealing the Strzelecki Track.

Working Group 3 (Water use in Cooper Basin) – operators pooling water use forecasts (SA-Qld) for basin-wide modelling – first step towards life-cycle water use planning.

Working Group 4 (SA-Qld 'wharf to well' corridors) – working with Qld regulators and new National Heavy Vehicle Regulator.

Working Group 5 () - heard results of measuring and monitoring fugitive GHG emissions in the USA and Qld. Grants sought for University research for more cost-effective GHG monitoring. Develop FAQs to inform public about all GHG emission sources.
Supply-chain goal posts:
2,800 wells @ 3Pj / well over 15 yrs to attain 8,422 Pj (~10% of 93 TCF EIA estimate for gas from shales)

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<tr>
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<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017-2028 (12 years)</th>
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<td>Drilling rigs</td>
<td>3</td>
<td>5</td>
<td>9</td>
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<td>Type of wells</td>
<td></td>
<td></td>
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<tr>
<td>Vertical</td>
<td>1.5</td>
<td>1.5</td>
<td>2.5</td>
<td>2.5</td>
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<tr>
<td>Horizontal</td>
<td>1.5</td>
<td>2.5</td>
<td>2.5</td>
<td>4.5</td>
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<tr>
<td>Wells/yr/rig</td>
<td>17.5</td>
<td>11</td>
<td>17.5</td>
<td>11</td>
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<tr>
<td>Wells Tally</td>
<td>26.25</td>
<td>16.5</td>
<td>43.75</td>
<td>27.5</td>
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</table>

- Rig Years @ 50% vertical vs horizontal
- (12 years)
2013 Cooper Basin Flank Acreage Release

Bids close on Thursday 29 May 2014

CO2013-A 627 sqkm.
1 exploration well (Tawriffic East 1)
876 line kilometres of 2D seismic data.

Potential exists for:
• multiple stacked Eromanga Basin oil plays along the Permian zero edge
• conventional 4 way dip closure and stratigraphic Cooper Basin gas plays
• unconventional Cooper and Warburton basin gas plays

CO2013-B 3443 sqkm.
No wells
315 km 2D seismic.

Potential exists for:
• migrated hydrocarbons beyond Permian zero edge
• unconventional plays including deep CSG, Warburton Basin?

Vacant areas have been added to release after expressions of interest from explorers
Field Size Distribution – Proven Productive Oil Play in the Cooper-Eromanga Basins

Swanson’s Mean = 2.53 million barrels per new field discovery
Retention Licenses for Oil

Proven Cooper-Eromanga oil play

PRLs
Oil exploration wells (2000-13), western Cooper – Eromanga
- 56% located with 3D were discoveries (and find-size ↑)
- 30% located with 2D were discoveries
- Average 2.53 mmbo find size
- 10 JV operators for 22 companies

Licences in Cooper Basin
- Ambassador Exploration Pty Ltd
- Beach Energy Ltd
- Bridgeport Energy Ltd
- Discovery Energy SA Ltd
- Drillsearch (513) Pty Ltd
- Holioman Petroleum Pty Ltd
- Linc Energy Ltd
- Sartos Ltd
- Senex Energy Ltd
- Strike Energy Ltd
SA Roundtable top priority was fit for purpose license terms to match the life-cycle for finding, appraising, developing and producing resources.

Subject Area Agreements can be applied for over PELs in the play trends - 15 year term Petroleum Retention Licenses (PRLs) with a minimum expenditure of $4500 per sq km per year.
PRL Work Program

Winner’s Curse?

- Average for High Bids: $4,435 per sq km per year
- $4,500 /km²/pa

$ = $14,000
$ = $16,000
$ = $12,000
$ = $10,000
$ = $8,000
$ = $6,000
$ = $4,000
$ = $2,000
$ = $1,000
$ = $0

Average for High Bids: $4,435 per sq km per year

y = 16418e⁻²⁰·³³x
R² = 0.6809
Subject Area PRLs

- A company approached Government to progress applications for PRLs, targeted consultation occurred with operators, at least 1 non-operator and service sector – clear majority supported initiative.
- Avoids 18 -24 months delay in new discoveries – after 5 yearly relinquishments, work program bid process and land access - grant of successively smaller and disjointed PELs;
- Accelerates investment (contestable levels) through PRL renewal terms;
- Delivers investment, jobs, production and royalties - sooner;
- Industry as a whole has greater investment efficiency;
- Based on DMITRE’s mapping, 21 companies in JVs under 10 Operators may opt into Subject Area Agreements;
- Overcomes ever-smaller licences attracting ~$20 million bids, c.f. financial competence of ASX IPOs;
- Seeks secure investment at a time the State needs stronger investment;
- Farm-outs and sales are expected to further accelerate investment;
Bight Basin

BIGHT BASIN WORK PROGRAMS

BP - EPPs 37 to 40
- Granted 4 permits in Jan 2011 covering 24,000km²
- Primary (guaranteed) program $605m
  (11,400km² 3D; 4 wells to 2014)
- Seismic acquisition 2011-12
- Drilling 2013-14
- Total 6 yr program worth $1.4b

SANTOS & MURPHY OIL - EPP43
- Granted 1 permit in October 2013 covering 32,375km²
- Primary program $103m (4,000km² of 2D seismic and 4,600km² 3D seismic surveys and drilling 1 exploration well)

BIGHT PETROLEUM - EPP 41 and 42
- Granted 2 permits in July 2011 covering 8,500km²
- Primary program $67.6m
  (235km² 2D and 768km²; 3D in 2011-12, 1 well to 2014)

CHEVRON - EPP44 & EPP45
- Granted 2 permits in October 2013 covering 32,375km²
- Primary program $496m (23,000km² of 3D seismic surveys and drilling 2 exploration wells on each permit)
Bight Basin

- The last under-explored Cretaceous delta in the world.
- Evidence for active petroleum systems: e.g. asphaltite strandings, seeps, organic rich source rocks with good-excellent liquids potential.

Images courtesy Geoscience Australia
Conclusions

- South Australia has huge ‘blue sky’ potential for unconventional gas, the Roadmap is providing a very effective framework, but still early days – 29 wells, more to come!
- Great opportunities to learn from US and to build local supply chain.
- Opportunities exist now for explorers, infrastructure developers, service & supply sectors.
- SA 1st in Oceania region in 2013 Fraser Institute Global Petroleum Survey, industry said:
  - “Pro-active government (and opposition), stable and attractive fiscal regime, informed and professional regulator, very superior access to essential data.”
  - “South Australia is becoming well-known for rapid approvals and cutting through green and red tape”
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