Exploration Opportunities in South Australia

Australia House
13 October 2017

Elinor Alexander

Energy Resources Division - Minerals and Energy Group
South Australian Department of the Premier and Cabinet
STATE OF PLAY
ONSHORE
AUSTRALIA

<table>
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<th>Jurisdiction</th>
<th>Fracc ban or moratorium</th>
<th>Conventional exploration ban</th>
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Brief history of oil & gas in SA

1836 - SA founded
1859 - Col. Drake drills 1st oil well, Pennsylvania USA
1866 - First Australian oil well drilled near Salt Creek
1941 - SA Mining (Petroleum) Act
1963 - Cooper Basin gas discovered
1968 - Moomba 6 fracture stimulated
1970 - Cooper Basin gas supplied to Adelaide
1982 - Economic oil fields discovered
1984 - First oil exports from Pt Bonython
1987 - Katnook gas discovery, Otway Basin, SE
1991 - Natural gas from Katnook field supplied to SE industrial, commercial and domestic customers
2000 - Modern Petroleum Act and Regulations
2010 - SA roundtable for unconventional gas forms
2012 - Roadmap for Unconventional Gas in SA launched
2016 - PACE Gas grant program launched to deliver more gas soonest to efficient SA power generators
2017 - >$42 billion oil and gas produced and over >$2.8 billion in royalties paid to government since 1969
Benchmarking regulatory performance – Fraser Institute

Policy Perception Index Scores for Australian Jurisdictions 2010-2016

Policy Perception Index Score

South Australia
Northern Territory
Victoria
Western Australia
Tasmania
Australia—Offshore
Queensland
New South Wales
SA’s ‘one window into government’

Company activity

ERD

Our co-regulators

Health

EPA

National Parks

Native vegetation - MOU

Surface and ground water

Safework (Major Hazardous Facilities)

Planning
South Australia Energy Plan – Gas Incentives

The A$48 million PACE GAS Program to support the most substantiated ‘shovel-ready’ projects with the greatest likelihood of:

- securing significant new gas supplies to South Australian customers by year-end 2019 (Round One) and 2020 (Round Two); and
- accelerating new technology deployment to lift productivity

$24m Round One PACE Gas grants:

- A$5.82m - Senex-Santos Cooper Basin pipelines;
- A$6m - Beach Energy Otway Basin exploration well;
- A$3.96m - Santos Cooper Basin re-frac stimulation;
- A$6m - Santos Cooper Basin underbalanced drilling;
- A$2m - Strike Energy Cooper Basin deep coal pilot.

$24m Round Two PACE Gas grants:

- Bids closed 1 Aug 17. Fifteen applications from 11 companies through 6 operators – announcement in October 2017

Unrisked sales gas targeted by the 5 PACE Gas grants > 100 PJ with > 1,700 PJ follow-up potential. All projects scheduled. Haselgrove #3 spudded.
Where is petroleum found in South Australia?

1. 1866-68 ‘Alf Flat 1’ drilled to 7.6 m depth. First oil well in Australia only 7 years after Col Drake’s well.

2. 1955 - Santos Wilkatana 1: Cambrian oil (~540 million years old) indications focussed explorer interest on SA. Santos exploration effort shifted to NE of State.


South Australia

- Conventional oil and gas
  - Western flank oil play continues with 50+% success rate in finding avg. 2.5 mm bbls oil
- Huge potential for unconventional gas plays:
  - deep coal, shale gas, tight gas, BCG
  - deep CSG, coal gasification plays
- Work program bidding in competitive tender regions in Cooper and onshore Otway basins
- Over the counter applications for vacant acreage outside of competitive tender regions
- Native Title land access agreements cover exploration and production in areas where Native Title is recognised
- Offshore - Bight Basin fully under licence
Cooper Basin

- First commercial gas discovered in 1963
- Produced ~ 5.7 TCF of gas since 1970
- > 2,500 petroleum wells in SA Cooper,
- 44 wells targeting gas in unconventional reservoirs
- Over 700 wells stimulated; over 1200 stages.
- Large unconventional gas resource targets - huge tight sandstone and deep coal/source rock gas plays. Proven 1,000+ m gas columns

Photos courtesy of Santos Ltd
Photos courtesy of Condor Energy
Cooper Basin vacant acreage is subject to work program bidding

No current releases

Future vacant acreage will be available via work program bidding:

• 5 year work program – scoring method published,
• Evidence of financial and technical capacity.
Exploration wells located with 3D seismic in the proven play have attained a **46% commercial success rate** from 2001 to date in 2017.

Range of commercial discoveries is hundreds of thousands of barrels if close to facilities to **20 mmbo 2P reserves** (Bauer field).

Grouped Petroleum Retention Licences (PRLs) **enable explorers to drill the best prospects first** while assuring a multiple of investment above the present value of winning bids for ever smaller licences. **This has sustained investment since the fall in the price of oil in late 2014.**
Cooper Basin Regional Petroleum Prospectivity Study

Collaborative study involving Geoscience Australia, SA and QLD

Generated datasets for USGS assessment of the Cooper Basin conventional and unconventional oil and gas resources.

Completed in early 2016.

Reports and models here:


USGS Conventional Resource Assessment

Completed in May 2016

Assessed undiscovered technically recoverable conventional oil and gas resources of the entire Cooper and Eromanga basins.

Mean total of 68 million barrels of oil, 964 BCF of gas and 19 million barrels of natural gas liquids.

https://pubs.er.usgs.gov/publication/fs20163028
Otway Basin

- 1866 – Australia’s first oil well drilled at Alfred Flat; > 100 wells drilled since.
- 1966 - first commercial gas flow Caroline-1 - CO₂
- 1987 - first commercial natural gas flow Katnook-1
- 1991 - Katnook Plant built and commissioned – currently mothballed
- 1992 - oil recovered from Sawpit-1 in 1992, oil flowed from Wynn-1 in 1994 – neither well commercial
- 2014 - Beach Energy Bungalow 1 and Jolly 1 ST1 identified conventional and unconventional targets
- Sept 2017 - Beach Energy spudded Haselgrove 3 after securing A$6million PACE Gas Grant funding
Otway Basin

Conventional gas play trends, shale oil and unconventional gas potential covering 4 prospective troughs

Pipeline infrastructure - access to SE Australian gas market

OT2017-A work program bidding closed
Friday 29 September 2017
PACE Royalty Return Program

- Designed to encourage the continued development of oil and gas fields in SA by sharing a percentage of the State’s royalties with freehold and perpetual lease owners whose properties coincide with oil and natural gas fields.
- Initially set at 10 per cent of the prevailing royalty rate received by the State Government.
- A first for Australia.
Bight Basin - Commonwealth waters

14 exploration wells scheduled 2011 – 22

A$ value of current work program (assumes 2 BP EPPs cease):

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<tr>
<th>Term</th>
<th>Tally</th>
<th>Annual Forecast</th>
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<td>2011 – 17:</td>
<td>$215m</td>
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<tr>
<td>2011 – 18:</td>
<td>$443m</td>
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<td>2011 – 21:</td>
<td>$1,036m</td>
<td>$284m in 2021</td>
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<tr>
<td>2011 – 22:</td>
<td>$1,097m</td>
<td>$61m in 2022</td>
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Major E&P companies are targeting billion barrel prospects – suggests potential for very competitive finding costs.
SA government keen to facilitate onshore service and support industries.
Easy access to data

• PEPS online – project in progress
• Downloadable WCRs - including scanned mudlogs and composite logs
• Digital well logs + images
• Download selected LAS logs for free
• 2D & 3D seismic data
• Field, edit tapes, cased hole, digital mudlogs, image logs – free web access to logs via PEPS online in future
• Maps, GIS - Cooper isolith, isopach, gas wetness etc.
• Core and cuttings available for viewing and sampling (new Core Library)
• Core & thin section photo databases via free downloads
Roundtable for Oil & Gas in SA

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

>2,000 members >1000 organisations ~30 individuals

8 working groups addressing priorities:

• Training – Tonsley Centre of Excellence;
• Cooper Basin supply hubs, roads & air strips;
• Cooper Basin water use;
• Transport with reduced red tape;
• GHG detection;
• Supplier forum;
• Gaseous fuels for transport & heavy machinery;
• Sharing Information.

New members are welcome – please see me

Take in the **Flinders Ranges and Outback** - step back in time in a beautifully rugged, 540 million-year-old landscape. A trip to the Flinders Ranges is something every geologist should experience.

**VISIT ADELAIDE** and get a warm welcome to Australia.

**APPEA 2018**
**Conference and Exhibition**
Adelaide, Australia 14-17 May 2018

South Australia’s door is open.

Supportive, innovative and effective oil and gas investment framework

Cooper Basin remains Australia’s largest onshore oil and gas province

Bight Basin attracting billions in exploration investment

Oil and gas roundtable with hundreds of members working to address priorities

A framework placing local companies into a global supply chain

Australia’s first roadmap for unconventional gas projects

Come and visit us at AAPG ICE

www.petroleum.dpc.sa.gov.au