



Exploration Opportunities in South Australia

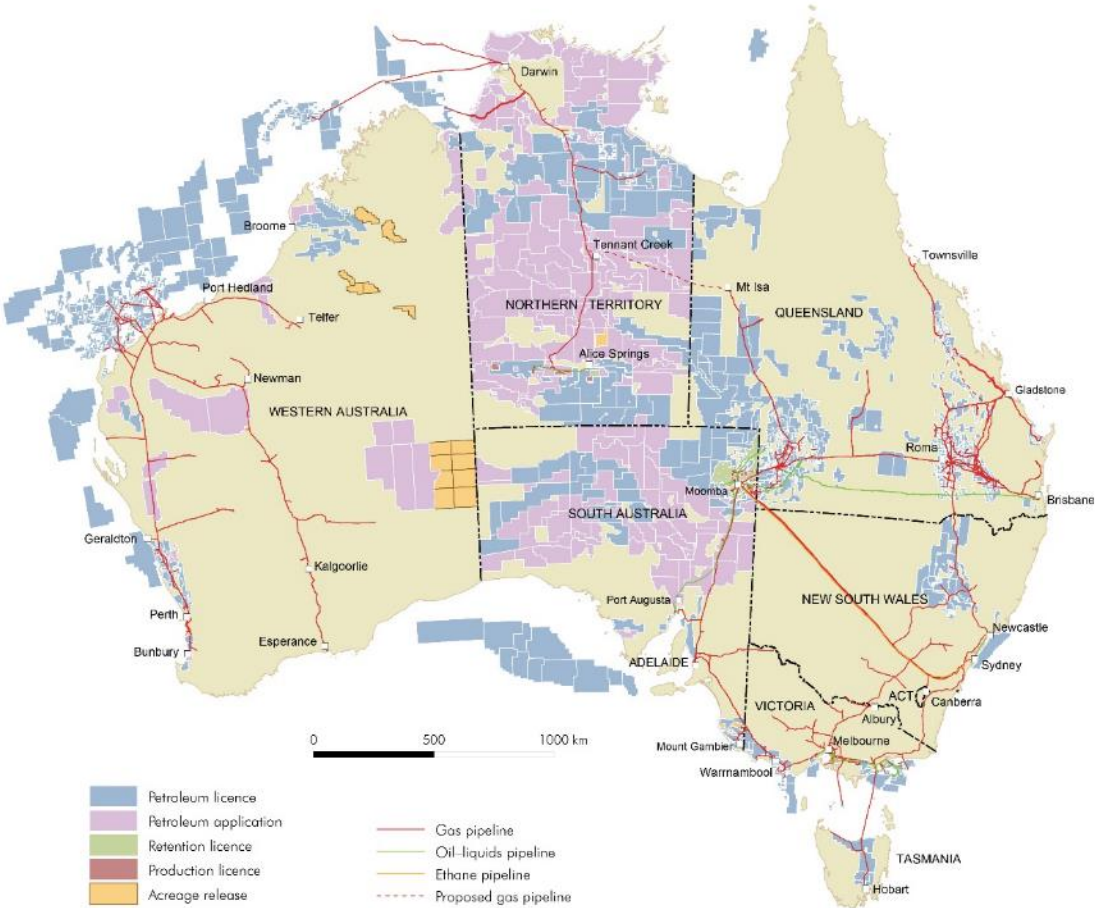
Australia House
13 October 2017



Elinor Alexander

Energy Resources Division - Minerals and Energy Group
South Australian Department of the Premier and Cabinet

STATE OF PLAY ONSHORE AUSTRALIA



Jurisdiction	Fracc ban or moratorium	Conventional exploration ban
NSW	Orange	Green
NT	Red	Green
Qld	Green	Green
SA	?	Green
Tas	Red	Green
Vic	Red	Red
WA	Red	Green

Brief history of oil & gas in SA

Premier Dunstan, smelling the oil,
Tirrawarra 1 in 1970



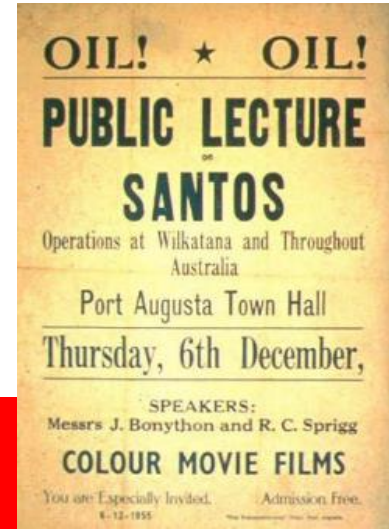
Premier Weatherill turns the
valve to kick off gas
production from Santos JV
Moomba 191 in 2012



Premier Playford on holiday in the Cooper
Basin, 1960 (he's the one in the red and white
beanie)

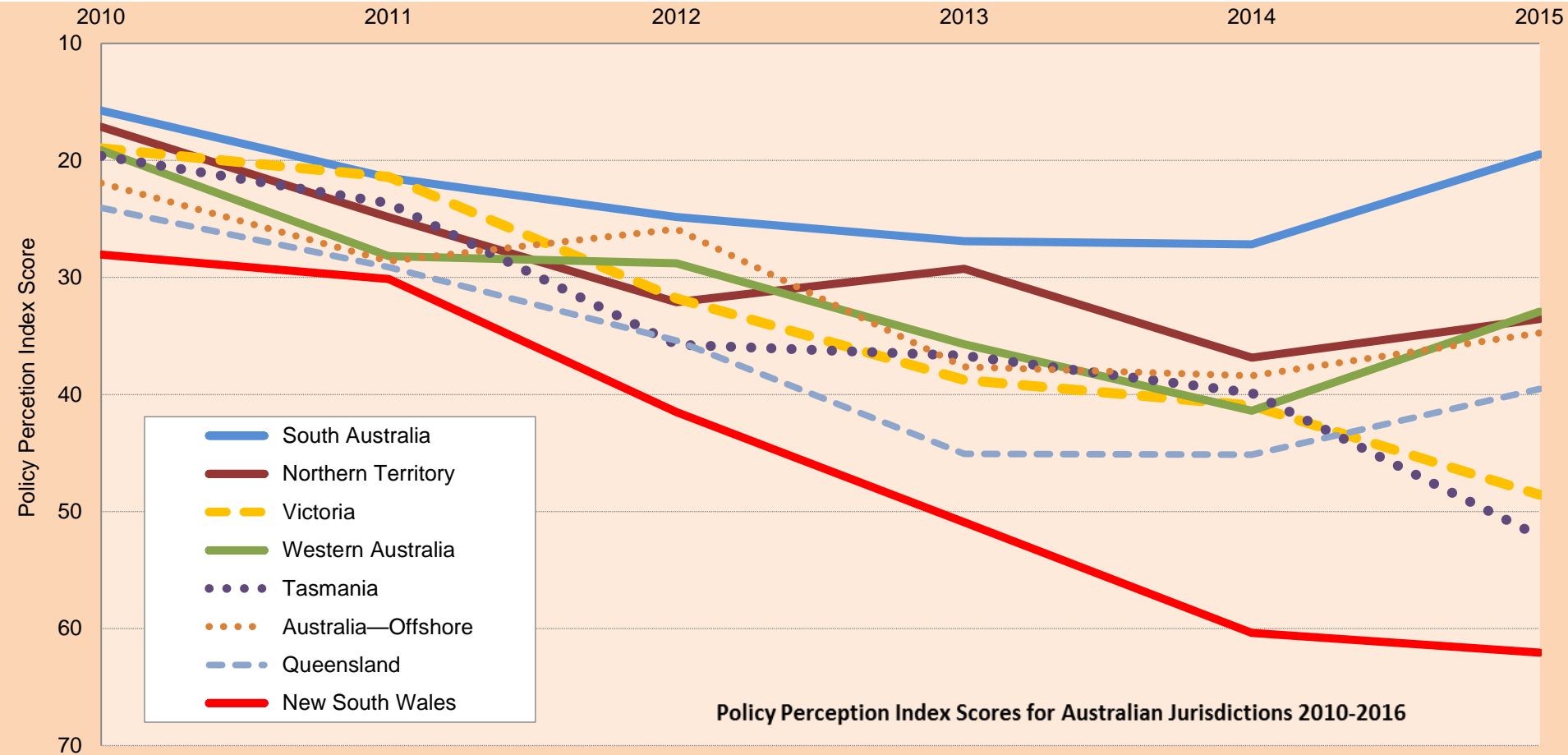


Replica of old
steam powered
rig, Salt Creek



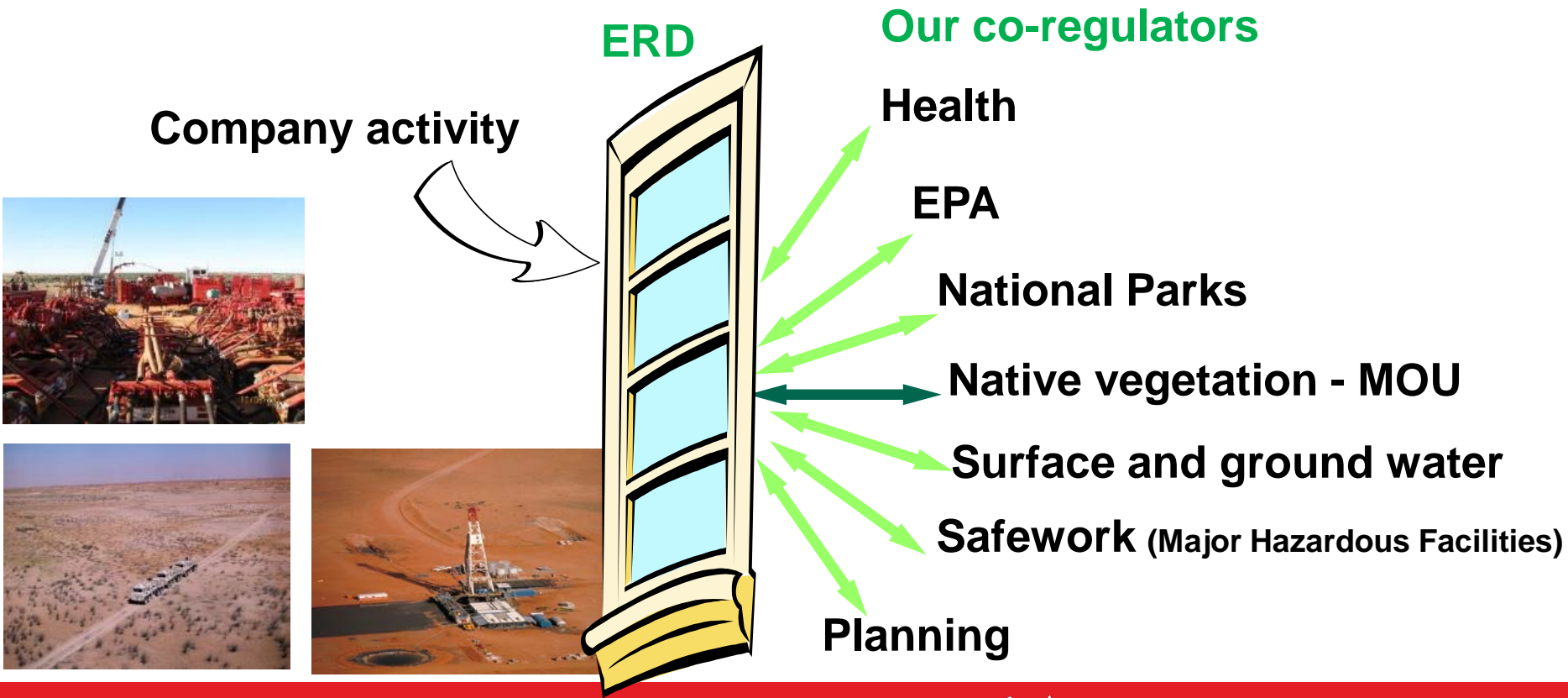
- 1836 - SA founded
- 1859 - Col. Drake drills 1st oil well, Pennsylvania USA
- 1866 - First Australian oil well drilled near Salt Creek
- 1941 - SA Mining (Petroleum) Act
- 1963 - Cooper Basin gas discovered
- 1968 - Moomba 6 fracture stimulated
- 1970 - Cooper Basin gas supplied to Adelaide
- 1982 - 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

SA's 'one window into government'





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

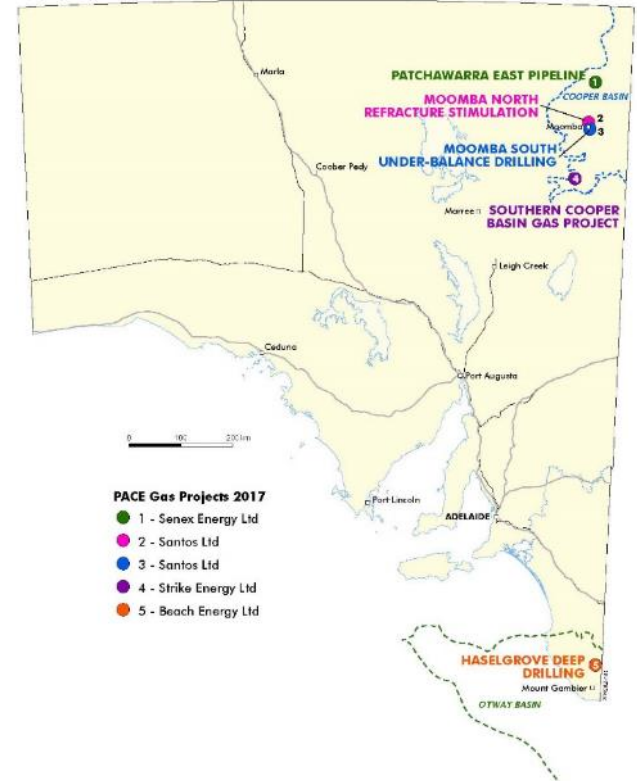
\$24m Round One PACE Gas grants:

- 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.

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.

\$24m Round Two PACE Gas grants:

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



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.

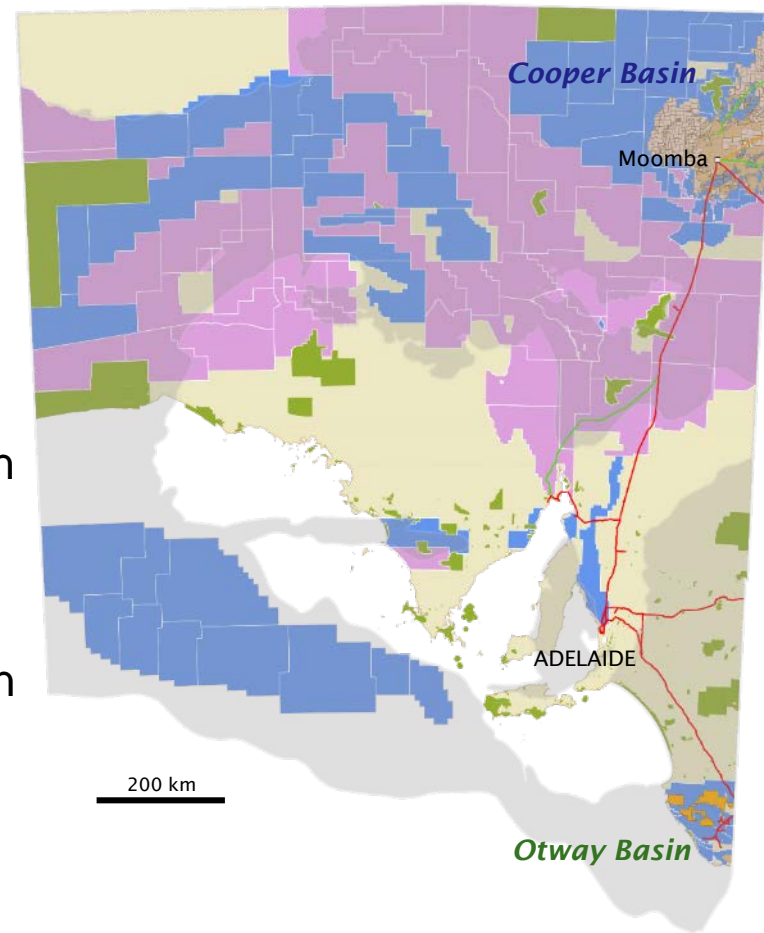
2.
1955 - Santos Wilkatana 1: Cambrian oil (~540 million years old) indications focussed explorer interest on SA. Santos exploration effort shifted to NE of State.

3.
1963 - Cooper Basin: economic natural gas discovered, first supplied to Adelaide customers in 1970.
1978 - oil discovered, exported via Pt Bonython from 1984

4.
1987 - Otway Basin: economic gas discovered at Katnook
1991 - natural gas first supplied to SE industrial, agricultural and domestic customers.

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



Photo courtesy of Condor Energy

Cooper Basin

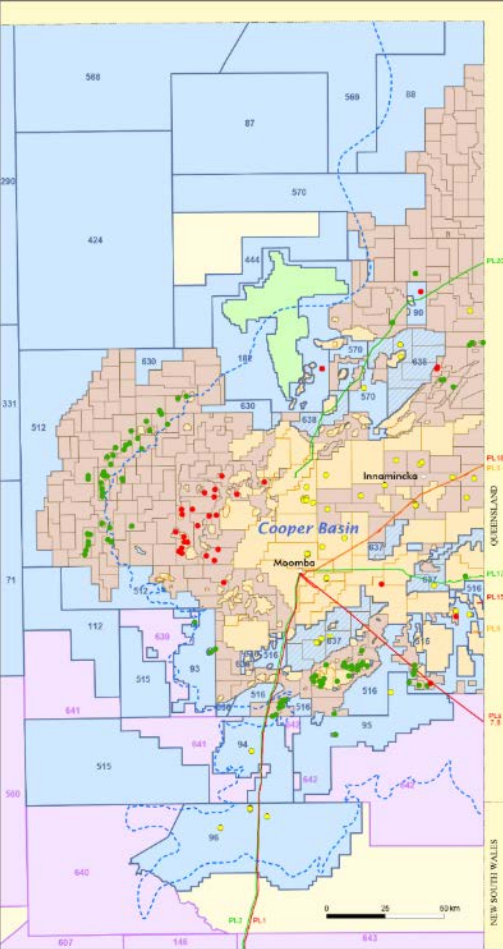


Cooper Basin vacant acreage is subject to work program bidding

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.



Petroleum tenements

- Exploration licence (PEL)
- Exploration licence application (PELA)
- Production licence (PPL)
- Retention licence (PRL)
- Retention licence application (PRLA)

Petroleum pipeline

- Oil
- Gas
- Gas and liquids

Discoveries 2002 - 2017

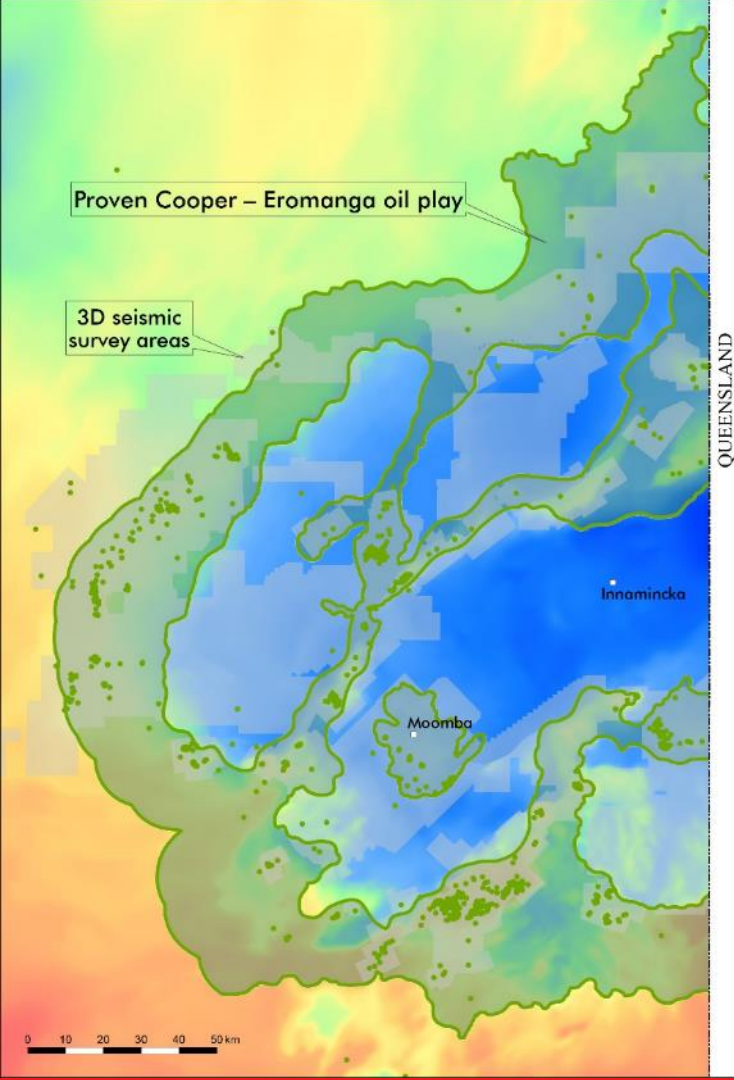
- Oil
- Gas
- Resource play

Proven Cooper-Eromanga oil play in SA

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 mmbbl 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:

<http://www.ga.gov.au/about/projects/energy/onshore-energy-systems/cooper-basin-prospectivity-study>

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.

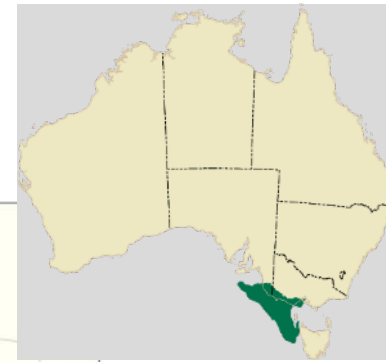
<https://pubs.er.usgs.gov/publication/fs20163028>

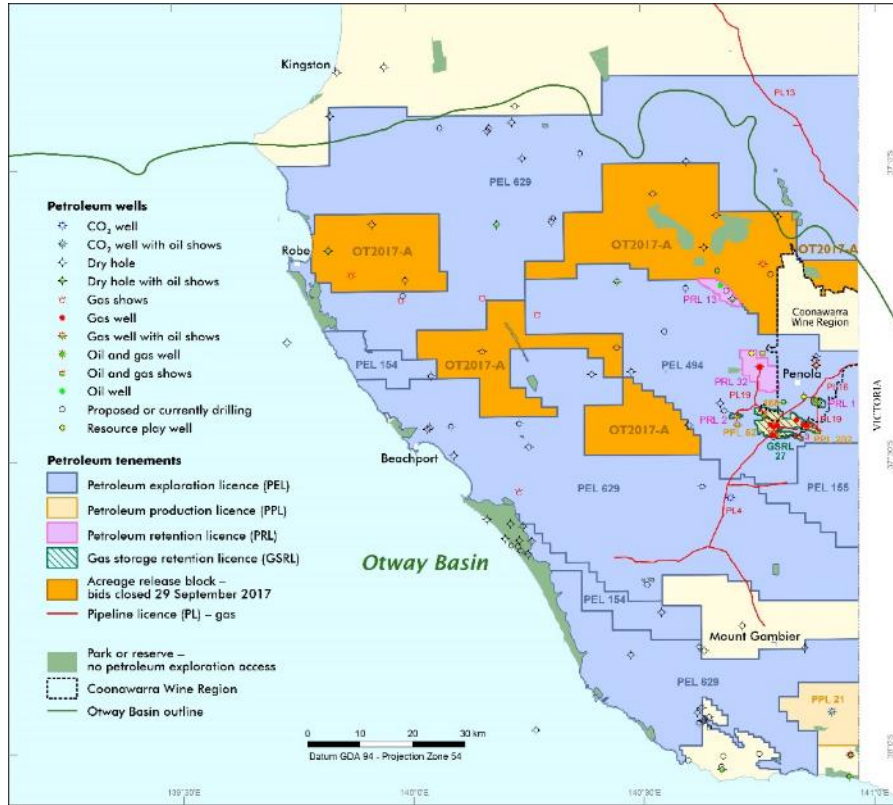


Go
Dep
and

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

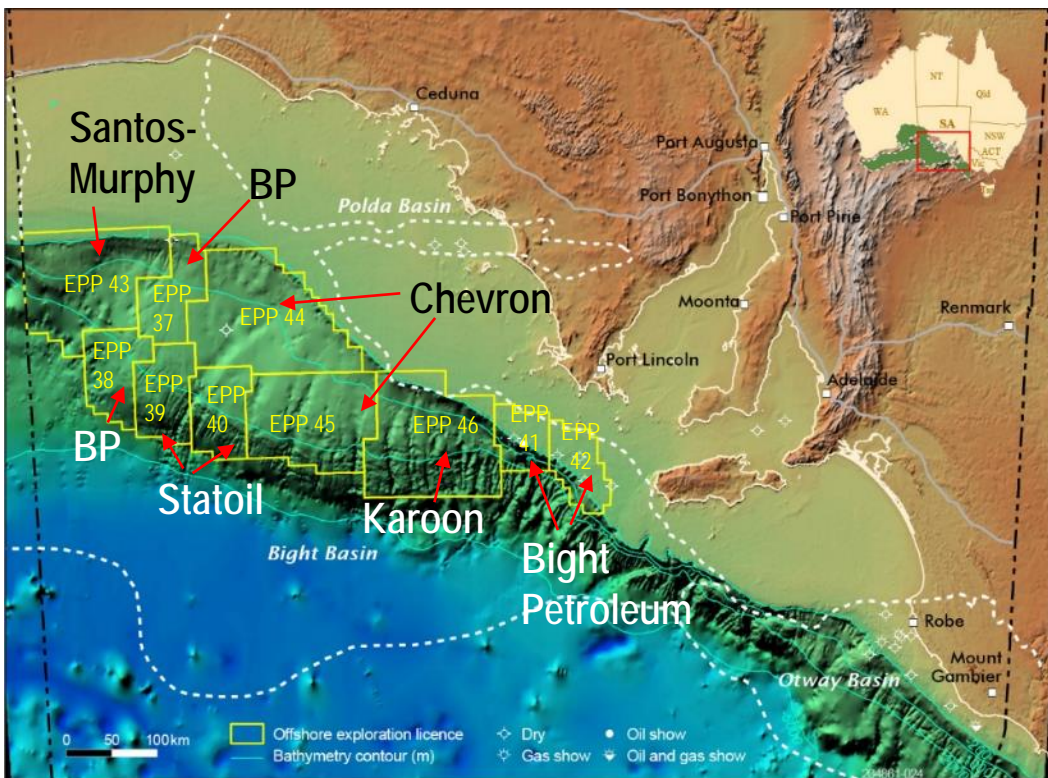
- Designed to encourage the continued development of oil and gas fields in SA by sharing a percentage of the State's royalties with freehold and perpetual lease owners whose properties coincide with oil and natural gas fields.
- Initially set at 10 per cent of the prevailing royalty rate received by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

Otway Basin, South Australia
LAND USE and ACCESS



<p>Parks and Reserves</p> <ul style="list-style-type: none"> Park or reserve – no petroleum exploration access Park or reserve – petroleum exploration access Marine Parks Network – petroleum exploration access <p>Land use</p> <ul style="list-style-type: none"> Cropping Forestry Grazing Horticulture Irrigated grapes Coonawarra Wine Region 	<p>Petroleum tenements</p> <ul style="list-style-type: none"> OT2017-A acreage release block Petroleum exploration licence (PEL) Petroleum production licence (PPL) Petroleum retention licence (PRL) Gas storage retention licence (GSRL) Pipeline licence (PL) – gas <p> Otway Basin outline</p>	<p>Petroleum wells</p> <ul style="list-style-type: none"> CO₂ well CO₂ well with oil shows Dry hole Dry hole with oil shows Gas shows Gas well Gas well with oil shows Oil and gas well Oil and gas shows Oil well Proposed or currently drilling Resource play well <p>Geothermal wells</p> <ul style="list-style-type: none"> Abandoned well Suspended well
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Bight Basin - Commonwealth waters



14 exploration wells scheduled 2011 – 22

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

<u>Term</u>	<u>Tally</u>	<u>Annual Forecast</u>
2011 – 17:	\$215m	
2011 – 18:	\$443m	\$227m in 2018
2011 – 19:	\$673m	\$230m in 2019
2011 – 20:	\$752m	\$79m in 2020
2011 – 21:	\$1,036m	\$284m in 2021
2011 – 22:	\$1,097m	\$61m in 2022

Major E&P companies are targeting billion barrel prospects – suggests potential for very competitive finding costs.

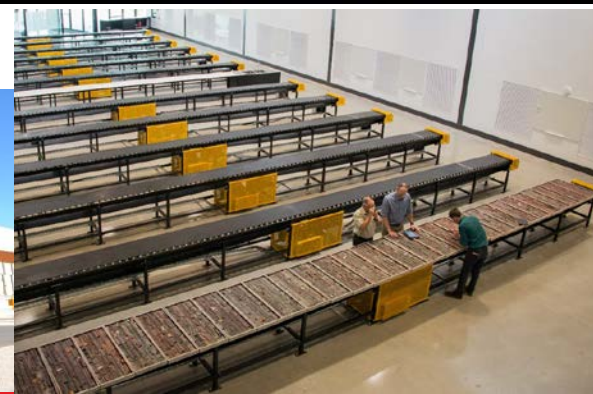
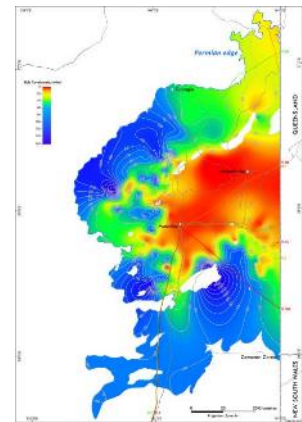
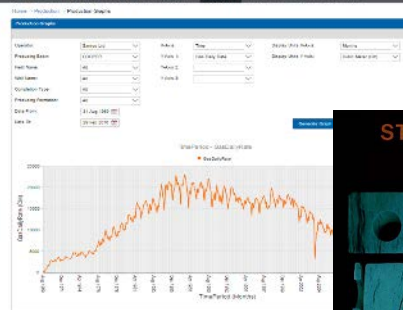
SA government keen to facilitate onshore service and support industries.

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



Petroleum and Geothermal Information



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.

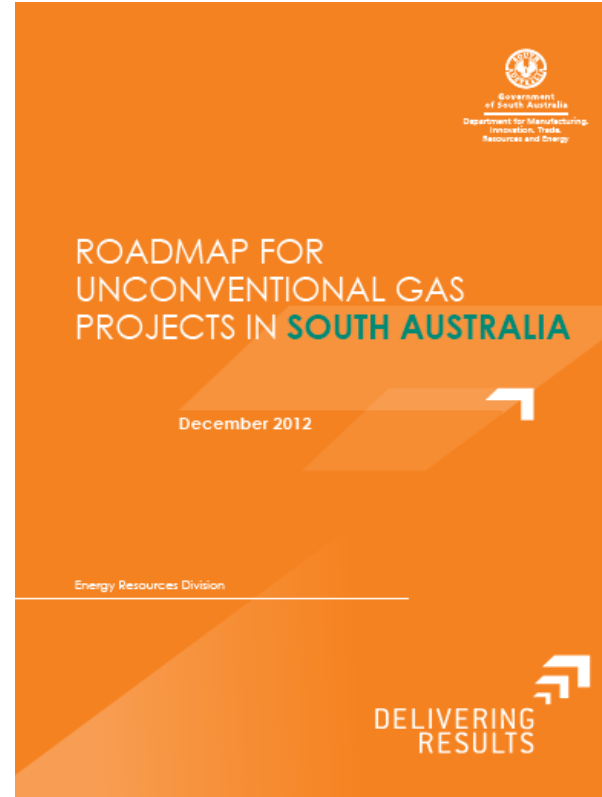
>2,000 members >1000 organisations ~30 individuals

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

http://petroleum.statedevelopment.sa.gov.au/roundtable_for_oil_and_gas

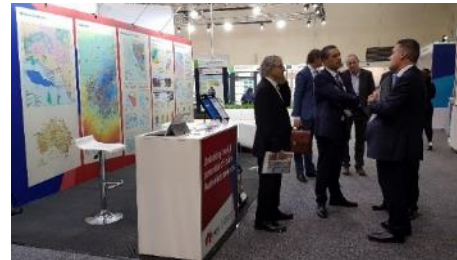




VISIT ADELAIDE and get a warm welcome to Australia.

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.

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



<https://www.appeaconference.com.au/>



Government of South Australia
Department of the Premier
and Cabinet

South Australia's door is open.

Australia's first
roadmap for
unconventional
gas projects

Supportive, innovative
and effective oil and gas
investment framework

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

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

Bight Basin attracting billions
in exploration investment

A framework placing
local companies into
a global supply chain



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