



Australia:

A federal perspective on current and emerging oil & gas opportunities

Australia PETROLEUM

Tom Bernecker, Australian Government, Geoscience Australia



AUSTRALIA PETROLEUM 2019



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- Elinor Alexander (SA Dept. for Energy and Mining)
- Justin Gorton (Dept. of Natural Resources, Mines, and Energy)
- Rod Applegate (NT Dept. of Primary Industry and Resources)
- Ryan Taylor-Walsh (Theia Energy)



Australia is the world's biggest LNG exporter



COMMODITIES DECEMBER 10, 2018 / 2:07 PM / A MONTH AGO

Australia grabs world's biggest LNG exporter crown from Qatar in Nov

ENERGY DECEMBER 10, 2018 / 2:03 PM / A MONTH AGO

Australia overtakes Qatar as world's biggest LNG exporter - Refinitiv data

Jessica Jaganathan

1 MIN READ



SINGAPORE, Dec 10 (Reuters) - Australia overtook Qatar as the world's largest exporter of liquefied natural gas (LNG) for the first time in November, data from Refinitiv Eikon showed on Monday.

In November, Australia shipped out 6.7936 million tonnes of LNG while Qatar exported 6.2025 million tonnes, the data showed.



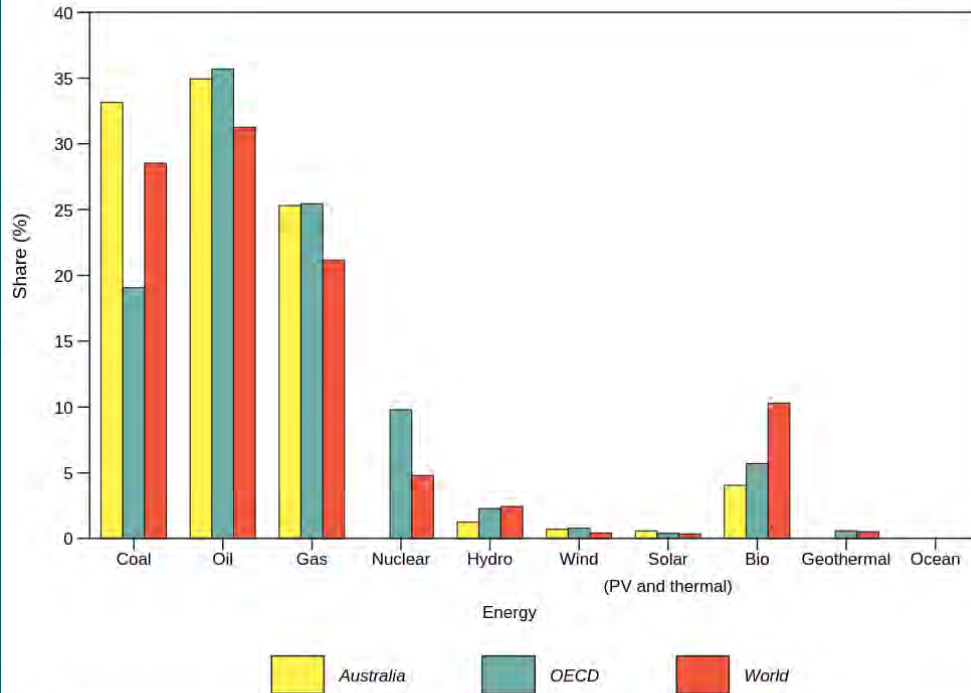
Ichthys



Prelude



Fuel Mix in Primary Energy Consumption (2014)



Source: International Energy Agency 2016, World Energy Balances

Note: OECD = Organisation for Economic Co-operation and Development; PV = photovoltaic

AERA 2.3

- **Australia's primary energy consumption remains strongly fossil fuel based**
- **Oil and coal accounting for over 60%**
- **Increased production of gas-generated energy supported by government initiatives**
- **Production and consumption of renewables increasing steadily**
- **No nuclear energy production, exporter of uranium**



Overview of Low Emission Fossil Fuel Technology Research in Australia

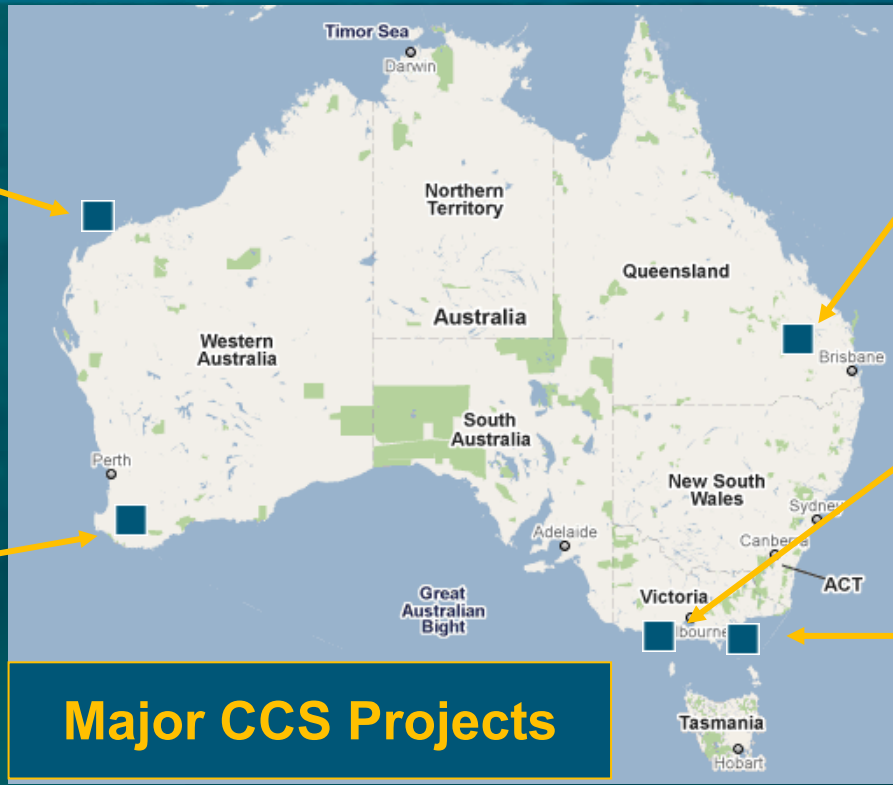


Gorgon LNG Project

Starting 2019; 3-4MMtpa
Largest CCS project globally

South West Hub Project

Injection research facility
Experiment with 1,000t completed



CTSCo Surat Basin Project

Demonstration project,
Target to store 200,000 t
FID in 2019

CO2CRC

Otway Project

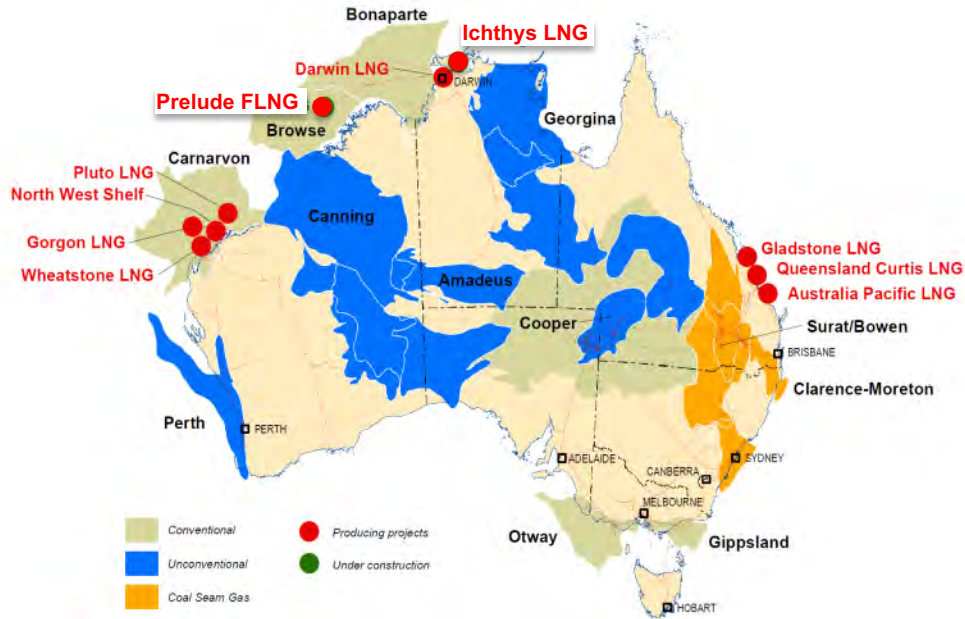
Research facility
Injection, monitoring

CarbonNet Project

Appraisal drilling '19/'20
5MMtpa target



Current Status



- **Australia now Number 1 global LNG exporter**
- **Deepwater drilling in Bight Basin now scheduled for late 2019**
- **Continued appraisal of new oil province in Roebuck (offshore Canning) Basin**
- **Despite downturn in exploration activity, robust participation in nomination for new acreage**
- **New Acreage Release process implemented**

Recent Successes: Roebuck Basin



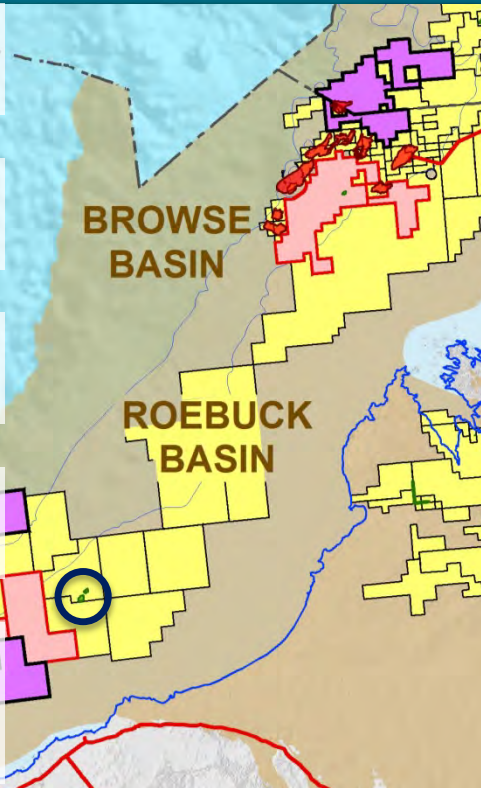
Phoenix South-1 (2014):
oil

Roc-1 (2015):
gas / condensate

Roc-2 (2016):
gas / condensate

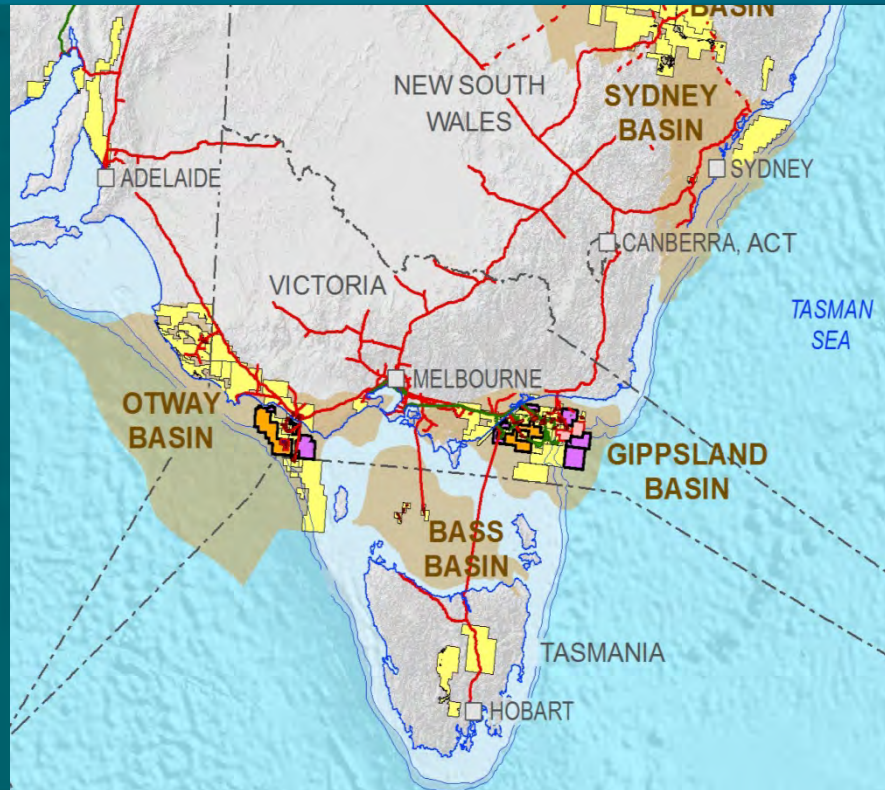
Phoenix South-2 (2016):
gas / condensate

Phoenix South-3 and
Dorado-1 (2018):
BIG OIL



- New oil province on NW Shelf
- At least two operating petroleum systems identified (oil and wet gas)
- Source rocks not understood
- Sedimentary facies mapping needed to predict changes in reservoir quality
- Early Triassic (and older?) section offer new exploration opportunities

Open offshore acreage and the 2019 proposed release areas



- 7 areas open for work program bidding until 21 March 2019 (*NW Shelf, Bight, Gippsland*)
- 66 new areas proposed for work program bidding, (*NW Shelf, Otway, Gippsland*)
- 2019 Acreage to be released in late July
- Comprehensive support documentation provided by government (DIIS and GA)
- Ready access to relevant petroleum data.
- Acreage Release process optimized, industry nominations accepted all year long



Northern Australia Infrastructure Facility



ELIGIBILITY: The Project must

1. Involve the construction or material enhancement of northern Australia economic infrastructure
2. Be of public benefit
3. Be located in, or have significant benefit for, northern Australia
4. Demonstrate an ability to repay the loan
5. Have an Indigenous Engagement Strategy

Projects:
ports, airports, rail, roads, water, **energy**,
social infrastructure, processing facilities,
transshipment vessels

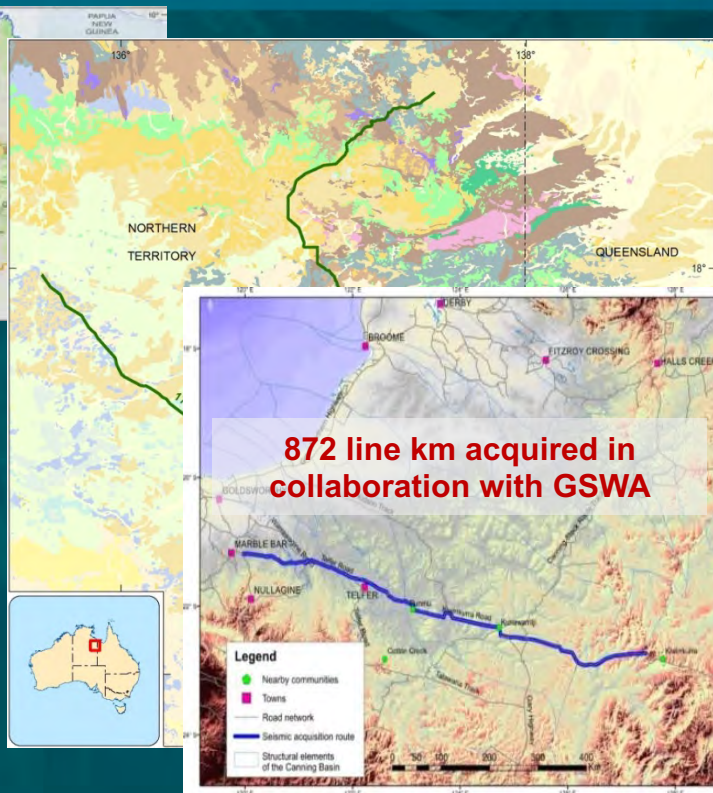
www.naif.gov.au

Exploring for the Future

GA's major pre-competitive program across northern Australia

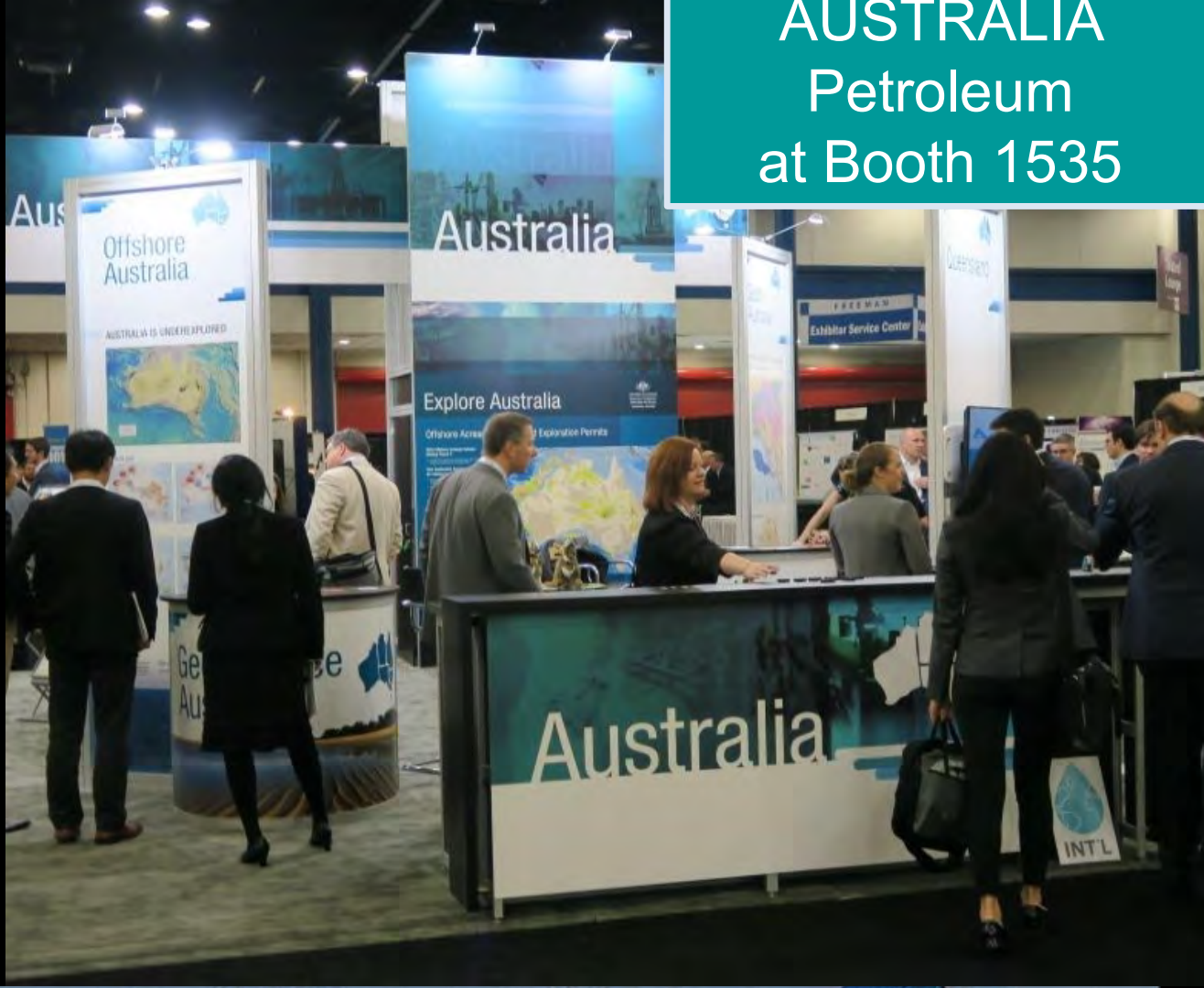


- Energy related data acquisition includes new seismic data and stratigraphic drilling in:
 - McArthur and related basins of Proterozoic and old Paleozoic age (e.g. South Nicholson)
 - Kidson Sub-basin of the Canning Basin



- A major new investment initiative in pre-competitive geoscience from the Australian Government (Minister for Resources and Northern Australia)
- Federal Budget measure of \$100.5 million over 4 years (2016 to 2020)
- Comprises three integrated elements:
 - Energy
 - Minerals
 - Groundwater

AUSTRALIA Petroleum at Booth 1535



Western Australia – Rich in Resources



Jeff Haworth, Executive Director
Geological Survey and Resource Strategy
Department of Mines, Industry Regulation and Safety

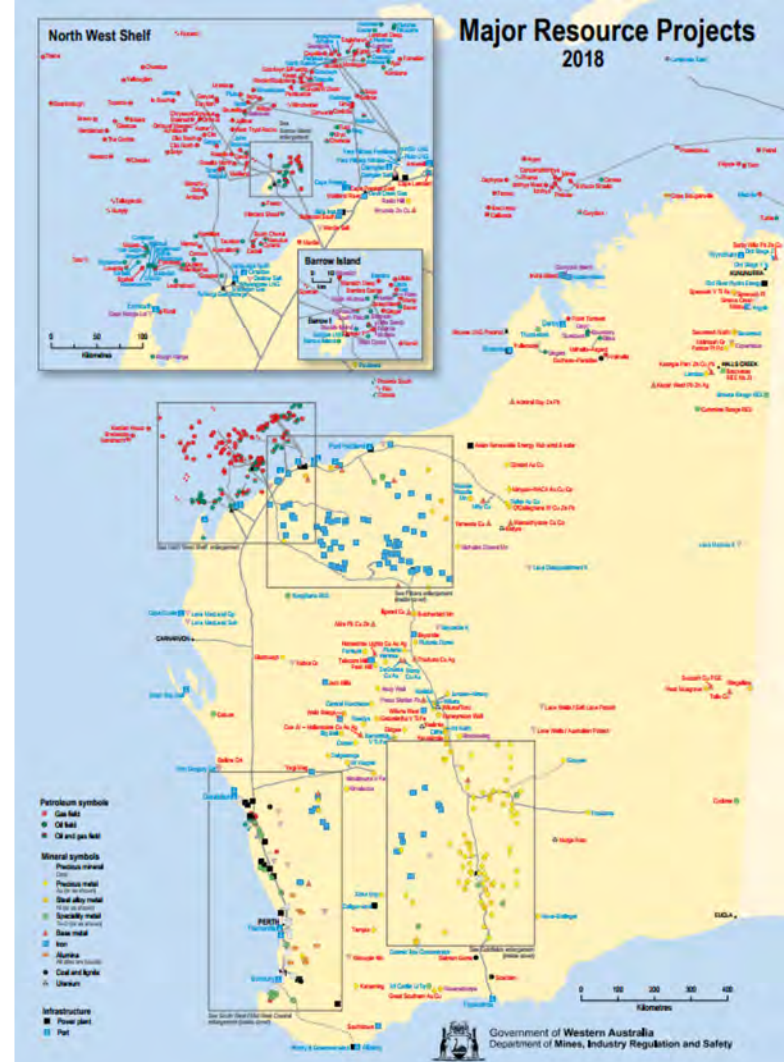
WA Resources World-class

World's #1 diversified mining and energy province

- LNG, iron ore, gold, bauxite, nickel, battery metals, heavy mineral sands, etc.

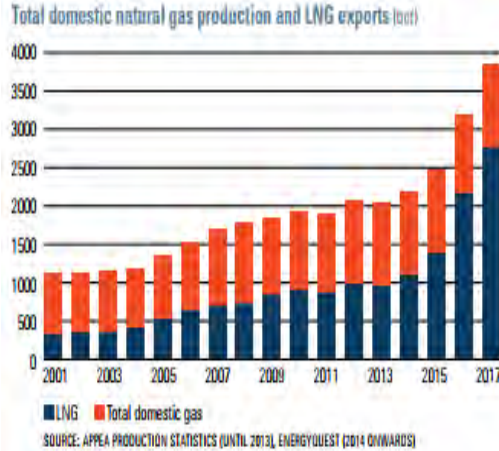
Capital city Perth

- has Australia's largest concentration of global oil & gas companies and oil service companies.
- centre for scientific and technological innovation.
- hosts the Australasian Oil and Gas Conference which showcases engineering products and services.



WA Government Initiatives

- LNG Jobs Taskforce
- Hydrogen Energy – Our Next Great Export?
- Future Batteries



Structure of a Lithium Ion Battery																																											
Colors ■ Type B Conversion Anodes ■ Type B Conversion Cathodes ■ Commonly used Transition Metals for Intercalation Electrodes																																											
H 1.52E-3																	He																										
Li 1.80E-5	Be 2.00E-6																	Ne																									
Na 2.27E-2	Mg 2.76E-2																	Ar																									
K 1.84E-2	Ca 4.66E-2	Sc 2.50E-5	Ti 9.32E-3	V 1.34E-4	Cr 1.22E-4	Mn 1.05E-3	Fe 8.25E-2	Co 2.90E-5	Ni 3.90E-3	Cu 8.30E-3	Zn 7.50E-5	Ga 1.90E-5	Ge 1.60E-6	As 1.80E-6	Se 1.09E-6	Br 3.5E-6	Kr																										
Rb 7.88E-5	Sr 3.84E-4	Y 3.10E-5	Zr 1.62E-4	Nb 2.00E-5	Mo 1.20E-6	Tc 1.2E-6	Ru 1.0E-10	Rh 1.0E-10	Pd 1.5E-4	Ag 8.00E-8	Cd 1.60E-7	In 2.40E-7	Sn 2.10E-6	Sb 2.00E-7	Te 1.2E-6	I 4.80E-7	Xe																										
Cs 6.60E-5	Ba 3.90E-4	Lu 2.80E-5	Hf 3.80E-5	Ta 1.70E-6	W 1.20E-6	Re 7.8E-10	Os 8.90E-8	Ir 1.04E-8	Pt 1.80E-8	Au 4.00E-5	Hg 8.50E-8	Tl 1.00E-7	Pb 1.30E-5	Bi 8.00E-6	Po 8.0E-5	At	Rn																										
<table border="1"> <thead> <tr> <th>B</th><th>C</th><th>N</th><th>O</th><th>F</th><th>Ne</th> </tr> </thead> <tbody> <tr> <td>9.00E-6</td><td>1.80E-4</td><td>1.90E-5</td><td>4.55E-1</td><td>5.44E-4</td><td></td> </tr> <tr> <td>Al 8.00E-2</td><td>Si 2.72E-1</td><td>P 1.12E-3</td><td>S 3.40E-4</td><td>Cl 1.26E-4</td><td>Ar</td> </tr> <tr> <td>0.5-1.5</td><td>0.5-2</td><td>0.5-2</td><td>0.001-0.3</td><td></td><td></td> </tr> </tbody> </table>																		B	C	N	O	F	Ne	9.00E-6	1.80E-4	1.90E-5	4.55E-1	5.44E-4		Al 8.00E-2	Si 2.72E-1	P 1.12E-3	S 3.40E-4	Cl 1.26E-4	Ar	0.5-1.5	0.5-2	0.5-2	0.001-0.3				
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Exciting drilling, new plays

Northern Perth Basin

Waitsia - biggest WA onshore gas field, record flow

- Deeper Permian sandstone play discovered in 2014

Xanadu - offshore oil discovery 2017 in Permian sandstones.

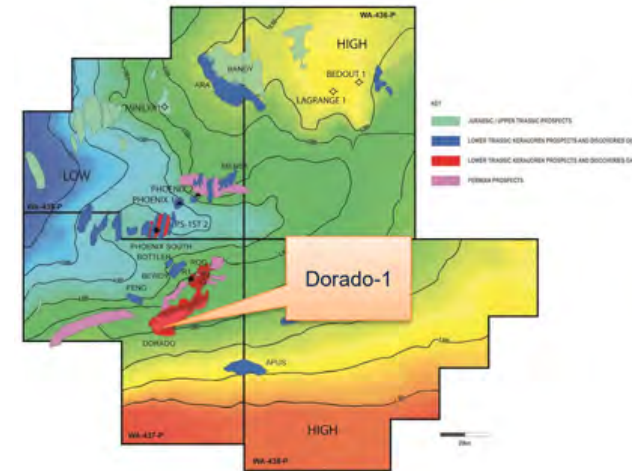


Onshore Canning Basin

- Ungani oilfield's Dev-Carb dolomite play discovered in 2011

Bedout Sub-basin

- Dorado 1 Lower Triassic oil discovery in 2018.
- Carnarvon Petroleum indicated ~171 million barrels.



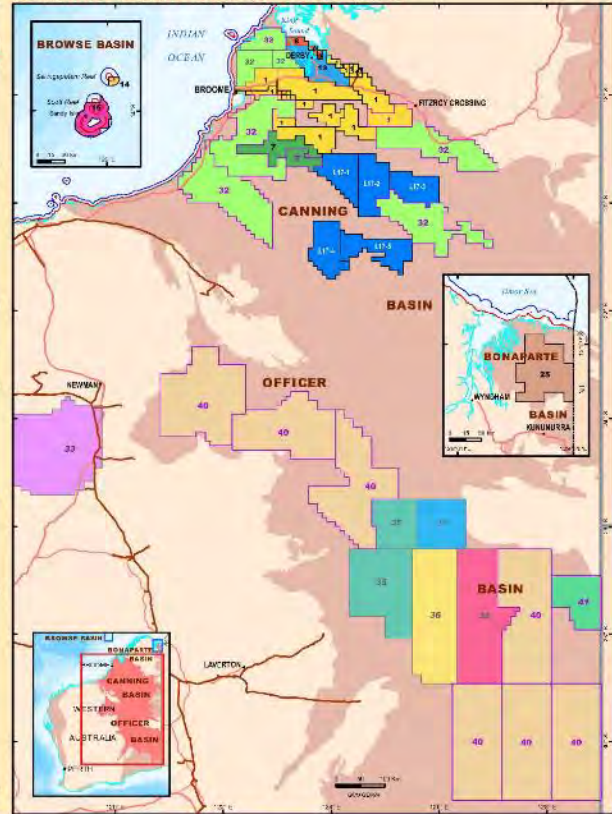
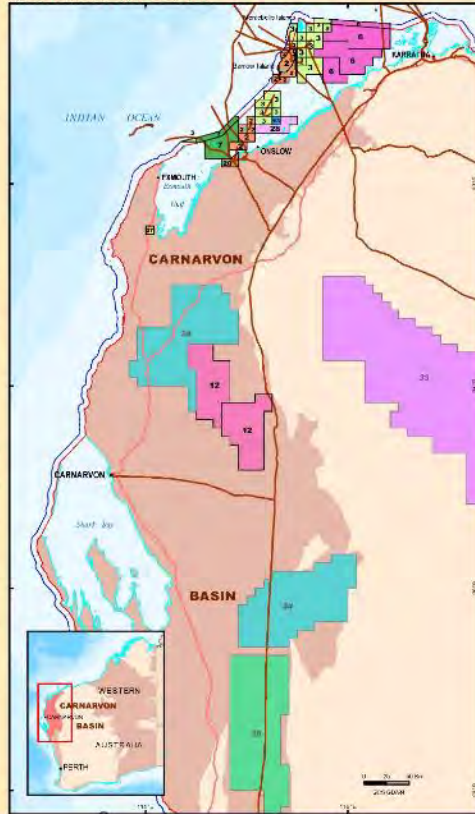
Images courtesy Norwest Energy, Buru Energy & Carnarvon Petroleum

PETROLEUM TITLES BY NOMINEES AND APPLICANTS

PERTH BASIN

CARNARVON BASIN

CANNING BASIN AND OFFICER BASIN



Nominees		Applicants	
4 Empire Oil*	19 Cyclone Energy	9 IRI Energy	28 Skye Alva Petroleum
5 AWE Perth	21 GOC Methane	10 Macalium Group	
6 UEL Energy	22 Latent Petroleum	29 Palatine Energy	
8 Key Petroleum #	23 Harvest Energy*		
11 Lattice Energy	24 Occoanhill		
14 Origin Energy	26 Pikt Energy		
16 Macalium Group	29 Southern Sky Energy		
17 Sunbury Energy	30 Warrage Energy		
18 CellEnergy Res.	31 Westbranch*		

Note: * = Symbols indicate associated companies

Nominees		Applicants	
2 Chevron Australia	31 Pangea Resources	32 Pangea Resources	
3 Quadant	36 Rusa Resources	38 Polivine Energy	
4 Empire Oil*	38 Polivine Energy		
7 Tarent Energy			
8 Findor			
12 New Standard Onshore			
19 Oil Basins			
20 DDC Tubidigi			
27 Rough Range Oil*			

Nominees		Applicants	
1 Bura Energy	17 Rura Energy	37 Rura Energy	
7 Findor	32 Coalbrook	38 Pangea Resources	
8 Oil Basins	39 Pangea Resources	40 Zamboran Res.	
14 Origin Energy	40 Australian Petroleum Portfolio	41 Australian Energy	
19 Woodside Energy	41 Australian Energy	42 Liberty Petroleum	
25 Onshore Energy	42 Liberty Petroleum	43 Peirax	

- Release Area (in grey assessment (20 and 1 February 2018))
- Social Prospectivity Authority Area (SPAs with Average Option, CO2-EQUIV ACCORDING TO TOP-1000)
- Social Prospectivity Authority Area Approval (CO2-EQUIV ACCORDING TO TOP-1000)
- Provision Licence
- Basement Rock
- Seismicity Index

Government of Western Australia
Department of Mines, Industry Regulation and Safety

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Farm-in opportunities



SIZE COMPARISON MAP

Further information

Card for information on DMIRS website such as:

- Prospectivity and acreage
- Petroleum data – free to download
- Explorer's guide
- Titles register & titles maps
- Various other books, flyers and maps

www.dmirs.wa.gov.au/

Email petroleum.acreage@dmirs.wa.gov.au

NAPE's Australia Petroleum booth # 1535

