

April 2018

Mike Harrowell | Senior Research Analyst

[www.breakawayresearch.com](http://www.breakawayresearch.com)

### Company Information

ASX Code	RLE
Share Price (DATE)	A\$0.11
Ord Shares/Perf rights	255.4m
<b>Market Cap</b>	<b>A\$28.4m</b>
Options	00.0m
<b>Market Cap (fully diluted)</b>	<b>A\$28.4m</b>
Cash (December 2017)	A\$8.4m
Total Debt	A\$0.0m
<b>Enterprise Value</b>	<b>A\$20.0M</b>

### Directors

Chairman	Lan Nguyen
Managing Director	Scott Brown
Director (Non-Exec)	Norman Zillman

### Significant Shareholders (Pre deal)

Managing Director	10.30%
Chairman	8.03%
Sino Portfolio International	6.78%

Source: Company

### Company Details

Address	Level 3, 32 Walker St, North Sydney NSW
Phone	+61 02 9955 4008
Web	<a href="http://www.realenergy.com.au">www.realenergy.com.au</a>

### One Year Price Chart



Source: ASX

# Real Energy Corporation Ltd (RLE)

*Next two wells could confirm commercialization*

**Recommendation: BUY**

### Key Points

- **Real Energy has commenced appraisal drilling and fracking of its northern Cooper Basin Windorah Trough tight gas targets with the drilling of Tamarama #2 and #3. Drilling will take four weeks per well, with fracking and testing later in the year, followed by updated resources and maiden reserves.**
- **Building blocks in place to deliver a commercial discovery**
  - **2014 wells Tamarama #1 and Queenscliff #1 encountered gas that flowed to surface, demonstrating a contingent gas resource of 276 Bcf (2C) and 672 Bcf (3C).**
  - **DeGolyer & MacNaughton estimate a prospective resource of 13.7 Tcf in place, with 5483 Bcf recoverable.**
  - **RLE signed a MOU with Santos for toll processing of gas production in June 2017, and a sales offtake MOU with Weston Energy for 15 PJ over 5 years, signed 17 July 2017.**
  - **The Weston MOU includes a provision for a pre-payment of A\$6M. This would cover our estimate of A\$3-4M for a pipeline connecting the field to the Santos hub.**
- **The appraisal wells:**
  - **Step out only 640m from Tamarama #1, so low risk**
  - **Drilling has started and regular updates are expected over the next two months.**
  - **The fracking must release the formation gas with as little damage as possible to the surrounding coal seams. The coal seams are water aquifers. Disposing of water will be a cost, and water displaced gas, reducing saleable output.**
  - **RLE had A\$8.4M cash on hand at 31 December 2017. We estimate the cost of the two wells at A\$6M in total, with A\$0.2M/quarter of overheads to pay.**
- **Using EV/2C and EV/3C peer relative comparisons, we value Real Energy at A\$0.39-0.45/sh. Our price target remains A\$0.32/sh.**
- **The overarching theme of the gas supply shortage on the Australian Eastern Seaboard remains in place. Gas prices will appreciate to import parity. A\$7 Billion of supply investment is required to 2024, and the gas price must be sufficient to incentivize that level of supply addition.**

*RLE is at a critical stage where two appraisal wells have the potential to prove up commercial elements of the project in terms of resource and reserve size, and gas/water flow rates which will allow the company and market to determine a value for the company's discovery. Breakaway Research has a **buy recommendation** on Real Energy and a price target of **32cps**.*



## Two well program to determine commercial potential starting now

### Contract signed for Tamarama #2 and #3 starting early April 2018

RLE announced in an ASX release on 16 March 2018 that Ensign International's Rig 964 has been contracted to drill two wells in ATP927P. Well site and access road construction has started. Tamarama #1 was 2574 metres depth and took Ensign's Rig 916 21 days to drill and log.

### If the wells are successful, RLE will look to start pilot production.

- Drilling and fracking of Tamarama #2 and #3 is expected to be complete by September 2018
- Design and engineering of surface facilities and flow lines 14km to Santos Mount Howitt plant
- Initial pilot production from Tamarama #1, #2, and #3. The Weston MOU is based on 15PJ over 5 years, 3PJ/yr, or 8.2TJ/d, covering planned production.
- We estimate the Pilot Stage will cost A\$10M plus working capital to first payment, which is covered by the A\$8.4M cash on hand, and the A\$6M pre-payment from Weston, if that MOU is converted into a sales contract. Sunk cost to December 2017 was A\$20.0M.
- The Tamarama #1 frac did connect the reservoir horizon with a coal horizon, limiting initial production to as low as 0.5mmcf/d, but as time has progressed and the water flow has reduced, the well flowed 2 mmcf/d/day for long periods (see RLE release 12 March 2018). We expect the first three wells will flow a combined 6mmcf/d, or 6.8TJ/d. This rate is consistent with the production RLE expects from 9 wells according to its investor presentation of 14 March 2018.
- Figure 1 shows indicative economics to provide investors with an idea of where the company might be heading, subject to successful appraisal. Our selling price of A\$8/GJ East Coast is at the lower end of the range in Figure 7. The pipeline tariff is from the APA website (<https://www.apa.com.au/archive/indicative-transmission-tariffs/>) and the Santos processing costs, RLE site costs and capex are our judgemental estimates. We have assumed no change to the processing charge %, but the Stage 2 would probably include the project's own processing plant.
- Risks include cost over-runs, insufficient fracking resulting in low gas flows, or over-fracking that connects the gas bearing formations with the coal water bearing formations, resulting in high water generation and requiring additional surface facilities and operating costs for water disposal. Other risks include wellbore failure, and errors in reservoir interpretation. These risks are offset by the considerable experience of the Real Energy management and their consultants.

RLE planning staged development following low risk stepout wells

Positive cash flow from pilot stage

Significant cash flow from low capex Stage 1

Indicative Economics	Pilot	Stage 1	Stage 2
Number of Wells	3	9	50
Production TJ/d/well	2	2	2
Production TJ/d	6	18	100
Production PJ/yr	2.2	6.6	36.5
Selling Price A\$/GJ	8	8	8
Revenue	17.5	52.6	292.0
Santos Processing Cut	30%	30%	30%
Santos Processing Cut A\$M	5.256	15.768	87.6
Royalty (Well head value)	10%	10%	10%
Royalty A\$M	1.0	3.2	17.4
SWQ to Bris Pipeline A\$/GJ/d	1.91	1.91	1.91
Pipeline Charge A\$M	4.2	12.5	69.7
Net Revenue A\$M	7.1	21.1	117.2
Opex A\$M	2.0	5.0	30.0
EBITDA A\$M	5.1	16.1	87.2
Cumulative Capex A\$M	30	56	256

Figure 1 Indicative economics of each development stage Source: RLE guidance on volumes, Breakaway estimates of costs and revenues



Figure 2 Tamarama #1 flaring during a production test (Source: RLE website- refer release of 12 March 2018)

**..followed by Stage 1 development..**

- Drilling 6 additional Tamarama wells
- Production target 20TJ/d from 9 wells in total or a bit over 2TJ/d from each well.
- The additional wells and surface facilities are estimated by Breakaway to cost A\$4M to A\$6M per well, so the capital cost of the 6 well Stage 2 is estimated by Breakaway to cost around A\$24m to A\$36M, and require an equity issue, or a sell down from RLE’s 100% interest.

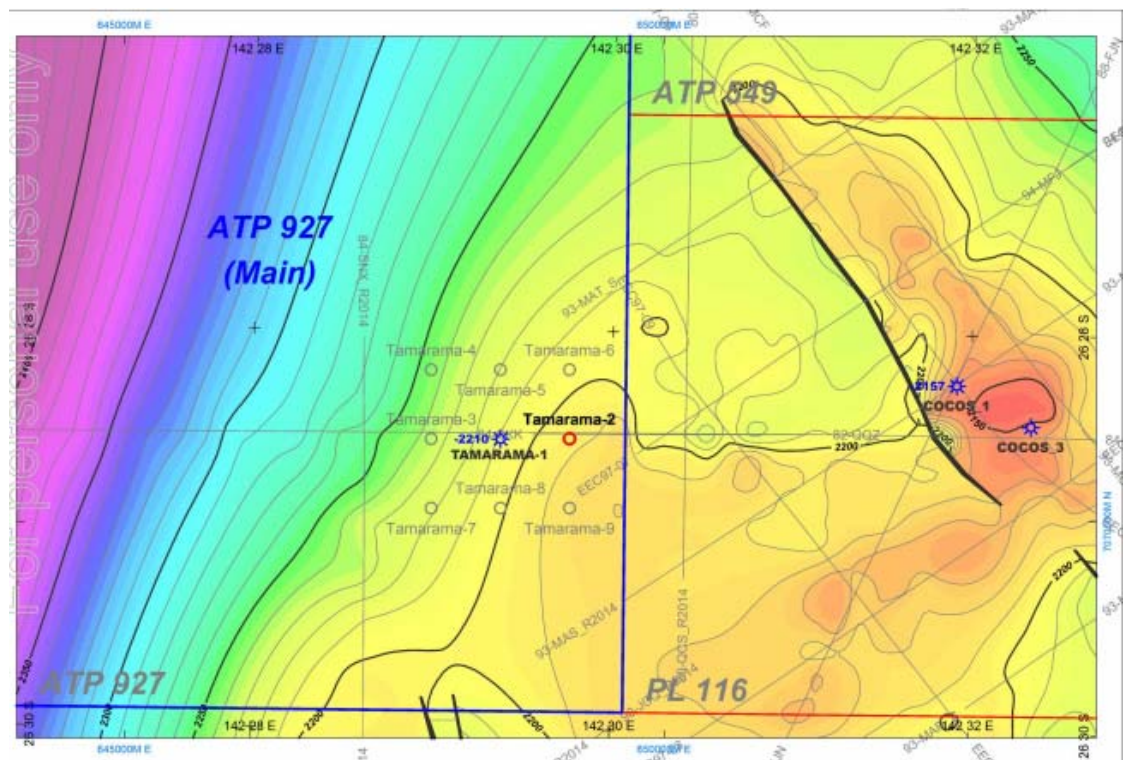


Figure 3 Well locations for Stage 1 (Source: RLE presentation 14 March 2018)



## .. then Stage 2 development

- Full field development of ATP927 as a tier one gas project targeting 100TJ/d
- Certify a 3P (Proven, Probably, Possible) reserves target of 2Tcf of gas
- We believe this would be paid for out of cash flow from a successful Stage 1
- Figure 1 assumes Stage 2 is toll processed, but most likely to have own plant.

## Valuation based on comparison with peers

### We value RLE at A\$0.39/sh-A\$0.45/sh

RLE very cheap vs closest peer Strike Energy, cheap vs other peers close to infrastructure

Real Energy does not have reserves at present, and its resources are contingent on demonstration that they are commercial. We expect that to happen following the current drilling program, but there are risks, and hence we have used valuation against peers rather than discounted cash flows as the base of valuation. We have also discounted our price target, relative to the peer driven valuation.

Of the peers, Real Energy is most similar to Strike Energy, which has no reserves also. Strike is still trading at EV/2C of A\$0.50/GJ and EV/3C of A\$0.36/GJ, around 7-13x Real Energy's equivalent metrics of A\$0.07/GJ and A\$0.028/GJ.

Real Energy is trading at a premium to Galilee Energy, which has a substantial 2C and 3C resource. At present, Galilee has no pathway to market, and is awaiting Jemena's decision to build a pipeline from Galilee to either Roma (~600km) or to Jemena's Queensland Gas Pipeline (~400km). The tariff on the ~600km QGP is A\$1/GJ. We would expect that the tariff to transport Galilee's gas would include a higher capital recovery cost.

Jemena is building the Northern Gas Pipeline from Tennant Creek to Mt Isa (622km costing A\$800M.)

Company	RLE	GLL	BUL	COI	STX	Average	Valuation of RLE A\$/sh
EV/2C - A\$/GJ	0.07	0.015	0.14	0.31	0.50	0.244	0.39
EV/3C - A\$/GJ	0.03	0.007	0.036	0.059	0.36	0.116	0.45

Figure 4 Selected peer valuation comparisons (Source: Figure 5)

We have chosen to value Real Energy at the average of a basket of peer companies shown in the table above. We expect RLE to add to resources with the current drilling, and to convert some of these resources into reserves, lifting the base to which the average valuation metrics apply. For now, we are using the existing contingent resource.

We maintain our price target at A\$0.32/sh, consistent with the target in our previous research report dated November 2017.

At our price target, Real Energy has an EV of A\$81M. At a 2P reserve EV/GJ of A\$1.31/GJ (see Figure 5), this implies a 2P reserve of 62PJ, a 21% conversion ratio from 2C to 2P, which we believe the company will exceed.

### Cash balance and planned expenditures

Sufficient cash to complete next two appraisal wells

Real Energy had cash on hand of A\$8.4M at 31 December 2017. In the 5B cash report for December 2017, the company forecast A\$205K of administration and A\$550K of exploration outgoings. The company stated it has the cost of the two well program covered by current cash reserves.

The offtake MOU signed with Weston Energy and announced by RLE on 17 July 2017 includes a provision for prepayment of A\$6M to assist in funding the project development. While it would provide just enough cash to complete the Pilot Stage development, RLE would have very little cash reserve, so we would expect a share issue, partial project sell-down, or negotiation of a larger prepayment to be announced prior to commitment to construction of the Pilot Stage, but after the announcement of maiden reserves.

Reserves/resources in PJ	EV	2P	3P	2C	3C	EV/2P	EV/3P	EV/2C	EV/3C
<b>Comet Ridge (COI)</b>									
Mahalo Bowen basin		172	374	385	389				
Galilee		0	0	220	2287				
NSW Gunnedah Basin					562				
Total	<b>190</b>	172	374	605	3238	<b>1.11</b>	<b>0.51</b>	<b>0.31</b>	<b>0.059</b>
<b>Blue Energy (BUL)</b>									
Bowen & Surat		71	298	923	3112				
Galilee		0	0	61	830				
Total	<b>142</b>	71	298	984	3942	<b>2.00</b>	<b>0.48</b>	<b>0.14</b>	<b>0.036</b>
Galilee Energy (GLL)	37	0	0	2508	5314			0.01	0.007
<b>Senex (SXY)</b>									
Western Surat		492	0	262	0	1.07			
Cooper basin tight gas									
Total	526	492	0	262	0	1.07		0.70	
<b>Central Petroleum (CTP)</b>									
Amadeus Basin	148	132	82	144	107	1.12		1.03	
<b>Cooper Energy (COE)</b>									
Sole		249	293	33	0				
Casino		56	90	19	27				
Manta		0		106	239				
Total	<b>313</b>	305	383	158	266	<b>1.03</b>	<b>0.82</b>	<b>1.98</b>	<b>1.18</b>
Strike Energy (STX)									
Southern Cooper Basin	<b>55</b>			109	151			<b>0.50</b>	<b>0.364</b>
Real Energy (RLE)									
Qld- Eromanga basin	<b>20</b>			291	709			<b>0.07</b>	<b>0.028</b>
Armour Energy (AJQ)									
Kincora Gas field- Qld	<b>60</b>	57	158	0	0	<b>1.06</b>	<b>0.38</b>		
AWE (AWE)									
Taranaki NZ									
BassGas		42		184					
Otway		35		8					
Onshore Perth		234		263					
Indonesia				202					
Total	636	311		657		2.04		0.97	
<b>Volume average</b>	<b>2127</b>	<b>1540</b>	<b>1295</b>	<b>5718</b>	<b>13727</b>	<b>1.31</b>	<b>0.54</b>	<b>0.36</b>	<b>0.055</b>

Figure 5 Australian gas exploration and production companies considered to be peers of Real Energy (Source: Company 3B statements, most recent reserve and resource reports (converted into PJ Gas equivalent at 1.055PJ per Bcf, 6PJ per BOE) share prices from ASX at 2pm 10 April 2018.)





## Backdrop: Australian East Coast gas prices heading toward export parity

### East coast gas Industry dynamics: Tight markets and high prices are the new norm

Industry conditions are favourable for new entrant gas producers and RLE is particularly favoured given its strategic location near existing infrastructure.

High prices brought on by LNG exports since early 2015, and depletion of key fields, have been well documented in the financial and mainstream media. Political and consumer groups are in a state of panic about adequacy of supply. Take-over prices for established gas producers AWE and potentially Santos by foreign new entrants only make sense if these companies' gas resources can be fully exploited, either domestically or via LNG, at prices reflective of the international gas trade. Such prices are even higher than those prevailing in the domestic market.

### There is gas shortage and it will escalate.

There have been several reports in the past from Government agencies the AER, AEMO and the ACCC. They all document a deteriorating trend. The most recent is the AEMO Victorian Gas Planning Report, released on March 29, 2018 and shows the impact of rapid depletion from the existing conventional fields offshore Victoria, specifically the Beach Energy operated fields off western Victoria, and the Esso-BHP fields offshore from Gippsland.

In summary, these fields supplied 435 PJ in 2017. That is 70% of the east coast domestic demand of 640 PJ, with the balance coming from Santos operated Cooper Basin fields (90 PJ) and the Queensland Coal Seam Gas (CSG) fields (115 PJ).

By 2022, the AEMO forecast that the fields offshore Victoria will deplete to 187 PJ. That is a 57% drop in 4 years. It is driven by steep decline from Beach-operated Otway and BassGas fields, and Esso-BHP fields, and only partially offset by the planned Sole gas development in 2019. Onshore in South Australia, the Santos operated Cooper Basin fields are mature and declining, and partially committed to supply GLNG. There is a very large gap between expected levels of demand, and available supply in the current year and this will continue to widen.

East coast gas market will continue to tighten, with prices trending to import parity

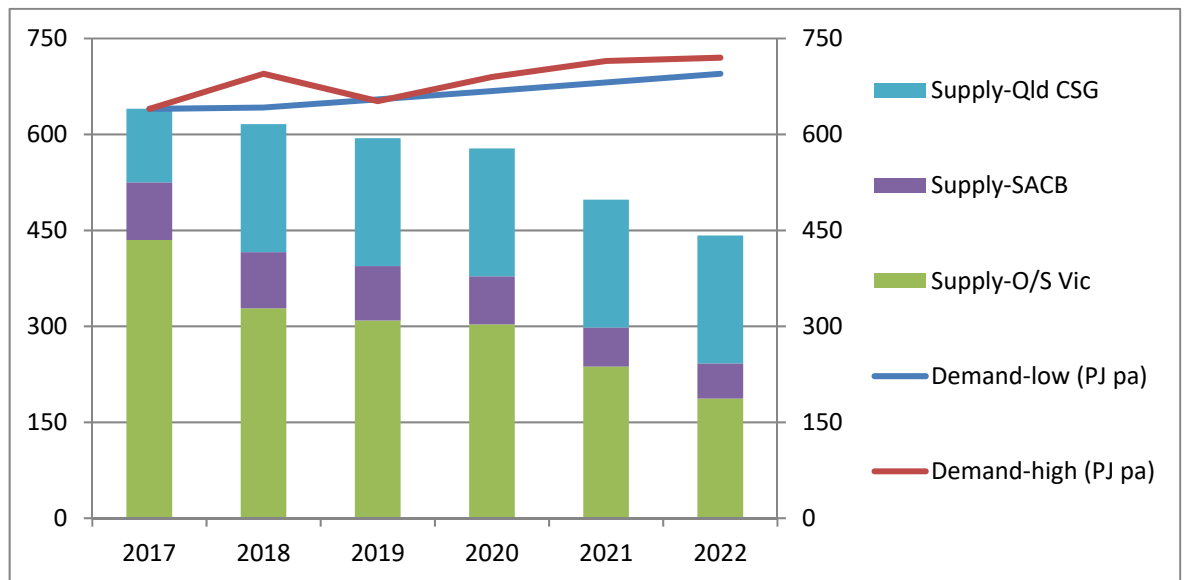


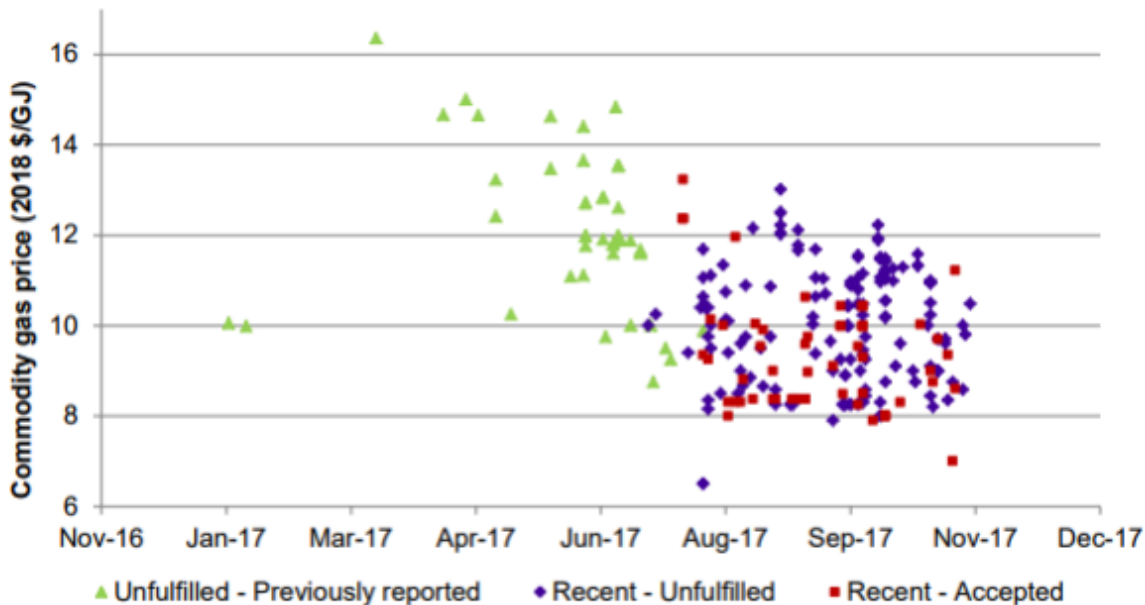
Figure 6 East Coast gas supply and demand (Source: AEMO 29 March 2018)

### The solution is to develop resources in new regions.

There are large prospective resources in CSG fields in NSW, but a re-opening of this industry requires political and social support and activity is currently dormant. In Qld, there are large resources in the Galilee Basin and Bowen Basin, but these areas are remote and would require a major expansion of the pipeline network. Unlike interstate rivals, RLE's acreage and potential development is close to existing Cooper Basin gas gathering, processing and transmission infrastructure.



### Offers for sale and purchase of gas in the Australian east coast gas market



Source: ACCC Gas Inquiry 2017-20 Interim Report – December 2017

Figure 7 Support for the A\$8/GJ price used in Figure 1

Our assumed A\$8/GJ gas price is at bottom end of A\$8-12/GJ range

### Meanwhile prices in all the major cities continue to escalate.

Before the advent of LNG exports, the domestic gas market was well supplied and contract gas prices were ~\$4/GJ. Two years ago, prices in the \$7-9/GJ range were considered high, in context to where they had been a year prior. Now prices are routinely \$9-11/GJ, and these will likely gravitate higher this winter. The pattern is now evident, with high prices in summer to support gas for power generation, followed by even higher prices in winter for heating.

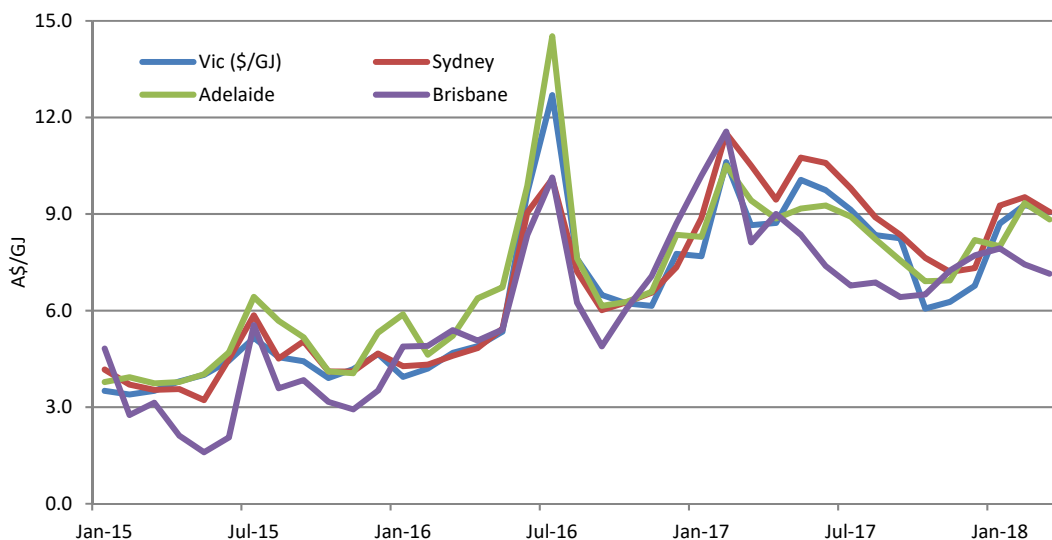


Figure 8 Gas prices at major Australian centres (Source: AER Weekly Gas Reports)



## A move to import LNG would only lift local prices to a new, higher level.

Australia to import gas?

AGL and other industry participants are considering LNG imports, with import terminals potentially located at Newcastle and Hastings, Victoria. This is not a sustainable solution to a market shortage, but more an act of desperation by specific wholesalers or retailers that failed to enter into long term contracts with producers and now cannot access local supply. It would be ironic if Australia was to import LNG from distant markets, while at the same time becoming the world's largest exporter. However, the export of LNG and the potential for imports to strengthen the links between export gas prices, and domestic prices. That linkage is now irreversible, and, driving both will be oil prices. During the oil boom of 2010-2014, regional LNG prices were US\$18-19/mmbtu (equivalent to ~A\$25/GJ) but at that time, domestic consumers in Australia were shielded as the east coast was well supplied and LNG exports had not commenced. The consumer will not be so fortunate this time as oil prices continue to rebound from the 2014 crash. LNG prices are oil-linked, and will follow oil prices higher, and this will percolate back to Australia and be reflected in the net-back price. As shown in the chart below, even at the current domestic gas prices, there is still a very large step-up to the -LNG export / import price.

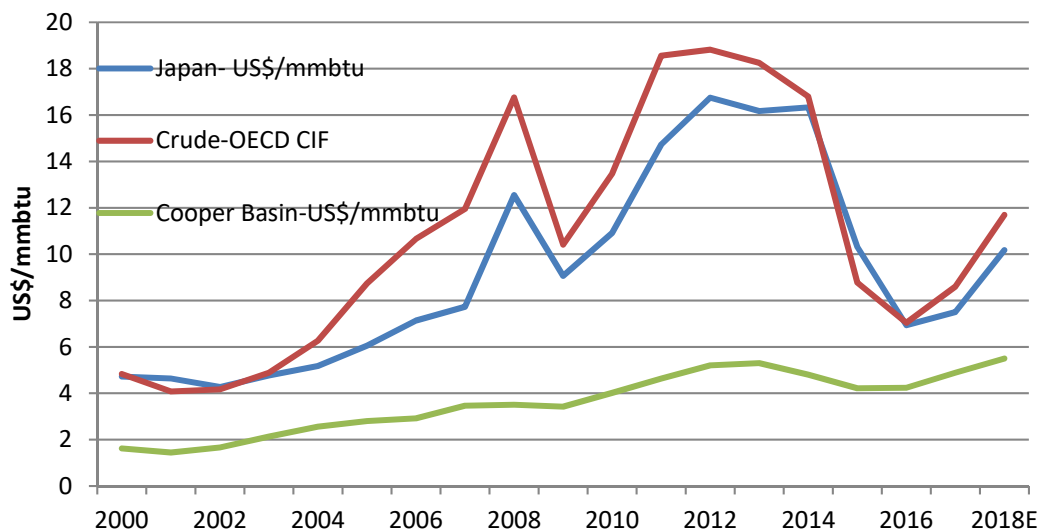


Figure 9 Domestic gas prices vs export gas and oil prices (Source: BP Statistical Review, Santos Cooper Basin realization prices)

## Key assets: Two large permits close to infrastructure

Close to pipelines and gas processing hubs that are underutilized

Real Energy Corporation (RLE) is a very cheap option on potential commercial development of a very large contingent gas resource in the northern Cooper Basin. It has two large permits, 100% owned which are prospective for gas trapped stratigraphically in the basin's trough, a so called "Basin centred gas play" (BCG). Since listing in 2013, RLE has targeted this acreage to test its geological thesis and drilled two wells, Tamarama and Queenscliff, both of which flowed gas to surface without fracking, thus validating the BCG model. The location of these wells relative to nearby commercial, conventional gas fields is shown schematically in Figure 10.

BCG plays are often laterally extensive and can hold vast resources. In RLE's ATP927 permit, the estimate of gas-in-place is 13.7 Tcf, with a prospective recoverable resource of 5.5 Tcf. These are very large figures. The flow rates recorded have enable RLE to book contingent gas resources of 276 Bcf (2C) and 672 Bcf (3C). The question to resolve is how much gas, if any, can be produced commercially. For this, RLE needs to establish flow rates high enough, and keep well costs low enough in order to book reserves.

Could be large

Basin-centred gas is unconventional in the sense that the gas is trapped stratigraphically in tight sandstones. The success to date validates RLE's geological model and demonstrated gas flows to surface. The keys to reserve bookings, and future development success are identification of permeability sweet spots, use of optimal drilling, completion, and fracking to maximise gas flow rates, dealing with associated water production if any, and keeping well costs contained.



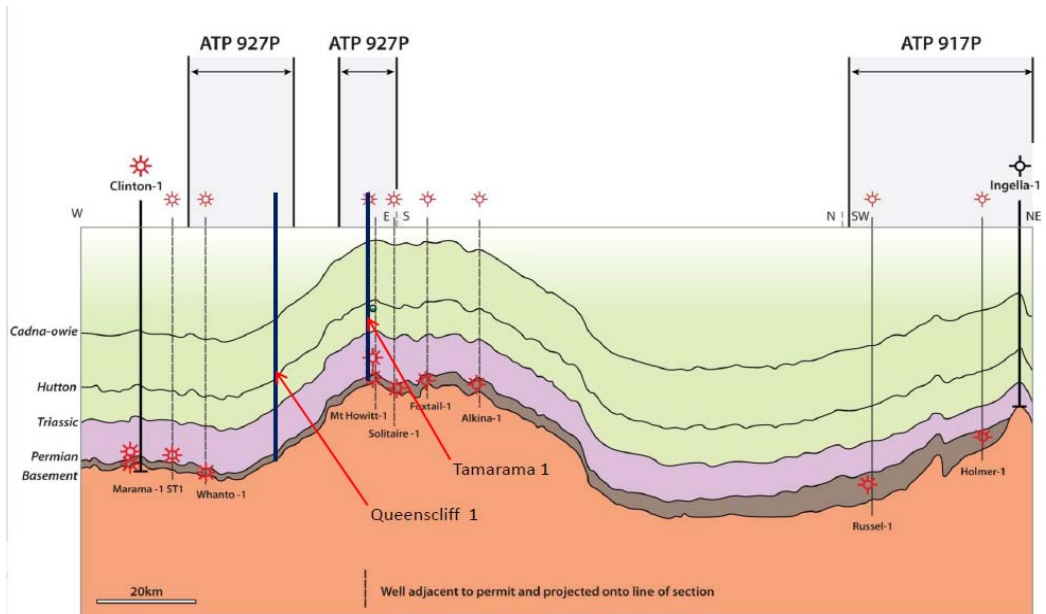


Figure 10 Real Energy permits and wells relative to other wells in region (Source: RLE investor presentation)

**Also in RLE’s favour, is location.** RLE’s permits ATP927P and ATP1194PA are in the northern Cooper Basin. There are conventional gas fields in adjacent permits, gas-gathering systems, and major processing centres at Moomba and Ballera that can pipe gas to eastern markets. Ballera has a capacity of 150TJ/d and is serving fields that are now largely depleted.

In the June quarter 2017, REL agreed a non-binding MoU with Santos to toll treat the raw gas for processing into sales quality gas. Santos has extensive gas gathering systems and fields to the west feeding gas to gas plants at Moomba and Ballera.

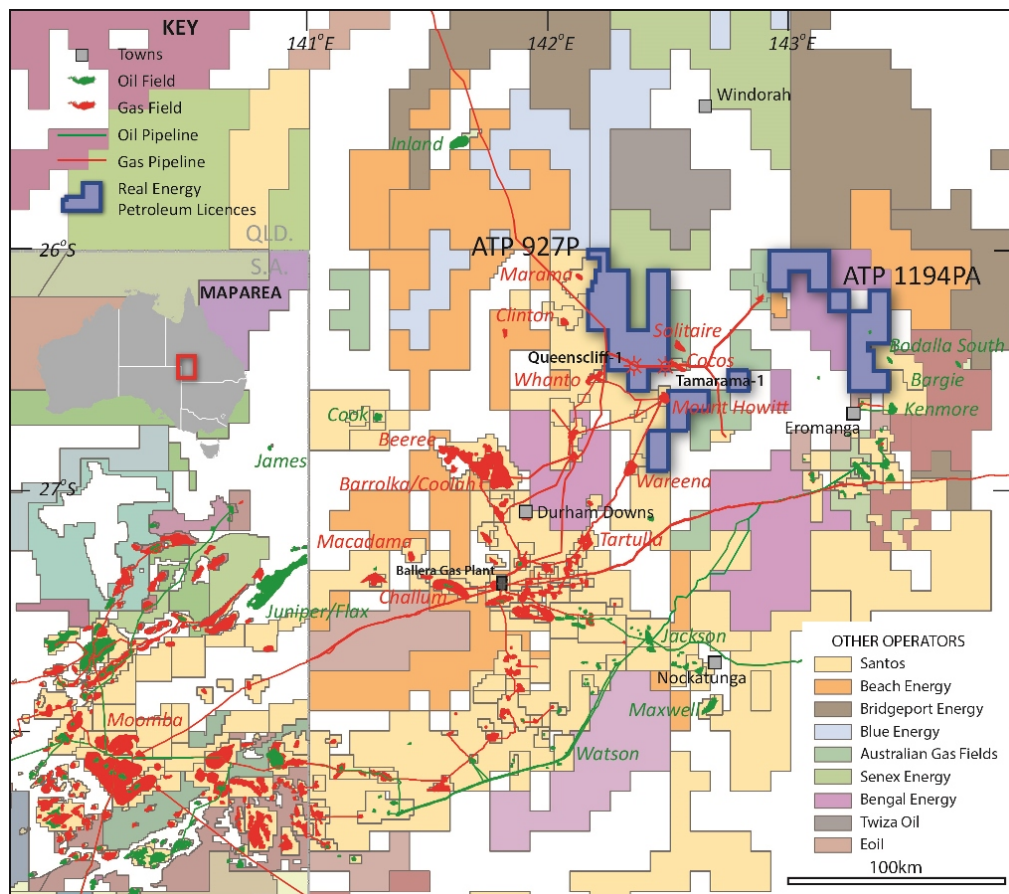


Figure 11 Real Energy tenements and neighbours (Source: <http://www.realenergy.com.au/current-projects/map-of-tenements.html>)

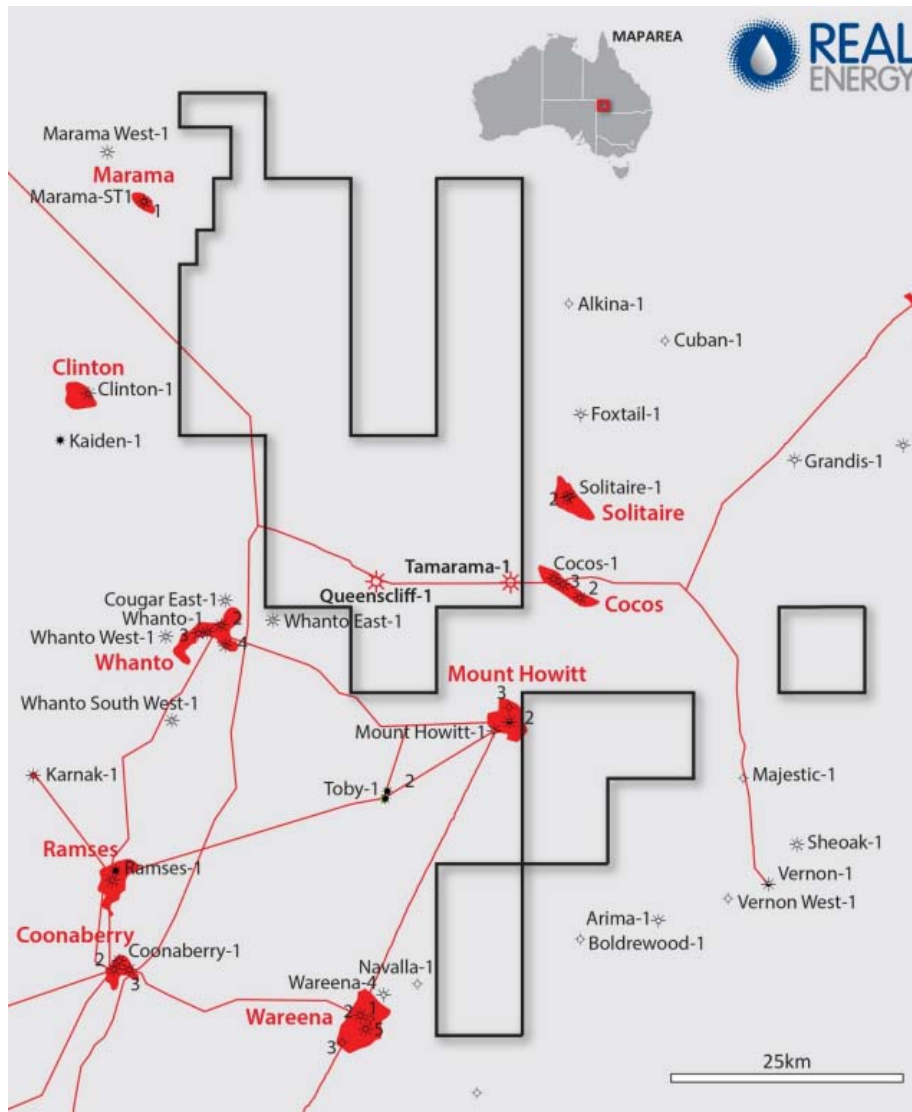


Figure 12 Real Energy tenements and major gas infrastructure (14km to Mt Howitt processing centre) (Source: RLE release 16 March 2018)

### Drilling and testing expenditures and timing for existing wells

	Tamarama #1	Queenscliff #1	Combined
Start Drilling	8-Sep-14	9-Oct-14	
Rig Released	29-Sep-14	5-Nov-14	
Well Drilling Time days	21	28	
Depth metres	2574	3219	
Cost A\$M			8.145
Flow Testing Start	24-Feb-15	24-Feb-15	
CO2 content	9%		
Fracking Start	18-Feb-16		
Fracking Complete	27-May-16		
Workover Complete	28-Jul-16		
Cost A\$M			3.239

Figure 13 Drilling times and costs for Tamarama #1 and Queenscliff #1 (Source: RLE releases at various times in 2014 to 2016)

Appraisal wells to take a month each based on past experience



## Board and Management

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*The management team has done this before*

The board and management team has previously worked together at Mosaic Oil (MOS:ASX) which was taken over by AGL in 2011, following success in discovering and commercializing oil and gas discoveries predominantly in the Surat Basin.

Ex Mosaic team members include Lan Nguyen, Scott Brown, Terry Russell, and Xinjin Wang.

### Director and Executive Backgrounds

#### *Lan Nguyen - Non-Executive Chairman, appointed*

Mr Lan Nguyen holds a Bachelor of Science (mining engineer-geologist) degree majoring in petroleum exploration from the Institute of Oil and Chemistry, Baku, Azerbaijan, and a Master of Science degree in petroleum geology from the University of New England, Australia. He is a member of the Petroleum Exploration Society of Australia (PESA), the American Association of Petroleum Geologists (AAPG) and the Society of Petroleum Engineers (SPE).

Lan is a professional petroleum geologist and engineer with over 20 years experience in petroleum exploration, development and production in Australia and internationally including 15 years at Mosaic Oil N.L. ('Mosaic'), an ASX listed petroleum exploration and production company, where he played a leading role, initially in technical and middle management positions and in the last 4 years, as Managing Director, in transforming Mosaic from a speculative petroleum explorer to a successful petroleum exploration and production company with growing production revenues, petroleum reserves/resources and profitability. Lan is credited with the discovery and development of many oil and gas fields in the Surat-Bowen Basins through his innovative introduction of various exploration, drilling and completion technologies to Australia.

Lan is currently a principal/director of Tanvinh Resources Pty Ltd and Latradanick Holdings Pty Ltd, which provide services to energy and resources companies in Australia and Asia-Pacific region.

#### *Scott Brown – Managing Director, appointed*

Mr Scott Brown holds a Bachelor of Business and a Master of Commerce and is a member of the Institute of Chartered Accountants and the Petroleum Exploration Society of Australia (PESA).

Scott is the Chief Executive Officer and co-founder of Real Energy Corporation Limited. Prior to this, he was the Chief Financial Officer of Mosaic Oil NL (ASX: MOS), a listed petroleum production and exploration company with an extensive range of oil and gas production and exploration permits in Queensland, New Zealand and offshore WA. He is also a non executive director of Kairiki Energy Limited (ASX:KIK) and Oriental Technologies Investment Limited (ASX:OTI).

During his time with Mosaic, he was involved in the acquisition of production properties and the growth of its business and profitability. He was instrumental in putting together a Scheme of Arrangement with AGL Energy Ltd to acquire Mosaic for consideration of \$142 Million.

Scott has an extensive background in finance and the management of public companies including guiding numerous companies through the listing process. Prior to Mosaic Oil NL, Scott was Finance Director of Objective Corporation Limited ('Objective'), an enterprise content management (ECM) software company that established itself as one of the leaders in the ECM market. Scott was instrumental in the ASX listing of Objective.

Scott was also formerly the Chief Financial Officer and Company Secretary with a number of public companies including Turnbull & Partners Limited, Allegiance Mining NL, FTR Holdings Limited and Garratt's Limited. Scott also worked at accounting firms, Ernst Young and KPMG



#### ***Norman Zillman, Non-executive Director, appointed***

Mr Norman Zillman is a professional geologist and a member of Australasian Institute of Mining and Metallurgy (Aust.I.M.M) and the Petroleum Exploration Society of Australia (PESA). He has B.Sc. Geology from University of Queensland, and a B.Sc. Botany from University of Queensland.

Norm has over 45 years' experience in minerals, petroleum, coal, coal bed methane and geothermal exploration and production in Australia and internationally. His initial experience was as a petroleum geologist with international companies Aquitaine Petroleum in Australia and Papua New Guinea and Union Oil Company of California in Australia and Indonesia.

Norm has occupied the positions of Deputy CEO of Crusader Ltd, General Manager Exploration and Production with Beach Petroleum N.L. and Claremont Petroleum Ltd and Manager of the Petroleum Branch of the Queensland Department of Mines and Energy and State Mining Engineer for Petroleum and Non-executive co-Chairman of Chinalco Yunnan Copper Resources Ltd (CYU), Non-executive Chairman of Burleson Energy Ltd (BUR) and Non-executive Director of Earth Heat Resources Ltd (EHR).

More recently, Norm has been responsible for a number of successful public resource floats on the ASX. He was the inaugural Managing Director and a co-founder of Coal Bed Methane (CBM) company Queensland Gas Company Ltd (QGC), being responsible for the initial acquisition of all of its areas, the successful floating on the ASX and the discovery of QGC's first CBM gas field, Argyle. He was also the inaugural Chairman and Founder of conventional oil and gas company Great Artesian Oil and Gas Ltd (GOG). He was also a founder of a number of other ASX listed companies including Blue Energy Ltd (BUL), Hot Rock Ltd (HRL), Planet Gas Ltd (PGS), Bandanna Energy Ltd (BND) and Red Gum Resources Ltd (RGX)..

#### ***Terry Russell, Consulting Exploration Manager***

Terry Russell is a geologist with over 25 years experience working in the oil and gas industry. He has a B.Sc. (Hons) from Victoria University of Wellington, and a PhD from University of New England. Terry was formerly the Exploration Manager of Mosaic Oil NL, with responsibility for the planning and execution of the company's exploration and development program. Prior to this, he was most recently employed as Manager Geoscience for Swift Energy New Zealand Ltd. As well as having extensive experience in onshore and offshore Australian basins, he has also worked on a range of international projects, principally in New Zealand, the United States, Argentina and Tunisia. He is a member of PESA and AAPG.

#### ***James Dingle, Drilling Supervisor***

James has practical experience in both field operations and engineering design in a broad range of drilling, completion and production operations across conventional and unconventional (CBM/CSG & tight gas/oil reservoirs). He has extensive experience with coal seam gas drilling, completion & production operations, conventional & underbalanced drilling & completion operations, horizontal/multi-lateral drilling & completion operations and high pressure-high temperature drilling operations in many countries including Australia, Indonesia, UK, Ukraine, Turkmenistan, Russia, Romania.

#### ***Dr Xingjin Wang, Senior Reservoir Engineering Consultant***

Dr Wang holds a PhD degree from University of New South Wales in Petroleum Engineering and has over 20 years' international experience in petroleum exploration and production applications. He specialises in reservoir simulation, well test analysis, production performance analysis and reservoir characterisation. Prior to running his own consulting company, Austar Gas, Xingjin was General Manager (Engineering) of Arrow Energy Ltd before Arrow was taken over by PetroChina and Shell. He has extensive tight sand gas, shale gas and Coal Bed Methane experience in the major basins of Australia, Russia, China, Indonesia and India. As an experienced reservoir engineer, he had worked for RISC, Mosaic Oil N.L., Sinopec and Arrow Energy. He has expertise in using FAST Welltest, FAST CBM, Simedwind, and FEKETE Production analysis software.





## Appendix 1. What is Basin Centred Gas (BCG)?

Figure 14 Illustration of the Basin Centred Gas concept

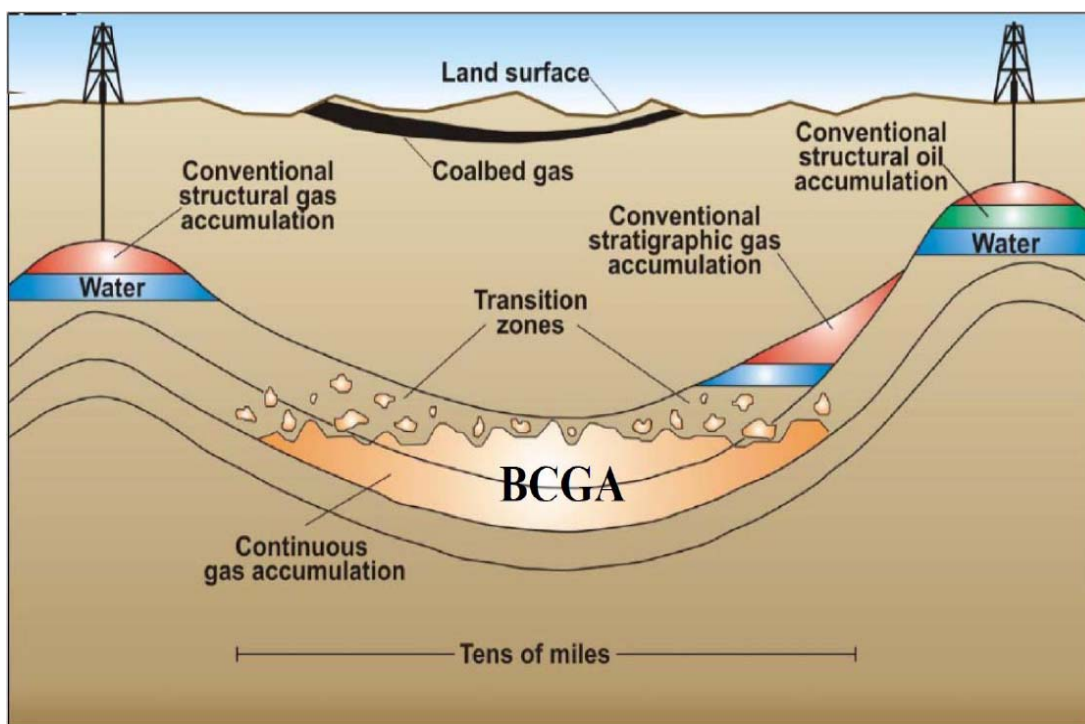


Figure 15 Diagrammatic representation of basin centred gas (Source: RLE investor presentation)

*Basin centred gas different and likely to be lower cost than shale gas plays*

RLE's resource is a "basin centred gas" play and this is diagrammed in Figure 14. It is "unconventional" in the sense that it does not rely on structure to create a trap as in conventional gas fields, but in many ways BCG is quite different to shale gas.

In BCG, the gas is trapped in low permeability sandstones but the nature of the trapping mechanism is such that the gas is usually held in place by water, and once the water is pumped out lacks a production drive, so gas flows at low pressure and low rates. Commonly, fracking or some other form of stimulation is required to aid commercial flow rates. Unlike the significant effort into shale gas activity in recent years, the BCG plays have received far less capital.

The shale gas drilling campaign from 2011 to 2014 conducted by Beach Energy and partner Chevron and Drillsearch and partner BG Group, was an attempt to replicate the success of similar activity in the USA. Collectively, around \$700 million was invested to drill 30 wells into various parts of the Cooper Basin. Initially, these ventures targeted deep but over-pressured shales at the bottom of the Nappamerri trough. Many wells were tested and flowed gas at >1mmcf/d.

Santos too, achieved good rates from some deep Moomba wells. The challenge these industry pioneers faced was cost. The Nappamerri trough wells cost typically \$15m to drill and test. Depth and temperature imposed technical limits and added to cost, and gas prices were not high enough at the time to make the economics work.

Then the oil price crashed in 2014 and all high-cost gas exploration activity ceased.

### Geology of the Windorah trough

Stratigraphy of the Windorah trough contains numerous thick Jurassic, Cretaceous, Permian and Triassic sandstones, interbedded by gas-rich coals, finer grain sediments and sealing shales.

These sequences are well understood in the Cooper Basin, with over 3000 well penetrations. In RLE's permit, the target objectives are the Patchawarra and Toolachee sandstones which are 3,000m deep in the





centre of the trough, and around 2,000m deep on the basin edge, in contrast, the shale rocks in the centre of the Nappamerri trough, were between 4,000m and 5,000m.

Figure 15 shows the stratigraphic sequence from west to east. Commercial gas discoveries are in conventional structural traps, at Wareena, Whanto, Cocos, Solitaire and Mount Howitt. These wells produced gas at commercial rates from sands in the Toolachee and Permian, from conventional 4-way dip closed or fault dependent traps. Reservoir quality is variable with porosities typically 10-15% evidencing good reservoir quality. The highest flow rate recorded from the Toolachee is 11.4 mmcf/d from Wareena #1, 25 km to the south. Several other wells have recorded rates in the 3-7 mmcf/d range. There are numerous coal measures and finer grained sediments which are water bearing and are sources of water influx if not avoided during the completion and fracking processes. CO<sub>2</sub> levels in all these reservoirs is high, generally in the 10-15% range and estimated at 12-14% at Tamarama and Queenscliff.

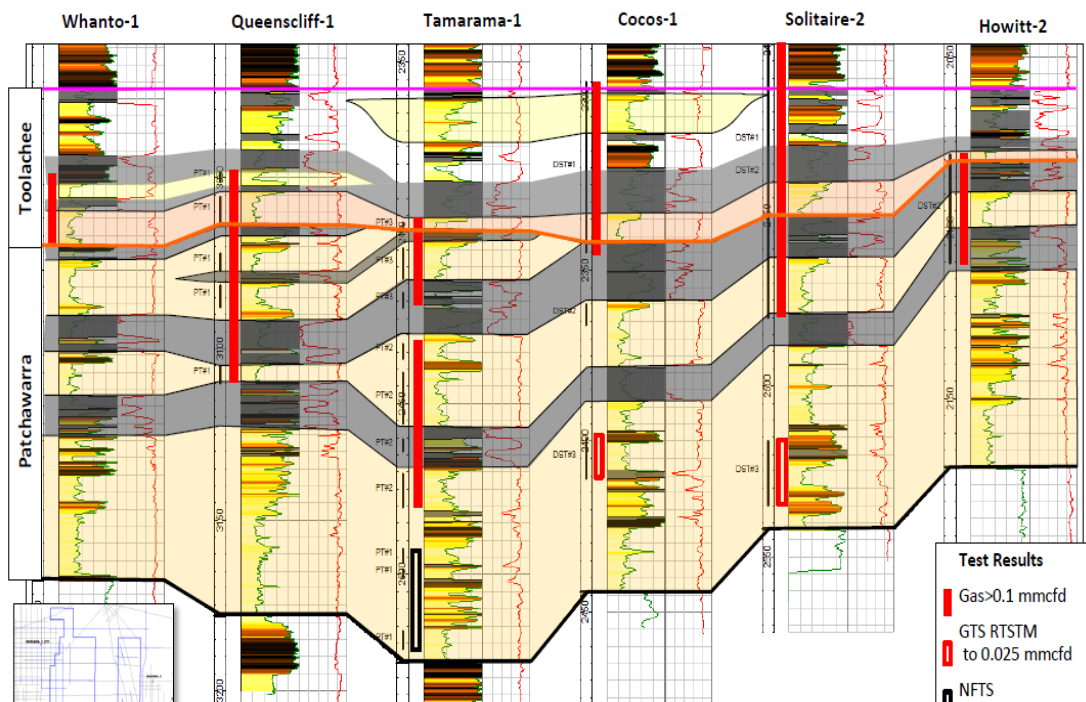


Figure 16 Well sections in the Windorah Trough ( Source: RLE investor material)



### **Analyst Verification**

I, **Michael Harrowell**, as the Research Analyst, hereby certify that the views expressed in this research accurately reflect our personal views about the subject securities or issuers and no part of analyst compensation is directly or indirectly related to the inclusion of specific recommendations or views in this research.

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We acknowledge that Senior Resource Analyst, Michael Harrowell, holds no shares in the any of the companies mentioned in this report.

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