

# **2018 ANNUAL RESERVES REPORT**

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For the year ended 30 June 2018

## 1. RESERVES AND RESOURCES

This Annual Reserves Report provides an update on the reserves and resources of Origin Energy Limited (Origin) and its share of Australia Pacific LNG (APLNG), as at 30 June 2018. The information in this report does not include Origin's share of reserves relating to Lattice Energy assets. The sale of Lattice Energy to Beach Energy was completed on 31 January 2018, with an economic effective date of 1 July 2017.

### 1.1 Highlights

#### APLNG

- Activity during FY2018 focused on maximising production for supply to the two LNG trains at Curtis Island and to the domestic market, contributing to:
  - a strong production result with Origin's share of APLNG production increasing by 11% or 25 PJe to 254 PJe
  - an increase in Origin's share of proven reserves (1P) of 11% or 314 PJe before production as a result of development drilling. After taking into account production, 1P increased by 61 PJe to 2,880 PJe.
- APLNG also continues to focus on maturing its strong resource base with exploration and appraisal activities, as well as through technology trials and cost saving initiatives underway.
- Following a technical and commercial review of ATP663 (Gilbert Gully), APLNG determined that this acreage has lower permeability and gas saturation than in other parts of the Surat Basin, making commercial development in this area unlikely, particularly due to the distance from existing production infrastructure. Accordingly, APLNG intends to divest the permit and has recorded a downward revision of 215PJe (Origin's share) to its 2C contingent resource

### 1.2 2P Reserves

#### Origin 2P reserves by area

2P reserves by area (PJe)	2P 30/06/2017	Acquisition/ divestment	New booking /discovery	Revisions/ extensions	Production	2P 30/06/2018
<b>Australia Pacific LNG</b>	4,704	-	-	219	(254)	4,670
Surat/Bowen (Unconventional)						
- Spring Gully & Denison Asset	606	-	-	102	(39)	670
- Condabri, Talinga & Orana Asset	1,467	-	-	87	(100)	1,453
- Reedy Creek, Combabula & Peat Asset	1,585	-	-	59	(54)	1,590
- Non-Operated Assets	1,046	-	-	(29)	(61)	957
<b>Other</b>						
Ironbark (unconventional)	249	-	-	(120)	-	129
<b>Total</b>	4,953	-	-	99	(254)	4,799

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**Summary of 2P Reserves Movement**

Proved plus probable (2P) reserves decreased by 154 PJe (including production) to a total of 4,799 PJe, when compared to 30 June 2017. The key changes in 2P reserves include:

- 254 PJe decrease due to production
- 99 PJe net increase resulting from revisions / extensions associated with APLNG and Ironbark

The increase of 99 PJe of 2P reserves before production included movements in the following areas:

- APLNG increased by 219 PJe or 5% due to:
  - improvements in forecast estimated recovery from producing areas due to more production data leading to an improved understanding of field behaviour
  - improved economic assumptions
  - reductions in future unit costs associated with the cost reduction program that is underway.
- Ironbark decreased by 120 PJe due to a revision to the field development plan based on experience and updated assumptions from analogous APLNG fields as announced to the market ASX on 8<sup>th</sup> February 2018  
<https://www.asx.com.au/asxpdf/20180208/pdf/43rf6t5nxl0ycy.pdf>.

Additional notes

- At 30 June 2018, 100% of Origin 2P reserves are unconventional gas.

**Origin 2P reserves by development type**

2P reserves by development type (PJe)	Total 2P		Total 2P 30/06/2017	Total 2P		Total 2P 30/06/2018
	Developed	Undeveloped		Developed	Undeveloped	
<b>Australia Pacific LNG</b>	2,387	2,317	4,704	2,461	2,208	4,670
Surat/Bowen (Unconventional)						
- Spring Gully & Denison Asset	455	151	606	543	126	670
- Condabri, Talinga & Orana Asset	984	483	1,467	988	465	1,453
- Reedy Creek, Combabula & Peat Asset	486	1,099	1,585	529	1,061	1,590
- Non-Operated Assets	461	585	1,046	401	556	957
<b>Other</b>						
Ironbark (unconventional)	-	249	249	-	129	129
<b>Total</b>	2,387	2,566	4,953	2,461	2,338	4,799

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**1.3 1P Reserves**

Proved (1P) reserves increased by 314 PJe or 11% (before production) and 61 PJe after production to a total of 2,880 PJe, when compared to the previous reporting period, due to development drilling. 100% of 1P reserves are unconventional gas.

**Origin 1P Reserves by area**

1P reserves by area (PJe)	1P 30/06/2017	Acquisition/ divestment	New booking /discovery	Revisions/ extensions	Production	1P 30/06/2018
<b>Australia Pacific LNG</b>	2,819	-	-	314	(254)	2,880
Surat/Bowen (Unconventional)						
- Spring Gully & Denison Asset	497	-	-	95	(39)	553
- Condabri, Talinga & Orana Asset	1,018	-	-	133	(100)	1,051
- Reedy Creek, Combabula & Peat Asset	532	-	-	107	(54)	585
- Non-Operated Assets	772	-	-	(21)	(61)	691
<b>Other</b>						
Ironbark (unconventional)	-	-	-	-	-	-
<b>Total</b>	2,819	-	-	314	(254)	2,880

**Origin 1P Reserves by development type**

1P reserves by development type (PJe)	Total 1P		Total 1P 30/06/2017	Total 1P		Total 1P 30/06/2018
	Developed	Undeveloped		Developed	Undeveloped	
<b>Australia Pacific LNG</b>	2,387	432	2,819	2,461	419	2,880
Surat/Bowen (Unconventional)						
- Spring Gully & Denison Asset	455	41	497	543	10	553
- Condabri, Talinga & Orana Asset	984	34	1,018	988	63	1,051
- Reedy Creek, Combabula & Peat Asset	486	46	532	529	56	585
- Non-Operated Assets	461	311	772	401	290	691
<b>Other</b>						
Ironbark (unconventional)	-	-	-	-	-	-
<b>Total</b>	2,387	432	2,819	2,461	419	2,880

## 1.4 3P and 2C Contingent Resources for Origin Energy

### Beetaloo

A material contingent resource announcement of 6.6 Tscf (gross) or 4.6 Tscf (Origin share) for the Beetaloo Basin was provided on 15 February 2017 to the ASX: <http://www.asx.com.au/asxpdf/20170215/pdf/43g0qhh87j71bb.pdf>. There has been no change to the contingent resource for the Beetaloo Basin in this reporting period.

On 17 April 2018 the Northern Territory government announced its decision to lift the moratorium on fracking and adopt the recommendations of the independent scientific inquiry. Origin is working with the NT Government, APPEA and other operators to provide input into the detail of recommendations before they are implemented and has held initial meetings to start access negotiations.

### Ironbark

Ironbark (unconventional) 3P reserves decreased by 443 PJe to 192 PJe and 2C decreased by 44 PJe to 288 PJe. These changes are due to a revision to the field development plan, as announced to the ASX on 8<sup>th</sup> February 2018 (<https://www.asx.com.au/asxpdf/20180208/pdf/43rf6t5nxl0ycy.pdf>) and follow a detailed assessment of the Ironbark gas field applying updated assumptions consistent with the technical review of APLNG's reserves in June 2017.

## Appendix A: APLNG Reserves and Resources

Netherland, Sewell & Associates, Inc. (NSAI) has prepared a consolidated report of the reserves and resources held by APLNG for Non-Operated Assets. The reserves and resources estimates for each property in this report have been independently estimated by NSAI.

The tables below provide 1P, 2P and 3P reserves and 2C resources for APLNG (100%) and Origin's 37.5% interest in these APLNG reserves and resources.

### Reserves / resources held by APLNG (100% share)

Reserves / Resource classification	30/06/2017	Acquisition/ divestment	New booking /discovery	Revisions/ extensions	Production	30/06/2018
	<b>1P (proven)</b>	7,518	-	-	837	(676)
2P (proven plus probable)	12,545	-	-	584	(676)	12,453
3P (proven plus probable plus possible)	13,382	-	-	603	(676)	13,310
2C (best estimate contingent resource)	3,956	-	-	(707)	-	3,249

### Reserves / resources held by Origin (37.5% in APLNG)

Reserves / Resource classification	30/06/2017	Acquisition/ divestment	New booking /discovery	Revisions/ extensions	Production	30/06/2018
	<b>1P (proven)</b>	2,819	-	-	314	(254)
2P (proven plus probable)	4,704	-	-	219	(254)	4,670
3P (proven plus probable plus possible)	5,018	-	-	226	(254)	4,991
2C (best estimate contingent resource)	1,483	-	-	(265)	-	1,218

The 837 PJe increase in APLNG (100% share) 1P excluding production is due to development drilling.

The 584 PJe increase in APLNG (100% share) 2P excluding production is due to more production data leading to an increased understanding of estimated forecast recovery from producing areas, accompanied by improved economic assumptions and reduction in future capital expenditure reflecting the cost reduction program underway.

The 603 PJe increase in APLNG (100% share) 3P excluding production is due to improved understanding of estimated recovery in producing areas.

The 707 PJe decrease in APLNG (100% share) 2C is primarily due to the planned divestment of ATP663 (Gilbert Gully) resulting in a 573PJe write-off and some minor reclassification to reserves. There are a number of appraisal activities presently ongoing that if successful will convert some resources to reserves.

## Appendix B: Notes Relating to this Report

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### a. Methodology regarding Reserves and Resources

The Reserves Report has been prepared to be consistent with the Petroleum Resources Management System (PRMS) 2007 published by Society of Petroleum Engineers (SPE). This document may be found at the SPE website: [spe.org/industry/docs/Petroleum\\_Resources\\_Management\\_System\\_2007.pdf](http://spe.org/industry/docs/Petroleum_Resources_Management_System_2007.pdf). Additionally, this Reserves Report has been prepared to be consistent with the ASX reporting guidelines. For all assets Origin reports reserves and resources consistent with SPE guidelines as follows: proved reserves (1P); proved plus probable reserves (2P); proved plus probable plus possible reserves (3P); best estimate contingent resource (2C). Reserves must be discovered, recoverable, commercial and remaining.

The CSG reserves and resources held within APLNG's properties have either been independently prepared by NSAI or prepared by Origin. An independent audit of our CSG reserves and resources within ATP 788 (Ironbark) permit has been undertaken by NSAI. The reserves and resources estimates contained in this report have been prepared in accordance with the standards, definitions and guidelines contained within the Petroleum Resources Management System (PRMS) and generally accepted petroleum engineering and evaluation principles as set out in the SPE Reserves Auditing Standards.

Origin does not intend to report Prospective or Undiscovered Resources as defined by the SPE in any of its areas of interest on an ongoing basis.

### b. Economic test for reserves

The assessment of reserves requires a commercial test to establish that reserves can be economically recovered. Within the commercial test, operating cost and capital cost estimates are combined with fiscal regimes and product pricing to confirm the economic viability of producing the reserves.

Gas reserves are assessed against existing contractual arrangements, local market conditions, as appropriate. In the case of gas reserves where contracts are not in place a forward price scenario based on monetisation of the reserves through domestic markets has been used, including power generation opportunities, direct sales to LNG and other end users and utilisation of Origin's wholesale and retail channels to market.

For CSG reserves that are intended to supply the APLNG CSG to LNG project, the economic test is based on a weighted average price across all sales contracts (including domestic and LNG contracts), less short run marginal costs for downstream transport and processing. This price is exposed to changes in the supply/demand balance in the market through oil price-linked LNG contracts.

### c. Reversionary Rights

The CSG interests that Australia Pacific LNG acquired from Tri-Star in 2002 are subject to reversionary rights. If triggered, these rights will require Australia Pacific LNG to transfer back to Tri-Star a 45% interest in those CSG interests for no additional consideration. Origin has assessed the potential impact of these reversionary rights based on economic tests consistent with the reserves and resources referable to the CSG interests and based on that assessment does not consider that the existence of these reversionary rights impacts the reserves and resources quoted in this report. Tri-Star has commenced proceedings against Australia Pacific LNG claiming that reversion has occurred. Australia Pacific LNG denies that reversion has occurred and is defending the claim. Approximately 21% of APLNG's 3P CSG reserves as at 30 June 2018 are subject to reversionary rights. Refer to Section 6 of the Operating and Financial Review released on the same date as this report for further information.

### d. Information regarding the preparation of this Reserves Report

The internationally recognised petroleum consultant NSAI has prepared an independent audit of the reserves and resources for the Ironbark asset. The CSG reserves and resources held within APLNG's properties have either been independently prepared by NSAI or prepared by Origin. All assessments are based on technical, commercial and operational data provided by Origin on behalf of APLNG.

The statements in this Report relating to reserves and resources as of 30 June 2018 for APLNG's interested in Non-Operated assets are based on information in the NSAI report dated 31 July 2018. The data has been compiled by Mr. Dan Paul Smith, a full-time employee of NSAI. Mr. Dan Paul Smith has consented to the statements based on this information, and to the form and context in which these statements appear.

The statements in this Report relating to reserves and resources for other assets have been compiled by Simon Smith, a full-time employee of Origin. Simon Smith is a qualified reserves and resources evaluator and has consented to the form and context in which these statements appear.

# RESERVES AND RESOURCES

## FOR THE YEAR ENDED 30 JUNE 2018

### e. Rounding

Information on reserves is quoted in this report rounded to the nearest whole number. Some totals in tables in this report may not add due to rounding. Items that round to zero are represented by the number 0, while items that are actually zero are represented with a dash “-”.

### f. Abbreviations

bbbl	barrel
Tscf	trillion standard cubic feet
CSG	coal seam gas
kbbbls	kilo barrels = 1,000 barrels
ktonnes	kilo tonnes = 1,000 tonnes
mmboe	million barrels of oil equivalent
PJ	petajoule = $1 \times 10^{15}$ joules
PJe	petajoule equivalent

### g. Conversion Factors for PJe

CSG	1.038 PJ/Bscf
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### h. Reference Point

Reference points for Origin’s petroleum reserves and contingent resources are defined points within Origin’s operations where normal exploration and production business ceases, and quantities of the produced product are measured under defined conditions prior to custody transfer. Fuel, flare and vent consumed to the reference points are excluded.

### i. Preparing and Aggregating Petroleum Resources

Petroleum reserves and contingent resources are typically prepared by deterministic methods with the support from probabilistic methods. Petroleum reserves and contingent resources are aggregated by arithmetic summation by category and as a result, proved reserves may be a conservative estimate due to the portfolio effects of the arithmetic summation. Proved plus probable plus possible may be an optimistic estimate due to the same aforementioned reasons.

### j. Methodology and Internal Controls

The reserves estimates undergo an assurance process to ensure that they are technically reasonable given the available data and have been prepared according to our reserves and resources process, which includes adherence to the PRMS Guidelines. The assurance process includes peer reviews of the technical and commercial assumptions. The annual reserves report is reviewed by management with the appropriate technical expertise, including the Chief Petroleum Engineer and Integrated Gas General Managers.

### k. Qualified Petroleum Reserves and Resources Evaluators

The material presented in this report is based on, and fairly represents, information and supporting documentation prepared by, or under the supervision of the listed qualified reserves and resources evaluators. These individuals have consented to the statements based on this information, and to the form and context in which these statements appear.

Simon Smith	Origin Energy (Chief Petroleum Engineer)	SPE, EA, RPEQ
Graham Sutherland	Origin Energy	SPE, EA, RPEQ
Alistair Jones	Origin Energy	SPE, EA
Reneke van Soest	Origin Energy	SPE
Alexander Cote	Origin Energy	SPE, APEGA, EA
Levi Turner	Origin Energy	SPE
Melissa Goodfellow	Origin Energy	SPE
Miguel Tovar	Origin Energy	SPE, EA, RPEQ
Lin Xuejun	Origin Energy	SPE
Erhart Stockhausen	Origin Energy	SPE
Daus Jamal Asmara	Origin Energy	SPE
Ali Sani	Origin Energy	SPE
Turaj Nuralishahi	Origin Energy	SPE, EA, RPEQ
Russell Evans	Origin Energy	SPE
Samer Mutawe	Origin Energy	SPE
Masoud Zadmehr	Origin Energy	SPE
Natalie Chadud	Origin Energy	SPE, EA

\* SPE: Society of Petroleum Engineers; AAPG: American Association of Petroleum Geologists; APEGA: The Association of Professional Engineers and Geoscientists of Alberta; EA: Institution of Engineers Australia; RPEQ: Registered Professional Engineer of Queensland.