CORE ENERGY GROUP

Gas Reserves and Resources
Eastern and South Eastern Australia

February 2015

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1. INTRODUCTION

This section of the report provides detail on the scope of the report and the methodology and assumptions that underpin the data presented in this report.

1.1 Scope

Core has been engaged by the Australia Energy Market Operator ("**AEMO**") to present gas reserve and resource balances as at 30 June 2014.

Specifically this report addresses:

- Details of publicly reported gas reserves and resources at 30 June 2014, including:
  - > Reserve/resource classification (2P, 3P/2C, prospective resource) by basin or production area; and
  - > Gas resource type (i.e. Conventional, CSG or Other unconventional) by basin or production area.

1.2 Definitions

Unless otherwise stated, the definitions detailed in Table 1.1 apply throughout this report.

Table 1.1 Report Definitions

Term	Definition
1P Reserves	Defined by the internationally-recognised Petroleum Resources Management System as proven reserves (both proved developed reserves and proved undeveloped reserves).
2P reserves	Defined by the internationally-recognised Petroleum Resources Management System as 1P (proven reserves) plus 2P (probable reserves).
3P reserves	Defined by the internationally-recognised Petroleum Resources Management System as 2P (proven reserves plus probable reserves) plus 3P (possible reserves).
2C reserves	Defined by the internationally-recognised Petroleum Resources Management System as the best estimate of contingent resources.
Coal seam gas ("**CSG**")	Natural gas extracted from coal deposits.
Contingent resources	Defined by the internationally-recognised Petroleum Resources Management System as those quantities of petroleum which are estimated, on a given date, to be potentially recoverable from known accumulations, but which are not currently considered to be commercially recoverable.
Conventional gas	Natural gas that is extracted from conventional underground reservoirs using traditional exploration and production methods.
Prospective resources ("PR")	As defined by the internationally-recognised Petroleum Resources Management System. Prospective Resources are those quantities of petroleum which are estimated, on a given date, to be potentially recoverable from undiscovered accumulations.
Reserves	Defined by the internationally-recognised Petroleum Resources Management System as those quantities of petroleum which are anticipated to be commercially recovered from known accumulations from a given date forward.
Total Reserves and Resources	Meaning the sum of 2P, 3P/2C and prospective resources.
Other Unconventional gas	Natural gas that is extracted from shale or tight gas reservoirs.

1.3 Acronyms

Table 1.2 Acronyms

Acronym	Definition
AEMO	Australian Energy Market Operator
APLNG	Australia Pacific LNG
ASX	Australian Securities Exchange
AUD	Australian dollar
Core	Core Energy Group
CSG	Coal seam gas
GPG	Gas powered generation
GLNG	Gladstone LNG
GSOO	Gas Statement of Opportunities
LNG	Liquefied natural gas
MMLI	Mass market and large industrial
MWh	Megawatt hour
NSW	New South Wales
PJ	Petajoule
QCLNG	Queensland Curtis LNG
Qld	Queensland
R/P ratio	Reserves-to-production ratio
SA	South Australia
SPE	Society of Petroleum Engineers
Tas	Tasmania
Vic	Victoria

1.4 Methodology and Assumptions

To provide an estimate of reserves and resources as at 30 June 2014, Core has undertaken the following:

1. Extracted publicly reported reserves and resources from Core's proprietary Eastern Australia Reserves and Resources database as at 30 June 2014 (or 31 December 2013 if 30 June 2014 balances were not available).
2. For reserves and resources only available as at 31 December 2013, production statistics were sourced for the first half of 2014 and subtracted from reserves and resources as at 31 December 2013 to derive an estimate of reserves and resources as at 30 June 2014.
3. Presented reserves and resources by operator, against the following classifications:
   - 2P
   - 3P
   - 2C
   - Prospective resources
   - Total reserves and resources.
4. Provided select reserves and resources to major operators as part of a broader validation process.
5. Consolidated reserves and resources as at 30 June 2014.

1.4.1 Assumptions

Reserves and resources as at 30 June 2014 have been extracted from Core's proprietary Eastern Australia Reserves and Resources database. This database maintains a timely record of public information relating to gas reserves and resources, including annual, half yearly, quarterly and periodic reports, Australian Security Exchange announcements, and investor presentations. For reserves and resources available as at 31 December 2013, adjustments have been made to account for production within the first half of 2014.

Data captured in addition to reported reserves and resources includes the field/permit name, location (State and Basin), ownership interests, reservoir type (i.e. conventional, CSG, unconventional) and status (i.e. exploration, development, production).

Core adopts strict quality controls to ensure all data captured is complete, accurate and up-to-date.

2. RESERVES AND RESOURCES

Section 2 of this report provides a provides a summary of eastern Australian reserves and resources as at 30 June 2014.

2.1 Reserves and Resources by Type

Table 2.1 presents a summary of publicly reported reserves and resources in eastern and south eastern Australia as at 30 June 2014 by 'resource type'. Table 2.2 presents the same information as at 31 December 2012, and Table 2.3 presents the difference in reserves and resources between 31 December 2012 and 30 June 2014.

Table 2.1 Summary of Gas Reserves and Resources by 'resource type' as at 30 June 2014 | PJ

Basin	2P Reserves	3P/2C Reserves and Resources	Prospective Resources	Total Reserves and Resources
Conventional	6,398	12,508	25,473	37,981
CSG	46,130	107,472	142,323	249,795
Other Unconventional	5.0	7,414	209,927	217,341
TOTAL	**52,533**	**127,394**	**377,723**	**505,116**

Source: Core Energy Group

Table 2.2 Summary of Gas Reserves and Resources by 'resource type' as at 31 December 2012 | PJ

Basin	2P Reserves	3P/2C Reserves and Resources	Prospective Resources	Total Reserves and Resources
Conventional	7,093	12,377	21,902	34,279
CSG	46,131	114,126	142,323	256,449
Other Unconventional	5	5,712	178,915	184,627
TOTAL	**53,229**	**132,215**	**343,140**	**475,355**

Source: Core Energy Group

Table 2.3 Summary of Movement in Reserves and Resources by 'resource type' between 31 December 2012 and 30 June 2014 | PJ

Basin	2P Reserves	3P/2C Reserves and Resources	Prospective Resources	Total Reserves and Resources
Conventional	-694	131	3,571	3,702
CSG	-1	-6,654	-	-6,654
Other Unconventional	-	1,702	31,012	32,713
TOTAL	**-695**	**-4,822**	**34,583**	**29,761**

Source: Core Energy Group

Major movements in reserves and resources between 31 December 2012 and 30 June 2014 are attributable to:

- Inclusion of resources within ATP 855 joint venture (Beach Energy 46.9% and operator, Chevron 18%, Icon Energy 35.1% - Nappamerri Trough of the Cooper Basin), estimated prospective resources to be 26,866PJ as at 30 June 2014.
- Surat and Bowen 3P/2C resources increasing by approximately 750PJ to 91,812PJ.
- Gunnedah 2C resources were revised down to 3C resources, resulting in a negative movement of approximately 6,500PJ.
- Inclusion of Senex Energy Prospective Resources of 3,751PJ from the Hornet Gas operation in the Cooper Eromanga basin.

Figure 2.1 Eastern and South Australian 2P Reserves by Gas Source | PJ

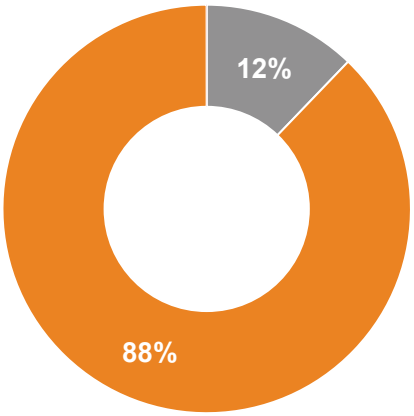
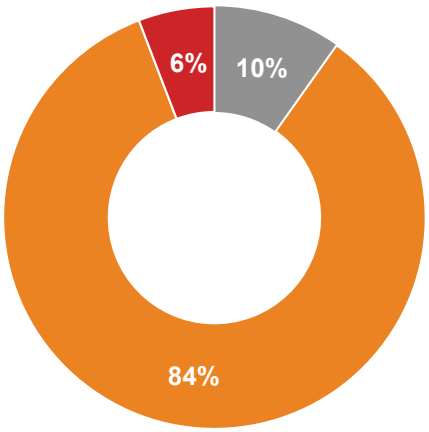


Figure 2.2 Eastern and South Australian 3P/2C Resources by Gas Source | PJ



Source: Core Energy Group

Figure 2.3 Eastern and Southern 2P Reserves by Basin | PJ

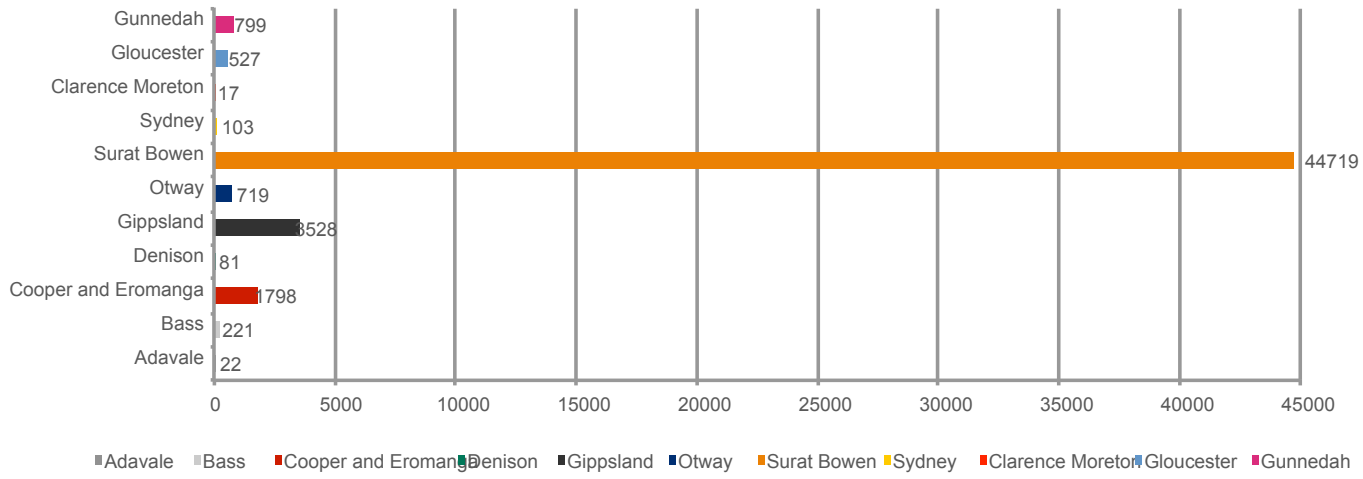
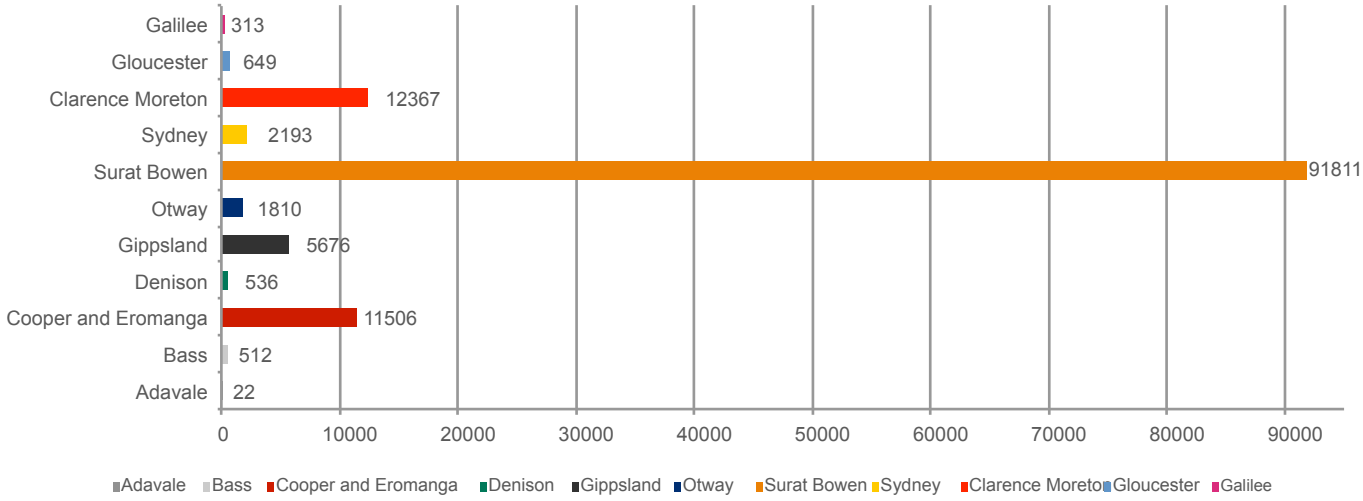


Figure 2.4 Eastern and Southern 3P/2C Resources by Basin | PJ



Source: Core Energy Group

2.2 Reserve and Resources by Basin

Table 2.4 Gas Reserves and Resources by Basin as at 30 June 2014 | PJ

Basin	2P Reserves	3P/2C Reserves and Resources	Prospective Resources	Total Reserves and Resources
Conventional				
Adavale	22	22	-	22
Bass	221	512	-	512
Cooper and Eromanga	1,793	4,855	3,571	8,426
Denison	18	88	-	88
Gippsland	3,528	5,676	7,910	13,585
Otway	719	1,048	-	1048
Surat and Bowen	97	309	-	309
Sydney	0	-	13,992	13,992
Subtotal Conventional	**6,398**	**12,508**	**25,473**	**37,981**
CSG				
Clarence Moreton	17	12,367	3,816	16,183
Cooper and Eromanga	-	-	38,852	38,852
Denison	63	448	-	448
Galilee	-	313	4,413	4,726
Gloucester	527	649	-	649
Gunnedah	799	-	48,684	48,684
Surat and Bowen	44,622	91,502	27,155	118,657
Sydney	103	2,193	19,403	21,596
Subtotal CSG	**46,130**	**107,472**	**142,323**	**249,795**
Other Unconventional				
Cooper and Eromanga	5	6,652	162,910	169,562
Gippsland	-	762	-	762
Otway	-	-	11	11
Maryborough	-	-	20,140	20,140
ATP 855	-	-	26,866	26,866
Subtotal Unconventional	**5**	**7,414**	**209,927**	**217,341**
Total	**52,533**	**127,394**	**377,723**	**505,116**

Source: Core Energy Group

Table 2.5 Gas Reserves and Resources by Basin as at 31 December 2012 | PJ

Basin	2P Reserves	3P/2C Reserves and Resources	Prospective Resources	Total Reserves and Resources
Conventional				
Adavale	22	22	-	22
Bass	268	559	-	559
Cooper and Eromanga	1,943	3,949	-	3,949
Denison	74	106	-	106
Gippsland	3,937	6,467	7,910	14,377
Otway	756	1,085	-	1,085
Surat and Bowen	93	190	-	190
Sydney	-	-	13,992	13,992
Subtotal Conventional	**7,093**	**12,377**	**21,902**	**34,279**
CSG				
Clarence Moreton	445	12,992	3,816	16,808
Cooper and Eromanga	-	-	38,852	38,852
Denison	-	-	-	-
Galilee	-	259	4,413	4,672
Gloucester	669	1,008	-	1,008
Gunnedah	1,426	6,387	48,684	55,071
Surat and Bowen	43,251	90,878	27,155	118,033
Sydney	340	2,602	19,403	22,005
Subtotal CSG	**46,131**	**114,126**	**142,323**	**256,449**
Other Unconventional				
Cooper and Eromanga	5	4,950	154,524	159,474
Gippsland	-	762	-	762
Otway	-	-	11	11
Maryborough	-	-	24,380	24,380
ATP 855	-	-	-	-
Subtotal Unconventional	**5**	**5,712**	**178,915**	**184,627**
Total	**53,229**	**132,215**	**343,140**	**475,355**

Source: Core Energy Group

Table 2.6 Gas Reserves and Resources Differences Between 31 December 2012 and 30 June 2014 | PJ

Basin	2P Reserves	3P/2C Reserves and Resources	Prospective Resources	Total Reserves and Resources
Conventional				
Adavale	-	-	-	-
Bass	-47	-47	-	-47
Cooper and Eromanga	-150	905	3,571	4,476
Denison	-56	-18	-	-18
Gippsland	-409	-792	-	-792
Otway	-37	-37	-	-37
Surat and Bowen	4	119	-	119
Sydney	-	-	-	-
Subtotal Conventional	**-694**	**131**	**3,571**	**3,702**
CSG				
Clarence Moreton	-428	-625	-	-625
Cooper and Eromanga	-	-	-	-
Denison	63	448	-	448
Galilee	-	54	-	54
Gloucester	-142	-359	-	-359
Gunnedah	-628	-6,387	-	-6,387
Surat and Bowen	1,371	624	-	624
Sydney	-237	-409	-	-409
Subtotal CSG	**-1**	**-6,654**	**-**	**-6,654**
Other Unconventional				
Cooper and Eromanga	-	1,702	8,386	10,087
Gippsland	-	-	-	-
Otway	-	-	-	-
Maryborough	-	-	-4,240	-4,240
ATP 855	-	-	26,866	26,866
Subtotal Unconventional	**-**	**1,702**	**31,012**	**32,713**
Total	**-695**	**-4,822**	**34,583**	**29,761**

Source: Core Energy Group

Figure 2.5 Difference in Conventional Reserves and Resources Between 31 December 2012 and 30 June 2014 | PJ

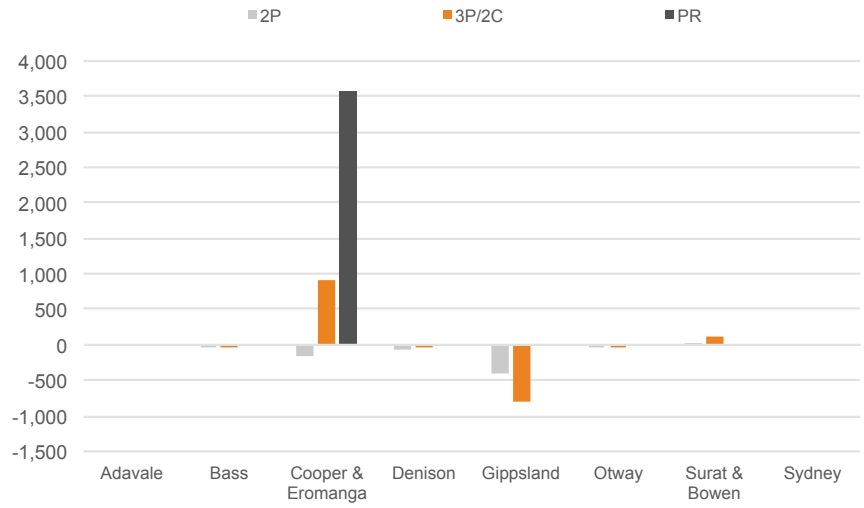


Figure 2.6 Difference in CSG Reserves and Resources Between 31 December 2012 and 30 June 2014 | PJ

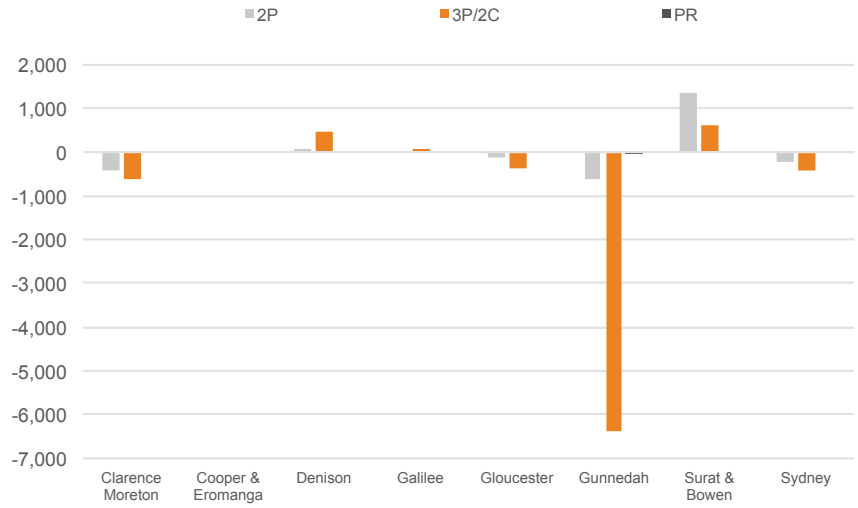
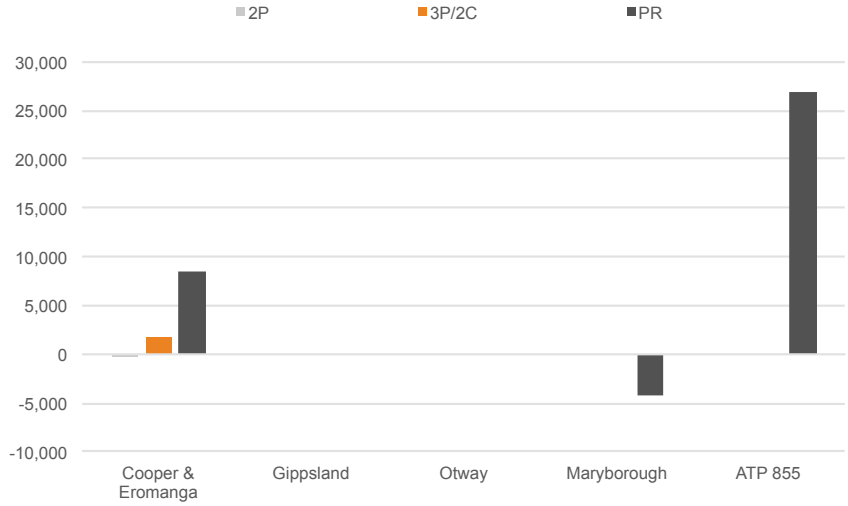


Figure 2.7 Difference in Other Unconventional Reserves and Resources Between 31 December 2012 and 30 June 2014 | PJ



Source: Core Energy Group

3. SUPPORTING INFORMATION

Supporting information for this report includes the Reserves and Resources databook and References.

3.1 Reserves and Resources Databook

A databook containing reserves and resources categorised by Operation, Basin, Operator and Resource Type accompanies this report. This databook is titled "Reserves.and.Resources_PublicDatabook". Included in this databook are summary tables and figures presented in Section 2. Reserves and Resources.

3.2 References

An extensive list of references were used to derive eastern Australian reserves and resources as at 30 June 2014. This list includes ASX releases, annual reports and investor presentations. Core has also sourced statistics from State governments and industry bodies, in particular the Queensland Government Department of Natural Resources and Mines and the Australian Petroleum Production and Exploration Association ("**APPEA**").

References included information released by the following organisations:

- AGL
- APPEA
- Arrow Energy
- AWE
- BG
- BHP Billiton
- Energy Australia
- GLNG
- Origin
- QCLNG
- QGC
- Queensland Government
- SA Government
- Santos
- Victorian Government

4. ATTACHMENTS

Section 4 includes three attachments.

Attachment 1 | Consultancy Scope

1.1 Purpose

The consultancy purpose is to:

- Deliver reserve projection inputs to the Gas Statement of Opportunities (GSOO) supply-demand modelling
- Provide publishable report and data book including a summary of reserves and resources at 30 June 2014.

1.2 Description of Consultancy Services and Deliverables

Consultancy Services are for the delivery of:

1. Reporting of gas reserves and resources as at 30 June 2014
2. Projections of gas production and gas transmission costs
3. Reporting on the current status of storage facilities, and an analysis of what potential options exist for new storage facilities

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For the avoidance of doubt, the provision of the Consultancy Services includes the provision of the following deliverables:

Deliverable	Description
A report and Excel data book of current reserves and resources	A report and Excel data book and report detailing current reserves and resources as at 30 June 2014 (suitable for publication on the AEMO website)
An Excel data book and report of reserves/resources by field and listing of key data sources	An Excel data book and report for AEMO use only which provides further detail of reserves/resources by field and listing of key data sources
A validation document of reserves and resources	A validation document for current reserves and resources for review by major resource owners

Attachment 2 | Definition of Terms

Reserves and Resources Classification

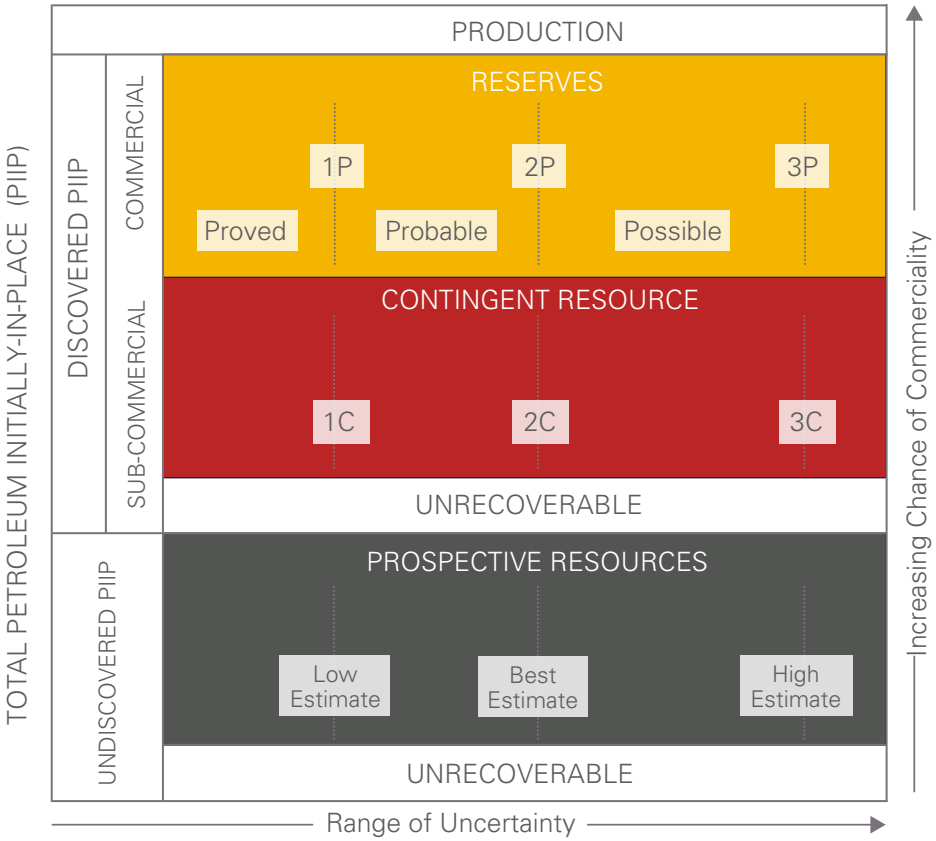
- Prospective Resources: resources inferred as being in place from comparisons of the geological understanding of particular petroleum basins, but these estimates may be very high and may change considerably as they are firmed up by exploration and appraisal.

- Contingent Resources: resources estimated to be potentially recoverable from known accumulations, but the applied project(s) are not yet considered mature enough for commercial development, due to one or more contingencies (e.g. no viable markets, no viable technology, and/or insufficient data). The Contingent Resource quantities (1C, 2C, and 3C) should theoretically move directly to 1P, 2P, and 3P Reserves once the contingency is removed, provided of course that all other criteria for assigning Reserves have been satisfied and the planned recovery project has not changed in any way.

- Reserves: volumes considered to be economically recoverable using current technology.
  - > 1P – Proven Reserves: those reserves claimed to have a reasonable certainty (normally at least 90% confidence) of being recoverable under existing economic and political conditions, with existing technology.

  - > 2P – Proven and Probable Reserves: In addition to Proven Reserves, it includes those additional reserves which analysis of geoscience and engineering data indicate are less likely to be recovered than Proven Reserves but more certain to be recovered than Possible Reserves. There should be at least a 50% probability than the actual quantities recovered will equal or exceed the 2P estimate. Considered the most relevant measure, these are widely quoted as those needed to underpin projects such as the CSG–LNG projects.

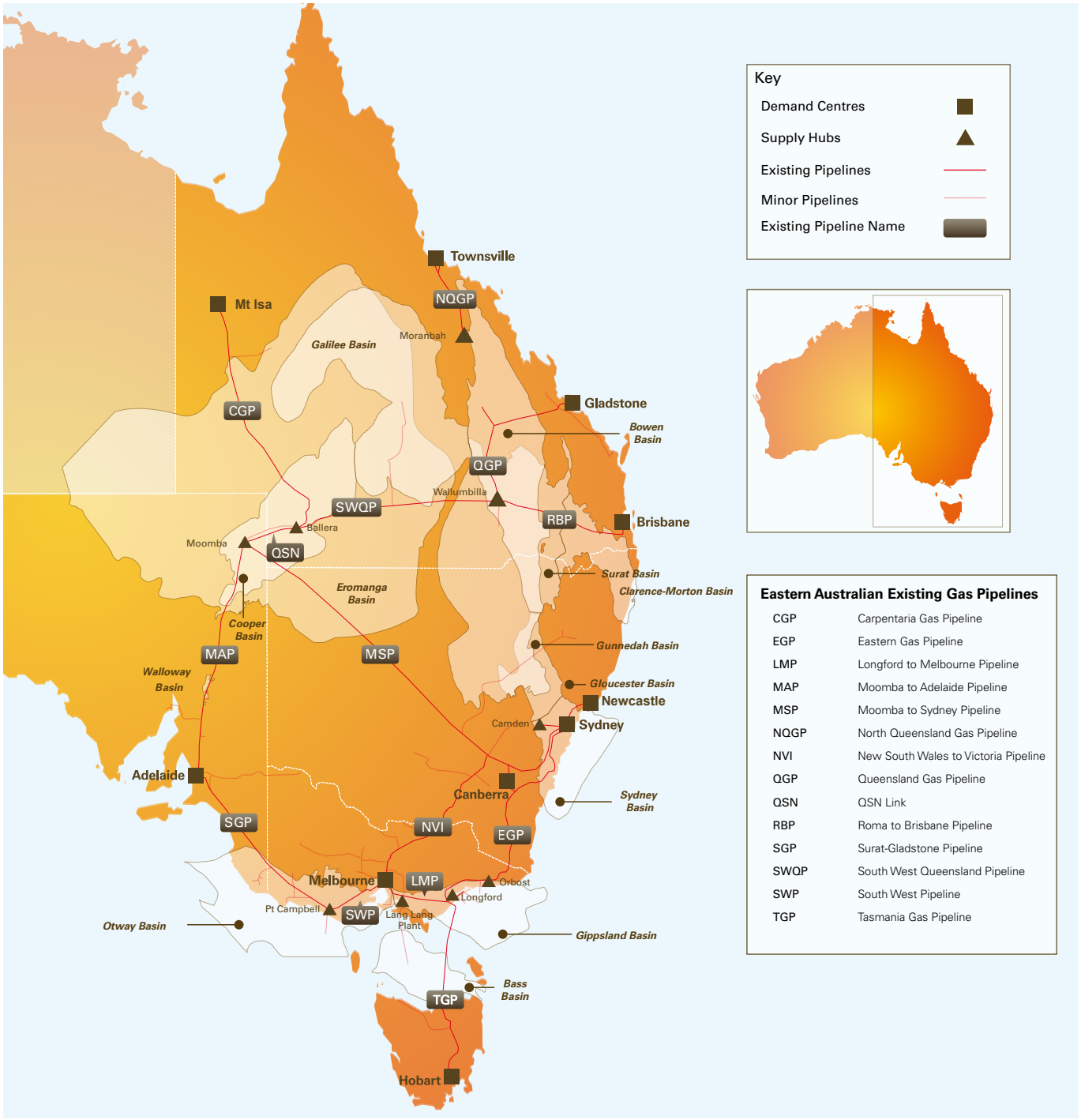
  - > 3P – Proven and Probable and Possible Reserves: attributed to known accumulations that have a less likely chance of being recovered than probable reserves. This term is often used for reserves which are claimed to have at least a 10% certainty of being produced ("P10").



Source: Core Energy Group

Attachment 3 | EA Gas Basins and Infrastructure

A map illustrating the eastern and south eastern Australian basins and infrastructure referred to in this Report.



Source: Core Energy Group

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Terms of use of this document

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