

OPPORTUNITIES FOR GAS – EASTERN AUSTRALIA AND NSW

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Positive trending factors

- ***East coast market has been subject to rapid change => driving innovation***
 - Standardisation, pipeline services, trade, transparency, volatility
- ***New direct participants entering facilitated markets and Wallumbilla trading hub => diversity***
 - Brings diversity of portfolios and different needs to market
- ***New players acting as intermediaries offering market management services => new options for participants***
- ***Industry seeking change and new direction => drives evolution***

Gas Supply

- Development of reserves
- Short term adequacy
- Long term investment & supply

Capacity Trade

- Third party access
- Competition

Information Transparency

- Pipeline and storage
- Sensitivity modelling
- System capability

Trading Hubs

- Gas supply hub
- Framework for east coast markets

GAS SUPPLY



THE SHORT TERM OUTLOOK, (2015-19)



No supply gaps expected in any regions.

In NSW, where a gas supply gap was previously expected, none is now expected.



This is in line with:

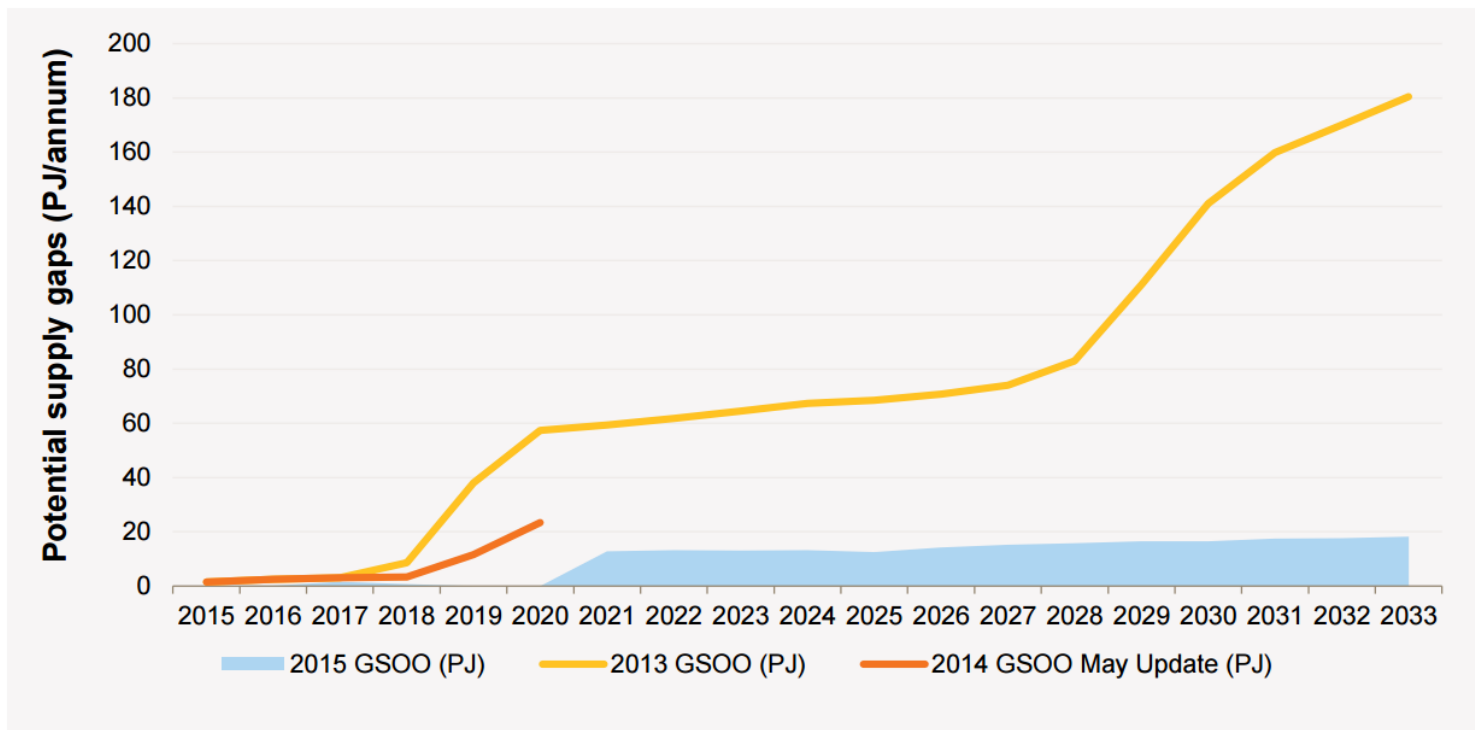
- 17% decline in gas consumption in 2019
- Newcastle LNG storage facility
- VNI capacity increase
- Improvements in data availability

MEDIUM – LONG TERM OUTLOOK (2020 – 2034)

Supply gaps:

- 214 PJ in QLD over the medium to long term outlook (2020 – 2034)
- Nearly all GPG, no LNG shortfalls
- No supply gaps identified in other regions

Figure 1 Total forecast supply gaps



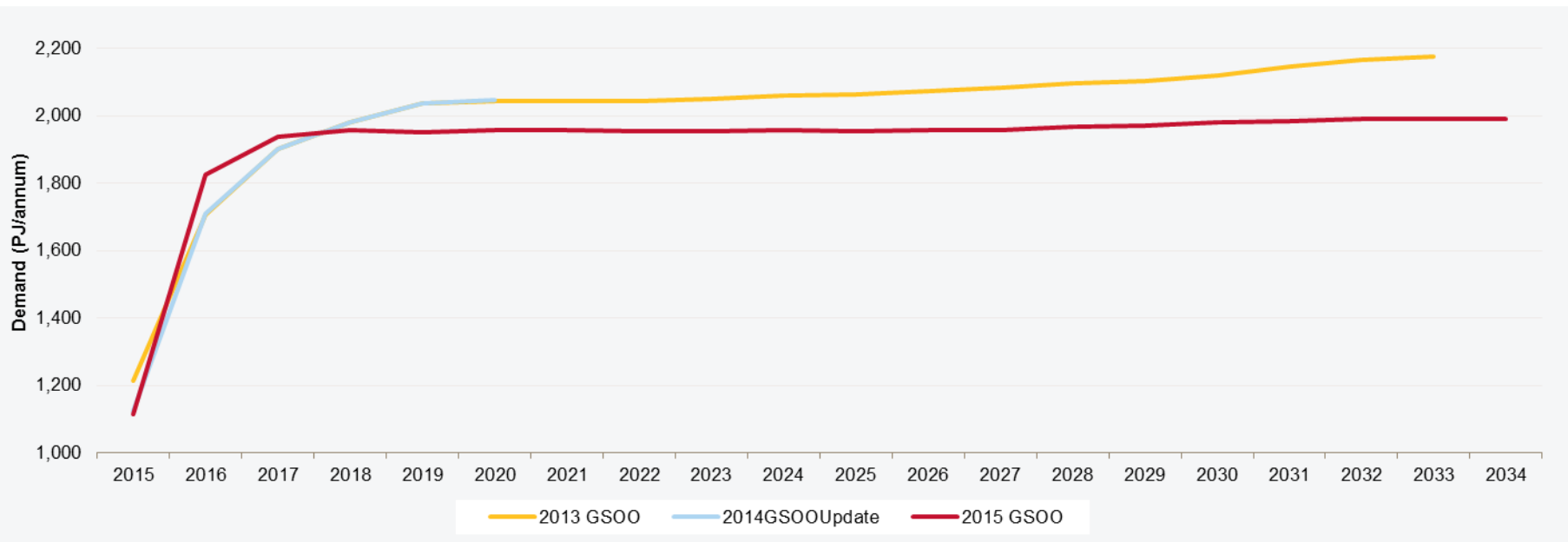
2015 GSOO - SUMMARY OF DEMAND

2014 NGFR

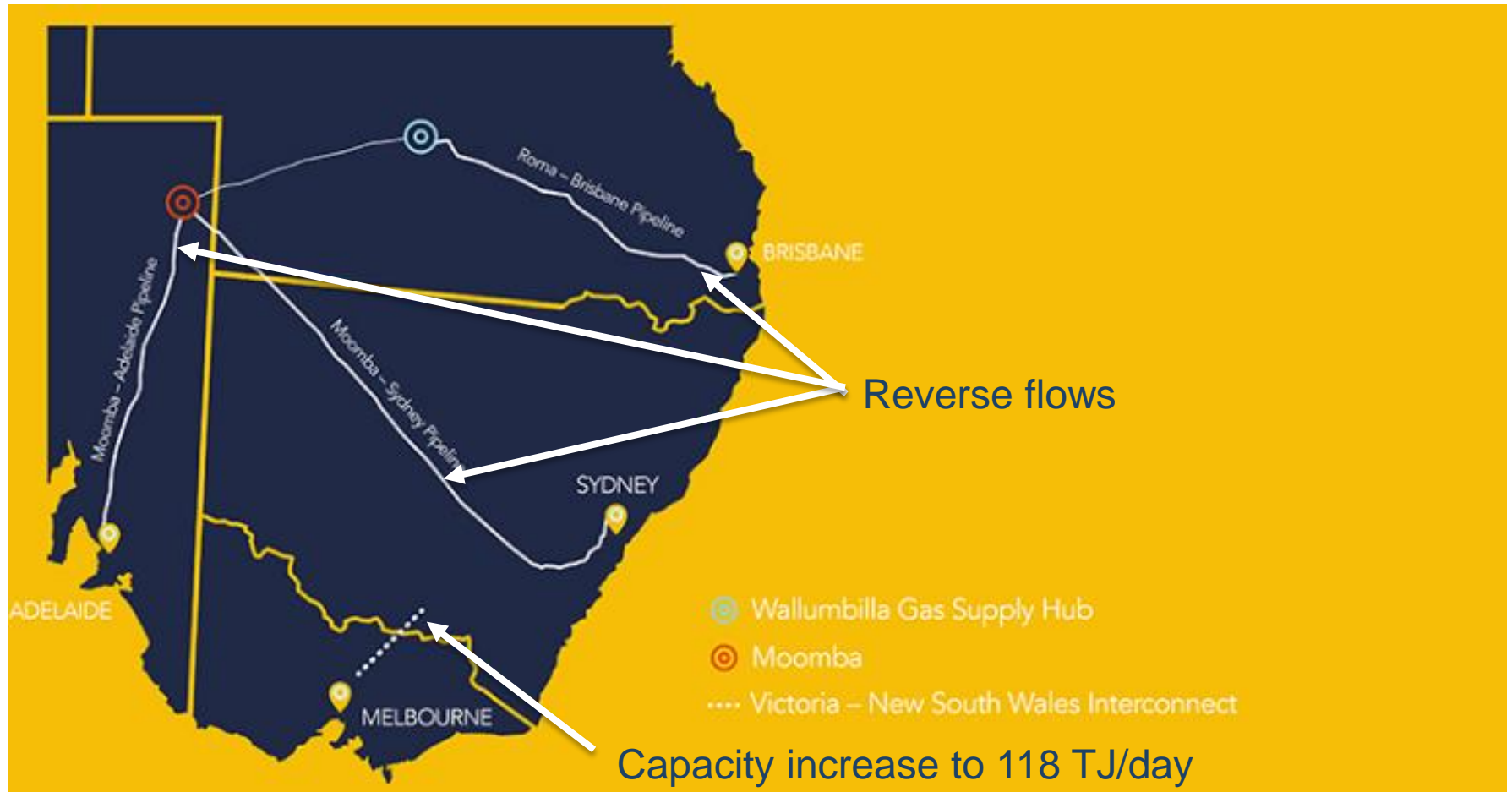


2015 GSOO demand compared to 2013 GSOO demand

	Total change	MMLI change	GPG change	LNG change
Next 5 years	1% ↓	11% ↓	58% ↑	0.6% ↑
Total 20 years	5% ↓	20% ↓	45% ↑	1% ↓



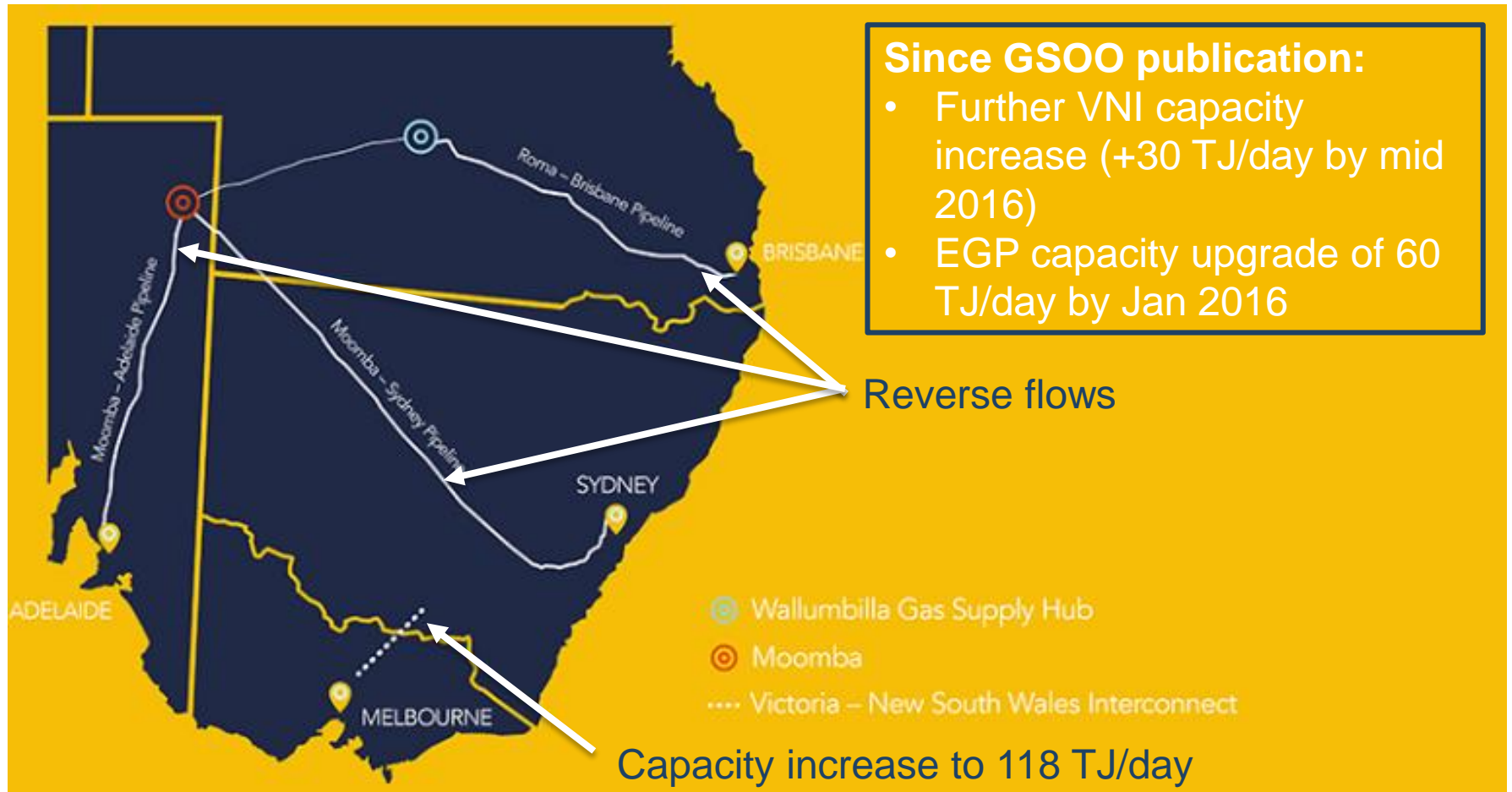
GAS INFRASTRUCTURE DEVELOPMENT – 2015 GSOO



Plus:

- TPG offers surplus line pack capacity as storage
- SEAGas and MAPS pipelines directly connected

NEW GAS INFRASTRUCTURE DEVELOPMENT ANNOUNCEMENTS



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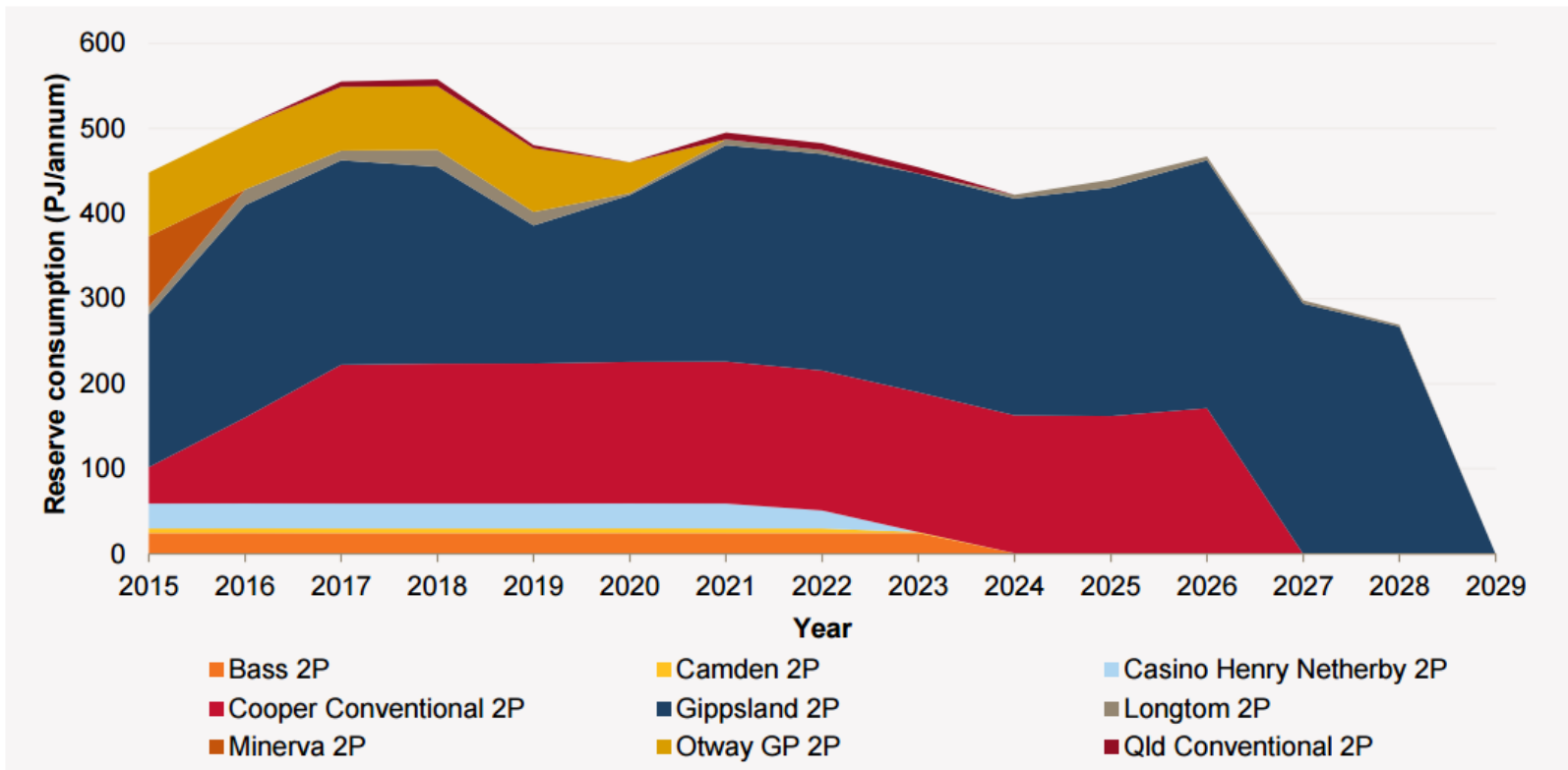
2015 GSOO – INFRASTRUCTURE ADEQUACY (RESERVES AND RESOURCES)



Sufficient reserves and resources available to satisfy projected gas demand for at least the next 20 years. However, new gas reserves need to be developed.

- 5,000 PJ from undeveloped reserves found mainly in the Cooper, Otway and Gippsland Basins.

Figure 2 Depletion of proven and probable conventional gas reserves

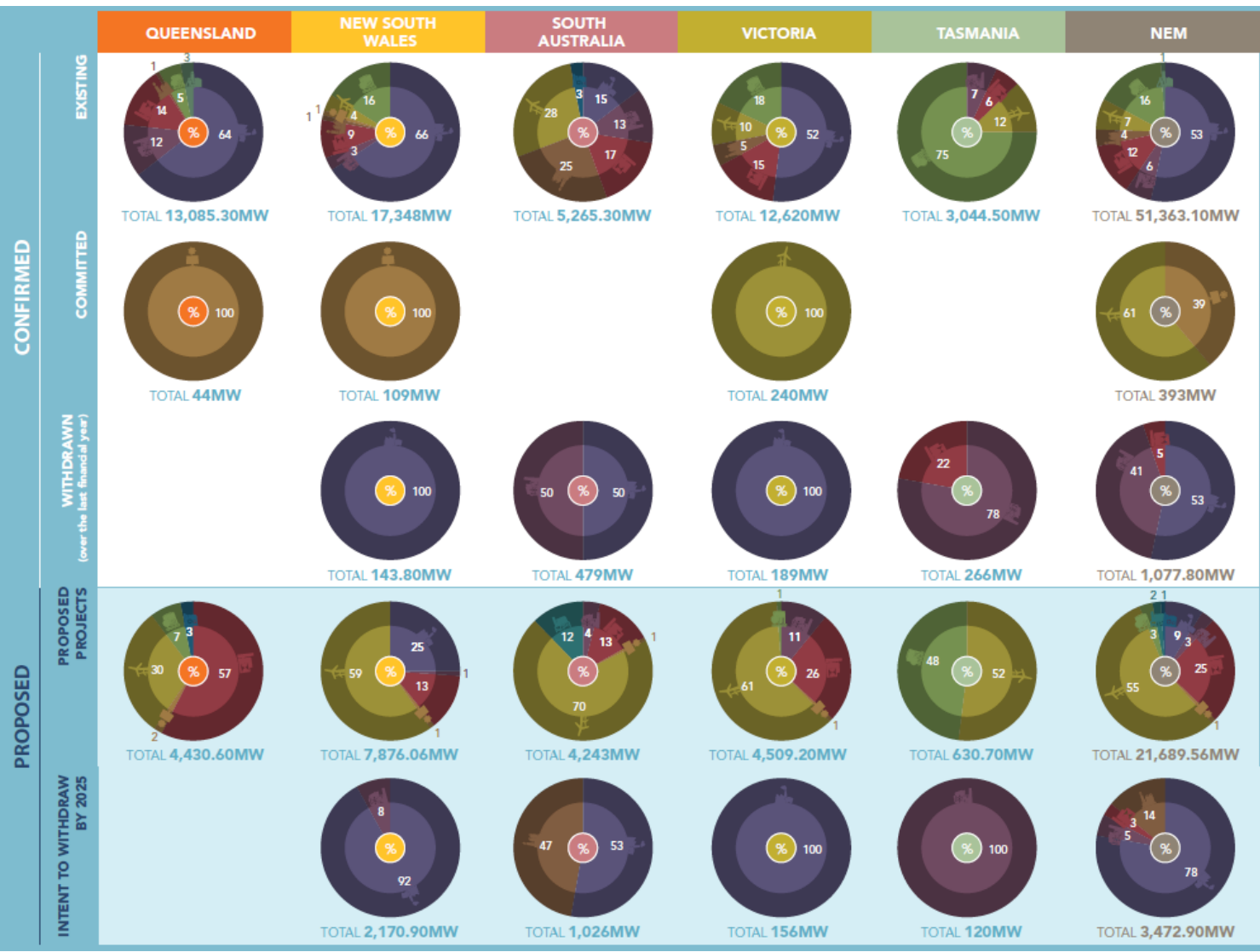


2015 GSOO – INFRASTRUCTURE ADEQUACY (PIPELINES)



- South West Queensland Pipeline (SWQP)
 - Between Ballera and Wallumbilla
 - Operate at maximum capacity almost continually from 2018 to meet LNG export demand
- South West Pipeline (SWP)
 - Net withdrawal capacity decreased from 129 TJ per day to 92 TJ per day
 - Constraints on SWP expected in the future due to:
 - reduced production in the Port Campbell region due to gas field depletion
 - reduction of supply from Moomba to Adelaide due to Moomba gas being directed to LNG production in Queensland
 - Increased flows from the Port Campbell gas plants to Adelaide via SEA Gas to support Gas Powered Generation in Adelaide due to the closure of Port Augusta coal-fired power stations

2015 ES00 – IMPLICATIONS FOR GPG DEMAND?



- COAL**
Conventional coal fired power stations using brown or black coal as a fuel source.
- COMBINED-CYCLE GAS TURBINE**
Uses both a gas turbine and steam created from waste heat in a separate turbine to produce more electricity from the same fuel than a traditional open-cycle plant.
- OPEN-CYCLE GAS TURBINE**
A combustion turbine where air is sucked into the engine intake and then compressed. The compressed air is ignited using fuel in the combustion chamber and the hot exhaust gases produced drive the 'gas' turbine rotating at a high speed to produce electricity.
- GAS OTHER**
Gas fired steam turbine or reciprocating engine powered generators using natural gas or biogas as a fuel source.
- SOLAR**
Energy from the sun used to produce electricity from either solar thermal or photovoltaic (PV) technology.
- WIND**
A wind farm generating electricity using wind as an energy source.
- WATER**
Generation from either hydro turbine generators or energy from the ocean. Hydroelectric generation uses the power of pressurized, flowing water to drive a turbine connected to a generating unit. Ocean energy uses ocean waves, tidal currents, or ocean thermal energy to generate electricity.
- BIOMASS**
Energy crops, or fuel crops, are grown to produce biomass for fuel. Can also include the by-product of food crops or timber production.
- GEO-THERMAL**
Geothermal energy resources are associated with high temperature granite, and/or lower temperature geothermal resources in aquifers deep in sedimentary basins.
- OTHER**
Conventional steam turbine or reciprocating engine powered generators using diesel or non-biomass municipal industrial waste as a fuel source.

INFORMATION TRANSPARENCY



- Data quality and transparency is a significant issue in the dynamic, changing east coast gas market,
 - critical to credible forecast modelling.

- AEMO worked with participants to complete additional data review and confirmation in preparing the 2015 GSOO
 - Moomba storage facility
 - Linepack data
 - Updated facility and cost data

- Going forward, AEMO will continue to work with industry to improve data quality and transparency
 - Improving visibility of the interdependency between supply, contracts and demand centres to better reflect actual gas market operation

- 2014 completion of revamped GBB => ability for people to more easily access historical data, improved useability
- Current work: LNG zones defined and implemented Q3 2015 => visibility of gas flows on LNG pipelines
- *What's next?*
 - AEMC holistic review of GBB
 - What data do we really need to operate an efficient market
 - Align GBB zones to existing markets
 - One stop shop for gas information?

CAPACITY TRADING



- ***Trading of spare pipeline transportation services between shippers***
 - participants can purchase transportation services required to optimise trading outcomes, and
 - contract holders can sell unused capacity to earn a return and reduce risk associated with long-term investment
- ***Pipeline capacity underpins trading of gas between regions and efficiency of the east coast gas market***
- ***The variability of gas supply and demand associated with LNG industry likely to increase requirement for effective capacity trading arrangements.***

TRADING HUBS



DRIVERS FOR A GAS SUPPLY HUB



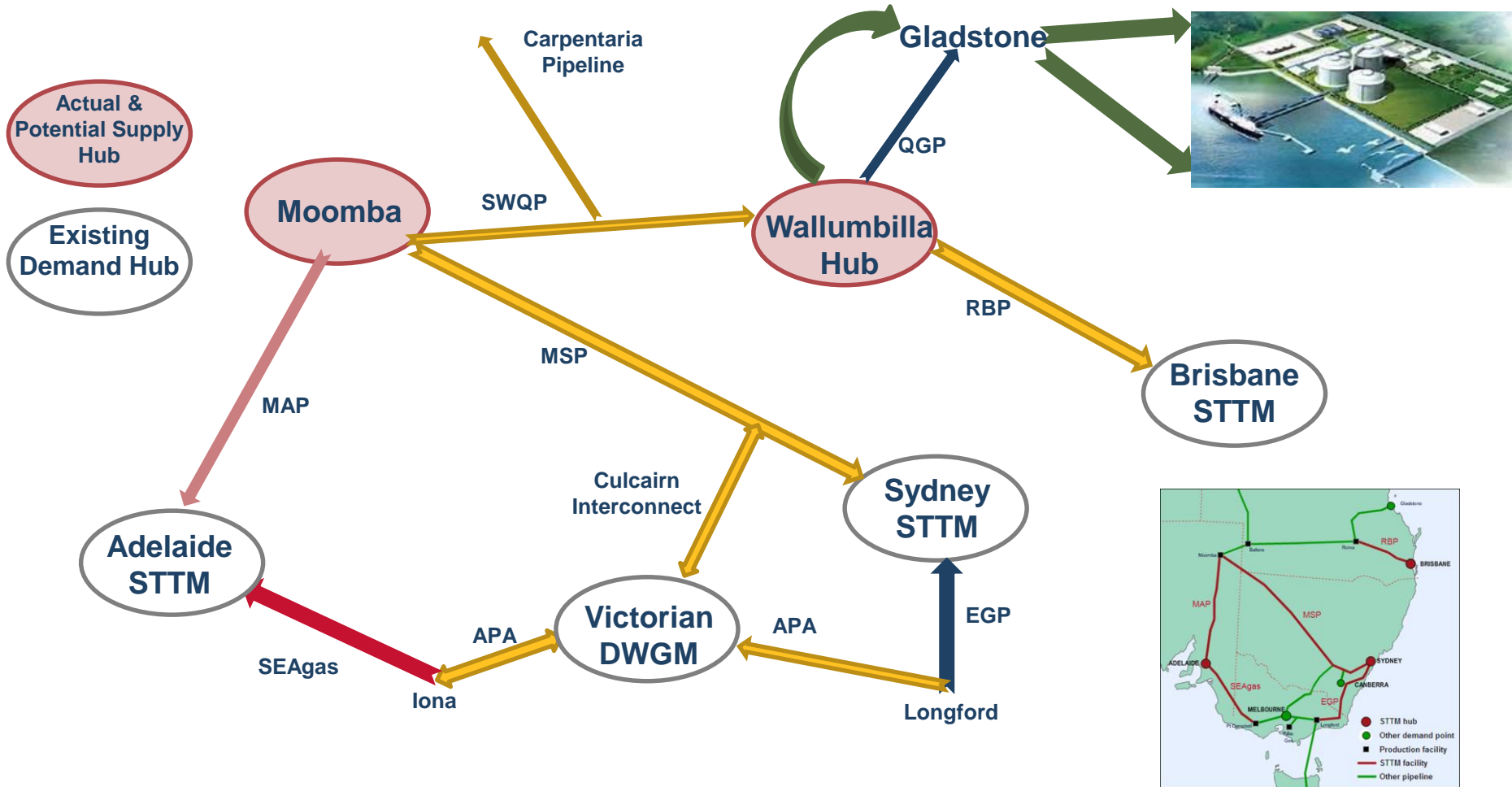
1. Portfolio management for trading participants.
 - Participants can use a trading location to manage their day-to-day requirements and long term position through spot and forward market products respectively.
 - Manage portfolio volatility

2. Market access for Producers
 - provides additional options for the management of sales gas.
 - Ability to trade in secondary market could reduce risk associated with long term gas supply investments.

3. Support development of new services
 - eg storage services

4. Improved market signals through greater price transparency at a key interconnection point

EAST COAST GAS MARKET



GSH MARKET ACTIVITY

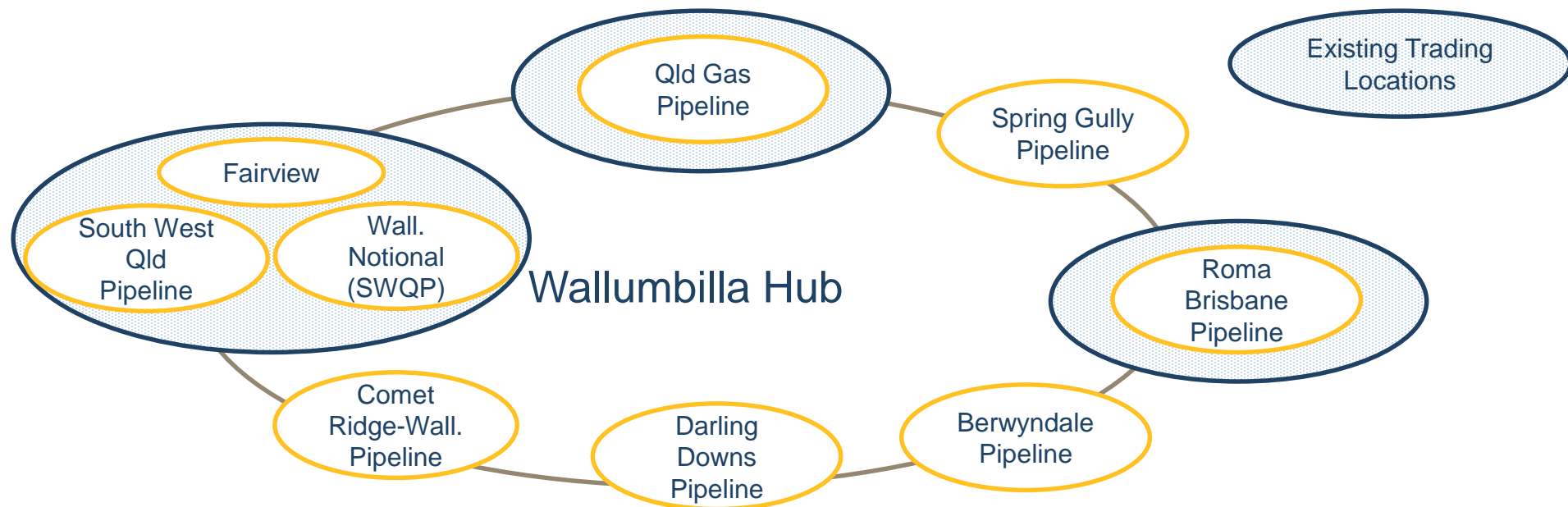


All locations	Trades	Trade Volume (GJ)	Trade Value (\$)	Vol Wtd (\$/GJ)	Highest Trade (GJ)	Low Price (\$)	High Price (\$)
	937	4,823,500	\$14,845,325	\$3.08	70,000	\$0.18	\$8.50
Balance of Day	69	182,500	686,325	\$3.76	6,300	\$0.70	\$8.00
Day Ahead	423	1,753,000	5,552,770	\$3.17	20,000	\$0.18	\$8.40
Daily	4	1,985,000	6,475,290	\$3.26	25,000	\$0.20	\$8.50
Weekly	41	903,000	2,130,940	\$2.36	70,000	\$0.75	\$4.00
Monthly	0	0	0	N/A			
Total	937	4,823,500	\$14,845,325	\$3.08			
Avg/Day	1.86	9,570	\$29,455				

- Market Commenced on 20 March 2014
- 13 registered Trading Participants (8 for market start)
 - All LNG projects have registered
- 10 registered Viewing Participants
- Data as of market close 6 August 2015

SINGLE PRODUCT

- Review of market design to consider how the three products could be consolidated into a single product to allow trading between participants operating at different locations
- High level design on options submitted to COAG Energy Council for progress update and guidance



- The GSH was developed as a transferrable model that can be implemented at other locations displaying similar market characteristics
 - High level design on proposed Moomba location approved by COAG Energy Council
 - Target implementation date June 2016.
- The proposed Moomba trading locations would be implemented with the same market framework (brokerage model) as Wallumbilla
- A Moomba location would provide an additional mechanism for participants/users to manage their short-term gas supply portfolio into southern markets