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# A Major New Play is Being Proven in Queensland's Taroom Trough

*Neil Young, Managing Director, Elixir Energy*

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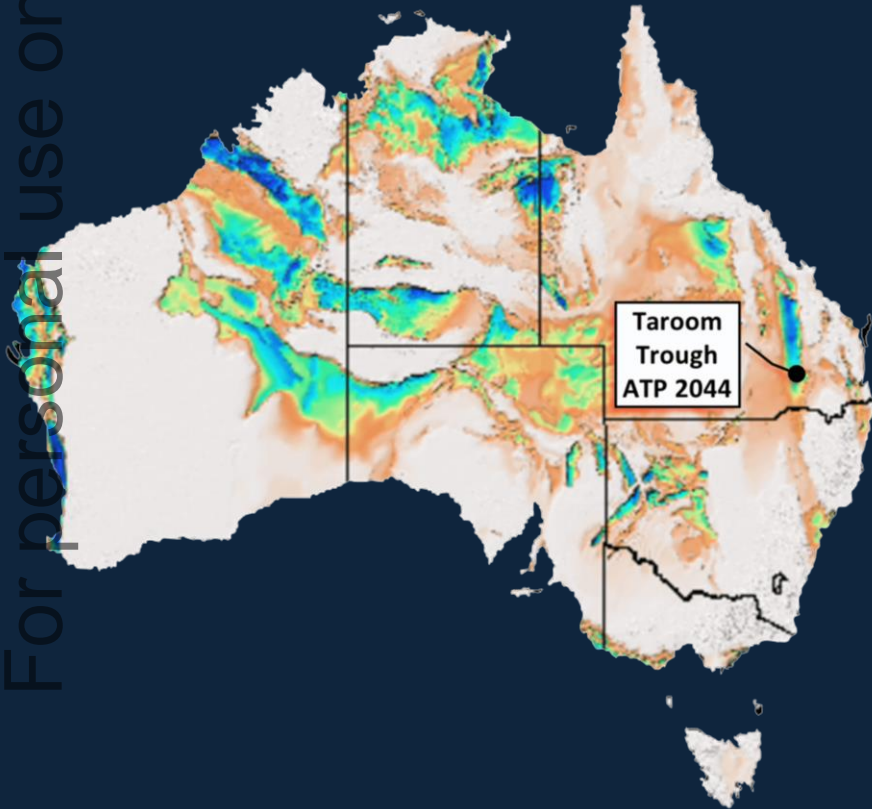
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# Introducing the Taroom Trough

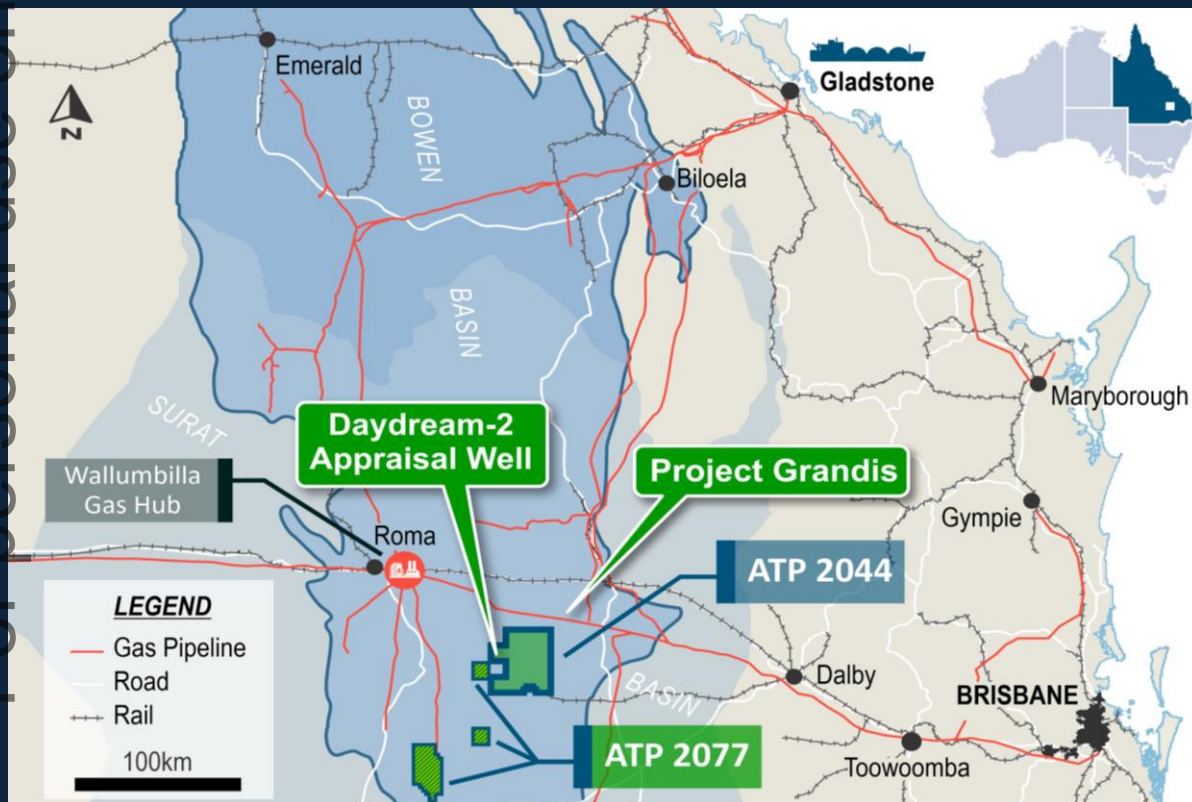
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- One of the few remaining places onshore Australia where a substantial gas resource could exist – and in a great location to access markets
- Permian coals have sourced oil and gas fields on the flanks, but considerable gas volumes remain trapped within the depocentre
- The unique geology of the Taroom Trough means tight gas from this basin may succeed where others (e.g. Nappamerri Trough – Cooper Basin) have failed
- Stress modelling by Elixir has recognised the importance of stress partitioning and stress anisotropy in this area resulting in the derivation of an optimal fracture stimulation program

# The Taroom Trough – An Advantaged Location

— The prolific Bowen Basin is now set to deliver another energy source



- The Grandis Gas Project is very well located in the Taroom Trough in the Southern Bowen Basin
- Australia's premier physical and commercial gas hub – Wallumbilla – is immediately adjacent
- Market factors are now driving new rounds of drilling in the Taroom Trough - including by Majors
- Pipeline costs minimal – material savings per GJ – as well as avoidance of financing concerns over new transmission pipelines
- Long term community acceptance of oil and gas locally
- Australia's onshore oilfield service sector is centred in the region

# Attractive to Large Sources of Capital

— Securing capital for gas development needs to pass through multiple gates



• The best source of capital for new gas developments is arguably existing large oil and gas companies – they provide not only money, but multiple technical, commercial and political skill sets

• The **Taroom Trough** is a favourable location for such large companies:

01

**Brownfields** – many majors, large LNG buyers, etc, are already in Queensland – and even for those who are not, the existence of the incumbents reduces risk perceptions

02

**Low emissions profile** – the Taroom is low in CO<sub>2</sub> (pipeline spec) and has a long-term pathway to reducing scope 1 & 2 emissions from electrification, etc

03

**Materiality** – the resource size is multi-Tcf (with possibly 100Ms of bbls of liquids) and could accept billions of dollars of investment

04

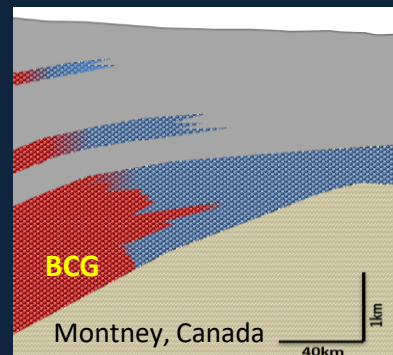
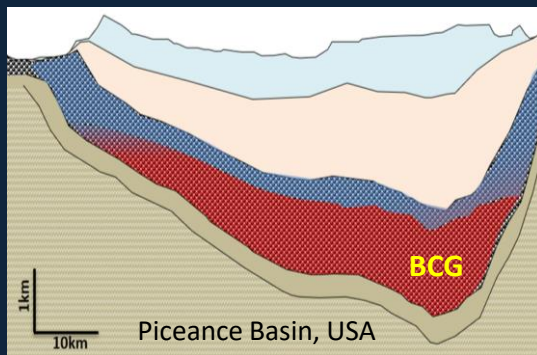
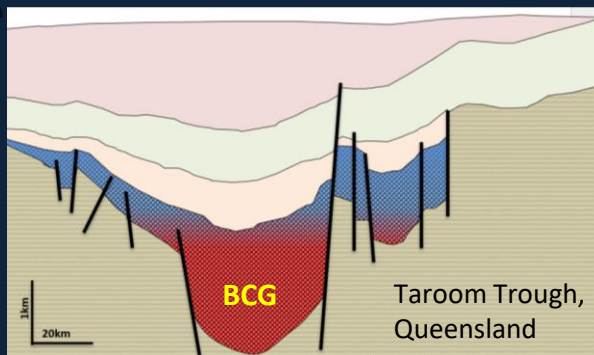
**Low sovereign risk** – Queensland is a favourable location within Australia for resource investments – and despite some recent sins at Federal level, Australia itself is still much better than most of the world

05

**Investments** in the future can be varied in response to market conditions – a key feature of an onshore unconventional play close to existing infrastructure



# Taroom: The birth of a new unconventional play in Australia



**Definition:** “Basin Centred Gas” or BCG

*Tight reservoirs surrounding source rocks that have such low permeability that generating hydrocarbons can't escape (Permeability Trap)*

**Analogue:** Piceance Basin, USA and Montney, Canada

**Key Elements:**

- Regionally pervasive
- Overpressure
- Abundant source rocks
- Water saturation increasing up dip above gas as permeability improves (and no downdip water leg)
- Generally requires stimulation to flow

# Fundamental Objectives of Daydream-2

1. Prove the Basin Centred Gas (BCG) Play is present
  - ✓ Pervasive accumulation - 600m gross interval over 1,000km<sup>2</sup> (within ATP 2044 alone)
  - ✓ Overpressure - 0.68 psi/ft
  - ✓ Hydrocarbon source – Permian coals contain 20+ m<sup>3</sup>/t gas
2. Induce flow rates from multiple tight coal and sandstone zones
  - ✓ Stabilised flow of 2.5 MMCFPD achieved (considered commercial on a per well basis)
  - ✓ Flow and flare recorded from deep coals
3. Develop new strategies for stimulation and future development
  - ✓ Micro-proppant placement leads to deepest flow from coals in Australia
  - ✓ Bespoke Mechanical Earth Model validated
4. Obtain R&D refunding from Federal Government
  - ✓ Advanced finding approved for 48.5c in \$1 for all Daydream-2 costs (built-in 2:1 farmout)

# Daydream-2: Multiple Breakthroughs

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1

Game-changing mechanical earth model validated

2

Coal desorption via cuttings identifies very high gas content

3

Free-flowing gas reservoir below 4,200m

4

Successful pinpoint stimulation using micro-proppant

5

Stimulated deep coal zone flows gas for first time

6

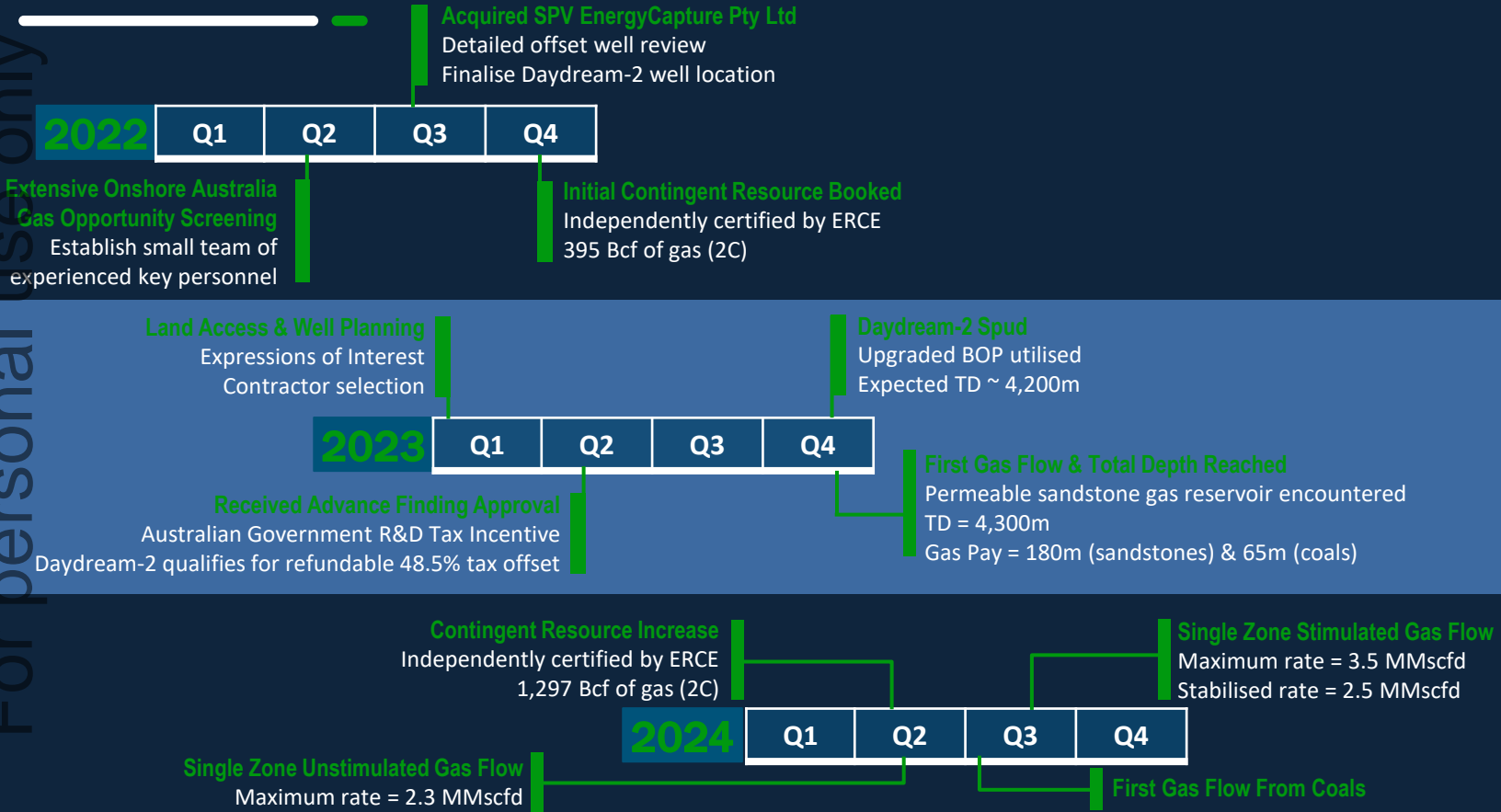
Low CO<sub>2</sub> – pipeline spec - confirmed





# Grandis Project - Timeline

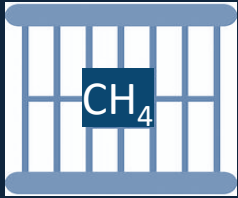
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# Cracking The Taroom's Code

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— The vast gas resources of the Taroom are starting to be unlocked



In ATP 2044, the primary play-type is BCG - which is an unconventional accumulation with no structural trap required - the gas is present permit wide. Often called a “permeability jail”



Elixir sees Grandis as a “stack” play – appraise vertically, develop high angle deviated and utilise horizontals for sweet-spots

K

Deeply-buried permeable sands can provide sweet-spots such as observed in the Lorelle Sandstone



Three Operators actively drilling with more to drill in 2025. Cooperative culture being developed

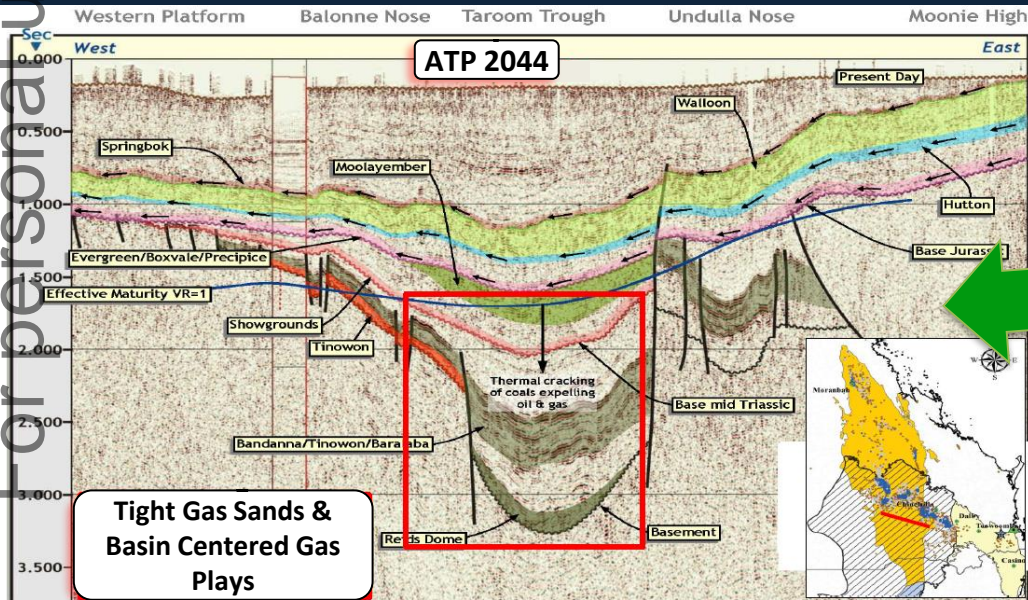
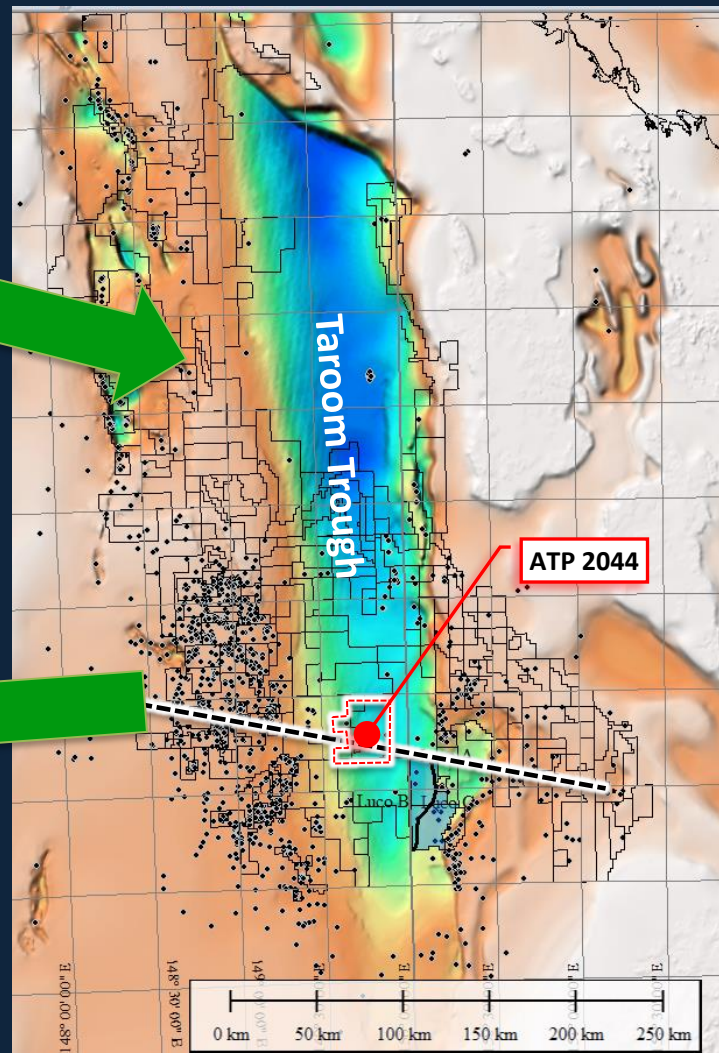
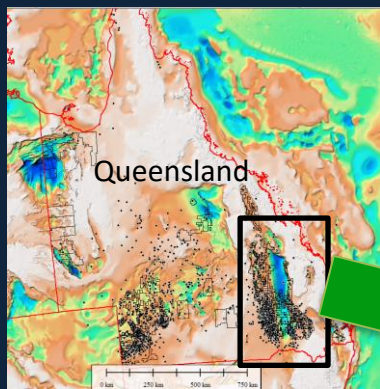
*“This is not the end. It is not even the beginning of the end... But it is, perhaps, the end of the beginning.” (W S Churchill)*



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# Taroom Trough

- Proven oil and gas generation
- Proven tight, gas-saturated reservoirs
- Large resource discovered



Modified from Origin Energy

# Daydream-2

Spudded November 2023

- Overpressured section predicted
- Conservative well design – safe operations
- TD = 4,300m

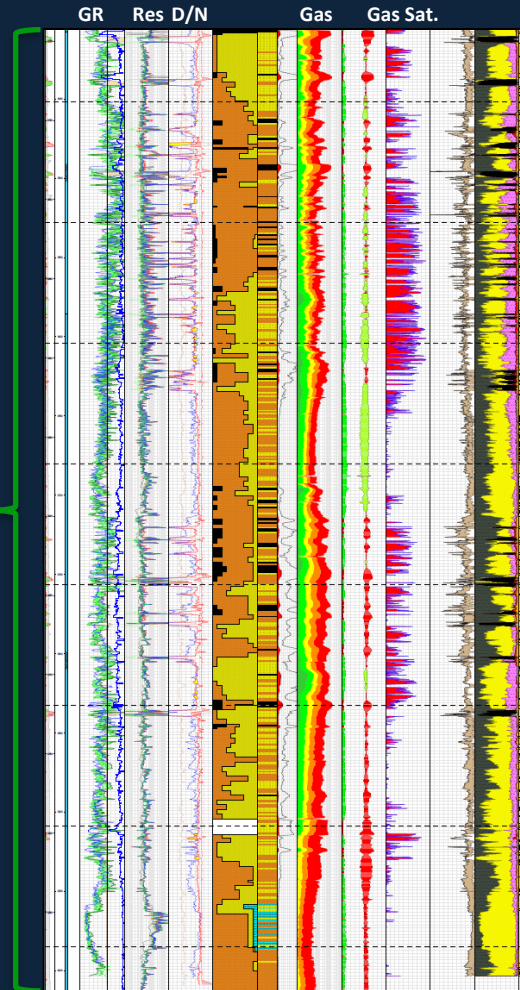
Target Section

- Intersected a substantial, gas-saturated, low-permeability sandstone and coal interval (>600m)
  - Better than expected (cleaner and thicker sandstones, very high gas content in coals)

New Plays Also Discovered

- Gas-saturated, permeable sandstone at 4,200m with >9,000psi
- Drilling kick taken and handled safely
- Stabilised gas flow rate of 2.5 MMscfd (post stimulation)
- Deep coals flowed gas to surface for first time

~600m



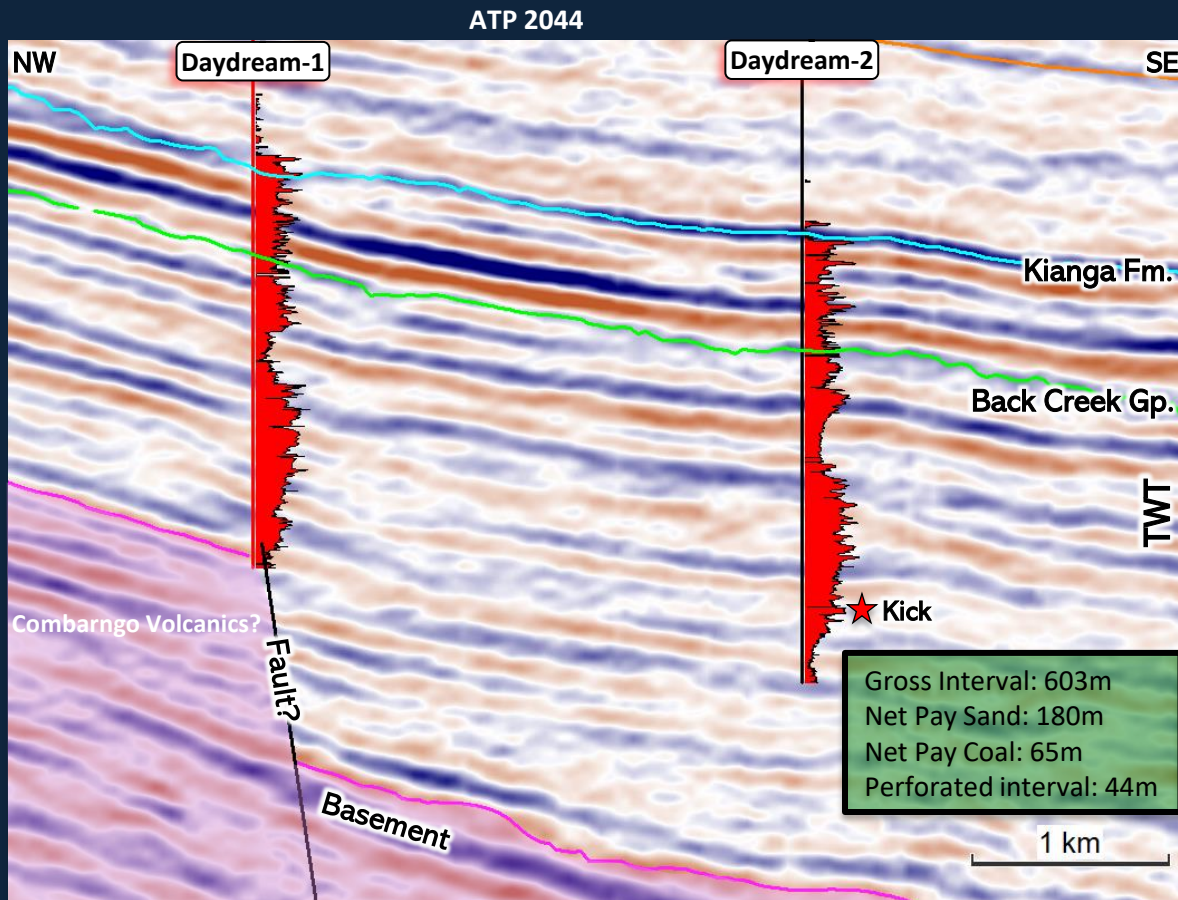


# Daydream-2 Gas-saturated Reservoirs

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No formation water

- Gas shows comparable with Daydream-1
- As expected, all sandstones and coals were interpreted as gas-saturated
- No water-saturated reservoir encountered



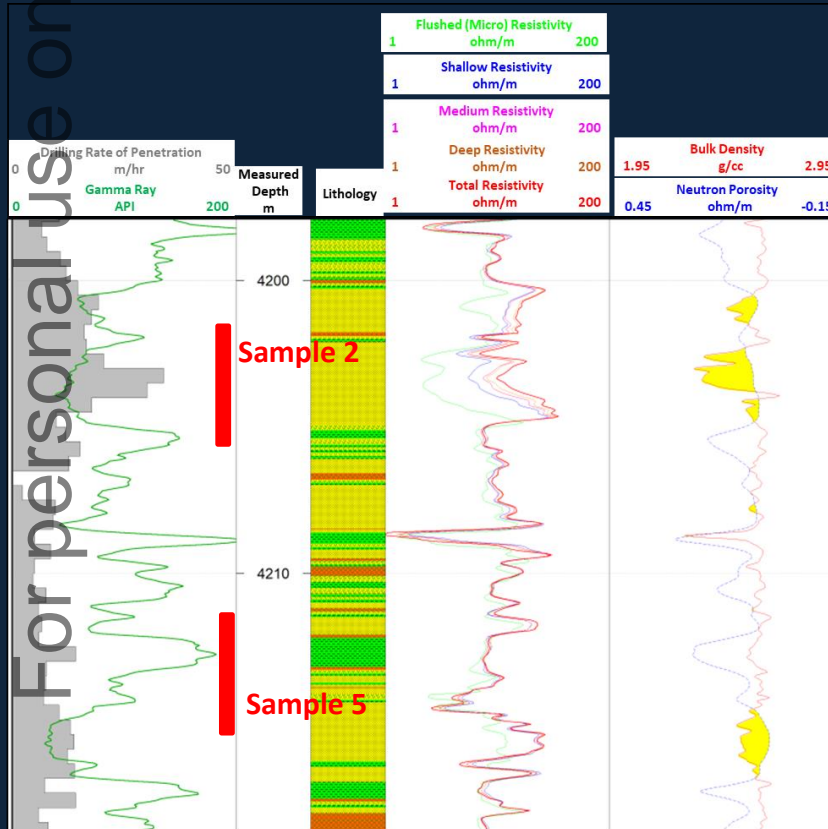
Total gas while drilling shown in red





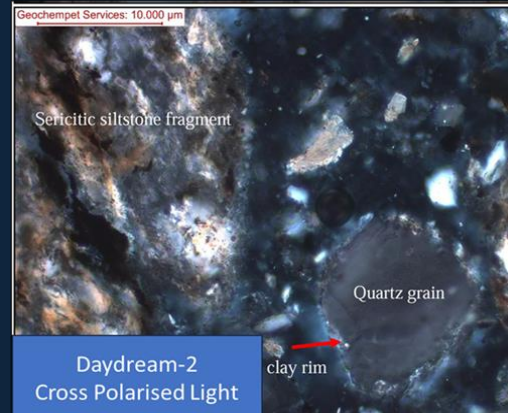
# Daydream-2 - Lorelle Sandstone

Porous and permeable sandstones >4,200m



Daydream-2  
Cross Polarised Light

Sample 2; 4203-4306m



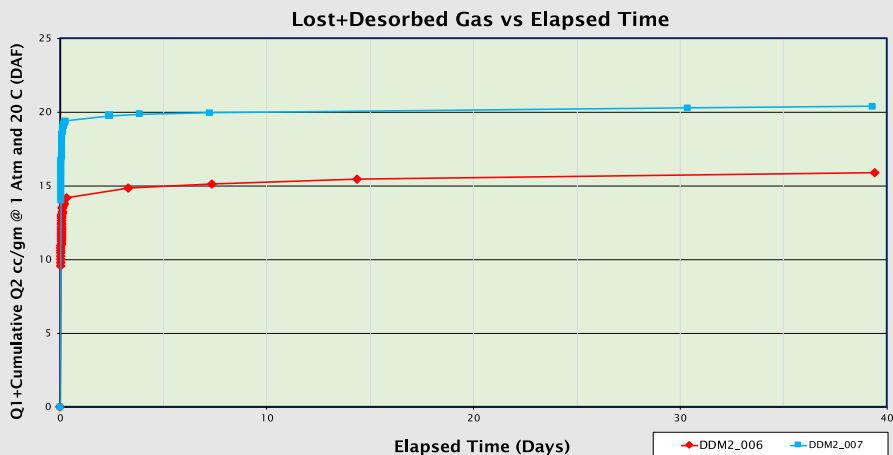
Daydream-2  
Cross Polarised Light

Sample 5; 4212-4215m

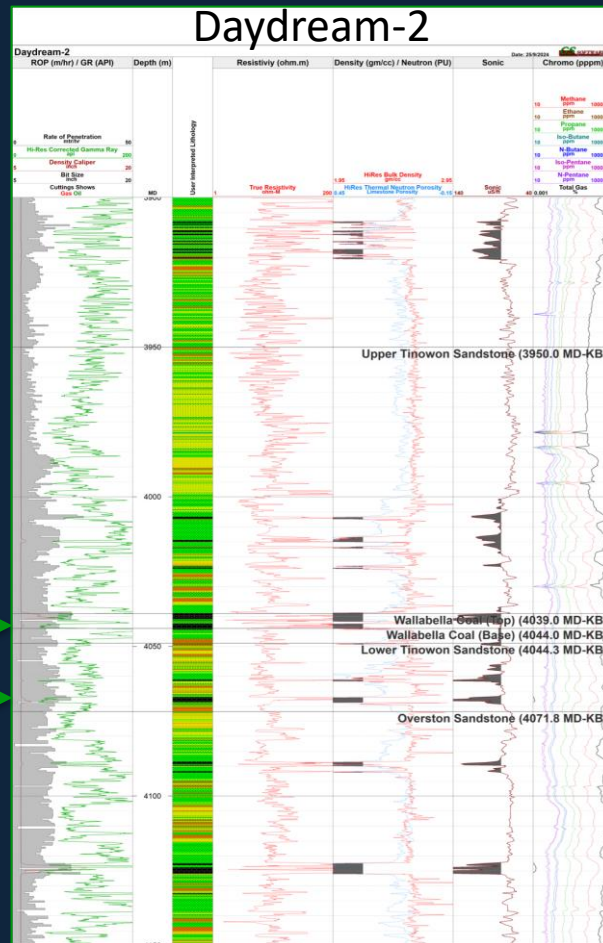
- Petrographical analysis have identified clay coatings (rims) around individual quartz grains
- These clay rims assist in the preservation of primary porosity at these depths by reducing the post depositional cementation
- Primary porosities are preserved above 12%
- Same porosity-preserving mechanism as Perth Basin and Tuscaloosa Sandstones (USA)

# Desorption Analysis of Deep Coals

Significant gas volumes remain in the coals



Sample ID	Top Depth (mMD)	Base Depth (mMD)	Thickness (m)	Q1 (m <sup>3</sup> /tonne Raw)	Q1 (m <sup>3</sup> /tonne DAF)	Q2 (m <sup>3</sup> /tonne Raw)	Q2 (m <sup>3</sup> /tonne DAF)	Q3 (m <sup>3</sup> /tonne Raw)	Q3 (m <sup>3</sup> /tonne DAF)	Total Gas Content (m <sup>3</sup> /tonne Raw) #	Total Gas Content (m <sup>3</sup> /tonne DAF)
DDM2_006	4034.50	4034.90	0.40	7.11	9.59	4.67	6.30	0.16	0.28	11.77	16.17
DDM2_007	4062.00	4062.30	0.30	11.82	13.99	5.40	6.39	0.15	0.22	17.21	20.60



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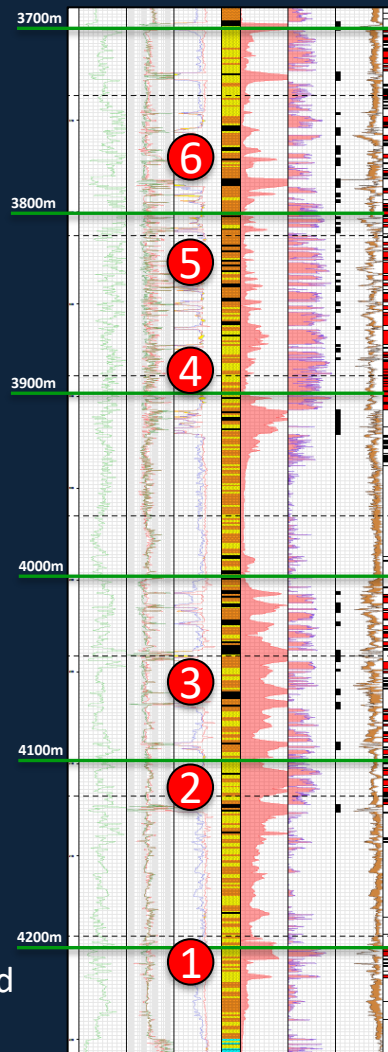
# Stimulation Stages

## Conventional Sands, Tight Sands and Coals

- Stage 1 = Lorelle Sandstone
- Stage 2 = Back Creek Group Sandstones
- Stage 3 = Back Creek Group Coals
- Stage 4 = Lower Kianga Fm. Sandstones
- Stage 5 = Middle Kianga Fm. Sandstones
- Stage 6 = Upper Kianga Fm. Coals

## Bespoke Stimulation Program Developed & Executed

- Some elements were an “Australian first”
- Qualified for a Federal Government “Research and Development Rebate” – 48.5% of qualifying costs
- Individual stages required specific stimulation operations and treatments
- 25 lb/Mgal guar gel – delayed borate crosslink
- Approximately 1 million pounds (~450 tons) of proppant placed



Upper Kianga Fm. coals tested separately to confirm flow from coals only

# Improve Stimulation Outcomes Using Micro-Proppant

## — Deepest Coal Gas Flow in Australia

- The fracture complexity of coals make it difficult to generate a Stimulated Rock Volume to achieve commercial gas flows – the fractures keep closing
- Laboratory testing indicates micro-proppant technology potentially benefits reservoirs with complex fracture networks and can keep small fractures open (<50 $\mu$ m) (Keshavarz et al., various publications, 2014-2016)
- Complex vertical fracturing (e.g., natural fracture activation and branching or multiple fractures) are likely to be enhanced by micro-proppant injections
  - Horizontal fractures aligned with bedding planes will likely have little benefit (low vertical permeability in coals)
- The 2022 UQ-NERA Project Final Report provides guidelines on design, execution, and evaluation of micro-proppant treatments as well as application guidance on execution (Johnson, Leonardi, You, Rabeiro, et al. 2022);
- Daydream-2 successfully pumped two jobs at ~3800 and ~4100m intervals with gas noted from isolated, post-frac independent testing of coals at ~3800m





# Key Gas Flows From Daydream-2

*"First commercial flow of Permian gas in the Taroom Trough"*

*"Deepest unstimulated flow east of Perth Basin"*

*"Deepest flow from a coal seam in Australia"*

## Final flowrate affected by Formation Damage



- Dec 2023
- 4201m
- Gas kick whilst drilling with 11.1 ppg mud



- April 2024
- 4200-4217m
- Unstimulated flow from the Lorelle Sst
- 1.3 MMCFPD



- August 2024
- 4200-4217m
- Stimulated flow from Lorelle Sst
- 2.5 MMCFPD



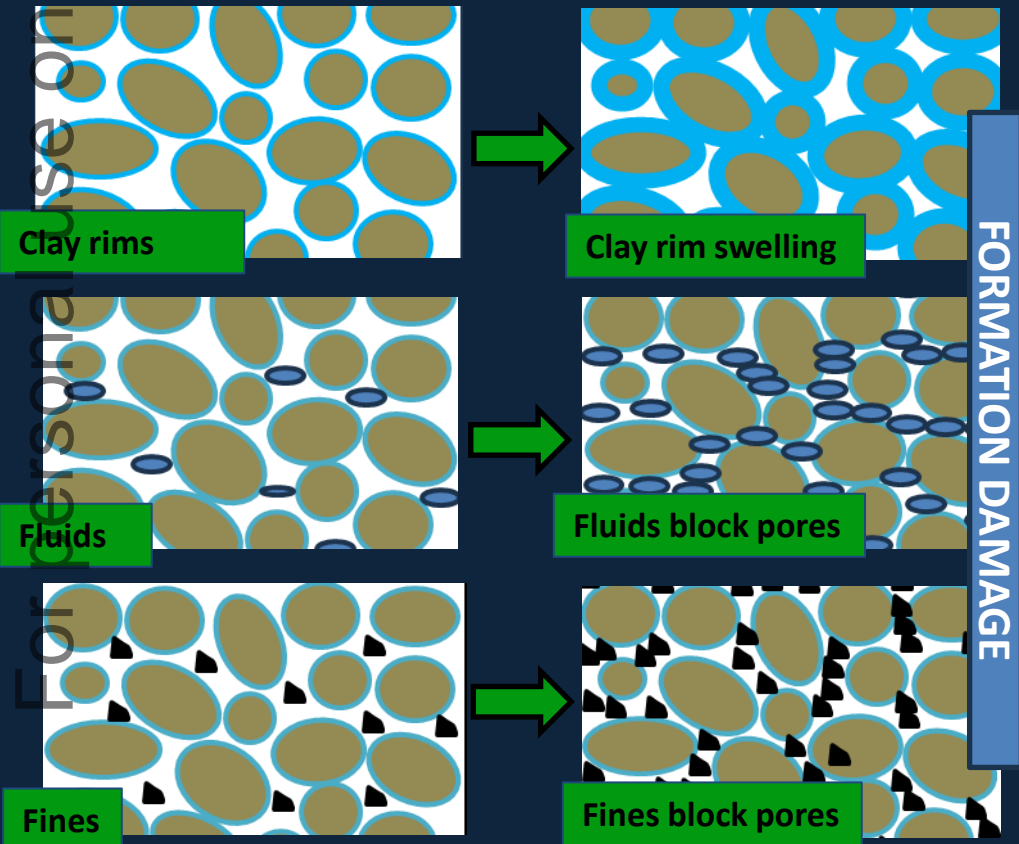
- August 2024
- 3698-3786m
- Stimulated flow from coal
- Rate not measured



- October 2024
- 3698-4217m
- Stimulated flow coal and sst
- 1 MMCFPD

# What happened during the final testing?

Skin and formation damage built up over the extended period of testing:



**Clay rim swelling:** Fluids introduced into the formation from the wellbore during drilling, stimulation and testing: KCl and water may have had an unexpected reaction with the reservoir near the wellbore (likely swelling/interaction with clays)

**Movement of fluids:** Shock pressure changes (during open and shut-ins) in the reservoir may have caused condensate dropout or water banking leading to a relative permeability issue

**Movement of fines:** Large drawdown across the wellbore formation/interface whilst flowing may have caused a migration of fine rock particles into the pore throats

*No evidence of depletion noted on pressure buildup*

# Potential Remedies to Skin and Formation Damage

## Continued learnings and strategies to be implemented

1

Closely monitor pressure drawdown from reservoir during testing operations

2

Refine fluid chemistry and monitoring during operations

3

Logistics management to reduce time between operations

4

Minimise reservoir shock by limiting open and shut-ins

5

Further learnings from stimulation modelling to be incorporated into next program



*Coil Tubing Unit at Daydream-2.  
Only 1 of 2 units currently available for this  
type of work on the east coast of Australia*

# Growing & De-Risking the Resource Base

Grandis Project's resource progression (ATP 2044 + ATP 2077 combined) has seen impressive growth

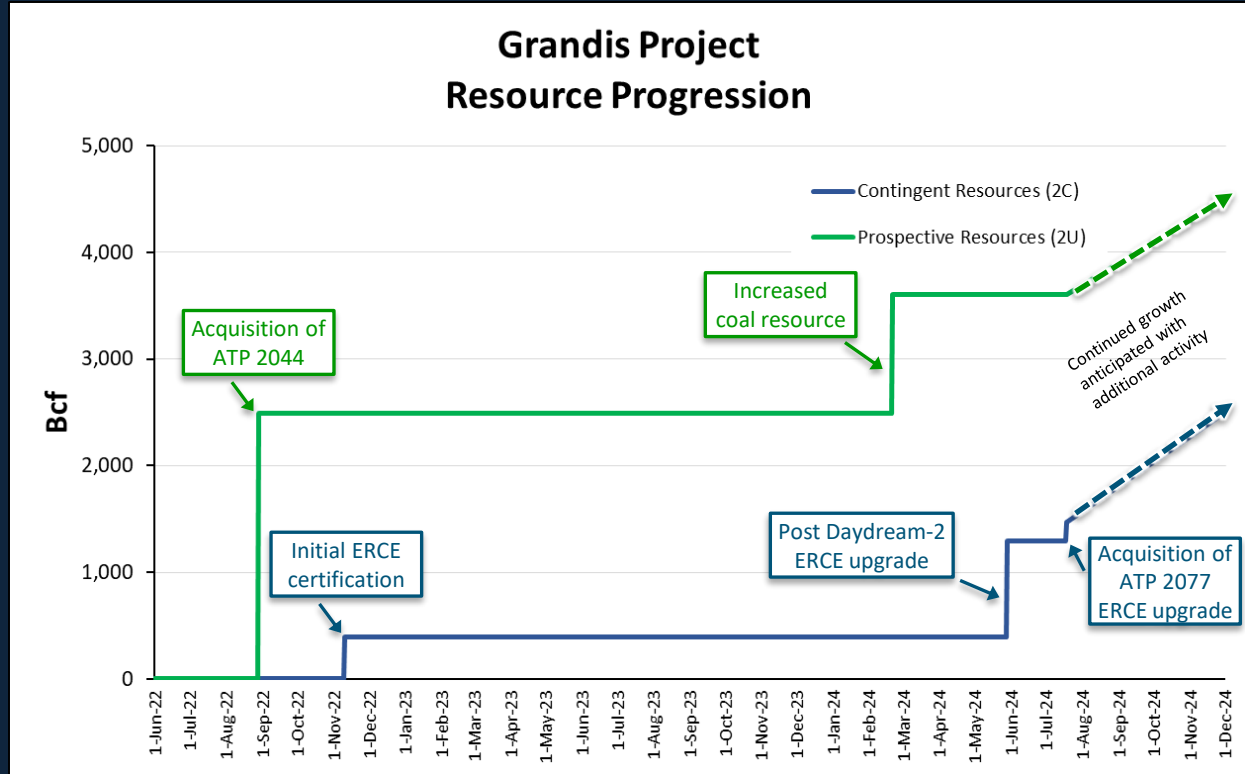
## Current Resources

Contingent (2C)  
**1.47 Tcf**

Prospective (2U)  
**3.6 Tcf**

### Potential Future Activity:

- Convert coals from Prospective to Contingent with proof of flow
- Expand Contingent with deeper drilling
- Expand laterally with step-out wells



Refer to Appendix for full disclosure of resource numbers & methodologies

# What we have learnt:

Massive learnings and inroads into the tight gas play from the drilling, stimulation and testing of Daydream-2:

- 1 Achieved a commercial flow rate
- 2 Increased 2C contingent resources by 328% to 1.47 Tcf
- 3 Increased 2U prospective resources by 180% to 3.6 Tcf
- 4 Flowed gas from two separate deep coal zones, allowing the commencement of the conversion of these prospective into contingent resources
- 5 Flowed gas from five out of six stimulated zones
- 6 Confirmed the raw gas contains low amounts of CO<sub>2</sub> – within pipeline specification
- 7 Met all licence commitments – allowing application for conversion to retention lease
- 8 Applied novel extraction techniques and attracting Commonwealth Government R&D support

*THE GAS IS THERE - productivity improvements expected*



# HSE & Other Achievements

- ~4,000 hours worked with no HSE incidents (Condor)
- ~10,000 kilometres driven with no road accidents or incidents (Condor)
- ~1 million pounds of proppant placed (Halliburton and Condor)
- All operations fully contained on lease with no issues
- Excellent relations maintained with all local stakeholders
- Locally sourced accommodation/catering/etc. used



## Next Steps

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1. Post well studies underway
2. Upgrading Contingent Resource to include coals
3. Progressing farmout discussions
4. Applying for a Potential Commercial Area (PCA) - up to 15 years retention
5. Ongoing and growing cooperation with neighbouring operators
6. Investigating potential infrastructure and offtake options
7. Daydream-3 planning

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# In Summary



The World needs more gas for longer – now explicitly recognised by Govt policy



The East Coast has very strong pricing, a growing supply gap & LNG plant ullage



The Taroom Trough has multiple locational advantages to serve these markets



The Taroom is currently hosting multiple operator programs under which \$100Ms are being spent



The massive Taroom unconventional gas play is starting to be unlocked with multiple achievements to date



The results from Daydream-2 have led to proving the BCG play in the Taroom and multiple technical breakthroughs

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# Appendix 1A – Contingent Resources

Based on the work undertaken by Elixir in ATP 2044, the Company sought an independently certified contingent resource estimate (from international firm ERC Equipoise Pty Ltd – “ERCE”) for ATP 2077 Sub-block A – see table below. The subclass of Contingent Resources (as defined under the PRMS) is “Development Unclarified”, as of 16th August 2024.

ERCE Contingent Resource Certification <sup>1</sup>						
Kianga & Back Creek Reservoirs Only	1C		2C		3C	
	Gas BCF	Condensate MMbbls	Gas BCF	Condensate MMbbls	Gas BCF	Condensate MMbbls
ATP 2077	68	0.6	173	1.8	439	5.3
ATP 2044	405	3.0	1,297	10.8	4,290	36.1
<b>TOTAL PROJECT GRANDIS<sup>2</sup></b>	<b>473</b>	<b>3.6</b>	<b>1,470</b>	<b>12.6</b>	<b>4,729</b>	<b>41.4</b>

**Notes:**

1. *These are un-risked contingent resources that have not been risked for the chance of development and there is no certainty that it will be economically viable to produce any portion of the contingent resources. These contingent resources are classified as “Development Unclarified”.*
  2. *Totals added arithmetically*
- Detailed notes on the background to the preparation of the contingent resources report are set out in Appendix 1.*

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# Appendix 1B – Prospective Resources

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The prospective resources of gas in the Permian coals in ATP 2044 includes both an adsorbed and fractured component, and is estimated as follows:

Total Unrisked Prospective Resources <sup>1</sup>				
Recoverable Gas associated with coal seams	1U <sup>2</sup> (BCF)	2U <sup>3</sup> (BCF)	Mean <sup>4</sup> (BCF)	3U <sup>5</sup> (BCF)
Adsorbed Coal	755	2,316	3,702	8,497
Fractured Coal	401	1,287	1,841	4,135
<b>Total Prospective Resources in Coal*</b>	<b>1,156</b>	<b>3,603</b>	<b>5,543</b>	<b>12,632</b>

\*added arithmetically

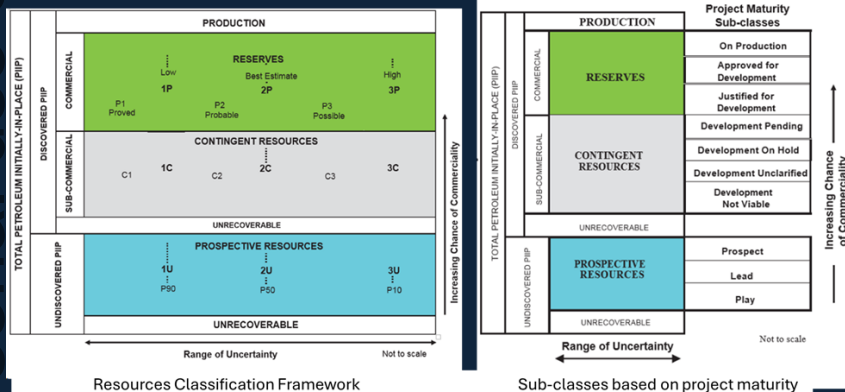
## Notes:

1. Each reservoir target was evaluated probabilistically, and the reservoirs were added together arithmetically.
2. At least a 90% probability that the quantities actually recovered will equal or exceed the estimate (low estimate).
3. At least a 50% probability that the quantities actually recovered will equal or exceed the estimate (mid estimate).
4. The arithmetic average of the probability distribution.
5. At least a 10% probability that the quantities actually recovered will equal or exceed the estimate (high estimate).
6. Prospective Resources have been assessed on the basis that they are unconventional in nature.
7. BCF means billion standard cubic feet of gas.
8. MMbbl means million barrels of oil or condensate.

Detailed notes on the background to the preparation of the prospective resources report are set out in Appendix 1.

# Appendix 1C – Notes to Resource Statements

- The evaluation date of the ERCE Contingent Resources is 27<sup>th</sup> May 2024 and 16<sup>th</sup> August 2024 for ATP 2044 and ATP 2077 respectively.
- Elixir's working interest share of ATP 2044 and ATP 2077 is 100%.
- The Contingent Resources are considered to be in the "development unclarified" category as defined by the 2018 PRMS SPE-PRMS standards.



- Per Listing Rule 5.33.5, the land area and the number of wells for which the estimates of contingent resources are provided are 1,000 km<sup>2</sup> and ~300 wells and 76 km<sup>2</sup> and ~20 wells respectively for ATP 2044 and ATP 2077 (for the 2C case).
- BCF means Billions of Standard Cubic Feet.
- MMbbls means Millions of Stock Tank Barrels.
- The totals are based on probabilistic aggregation of reservoir estimates.
- Contingent resource assessments in this release were estimated using probabilistic methods in accordance with 2018 PRMS SPE-PRMS standards.
- The data used to compile the independent contingent resources report includes detailed geological interpretation of seismic, well, core and test data within the region.

- ERCE has used standard petroleum evaluation techniques in the preparation of this report. These techniques combine geophysical and geological knowledge with assessments of porosity and permeability distributions, fluid characteristics and reservoir pressure. There is uncertainty in the measurement and interpretation of basic data. ERCE has estimated the degree of this uncertainty and determined the range of petroleum initially in place and recoverable hydrocarbons. The accuracy of estimates of volumes of gas is a function of the quality and quantity of available data and of interpretation and judgment. While the estimates of contingent resources presented herein are considered reasonable, these estimates should be accepted with the understanding that reservoir performance subsequent to the date of the estimate may justify revision, either upward or downward. There is no certainty that it will be economically viable to produce any portion of the contingent resources.

- This document contains forward looking statements that are subject to risk factors associated with the oil and gas industry. It is believed that the expectations reflected in these statements are reasonable, but they and or their timing may be affected by many variables which could cause actual results or trends to differ materially. The technical information provided has been reviewed by Mr Gregory Channon, Chief Geoscientist of Elixir Energy Limited. Mr Channon is a qualified geologist with over 35 years technical, commercial and management experience in exploration for, appraisal and development of, oil and gas. He is qualified as a competent person in accordance with ASX listing rule 5.41. Mr Channon is a member of the American Association of Petroleum Geologists and consents to the inclusion of the information in the form and context in which it appears.

- Prospective Resources are those estimated quantities of petroleum that may potentially be recovered by the application of a future development project(s) related to undiscovered accumulations. These estimates have both an associated risk of discovery and a risk of development. Further exploration, appraisal and evaluation is required to determine the existence of a significant quantity of potentially moveable hydrocarbons. The estimate of Prospective Resource was compiled by Elixir's Chief Geoscientist, Mr Greg Channon, who has completed a detailed and formal report on the prospective resources of the adsorbed coal in ATP 2044 dated 20 February 2024. The work was undertaken in accordance with the Society of Petroleum Engineers internationally recognised Petroleum Resources Management System 2018 (PRMS). Mr Channon's methodology was to compile and review all available data and make interpretations of (amongst other things) the adsorption and proximate analysis, wireline logs, seismic data and historical well records relevant to the permit area. An estimate of the gross and net rock volume was determined, and from that, a probabilistic distribution of the prospective resource was compiled. A site visit to the area was conducted.