



ASX:EEG

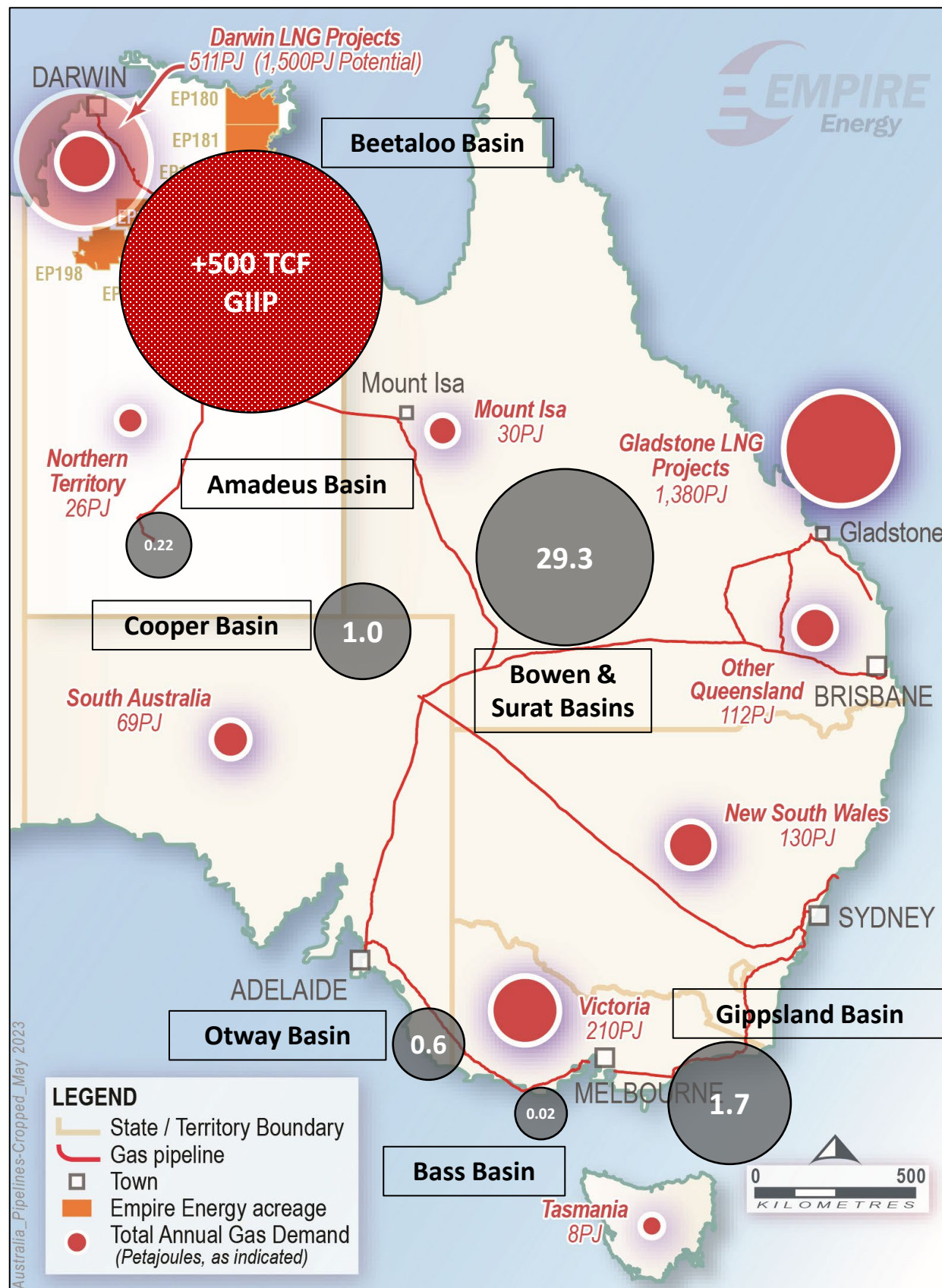
# Empire Energy – Beetaloo Basin – On the Path to Pilot Production and Beyond



South East Asia Australia Offshore & Onshore Conference – 13 September 2023



# Empire has a Commanding Beetaloo Position

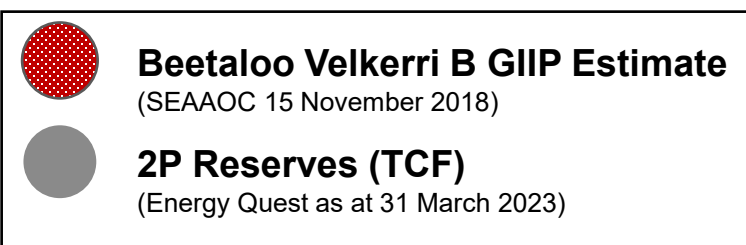


- Total potential Prospective Resources in the Velkerri B shale of between **50 TCF and 100 TCF** (one of five productive shale units) based on Government estimates of **500 TCF** gas-in-place (assuming recovery factors of between 10% and 20%)
- **Large enough to supply both LNG and east coast markets**
- **Empire (100%) NT 2C Contingent Resource of 1,906 PJ (1.63 TCF) gas and 3.5 MMBBLs liquids<sup>1</sup>**
- **Empire (100%) EP187 2C Contingent Resource of 1,739 PJ (1.5 TCF) at an average EUR per well location of 7.9 PJ**
- **Empire (100%) P(50) Prospective Resource of 44,541 PJ (41.67 TCF) gas and 764 MMBBLs liquids<sup>1,2</sup>**

Source: Netherland, Sewell & Associates Inc

1. Western Beetaloo 1.06 PJ per BCF applied

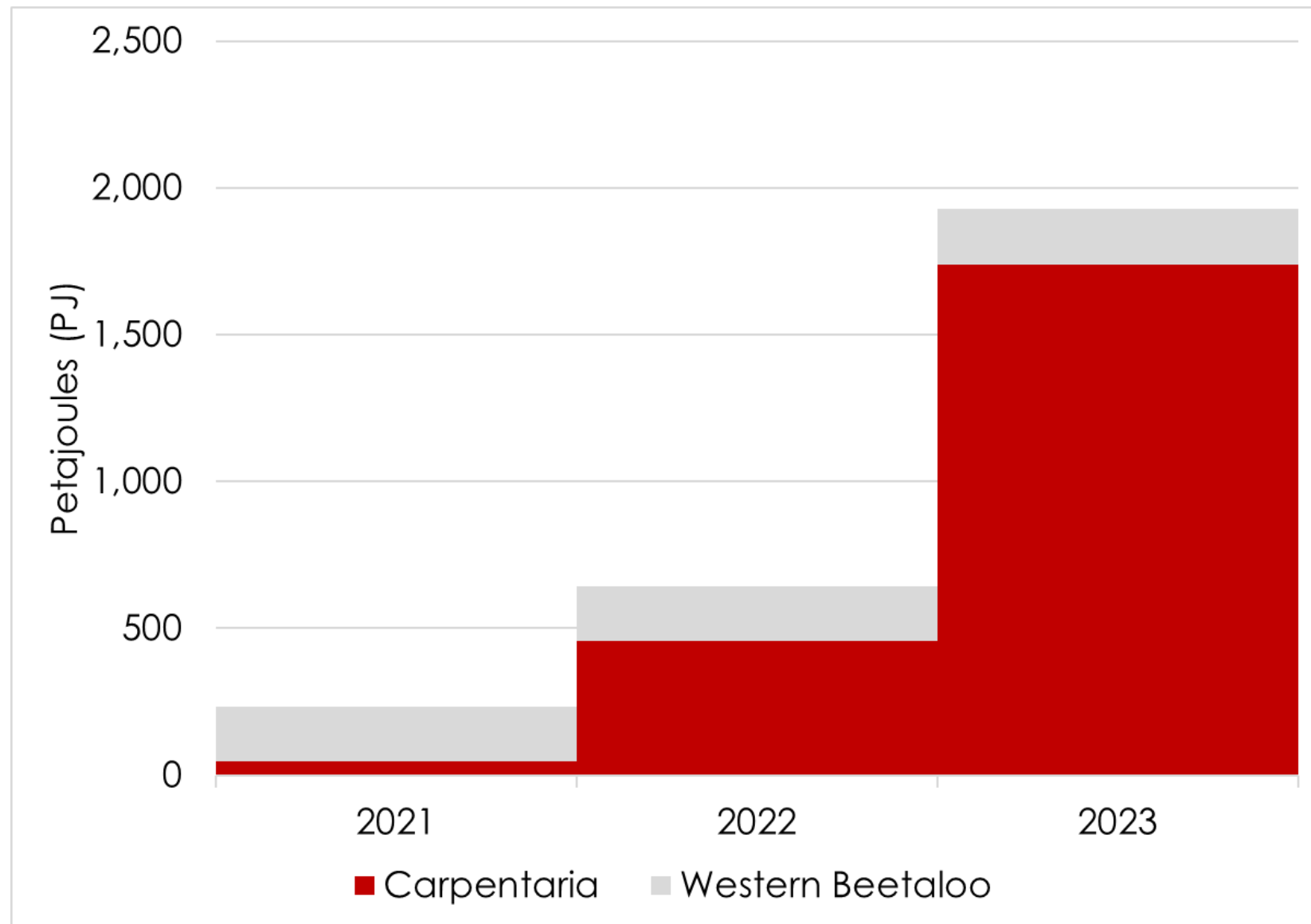
2. Barney Creek – McArthur Basin targets, 1.06 PJ per BCF applied



# Empire has Grown its Certified 2C Contingent Resources



## Empire's on ground activities have grown discovered resources to an LNG Scale



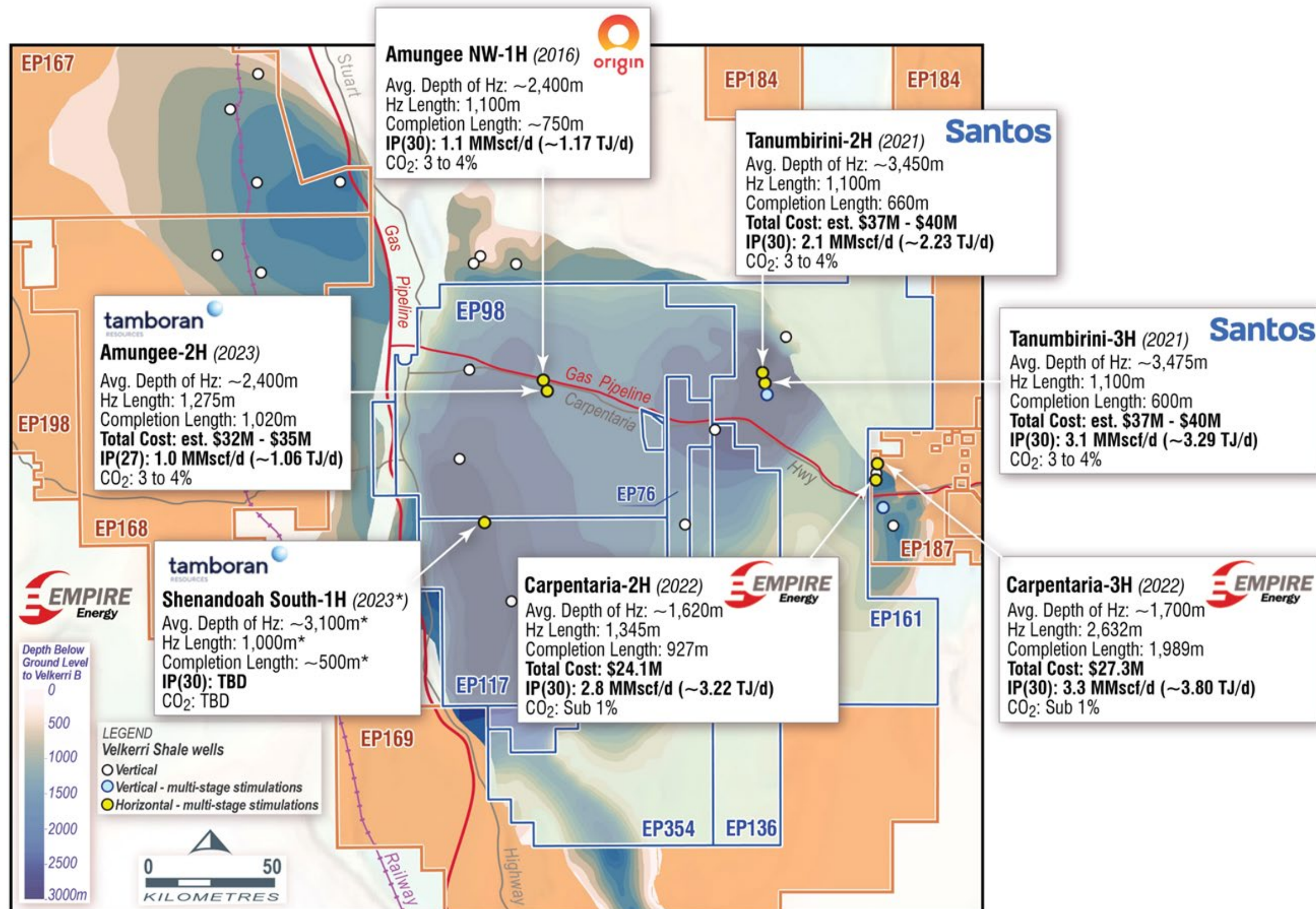
|   | EP187 Contingent Resources (100%) as at May 2023<br>Net Sales Gas (PJ) |                    |                    |
|---|--|--------------------|--------------------|
|   | Low Estimate (1C)  | Best Estimate (2C) | High Estimate (3C) |
| <b>Total</b>  | <b>304</b>   | <b>1,739</b>       | <b>3,507</b>       |
| <b>Average EUR Per Development Well</b>                             | <b>6.2</b>   | <b>7.9</b>         | <b>9.3</b>         |
| <b>Indicative Pilot Development Well Cost (\$20m per well)</b>      | <b>\$3.23 / GJ</b>   | <b>\$2.53 / GJ</b> | <b>\$2.15 / GJ</b> |
| <b>Indicative Full Field Development Well Cost (\$15m per well)</b> | <b>\$2.42 / GJ</b>   | <b>\$1.90 / GJ</b> | <b>\$1.61 / GJ</b> |

| Key Drivers of 2C Uplift   |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>▪ Carpentaria-1 drill</li> <li>▪ Pangaea acquisition</li> </ul> | <ul style="list-style-type: none"> <li>▪ Carpentaria-1 EPT</li> <li>▪ Carpentaria-2H drill</li> <li>▪ Charlotte 2D seismic survey</li> </ul> | <ul style="list-style-type: none"> <li>▪ Carpentaria-2H EPT</li> <li>▪ Carpentaria-3H drill and EPT</li> <li>▪ Carpentaria-4V drill</li> </ul> |

Note: Refer to EEG announcement dated 29 May 2023 for Netherland, Sewell & Associates, Inc. Contingent and Prospective Resources



# Basin-wide Appraisal Drilling is Demonstrating the Commercial Case



- Empire drilling and fracture stimulation costs ~2/3 of deeper wells (on a like for like basis)
- Empire generating strong flow rates on a per dollar of capex basis, building the economic case for the basin flanks
- Empire's gas has a higher energy content than dry gas (with positive implications for revenue)
- 100% interest in all properties and no private royalties maximises farm out flexibility and economics
- Empire's extremely low in-situ CO<sub>2</sub> reduces offset costs

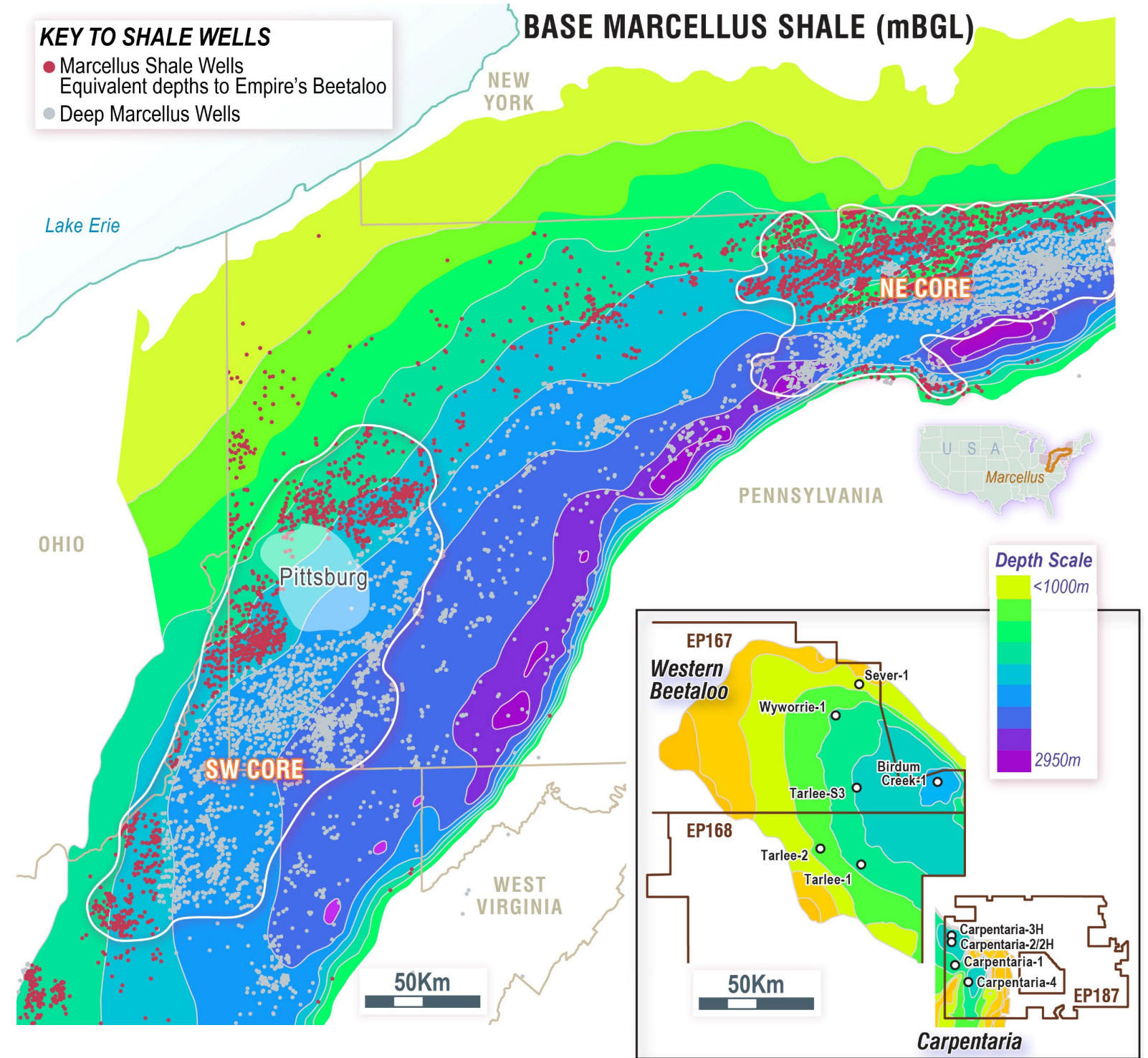
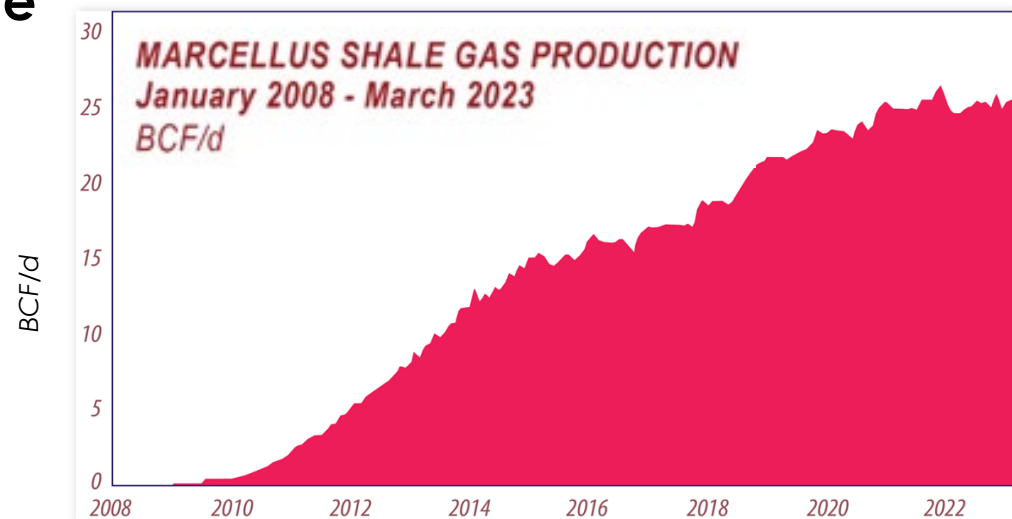


# Empire's Beetaloo Footprint Comparable to Marcellus



- Empire's Beetaloo footprint is comparable in size to significant portions of the core areas of the Marcellus Shale play in the Appalachian Basin
- More than 9,000 wells are producing from similar depths to Empire Beetaloo play (~34 percent of all Marcellus wells)<sup>1</sup> across both core areas
- The majority of the more than 27,000 producing Marcellus Shale wells are less than 2,250 metres below ground level
- **Marcellus shale producing acreage has typically transacted at US\$5,000 to US\$25,000 per acre<sup>2</sup>. Empire is valued at ~US\$70 per acre based on the Carpentaria Project and Western Beetaloo Project alone**

**“Marcellus shale gas production has grown by 25 BCF/d over ten years”**



Insert map: Empire's base Velkerri B Shale at same scale as base Marcellus Shale map

Source: U.S. Energy Information Administration - EIA - Independent Statistics and Analysis

1. EIA and relevant State databases

2. <https://mercercapital.com/energyvaluationinsights/ma-in-marcellus-utica-basins-2>



# Large Pilot Development and Appraisal Position (100% EEG)

**Empire has two large scale appraisal and pilot development projects across the Beetaloo Sub-basin connected to infrastructure**

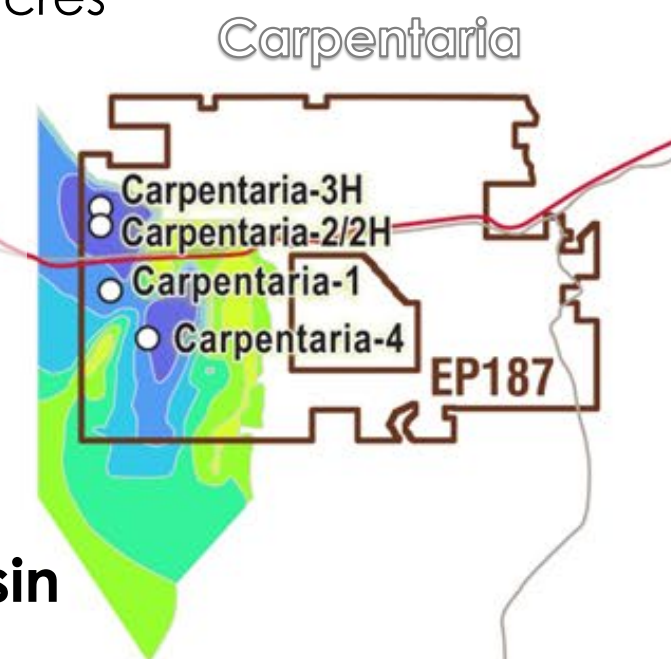
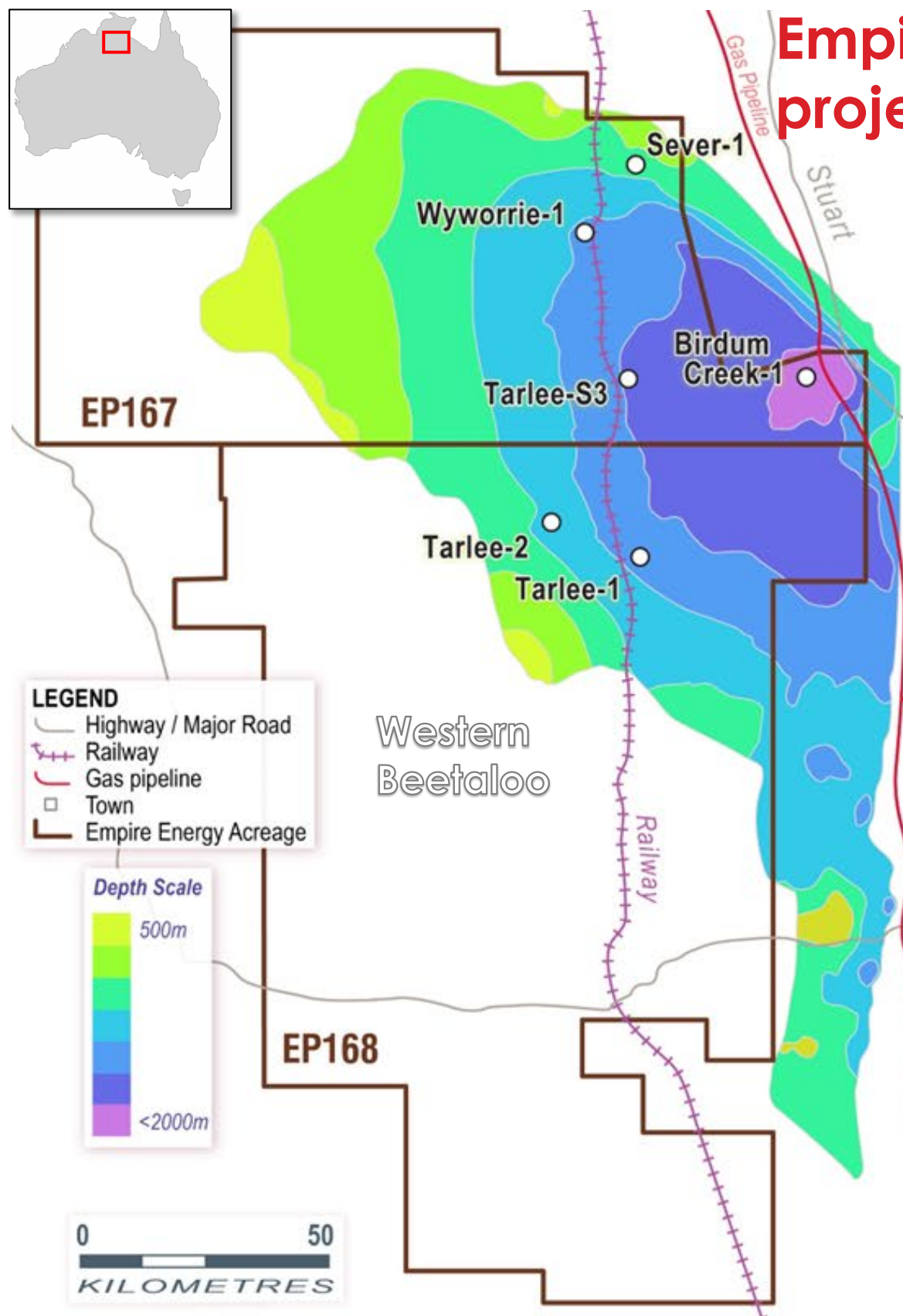
## • Carpentaria – Pilot Development

- Covers 110,000 acres
- Fully delineated with 2D seismic, two horizontal stimulated wells, one vertical multistage simulated well, one step-out vertical well and three Extended Production Tests
- Focused on FID for pilot project in 2023 and construction in 2024
- 2C Contingent Resource 1,739 PJ (~1.5 TCF)
- 2U Prospective Resource 3,542 PJ (~3.0 TCF)

## • Western Beetaloo – Appraisal

- Large, extensive play covering ~1m acres
- Delineated by five spatially drilled wells, ~1,800 metres of core and >1,000 km 2D seismic acquired
- Further de-risked by activity in Carpentaria (same rock)
- 2U Prospective Resource ~28 TCF

**One of only three operators in the Basin**

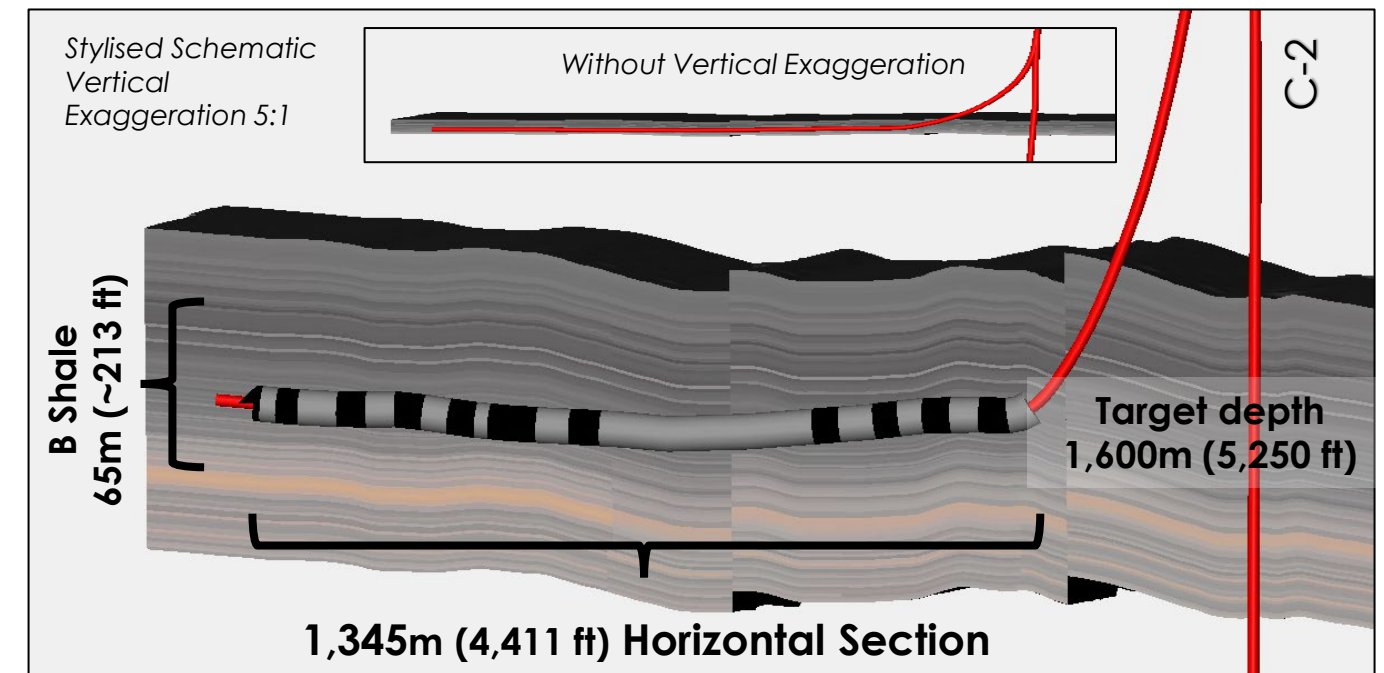




# Empire's First Horizontal Well Flow Test A Success

**Carpentaria-2H is the fourth horizontal well in the basin, was drilled 100% within zone, and successfully flowed gas to surface from all 21 frac stages**

- **Carpentaria-2H ("C-2H") produced a total of 323 TJ (281 mmscf) over 127 days**
  - This equates to a **normalised rate of 8.25 TJ (7.2 mmscf) per day for an equivalent 3,000m horizontal development well** for the entire test period
- Gas composition remained consistent with high calorific value and **extremely low CO<sub>2</sub> (less than 1%)**
- C-2H was brought back online after an initial 51 days of testing to test the benefit of soaking with excellent results
  - **The post-soak 2023 IP30 is confirmed at 10.5 TJ (9.2 mmscf) per day for an equivalent 3,000 metre horizontal development well**
- Completed without the need for production tubing, well free-flowed through 4 ½" casing. Empire is likely to move to 5 ½" in future scenarios
- **These rates exceed the benchmark other Beetaloo players have put forth as commercial, at a capital cost of ~half of Empire's peers**



Carpentaria-2H flare

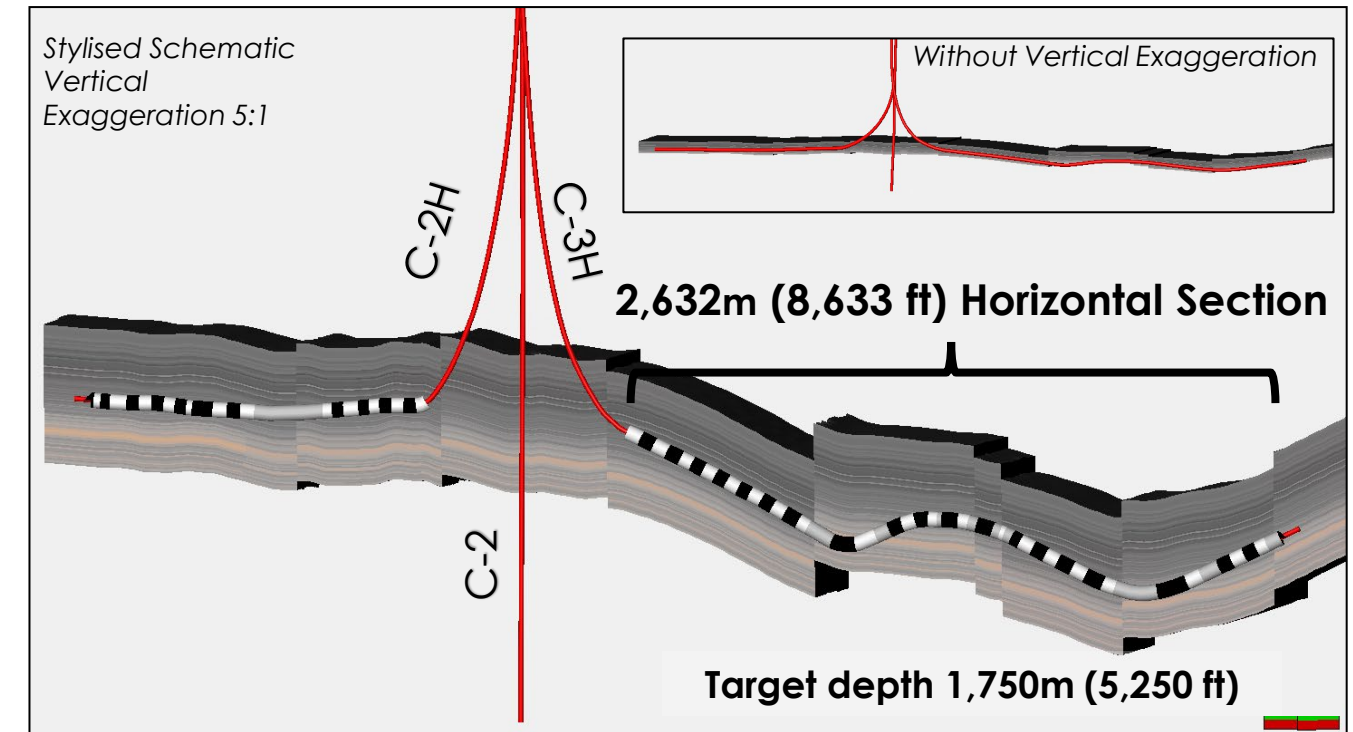


# Empire's Record Breaking Carpentaria-3H Horizontal Well



**Carpentaria-3H is the longest horizontal shale well, and the largest frac job ever executed in Australia, on time and ~\$6m under budget**

- **Total horizontal lateral length of 2,632m (8,633 ft)**, with 2,374 m (7,786 ft) successfully placed within the target Velkerri B shale (**90% in zone**), with strong gas shows throughout the target zone
  - **Confirming long horizontals can be drilled in the Beetaloo**
- Carpentaria-3H successfully stimulated, significantly below budget, executing all planned 40 stages across 1,989m (6,526 ft)
- A total of 12.8 million lbs of proppant placed, averaged 319,000 lbs per stage (~2,000 lbs/ft). Comparable to US Shale frac intensity
- Carpentaria-3H was brought back online on 3 August 2023 and has demonstrated the material benefits to productivity of soaking, through significantly increased gas flow rates
- **Following reopening, Carpentaria-3H flowed gas at an average rate of 3.3 mmscf / day (3.8 TJ / day) over the first 30 days ("IP30")**
- **The Carpentaria-3H "post-soak" average daily production rates have increased 30% over the IP27 "pre-soak" test conducted in Q1 2023**



SLB 185 Rig drilling Carpentaria-3H in EP187



# Connections to Market for Large Gas Volumes

- **APA Group (ASX: APA)** and Empire have executed an agreement for the establishment of exclusive midstream gas infrastructure furthering the memorandum of understanding as announced by Empire on 27 October 2021
- **APA will spend up to \$5 million** under a proposed early works agreement on Engineering and Design Concepts for midstream gas facilities associated with Empire's Carpentaria Pilot Project, which would materially reduce the capital requirements for Empire to commence commercial production
- APA and Empire are also working on concepts to transport **large volumes of gas from the Beetaloo to Australian east coast markets (in excess of 500 TJ/d)**. The leading concept considers the potential construction of a new pipeline connecting the Beetaloo to APA's existing Carpentaria Gas Pipeline between Mount Isa and Ballera (Queensland)
- Negotiations with NT Government owned utility **Power and Water Corporation** under the existing MOU are advancing to facilitate access to the McArthur River Pipeline
- **Empire is currently in active gas sales negotiations with multiple parties for supply of gas in both the pilot phase and full development phase**





# Pathway to Carpentaria Pilot Project Production and Revenue



## EXPLORATION & APPRAISAL

2021

✓ 2C Contingent Resource: 575 BCFe

✓ 2U Prospective Resources: ~48 TCFe

2022

✓ Gas Sales & Transportation: APA Group and Power and Water Corporation MoUs Executed

✓ Established \$15 million credit facility with Macquarie Bank to move to project financing

## KEY ACTIVITIES TO CARPENTARIA PILOT PROJECT FID

2023

✓ Major 2C Contingent Resource upgrade announced for EP187 to 1,739 PJ

✓ Carpentaria-2H flow rates: normalised IP30 of 10.5 TJ (9.2 mmscf) per day for an equivalent 3,000m horizontal development well. Carpentaria-3H flow rates: IP30 of 3.8 TJ (3.3 mmscf) per day

✓ Carpentaria-4V: intersected the same stacked Velkerri Formation shales as the Carpentaria Project wells thereby opening the Carpentaria East Area

1. Front End Engineering & Design ("FEED"): including engineering, economic modelling etc

• **Pilot development (up to 25 TJ/d) – over \$90m revenue per annum @ \$10/GJ**

2. Subsurface design planning

3. Execute gas sales and transportation agreements – discussions ongoing with multiple parties

4. Arrange financing for pilot (Macquarie Bank credit facility already in place)

5. Obtain government approvals: NT Petroleum Production Licence over Carpentaria

6. Negotiate Northern Land Council ("NLC") Production Agreement with Traditional Owners

## POST FID

2024

1. Pilot project construction

2025

1. First gas sales

2. Planning to move to full development (200 TJ/d+ to East Coast then >1 PJ / day LNG export via Darwin)





<https://empireenergygroup.net/>

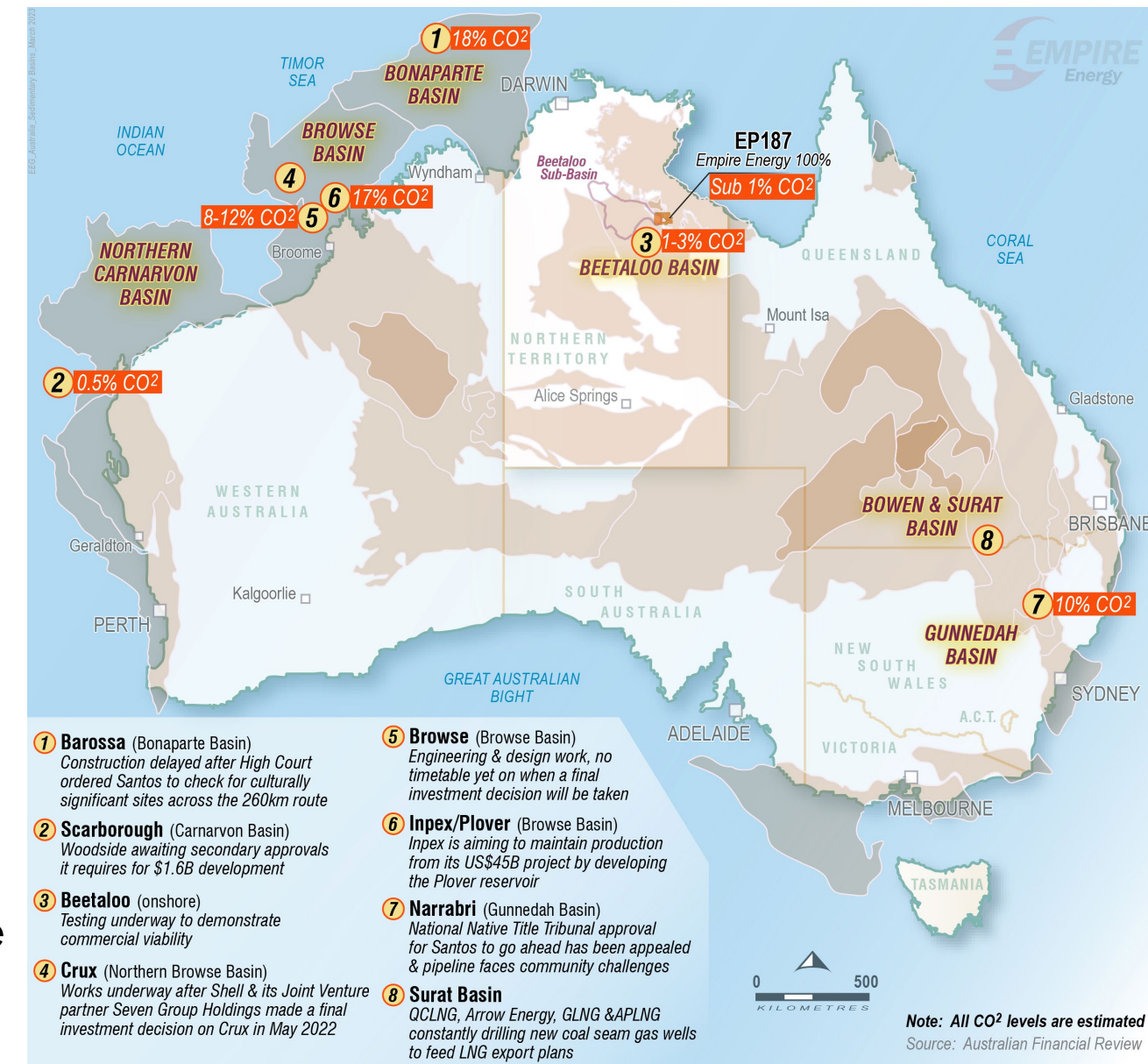
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## Empire is responsibly developing its Beetaloo gas resources

- Empire’s forecast Greenhouse Gas (“GHG”) emissions have been independently reviewed based on recent appraisal results, planned field development assumptions and the **National Greenhouse and Energy Reporting** framework<sup>1</sup>
- Empire’s Scope 1 emissions based on this analysis will include:
  - Fuel combustion e.g. gas for power, diesel use
  - Fugitive emissions associated with operations (aim to minimise)
- Empire estimates its **Scope 1 offsetting obligation is less than 5% of gross revenue** (at \$10/GJ gas price) for Carpentaria’s full field economic life at the Australian Government’s carbon price cap (\$75 per tonne indexed at 2% p.a. plus CPI). This obligation is **~2% of gross revenue at the current Australian Carbon Credit Unit (“ACCU”) price**<sup>1</sup>
  - Empire has commenced engagement with ACCU supply counterparties
- **Carpentaria CO<sub>2</sub> reservoir levels are extremely low (less than 1%)**
- Empire maintains strong relationships with Traditional Owners (“TO”) on whose land it operates with their full, informed and prior consent
  - ~30 on-county meetings held with TOs to date. NLC exploration payments paid for the benefit of TOs and thousands of hours of employment for TOs to date



1. Estimates have been independently reviewed by HRL Technology Group Pty Limited (<https://www.hrlt.com.au>)



# Appendix 2: Beetaloo Horizontal Well Activity



| # | Well Name             | Year           | Operator                | Average Depth of Horizontal (Below Ground) | Horizontal Length | Total Measured Depth (m) | Drilling Cost (\$'M) | Fracture Stimulation Stages | Stimulated Length | Fracture Stimulation and Extend Production Testing Cost (\$'M) | Total Cost (\$'M) | IP (EPT 1)                         | IP30 (EPT 2)      | CO2           |
|---|-----------------------|----------------|-------------------------|--|-------------------|--------------------------|----------------------|-----------------------------|-------------------|--|-------------------|------------------------------------|-------------------|---------------|
| 1 | Amungee-1H            | 2015/16        | Origin Energy (now TBN) | ~2,400m                                    | 1,100m            | 3,808m                   |                      | 11                          | ~750m             |  |                   | IP(57)<br>1.11mmscf/d              | N/A               | 3 to 4%       |
| 2 | Tanumbrini-2H         | 2021/22        | Santos                  | ~3,450m                                    | 1,000m            | 4,598m                   |                      | 11                          | 660m              |  | Est. \$37 to \$40 | IP(14)<br>2.0mmscf/d               | 2.1mmscf/d        | 3 to 4%       |
| 3 | Tanumbrini-3H         | 2021/22        | Santos                  | ~3,3475m                                   | 1,000m            | 4,857m                   |                      | 10                          | 600m              |  | Est. \$37 to \$40 | IP(10)<br>1.7mmscf/d               | 3.1mmscf/d        | 3 to 4%       |
|   | <b>Carpentaria-2H</b> | <b>2021/22</b> | <b>Empire</b>           | <b>~1,620m</b>                             | <b>1,345m</b>     | <b>3,150m</b>            | <b>\$11.1</b>        | <b>21</b>                   | <b>927m</b>       | <b>\$13.0</b>  | <b>\$24.1</b>     | <b>IP(30)</b><br><b>2.4mmscf/d</b> | <b>2.8mmscf/d</b> | <b>Sub 1%</b> |
|   | <b>Carpentaria-3H</b> | <b>2022/23</b> | <b>Empire</b>           | <b>~1,700m</b>                             | <b>2,632m</b>     | <b>4,460m</b>            | <b>\$10.0</b>        | <b>40</b>                   | <b>1,989m</b>     | <b>\$17.3</b>  | <b>\$27.3</b>     | <b>IP(27)</b><br><b>2.6mmscf/d</b> | <b>3.3mmscf/d</b> | <b>Sub 1%</b> |
| 4 | Amungee-2H            | 2022/23        | Tamboran                | ~2,400m                                    | 1,275m            | 3,883m                   | \$14.1               | 25                          | 1,020m            | ~\$18  | Est. \$32 to \$35 | IP(50)<br>0.97mmscf/d              | N/A               | 3 to 4%       |
|   | Shenandoah South-1H   | 2023 - Pending | Tamboran                | Est. ~3,000m                               | Est. ~1,000m      |                          |                      |                             | Est. ~500m        |  |                   |                                    |                   |               |

## Sources:

- Falcon Oil & Gas (TSXV: FO, AIM: FOG) release entitled:
  - “Amungee NW-1H – Normalised gas flow rate equivalent to 5 mmscf/d per 1,000m horizontal” dated 3 September 2021
- Tamboran Resources (ASX: TBN) announcements entitled:
  - “Operational update: Approximately 17 per cent upward revision to Tanumbirini-2H and 3H flow test results” dated 21 March 2022
  - “Tanumbirini-2H and 3H 30-day normalised flow rates exceed estimated Beetaloo commerciality threshold” dated 5 September 2022
  - Total Cost calculated as EP161: Tanumbirini 2H & 3H wells total funds used to date (\$18.5m) per Tamboran’s Q1 2023 Quarterly Report multiplied by 4 (TBN holds a 25% interest in these wells)
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- Releases entitled:
  - Falcon Oil & Gas, “Amungee NW-2H Well Update” dated 22 June 2023
  - Falcon Oil & Gas, “Operational Update on Amungee NW-2H Drilling” dated 23 December 2022
  - Tamboran Resources, “EP98 Operational Update: Successful completion of 25-stage stimulation program at Amungee-2H” dated 22 March 2023



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