



ASX:EEG

# The Shale Gas Revolution Takes Hold in Australia



Macquarie SMID Oil & Gas Day, October 2020

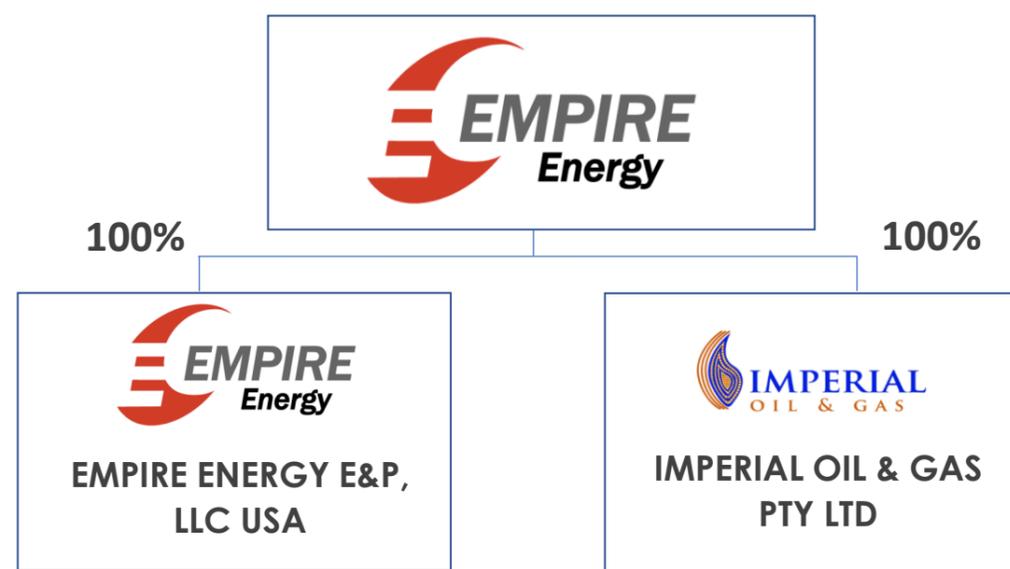
# Corporate Snapshot



## Capital Structure

Shares on issue <sup>1</sup>	323.5m
Share price	A\$0.335
<b>Market cap</b>	<b>A\$108m</b>
Net (debt) / cash <sup>2,3</sup>	~A\$12m
Enterprise value	~A\$96m
<b>Cash at bank</b>	<b>~A\$21m</b>

## Corporate Structure



## ASX Share Price



## Top Shareholders

Global Energy and Resources	8.7%
Macquarie Bank Limited	8.2%
Elphinstone Holdings Pty Limited	6.2%
Liangrove Media Pty Limited	5.5%
Board of Directors <sup>4</sup>	8.0%

1. Empire has ~19m unlisted options on issue with an average exercise price of <A\$0.32 per share. In addition, there are 11.1m Share Rights on issue to members of the management team and Board. Most of the Share Rights have performance hurdles tied to total shareholder return.

2. Empire has a US\$7.5 million debt facility (drawn to US\$6.675 million) with Macquarie Bank maturing in September 2024 which is secured against the Company's USA gas production assets. Under new management, total debt has been reduced by over 80% since 2018.

3. Net debt excludes a US\$552,600 loan which has been approved and received under the US Paycheck Protection Program. Empire expects that the loan will be forgiven in accordance with the US CARES Act.

4. Board shareholding includes Liangrove Media and excludes options and MD Rights. Empire Directors have invested more than A\$6.1 million in cash over the last two years.

# Empire Board & Management Team



John Warburton  
Alex Underwood  
**Board of Directors**

John Gerahty  
Paul Espie  
Peter Cleary



David Evans  
Kylie Arizabaleta  
Alex Bruce  
Ben Johnston  
**Management**

**Prof. John Warburton – Non-Executive Director**

- Highly regarded petroleum geoscientist experienced in big fields
- 30 years technical & leadership experience in leading E&P companies including BP, LASMO-Eni and Oil Search
- Previously Chief of Geoscience & Exploration Excellence for Oil Search
- Non-Executive Director of Senex Energy

**Alex Underwood – Managing Director**

- Associate Director Energy Markets Division of Macquarie Bank Limited (Sydney and Singapore)
- Director Natural Resources Division of Commonwealth Bank of Australia (Singapore)
- Financial Analyst BHP Billiton Petroleum (Perth)
- Experience investing debt and equity in the upstream oil and gas sector and identification of value creation opportunities for upstream oil and gas development / production assets

**John Gerahty – Non-Executive Director**

- Founding Director of Macquarie Bank
- Former investment banker with wide experience in commerce and business
- Former director of numerous public companies including Chairman of AFP Group PLC and MPI Mines Ltd
- Chairman of Associated Media Investments Pty Limited and AMI Advertising Media Pty Limited

**Paul Espie AO – Chairman / Non-Executive Director**

- Founding principal of Pacific Road Capital, a resources investing manager of private equity funds
- Former Chairman of Oxiana Ltd during the development of the Sepon copper/gold project in Laos
- Former Chairman of Cobar Mines Pty Limited after a management buyout
- Former Head of Bank of America operations in Australia, New Zealand and PNG

**Peter Cleary – Non-Executive Director**

- Distinguished 29-year career representing Santos, the North West Shelf Venturers and BP in Asia. His executive career was in LNG, pipeline gas and chemicals operations
- Member of the Executive Committee of the Australia Japan Business Co-operation Committee and the Australia Korea Business Council

**David Evans – Chief Operating Officer**

- Chief Operating Officer at Elk Petroleum Limited
- Chief Technical Officer and Acting Chief Operating Officer Drillsearch Energy Limited
- 30 years global upstream oil & gas exploration, development and production experience with significant exposure to Australian and North American unconventional plays
- 2014 East Coles Corporate Performance Awards Best Operational Management, Energy

**Kylie Arizabaleta – Financial Controller**

- Longest serving Empire management team member
- Prior to joining the Company, Kylie worked in the Audit division of Chartered Accounting firms as a senior and lead external auditor where she gained broad experience in Audit and other Assurance Services

**Dr Alex Bruce – Chief Geoscientist**

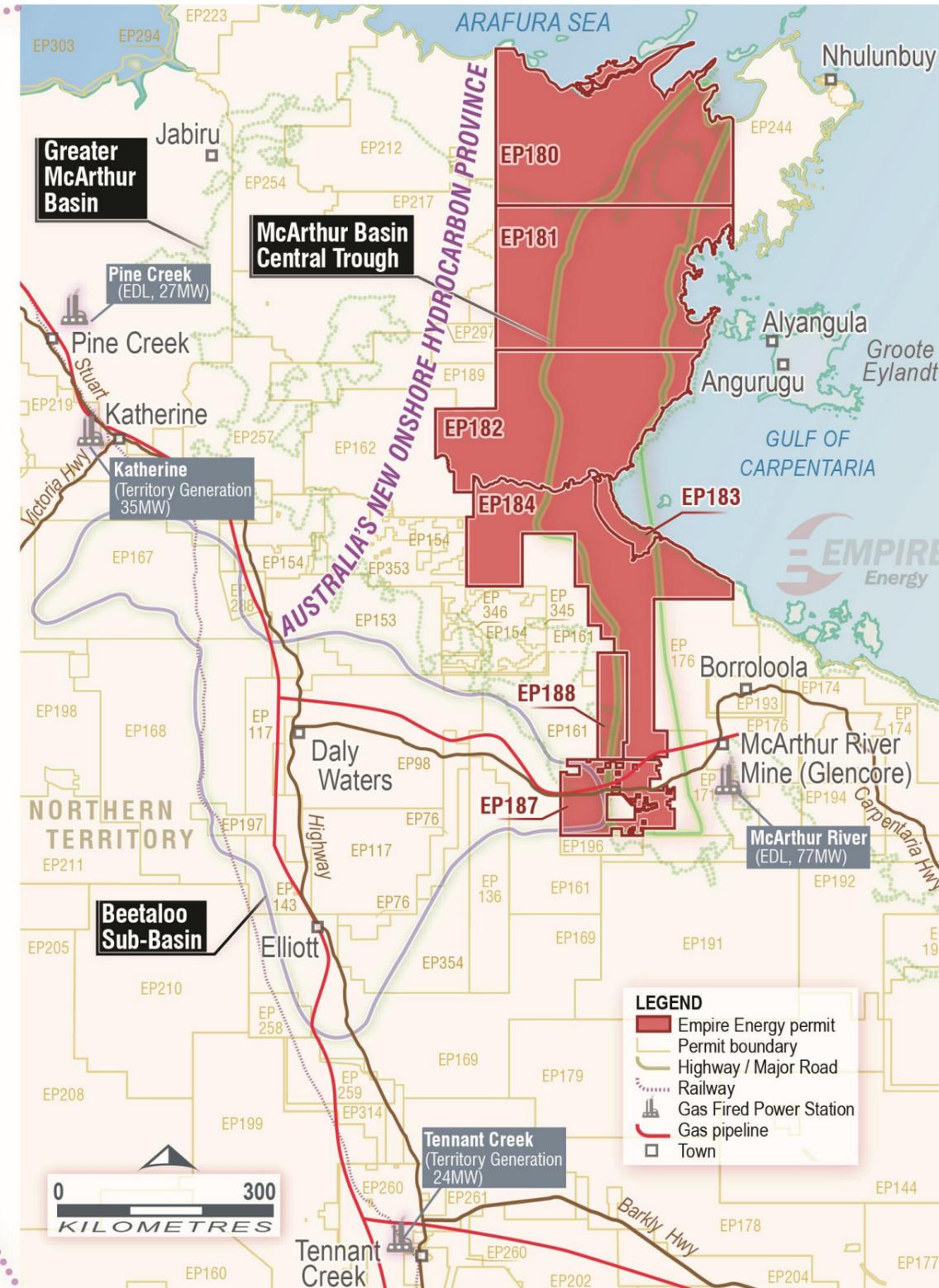
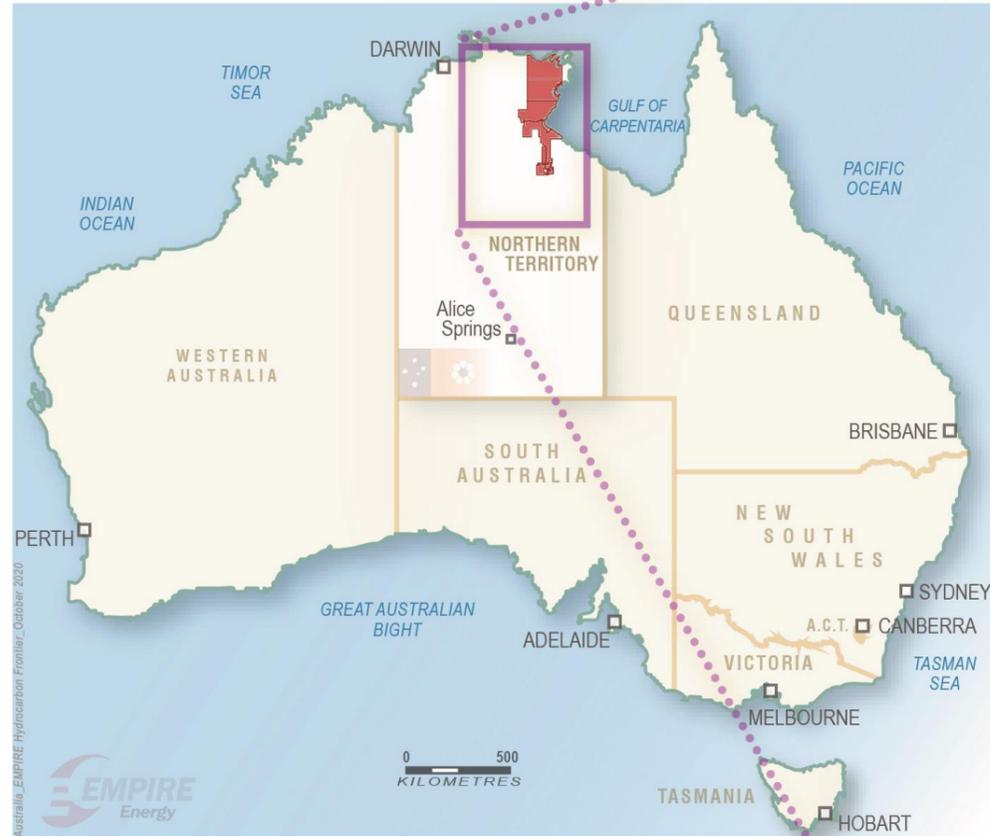
- PhD from the University of New South Wales (2001) in machine learning applications to geology
- 20 years experience across onshore and offshore projects from exploration to development and unconventional oil & gas
- Has held similar positions with other ASX oil & gas mid-caps including Drillsearch (acquired by Beach), AWE (now Mitsui), Roc Oil (now FOSUN) and Bridgeport Energy (part of New Hope Corporation)

**Ben Johnston – Vice President Business Development**

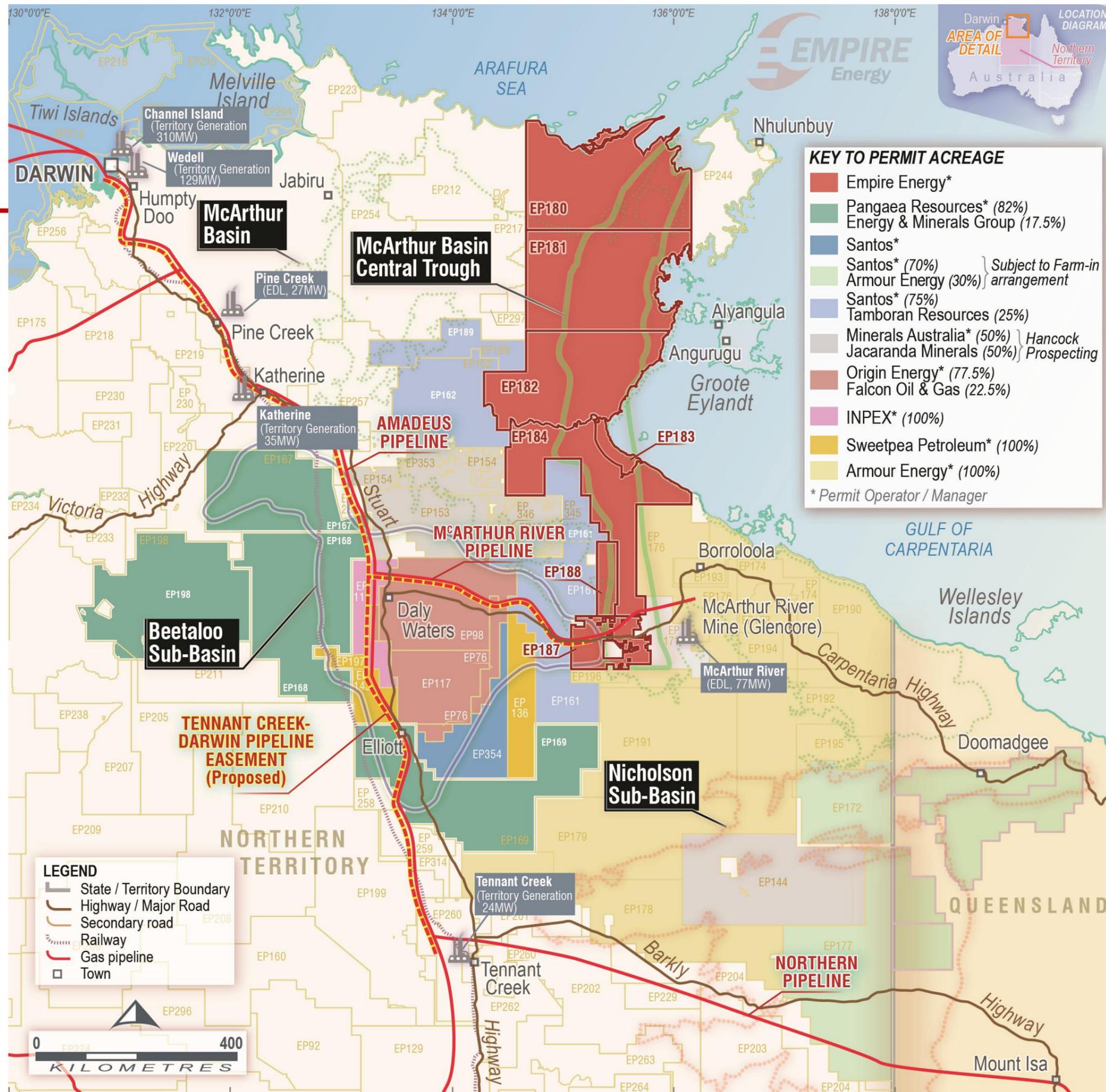
- Director, Natural Resources & Energy, Commonwealth Bank of Australia
- Vice President, RBC Capital Markets energy investment banking team
- Chartered Accountant and MBA (Australian Graduate School of Management)
- Energy sector specialist across M&A, ECM and debt / project finance transactions

- When COVID-19 impacted energy markets, Empire took pro-active steps to protect the balance sheet
- The impact of low US gas prices was partly mitigated by hedging
- **Netherland, Sewell & Associates assessed a total best estimate prospective resource for our Northern Territory properties of 13.46 TCF**
- NT Government approvals received to Carpentaria-1 drill in EP187
- During 2020, Empire has successfully raised A\$10 million via a placement to existing and new investors and A\$8.1m from the exercise of A\$0.30 options including A\$1.9 million from Directors of the Company
- **Empire has announced initial results from the Carpentaria-1 well**

# Empire Energy Leading in Australia's New Onshore Hydrocarbon Province



A land position of 58,000 km<sup>2</sup> across McArthur Basin & Beetaloo Sub-Basin



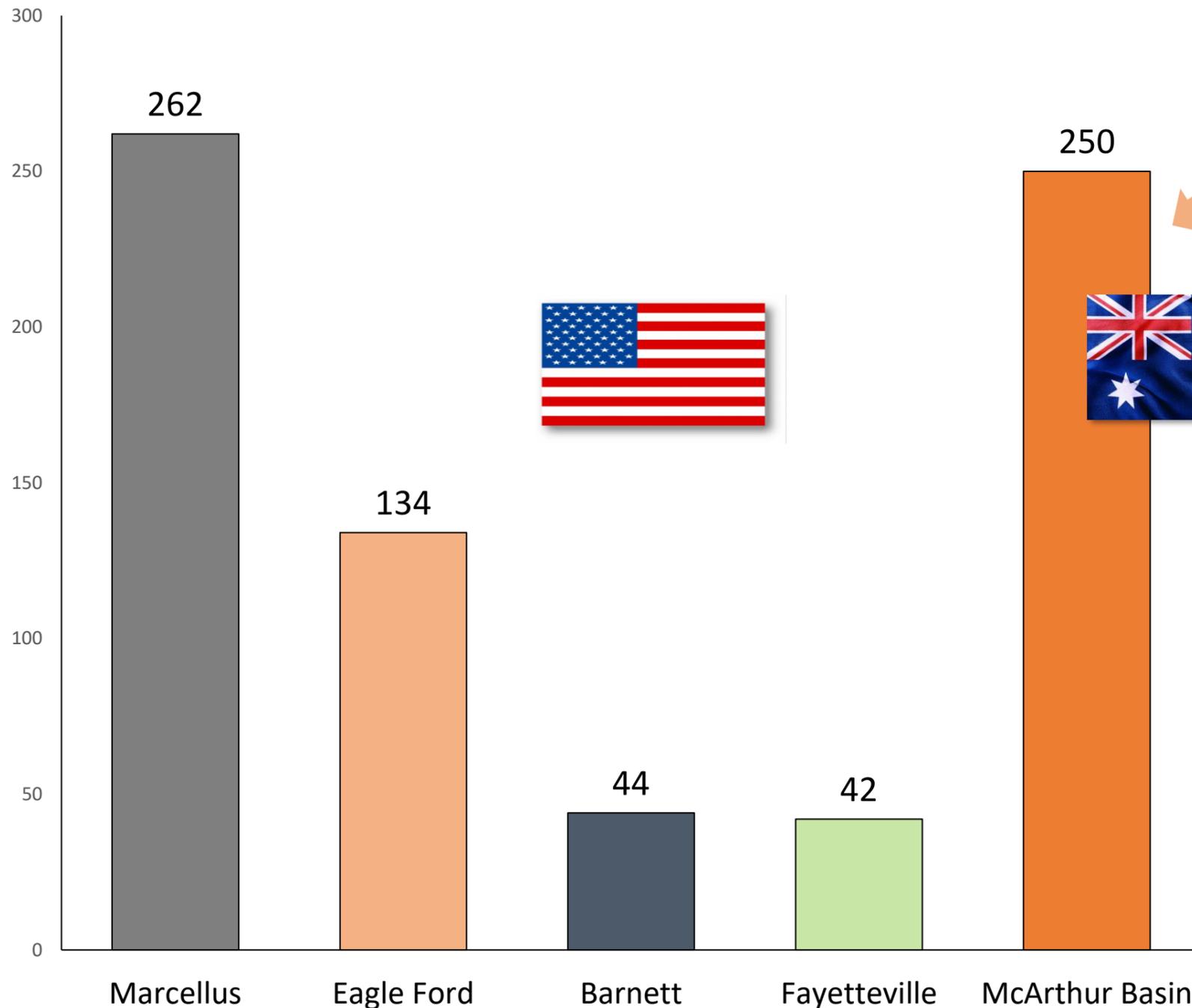
# Major NT Shale Gas Operators

- Major oil and gas companies hold substantial acreage positions in the Beetaloo Sub-basin McArthur Basin
- Origin drilling 2 fracked horizontal wells in 2020 / 21 testing Velkerri Shale and Kyalla Formation
- Santos to drill 2 fracked horizontal wells in 2021 testing Velkerri Shale
- Hancock Prospecting has indicated it may invest A\$150m - \$200m in exploration
- INPEX and Santos, exporters of LNG from Darwin, in the Basin

# NT Shale Gas Resources rival the prolific US Marcellus Shale



Trillion Cubic Feet (Tcf) comparison



The resource potential of the Beetaloo-McArthur Basin rivals the USA's premier Marcellus Shale

**“Prospective Resource”** is the estimated quantities of petroleum that may potentially be recovered by the application of a future development project(s) relate 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.

Sources:

1. US Department of Energy, Modern Shale Gas Development in the United States: A Primer
2. US Gulf Coast Petroleum Systems Project Assessment of Undiscovered Oil and Gas Resources in the Eagle Ford Group and Associated Cenomanian–Turonian Strata, U.S. Gulf Coast, Texas, 2018
3. US Energy Information Administration, Technically Recoverable Shale Oil and Gas Resources: Australia September 2015

# Empire's NSAI certified NT Prospective Resource Estimate



Reservoir	Undiscovered Original Gas-in-Place (BCF)			Unrisked Gross (100%) Prospective Gas Resources (BCF)			Unrisked Gross (100%) Prospective Oil Equivalent Volumes (MMBOE)		
	Low Estimate (1U)	Best Estimate (2U)	High Estimate (3U)	Low Estimate (1U)	Best Estimate (2U)	High Estimate (3U)	Low Estimate (1U)	Best Estimate (2U)	High Estimate (3U)
<b>Lower Kyalla</b>	496	724	1,073	24	72	161	5	14	34
<b>Middle Velkerri</b>	9,303	12,516	16,597	1,283	2,339	4,751	215	397	825
<b>Barney Creek</b>	17,667	59,652	155,058	1,633	11,053	45,380	274	1,886	8,011
<b>Total*</b>	<b>27,466</b>	<b>72,892</b>	<b>172,728</b>	<b>2,940</b>	<b>13,464</b>	<b>50,292</b>	<b>494</b>	<b>2,297</b>	<b>8,870</b>

Empire's P(50) Resource is **13.46 Tcf eq**

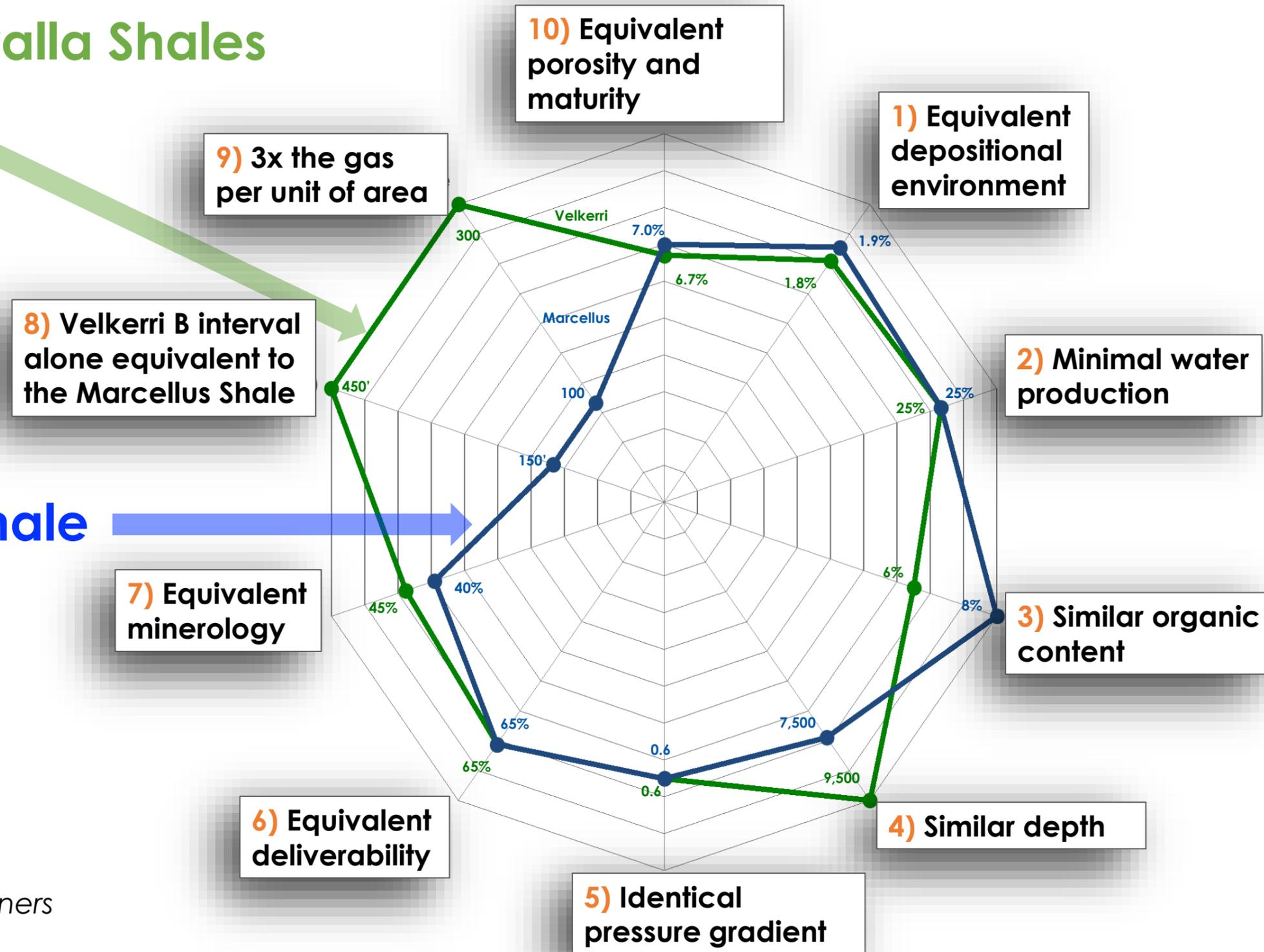
\*Note: Empire has aggregated the OGIP and prospective resources estimated by Netherland, Sewell & Associates, Inc. by arithmetic summation 15 May 2020

# Analogous with the major USA shale basins

**NT Velkerri / Kyalla Shales**  
(green line)

**US Marcellus Shale**  
(blue line)

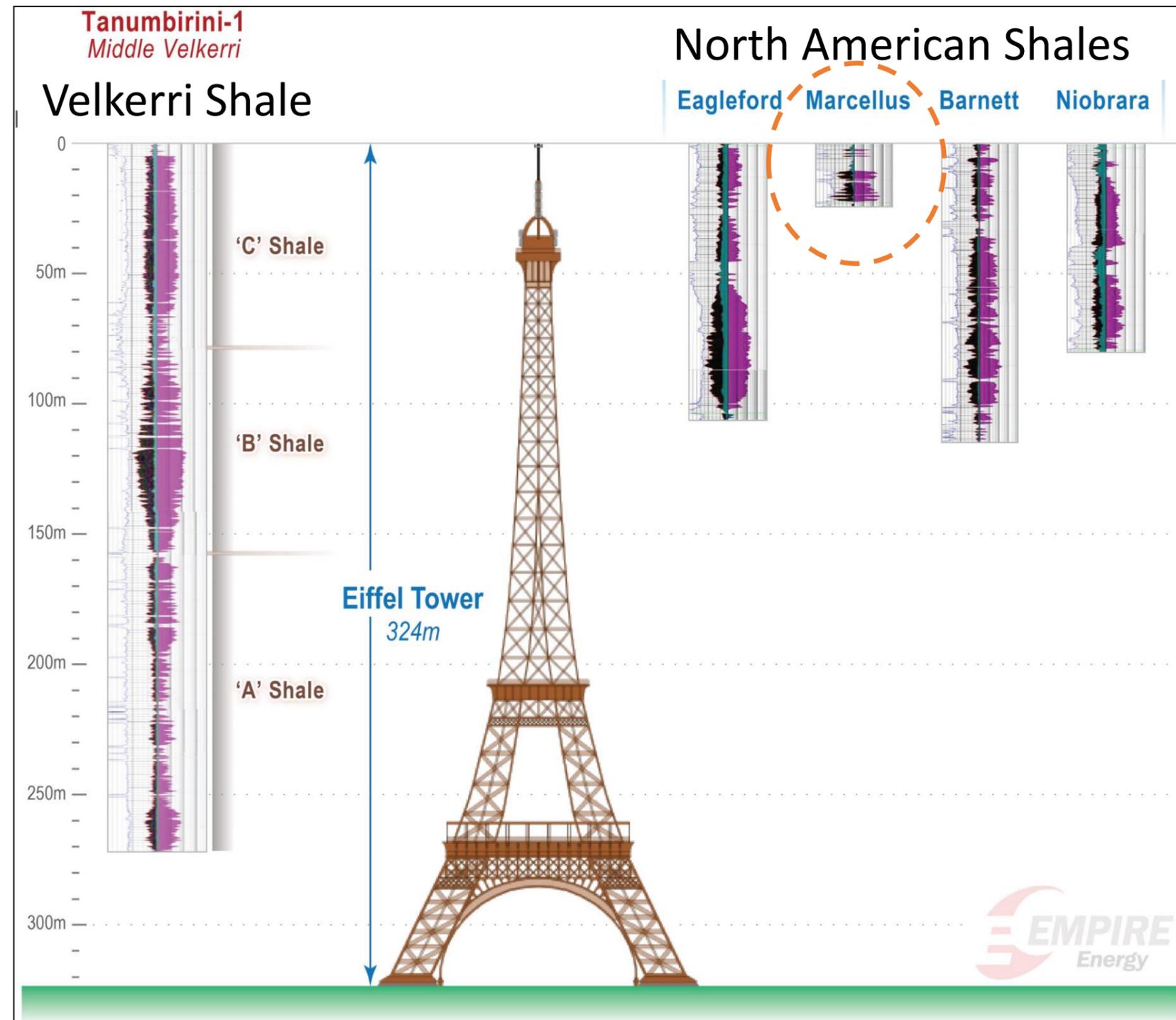
Endowment equivalent to three stacked Marcellus shales



Source: American Energy Partners

# Beetaloo Shales far thicker than US top producers

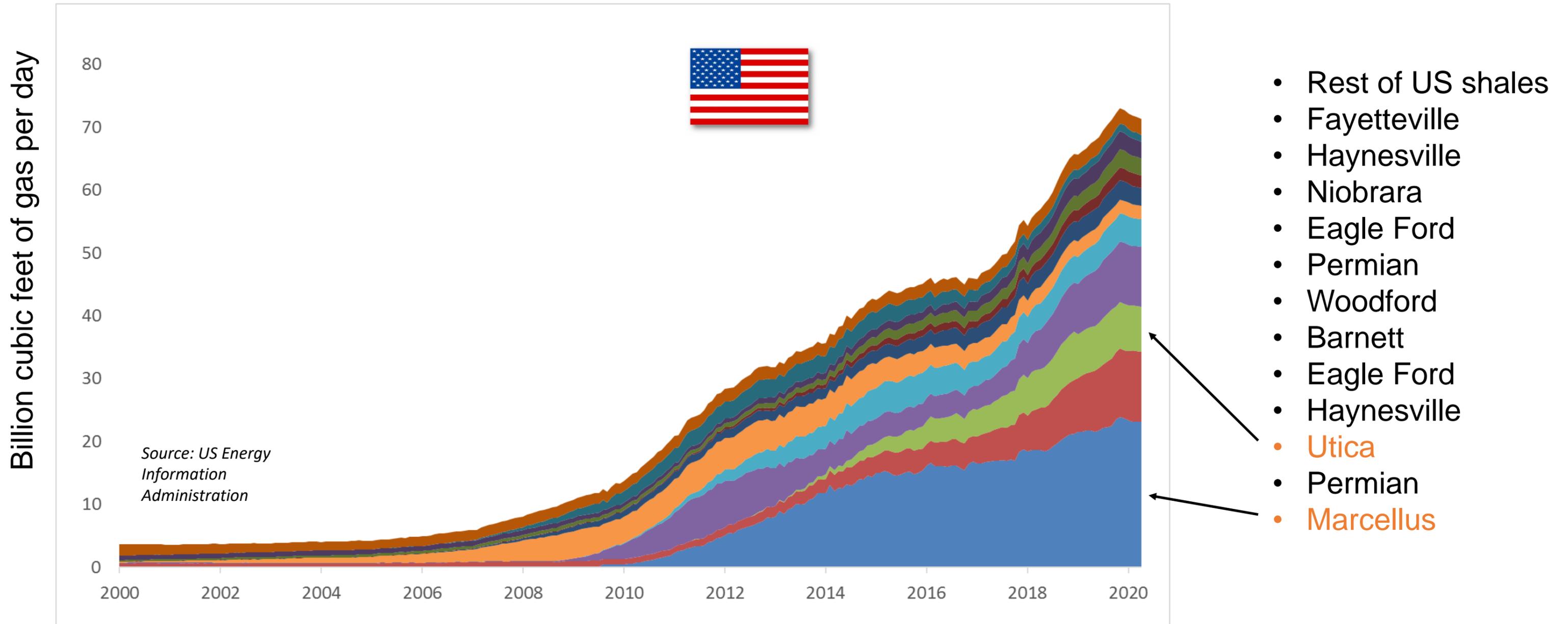
- The Velkerri Shale is a continuous gas accumulation across the Greater Beetaloo Sub-basin (GBSB), subject to thermal maturity
- The Middle Velkerri A, B and C are the most consistent and well-developed shale intervals in the basin with well penetrations intersecting a stratigraphic section of similar thickness and petrophysical characteristics across hundreds of kilometres of the GBSB
- Empire's Carpentaria-1 has encountered the most liquids rich gas of all Velkerri Shale gas wells drilled to date



Horizontal drilling, fracking and the shale gas industry have transformed the USA energy market, and its global geopolitics...



The Utica and Marcellus Basins are analogous to the Beetaloo-McArthur

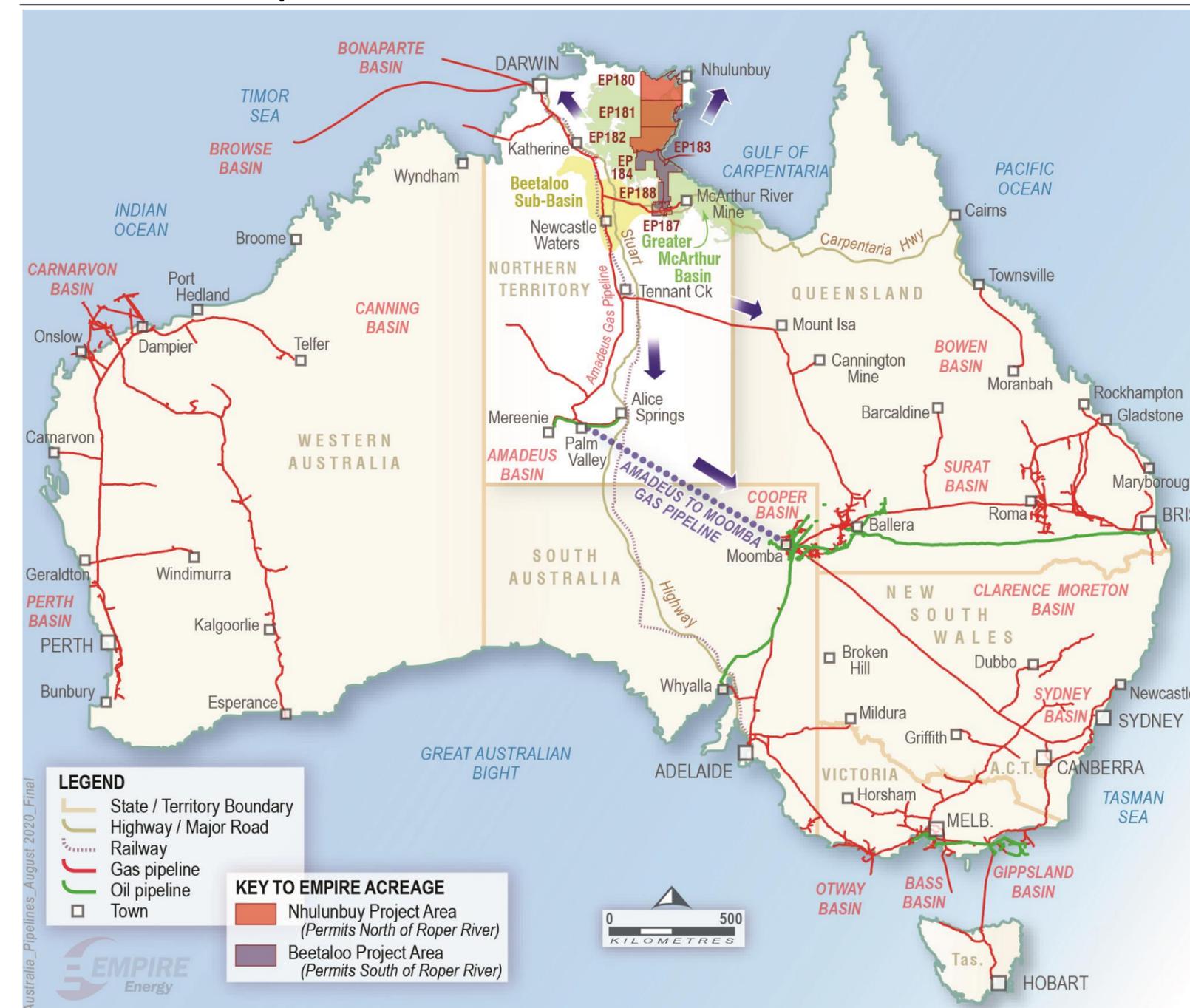


Monthly USA shale gas production coloured by shale basin

# Markets for Empire's Hydrocarbons

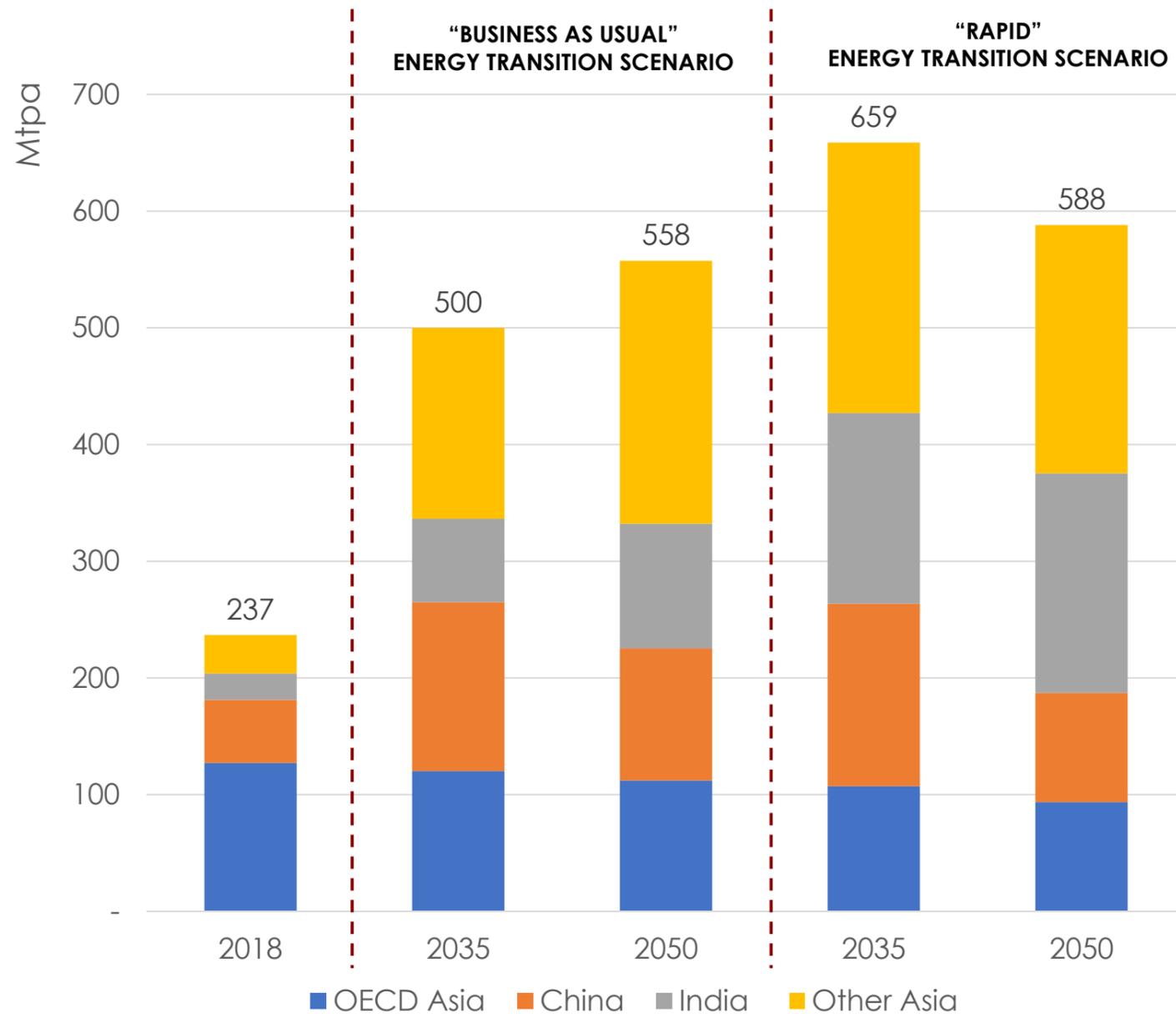
- **LNG Export from Darwin** via backfill or expansion at Ichthys LNG (INPEX) / Darwin LNG (Santos)
- **Downstream / Petrochemicals at Darwin** including proposed Coogee Methanol Facility, Darwin Clean Fuels Refinery
- **Northern Australia Gas Market** encompassing NT incl. Power and Water Corp, McArthur River Mine (EDL/Glencore) and Carpentaria Mount Isa Province incl. Cannington Mine, Diamantina Power Station, Mt Isa Mines, Phosphate Hill
- **Nhulunbuy Petrochemical / LNG Hub** approved gas pipeline easement to Nhulunbuy across Empire's northern tenements
- **East Coast Domestic Gas Markets** via existing Northern Gas Pipeline or the missing "Amadeus to Moomba Gas Pipeline"
- **Liquids Production via Road/Rail to Darwin**

Australian Gas Pipeline Network



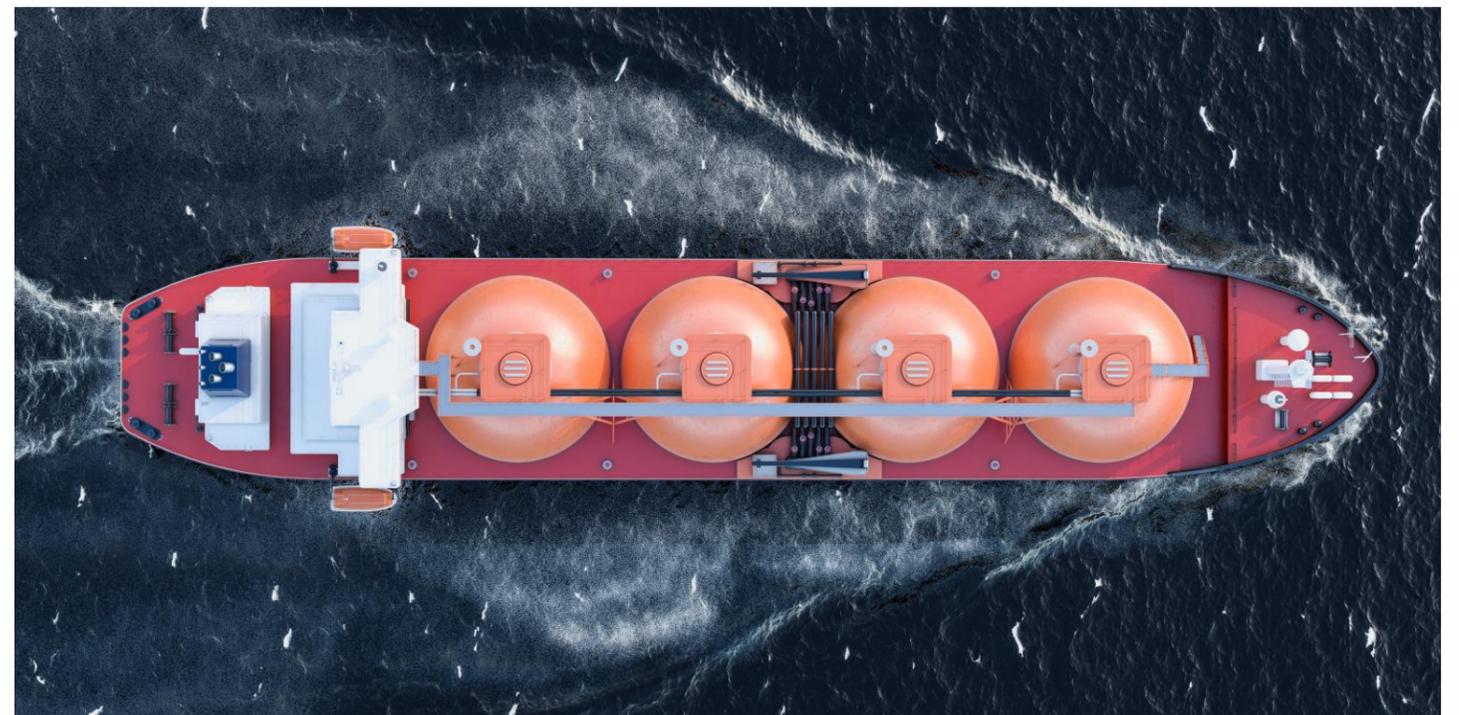
# Asia may require 32Tcf of LNG Imports by 2035

## BP Energy Outlook 2020 – Forecast Asian LNG Imports



BP forecasts stated as 1 BCM = 0.735Mt LNG

- BP’s rapid energy transition scenario assumes emissions fall to the middle of the range of ‘well below 2-degree’ scenarios contained in the 2019 UN IPCC Report<sup>1</sup>
- Gas, and particularly LNG, will play a key role in energy transition
- Asian LNG demand expected to increase from 237Mtpa in 2018 to up to 659Mtpa by 2035, led by China, India, Bangladesh, Pakistan and ASEAN nations
- **This equates to ~32Tcfe of annual LNG demand, or approximately three times greater than 2018 imports**



1. United Nations, The Intergovernmental Panel on Climate Change (IPCC)

# Major Activity in the Beetaloo to Date



**NT Fracking Moratorium**  
(Sep 2016 – Apr 2018)

2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Operational Highlights</b>								
	<ul style="list-style-type: none"> <li>Pangaea Resources acquires ~1,100-line km 2D seismic survey</li> </ul>	<ul style="list-style-type: none"> <li>Santos Tanumbirini-1 drilled to 3,945m TD. Play opening well, with 500m of shale logged in the Mid Velkerri section</li> <li>Pangaea Resources drills Hidden Valley S2 exploration well</li> </ul>	<ul style="list-style-type: none"> <li>Pangaea Resources drills 4 appraisal wells including the Wyworrie-1 gas discovery and acquires ~500-line km 2D seismic survey</li> </ul>	<ul style="list-style-type: none"> <li>Origin Energy announces Amungee NW-1H production test results, 66TJ produced at an average rate of 1.1Mcf/d</li> </ul>	<ul style="list-style-type: none"> <li>Origin books 2C contingent resources of 6.6Tcf in the Beetaloo Basin and indicates existence of a material gas resource</li> </ul>	<ul style="list-style-type: none"> <li>End of Northern Territory fracking moratorium</li> </ul>	<ul style="list-style-type: none"> <li><b>Empire completes 231-line km 2D seismic survey in EP187</b></li> </ul>	<ul style="list-style-type: none"> <li>Santos announces &gt;1.2MMcfd flow rates at Tanumbirini-1 (vertical frack)</li> <li>Santos books maiden 2C resource</li> <li>Origin and Falcon Oil drill and fracture stimulate the horizontal Kyalla 117 well</li> <li><b>Empire drilling the Carpentaria-1 well</b></li> </ul>
<b>Financial Highlights</b>								
<ul style="list-style-type: none"> <li>Santos farms into EP161 (and other tenements) with Tamboran Resources</li> </ul>		<ul style="list-style-type: none"> <li>Origin Energy and Sasol farm-in to Falcon Oil &amp; Gas' Beetaloo acreage</li> </ul>	<ul style="list-style-type: none"> <li>Energy &amp; Minerals Group farms into Pangaea Resources Beetaloo acreage</li> <li>INPEX awarded Beetaloo acreage</li> </ul>		<ul style="list-style-type: none"> <li>Origin increases its interest in its Beetaloo JV to 70% following the acquisition of Sasol's share</li> </ul>			<ul style="list-style-type: none"> <li>Origin increases its interest in its Beetaloo JV to 77.5%, valuing the project at A\$333 million (gross)</li> </ul>

# Beetaloo 2020 Season an eye-opener for Australian shale gas

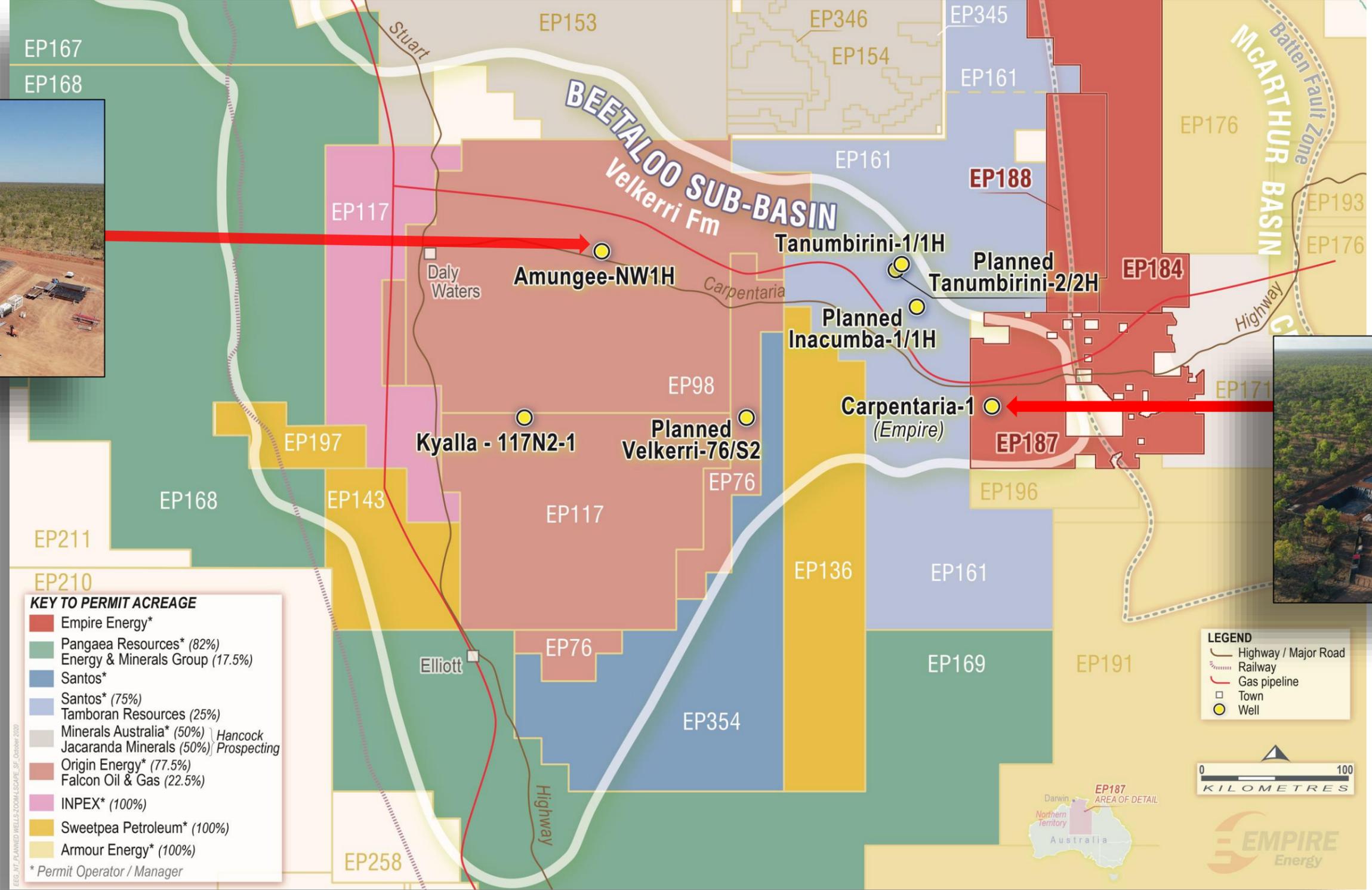


- Empire completed a 231-line km 2D seismic program in early 2020
- Santos' Tanumbirini-1 vertical fracture stimulated flow test exceeded expectations with flow rates  $> 1.2$ mmcf/d with  $>90\%$  methane, less than 5% total inert content and ethane
- Origin Energy has completed fracked horizontal drilling program at Kyalla-117 with flow testing to commence soon
- **Empire's Carpentaria-1 well is currently drilling and has intersected ~1,000m thick Velkerri Formation with liquids rich peak mudlog readings across the Middle Velkerri A, B and C Shales**



Velseis vibroseis vehicles acquiring 2D seismic data for Empire Energy Jan 2020

# Zooming in – Position of Empire’s Carpentaria-1 well



**KEY TO PERMIT ACREAGE**

- Empire Energy\*
- Pangaea Resources\* (82%) Energy & Minerals Group (17.5%)
- Santos\*
- Santos\* (75%)
- Tamboran Resources (25%)
- Minerals Australia\* (50%) } Hancock
- Jacaranda Minerals (50%) } Prospecting
- Origin Energy\* (77.5%)
- Falcon Oil & Gas (22.5%)
- INPEX\* (100%)
- Sweetpea Petroleum\* (100%)
- Armour Energy\* (100%)

\*Permit Operator / Manager

**LEGEND**

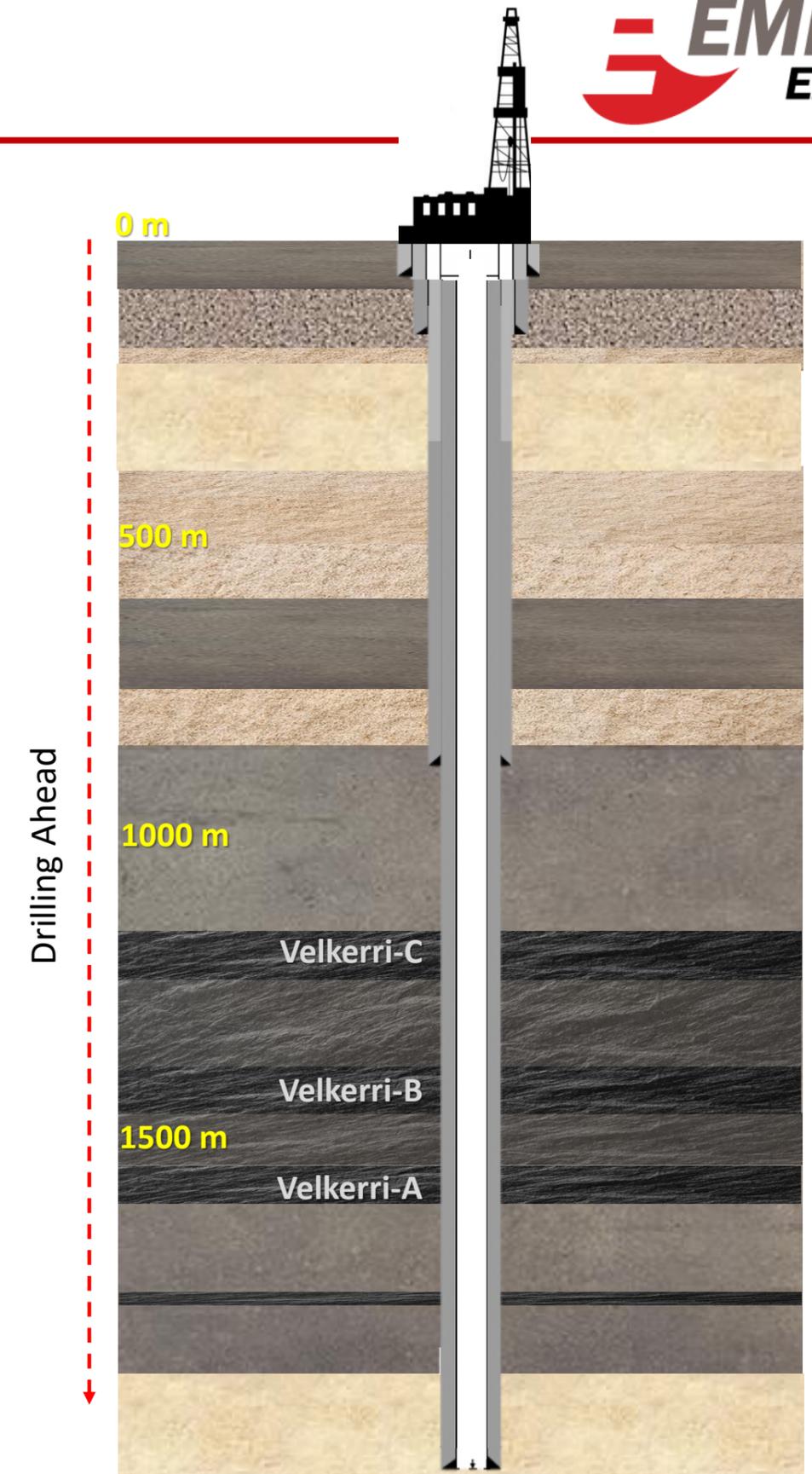
- Highway / Major Road
- Railway
- Gas pipeline
- Town
- Well



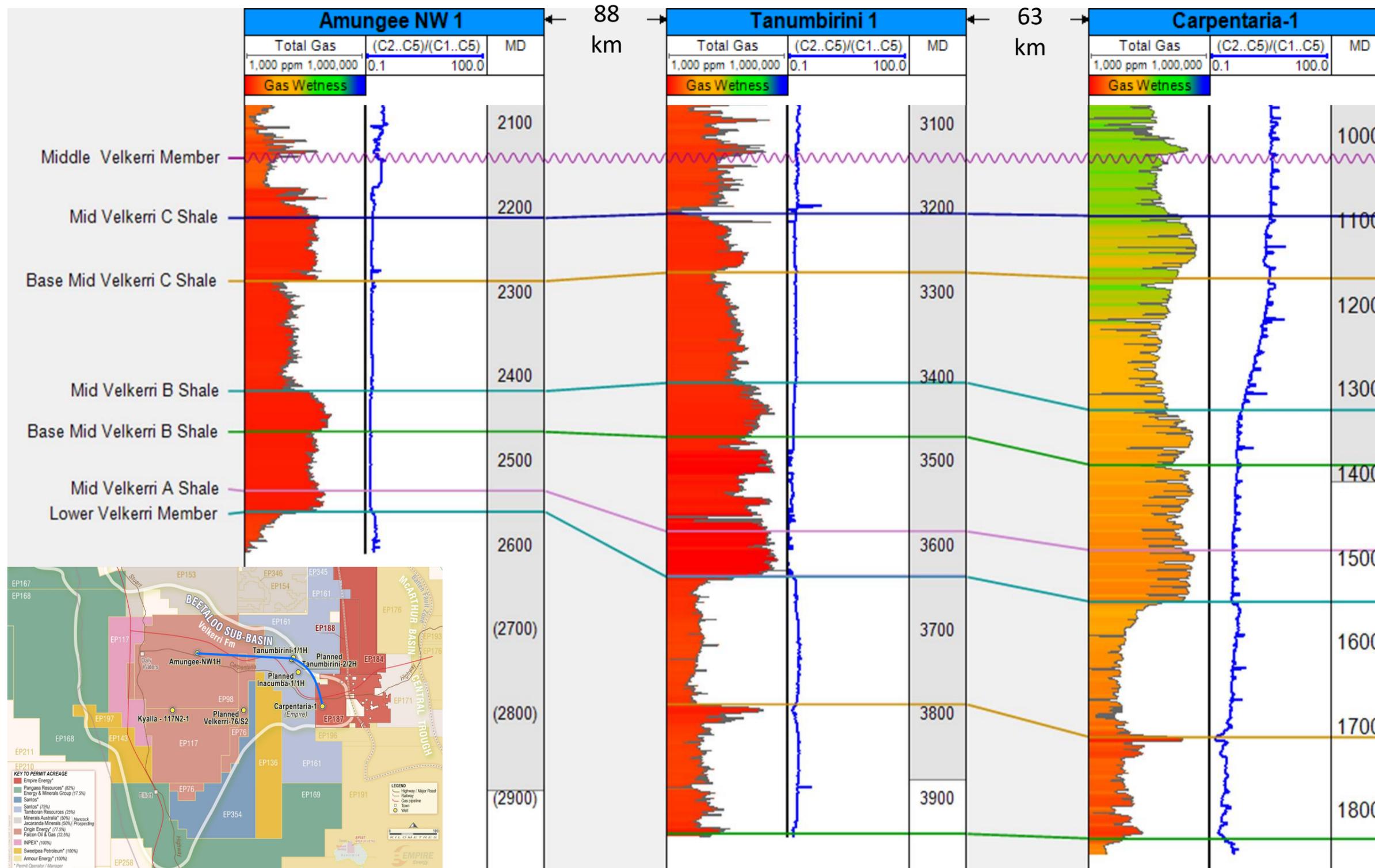
# Carpentaria-1 Drilling Update

## Well Update – Carpentaria-1

- ✓ Empire has successfully drilled to 1,907m and is drilling ahead
- ✓ The well has encountered an **extensive column of liquids rich gas in the Velkerri Shale Formation**
- ✓ The Velkerri Formation in Carpentaria-1 is nearly 1,000m thick
- ✓ The substantial proportions of heavier end, higher value liquid hydrocarbons will materially enhance the economics of future production scenarios because **liquid hydrocarbons attract higher oil linked pricing than dry gas**
- ✓ The Velkerri Shale is shallower than in analogue Beetaloo Basin wells resulting in reduced drilling costs
- ✓ The Kyalla Shale was not present in Carpentaria-1
- ✓ Once final total drilling depth is reached, an extensive formation evaluation program will be executed including logging, large diameter rotary sidewall coring and DFITs
- ✓ An appraisal program including **fracture stimulation and flow testing is planned for Q2 2021**



# Empire's Liquids Rich Velkerri Shale Gas



- Section has been flattened on the Middle Velkerri Member
- Contains Empire's technical interpretation of gas wetness ratios of mud gas chromatography while drilling
- Colour scale of gas wetness, although based on actual gas ratios, is illustrative only. Red denotes drier gas and orange / green indicate wetter gas

Sources: Northern Territory Geological Survey and Empire Energy data

# ASX:EEG

Shale Gas Takes Hold in Australia - Empire Energy is the Australian hydrocarbon player offering the most direct market exposure to the exciting future of both the McArthur and Beetaloo Basins in the Northern Territory



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