

Beetaloo seismic excites; as do “the neighbours”

Empire Energy Group Limited (EEG.ASX) is a junior oil and gas producer / explorer with onshore unconventional oil & gas shale reservoir assets. EEG holds the largest acreage position in the highly prospective, potentially global-scale, long-life, northern Australian McArthur-Beetaloo basins, with the Beetaloo alone forecast to contain shale dry gas volumes of over 100Tcf. The company has a number of event drivers over the coming 12-months, aimed at transforming the company into a strategically-important, long-life Australian onshore energy cash generator. In the Beetaloo, the company’s first fully-funded vertical well (Carpentaria-1) is set to drill mid-2020, to confirm EEG’s above-expectations 2D seismic results. This frontier exploration Basin is rapidly evolving into a potentially gas-rich (and possible liquids-rich) answer to east coast Australia’s future energy security, with strong policy support from both the Northern Territory (NT) and Australian Federal governments. Crystallising Empire’s inherent value potential is dependent on successful drilling outcomes and its capacity to secure the best strategic funding mix thereafter to commercialise its acreage.

Business model

Empire Energy Group (EEG) is a junior oil & gas producer/exploration company, focusing on maturing its portfolio of onshore, long-life oil and gas fields. The company holds substantial exploration acreage in Australia’s Northern Territory McArthur-Beetaloo basins. Although EEG’s NT assets are at an early exploration stage, given the high prospectivity of the region, success from the company’s 2Q 2020 drilling programme could see cashflows generated within 24-36 months, assuming links and upgrades to existing pipeline infrastructure are undertaken in time. Empire’s NT assets could benefit from look-through revaluations should Santos (ASX: STO) and Origin Energy (ASX: ORG) report drilling success from their adjacent acreage over their 2020 work programmes.

Seismic excites. Next step: confirmation drilling

Empire Energy Group (EEG) reported better-than-expected results from its recently acquired 231-km 2D seismic survey highlighting: i) the Beetaloo sequences extending into EEG’s permit zone; ii) middle Velkerri shale thicknesses up to 500m; iii) the presence of Kyalla shale at around 1,200m and thickness of 100m; and iv) limited faulting. Of note, the shales in EP187 lie some 1,000m shallower than reported in the adjoining Santos Tanumbirini-1 well (recently tested at 1.2mmscf), with positive implications for costs and increased liquids potential. EEG’s next steps will be to confirm the seismic results by drilling, upgrade existing prospective volumetrics and integrate the 2020 work program results of its Santos/Origin near-neighbours.

Valuation

As we highlighted in our December 23 scoping report, [Forging New Frontiers](#), we assign a base valuation of \$160m (\$0.61/share) to EEG on the current share count of 262.5m. On a fully diluted (in-the-money options) basis, the valuation is \$0.56/share. We observe a number of event drivers lining up for EEG’s portfolio over the coming 6-12 months which have the potential to generate a sizeable uplift in NAV.

Historical earnings and RaaS Advisory estimates

Year end	Revenue (US\$m)	Gross Profit (US\$m)	NPAT reported (US\$m)	OCFPS (AUD cps)	EPS Adj (AUD cps)	Price/Book (x)
12/18a	14.3	5.0	(15.9)	(0.15)	(1.41)	32.3
12/19e	6.7	1.7	(7.4)	(9.87)	(6.13)	3.8
12/20e	4.4	1.2	(3.0)	0.64	(1.47)	4.6
12/21e	4.5	1.2	(3.0)	2.06	(1.40)	4.9

Source: Company data, RaaS Advisory Estimates for FY19e, FY20e and FY21e

Energy exploration & production

30 January 2020

Share details

ASX Code	EEG
Share price (29 Jan)	\$0.40
Market Capitalisation	\$105M
Shares on issue	262.5M
Net cash	~\$5.0M
Gross cash	~\$15.0M

Share performance (12 months)



Upside Case

- Velkerri/Kyalla drilling success generates significant commercial outcomes for EEG’s EP187
- Drilling success generates high-value LT strategic partnership & funding options
- Drilling success is achieved on other EEG permits, including within McArthur Barney Creek formation

Downside Case

- McArthur-Beetaloo Basin EP 187 2Q 2020 drilling is unsuccessful, negatively impacting value of remaining NT permits (EP180-188)
- Continuing financing through equity issues highly dilutive to future capital growth
- Fracking success in NT/Qld pushes onshore energy prices to sub-economic levels.

Board of Directors

Alex Underwood	Managing Director/CEO
Paul Espie AO	Non-Executive Chairman
John Gerahty	Non-Executive Director
Dr John Warburton	Non-Executive Director

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Seismic results generate possibilities ahead of drilling

On 23 January, 2020, Empire Energy Group (EEG) released better-than expected seismic results from its recently acquired 231km 2D survey along the western flank of the EP 187 permit (EEG 100%). This data set has been interpreted in conjunction with results obtained from adjacent tenement wells and seismics made available on open file from the NT government.

EEG's latest seismic results contain a number of significant strategic highlights, serving to underpin our existing net equity valuation metrics:

- a) Confirmation the Beetaloo sub-basin shale formations extend into EP187;
- b) The south-western flank of EP187 likely contains at least one, if not two, areas extending across 160sq km, containing large shale formations of interest without faulting interference. This lack of faulting also significantly de-risks the prospective site chosen for the proposed, mid-2020 2,500-2,800m vertical drill hole;
- c) The Middle Velkerri shale can be confidently mapped into EP187 with continuous thickness (up to 500m gross (270m net) over the A,B,C shales), similar to those noted in the Tanumbirini-1 well, some 76km to the north-west. We note Tanumbirini-1 flowed 1.2MMcfd of gas on test;
- d) The seismic data suggests the presence of Kyalla shale over the western flank of EP187 down to a depth of c.1,200m, with a gross thickness of 100m. This is encouraging as the Kyalla was considered to be a higher risk opportunity, getting thinner and shallower towards the east. It should also be noted that the Kyalla could be a relatively liquids rich target in the EEG areas. The upcoming well could confirm considerable upside;
- e) Both the Kyalla and Velkerri shale formations lie some 1,000m shallower through EP187, compared to the adjoining Santos/Origin permits, increasing the potential for both dry and wet gas flows, while decreasing total appraisal costs.

These seismic results now need to be confirmed during the EEG's 2020/21 vertical/horizontal well drilling program.

Explorers had previously ignored the McArthur and Beetaloo regions, considering them too old to preserve hydrocarbons. Ongoing frontier exploration work by various tenement holders, including Santos and Origin, is aiming to prove the Beetaloo alone holds reserve levels of a world class standard.

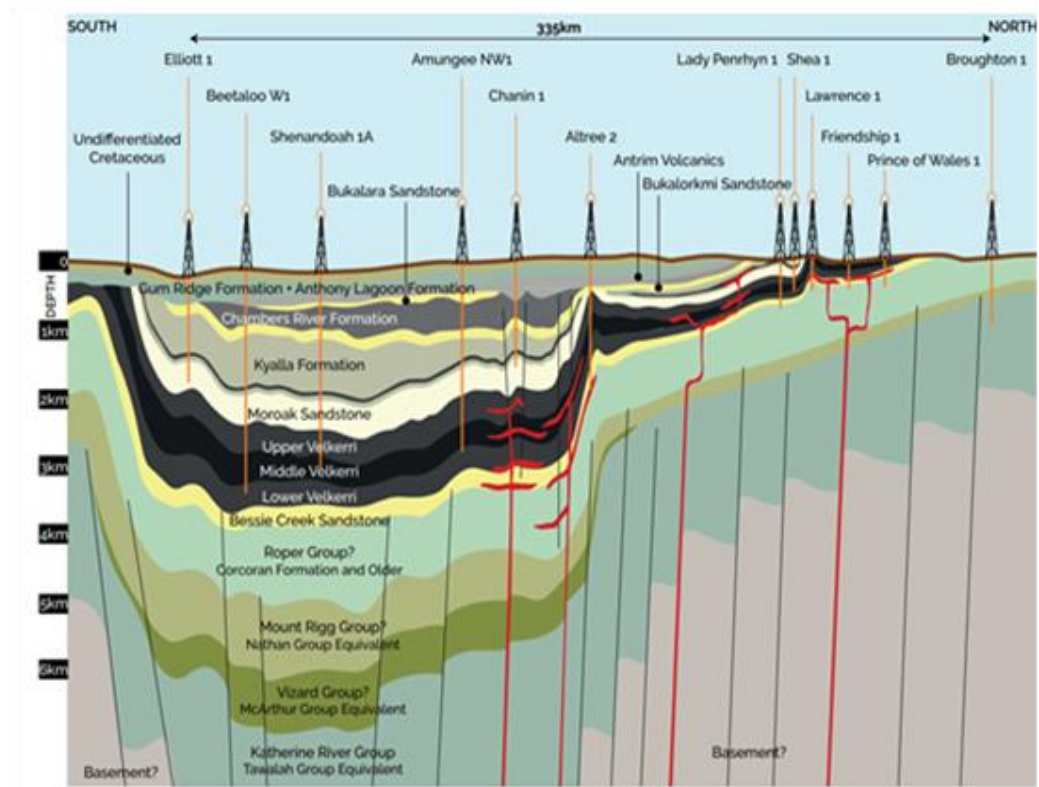
Those drilling the Beetaloo's middle Velkerri shale are seeking to prove the sub-basin contains similar resource concentrations to the most successful US shale regions (eg Marcellus/Barnett). Altogether the Beetaloo's unconventional resource base could reach as high as 500 Tcf, with technical attributes comparable to the US shale basins.

With the well location finalised for its first vertical exploration drilling, EEG will be evaluating the liquids-rich mid-Velkerri (primary target) and the Kyalla shale formation (secondary target) for hydrocarbon content, composition and rock mechanics.

Drilling of the 2,500m-2,800m Carpentaria-1 vertical well is scheduled to commence in the dry season by mid-2020, subject to regulatory approvals and drill rig availability. EEG had applied for four well pads as potential sites with the NT authorities and is now in the final stage of the well permitting process.

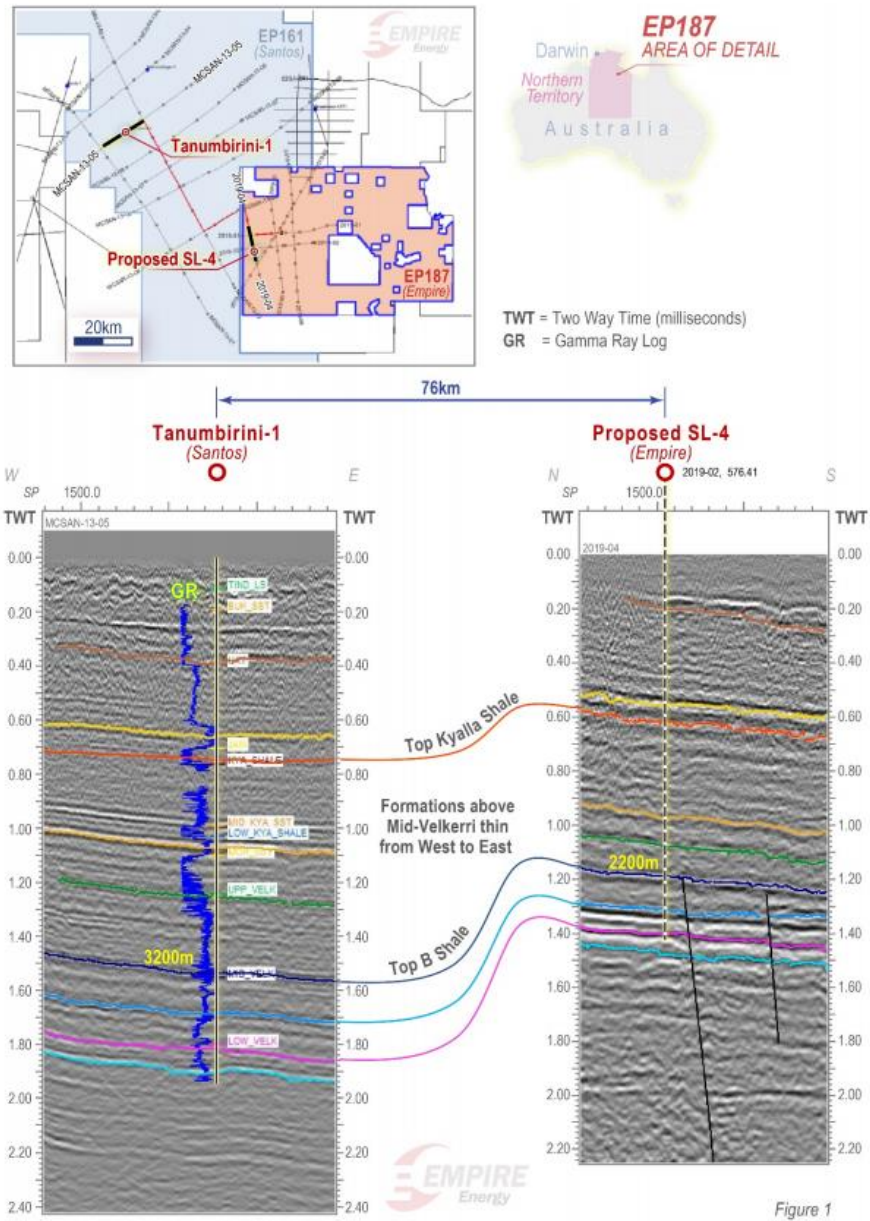
The company is also exploring existing regional rig availability in the first instance to reduce its overall mobilisation/demobilisation costs. This may also allow budget for additional formation evaluation.

Exhibit 1: Beetaloo South-North schematic cross-section



Source: NT Department of Primary Industry & Resources

Exhibit 2: EEG seismic directly ties back to Tanumbirini -1 well



Source: Company data

Santos/Tamboran Resources JV: Beetaloo activities read-through

In its December 2019 quarterly report, Santos reported excellent gas flow rates of over 1.2mmscf/d, containing over 90% methane and 3% ethane, from the Beetaloo Tanumbirini-1 vertical well.. Interestingly, these flows are similar to those achieved by Origin/Falcon’s mechanically flawed 2015 Amungee NW-1H well, which regularly flowed 0.8-1.2mmscf/d across the horizontal sections.

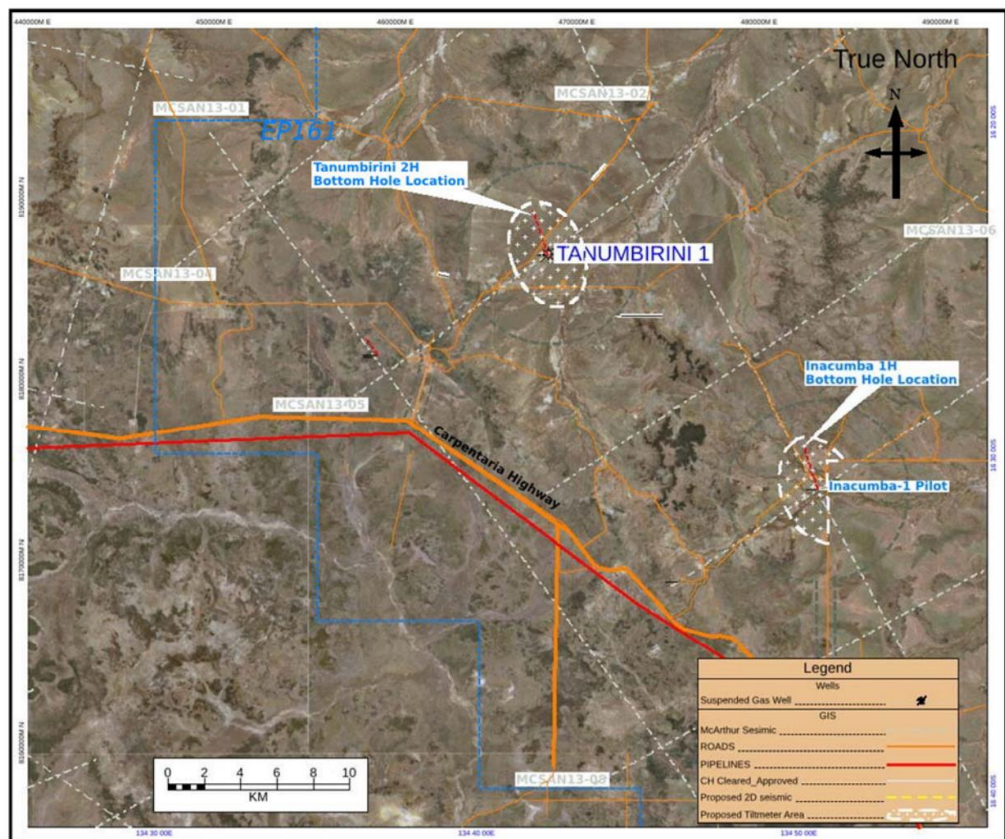
The Santos JV had returned to the appraisal of the Tanumbirini-1 well in November 2019, intending to conduct a 4-stage stimulation program. Tanumbirini-1 was spudded in June-2014 and drilled to a depth of 3,945m.

Multiple intervals of organic-rich shale were intersected within the primary Middle Velkerri Formation, accompanied by significant mud gas shows. Gas readings had spread over a total gross section of more than 500m.

The Santos JV expects to conduct multi-stage hydraulic stimulation of 2 horizontal wells (Tanumbirini 2H and Inacumba 1H, planned 20km south east of T-1), from a depth of c.2500-3000m, for a length of c.2000m, to further appraise the resource and flow potential, of the Velkerri B (Amungee) shales, during 1H 2020.

The “tram-track” nature of the regional geology in the Beetaloo suggests the well results from the Santos JV may be extrapolated over long intervals with relative confidence. EEG’s next steps will be to add certainty to the view with its 2020/21 drilling program.

Exhibit 3: Santos JV EP161 2020 work program – well locations (west of Empire’s EP187)



Source: Santos Company data

Origin Energy/Falcon Oil & Gas JV: Beetaloo activities read-through

Origin Energy, is the operator of the EP76; EP98 and EP117 in JV with Falcon Oil & Gas (LSE AIM: FOG; TSX-V: FO.V; Euronext Dublin: FAC).

The JV has drilled three vertical wells in the Beetaloo sub-basin across 2015 and 2016 (Kalala S-1; Amungee NW-1H; Beetaloo W-1), to depths of up to 3,808m; as well as one 1,217m horizontal section (Amungee NW-1H), targeting the Velkerri B. This well represented the Beetaloo’s first-ever hydraulically fractured well.

Based on their completed works, the Origin JV had announced a potential shale 2C contingent resource of 6.6Tcf feet of dry gas, over an area of up to 2,000 sq km, with a technically recoverable prospective (P50) resource estimated to be c.80-85Tcf in 2017.

Of most significance, gas flows from the Amungee NW-1H well had regularly reached 0.8-1.2mmscf/d (cumulative 63mmscf), proving that gas has been accumulating in and was producible from the Velkerri shale region.

The JV is now completing the final two stages of its work program in the Beetaloo, over the course of 2020, focused on:

- a) proving up the Velkerri shale resource;
- b) evaluating the liquids potential in the Velkerri & Kyalla shale formations; and
- c) “testing-the-best” to confirm commercial production rates and estimated ultimate recovery (EUR).

The recently drilled Kyalla 117 N2-1 appraisal well, designed to test shale liquids-rich flow potential down to a depth of 1,895m, provided confirmation of “elevated gas shows with relatively high C3-C5 observed”.

In December 2019, the JV commenced horizontal drilling of the Kyalla 117 N2-1 well, to conduct a 90-day extended flow test from the lower Kyalla shale region (c.1800m depth) over 1000-2000m. The plan remains to fracture stimulate the section and production test. In addition to gas prospectivities, the JV is aiming to estimate liquid yields (b/mmscf), which would substantially improve economics.

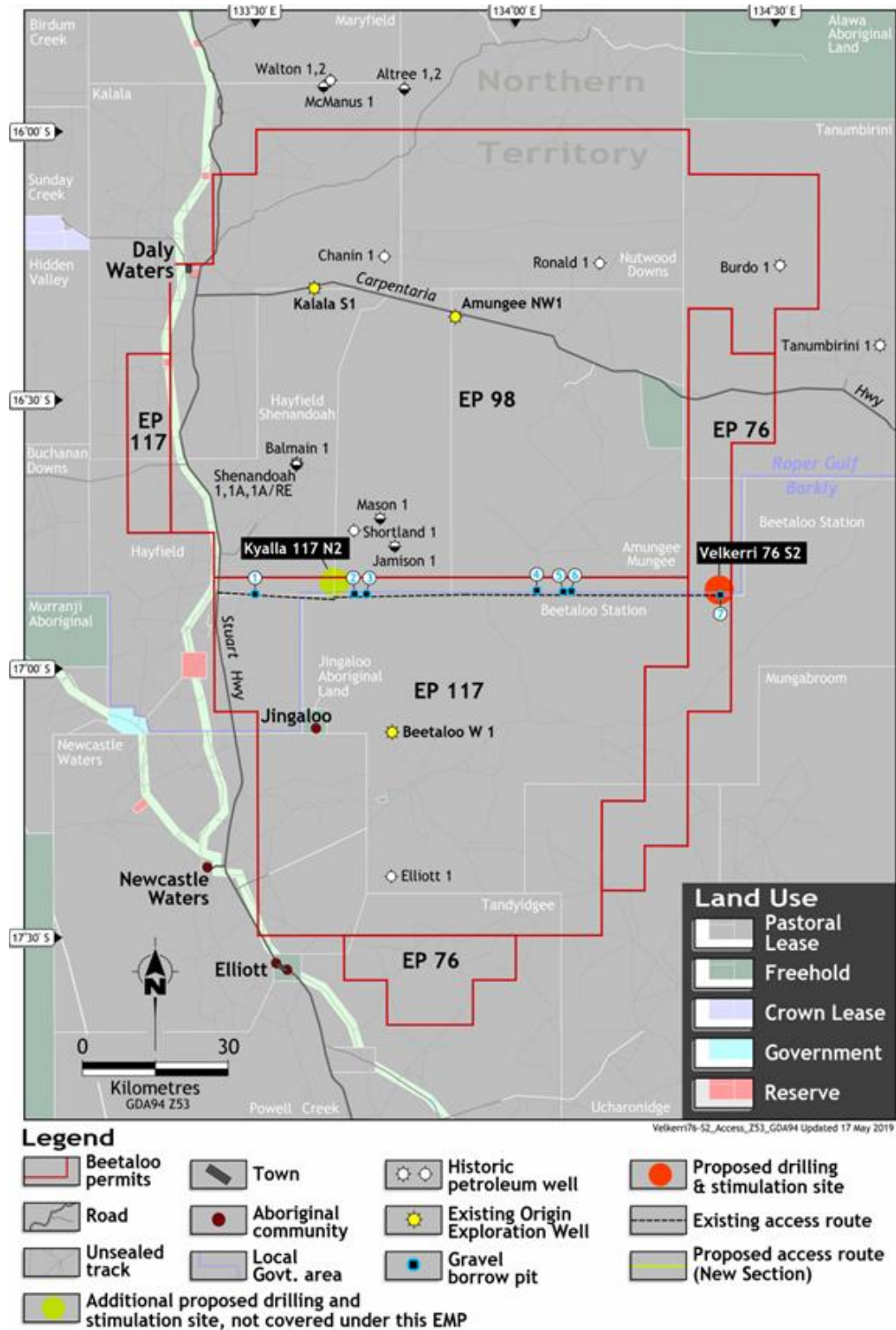
Unfortunately, the horizontal section was plugged in early-January 2020, at a lateral length of 700m, after “encountering inadequate clean hole and stability conditions in certain sections”. Given that the Amungee NW-1H well had been horizontally fracture-stimulated and tested safely in 2015, along a 1,217m section for over 57 days, despite some difficulties encountered running the casing into the wellbore, we can only conclude that this recent experience will serve to provide better insights regarding this frontier region’s “rock personality”. The other take-away from this washout incident is that the targeted zone is likely to be highly permeable or mildly over-pressured, offering potentially strong indications for high flow rates.

The JV plans to evaluate an alternative horizontal side-track. We’d expect a material update sometime in the late May-early June, once the horizontal well has been successfully stimulated with the 90-day commercial production tests and core/DFIT/wireline logging results available.

The Origin JV will also proceed with the drilling / horizontal stimulation of another well, on the most southern permit EP76, in order to better explore the potential for stacked liquids-rich shales to a depth up to 2000m, along the northern and south-east flanks of the JV’s permits. Drilling is expected to begin after the wet season, likely April, with test results available by 4Q 2020.

EEG’s 2020/21 drilling program is looking to confirm that similar gas (and liquids) flow results can be achieved within its Beetaloo permit acreage also.

Exhibit 4: Origin/Falcon permits and exploration wells (as at Dec. 2019)



Source: Origin Company data

Risk adjusted DCF Valuation at \$0.61/share

We have evaluated EEG's portfolio against a range of risk factors based on our assessment of prevailing operating conditions. These factors include, but are not limited to, commodity prices, location, phase of exploration, timing and scale of work programmes, potential timeline to development, and funding costs.

We value EEG using estimated values for Prospective Resources adjusted for our discretionary probability weighting (1-risk%), to derive a gross portfolio worth. These probability weightings are subject to change as the company delivers its next phase of exploration results.

We believe that the majority of EEG's current market value (~85%) is being derived from its early stage Northern Territory exploration assets. These Prospective Resource estimates could be subject to significant adjustments following the results of planned drilling and well testing, both by EEG and in adjacent tenements.

We note the significant subjectivity inherent in underpinning such valuations. For a full explanation of our valuation considerations, please refer to our December 23 2019 scoping report, [Forging New Frontiers](#).

Exhibit 5: RaaS's Empire Energy Group Valuation Range

In A\$M		Risked Range (A\$M)			Risk Weight	A\$/share			
		Low	Mid	High		Low	Mid	High	
Northern Territory									
Gas	100%	\$72	\$108	\$244	4%	\$0.27	\$0.41	\$0.93	Risking and valuing exploration assets is somewhat arbitrary and down to the discretion of the valuer
Oil	100%	\$23	\$35	\$78	4%	\$0.09	\$0.13	\$0.30	
US Onshore									Key sensitivity here is the assumed gas price – US\$2.40 in FY20 and US\$2.44 in FY21
Appalachian		\$9	\$17	\$26		\$0.03	\$0.06	\$0.10	
Sub total		\$104	\$160	\$347		\$0.40	\$0.61	\$1.32	
Net cash/(debt)		\$2	\$2	\$2					
Corporate costs		(\$5)	(\$5)	(\$5)					
TOTAL		\$101	\$157	\$345		\$0.39	\$0.60	\$1.31	Based on current shares of 262.5m

Source: RaaS analysis; risk-adjusted ranges based on company data; regional farm-in valuations and weighted by applying the RaaS risk overlay
The Base Case ascribed to the Marcellus assets assumed the continuation of the New York state ban on hydraulic fracturing. The Low Case assumes Pennsylvania introduces new taxes on gas drillers to pay for infrastructure upgrades, rendering some of EEG's wells sub-economic to operate. The High Case assumes New York state lifts the ban on fracking.

Exhibit 6: Financial Summary

EMPIRE ENERGY GROUP LTD		EEG					
YEAR END		Dec					
NAV	A\$mn	\$0.61					
SHARE PRICE	A\$cps	0.40		Last share price 29-Jan			
MARKET CAP	A\$mn	105					
ORDINARY SHARES	M	263					
OPTIONS	M	54					
COMMODITY ASSUMPTIONS							
		2018	2019E	2020E	2021E		
Realised oil price	US\$/b	59.86	60.03	53.43	51.72		
Realised gas price	US\$/mcf	3.24	2.86	2.40	2.44		
Exchange Rate	A\$:US\$	0.7452	0.6945	0.6807	0.6848		
EARNINGS							
	US\$000s	2018	2019E	2020E	2021E		
Revenue		14,252	6,670	4,450	4,472		
Cost of sales		(9,253)	(4,954)	(3,292)	(3,313)		
Gross Profit		4,999	1,716	1,157	1,159		
Other revenue							
Other income		2,304	208	200	200		
Exploration written off		0	(213)	0	0		
Finance costs		(2,976)	(1,919)	23	45		
Impairment		0	0	0	0		
Other expenses		(20,079)	(7,095)	(4,400)	(4,424)		
Profit before tax		(15,752)	(7,302)	(3,019)	(3,020)		
Taxes		(115)	(86)	0	0		
NPAT Reported		(15,867)	(7,389)	(3,019)	(3,020)		
Underlying Adjustments		(101)	(2,995)	0	0		
NPAT Underlying		(15,968)	(10,383)	(3,019)	(3,020)		
CASHFLOW							
	US\$000s	2018	2019E	2020E	2021E		
Operational Cash Flow		2,828	205	138	429		
Net Interest		(2,974)	(1,919)	23	45		
Taxes Paid							
Other		(115)	(84)	(30)	(30)		
Net Operating Cashflow		(261)	(1,799)	132	444		
Exploration		0	0	(6,000)	(6,000)		
PP&E		(49)	(113)	0	0		
Petroleum Assets		(168)	(19)	0	0		
Net Asset Sales/other		359	19,725	(382)	(694)		
Net Investing Cashflow		(120)	17,794	(6,250)	(6,250)		
Dividends Paid		0	0	0	0		
Net Debt Drawdown		(7,878)	(17,936)	(1,998)	(2,015)		
Equity Issues/(Buyback)		11,677	7,739	8,101	2,897		
Other		0	0	0	0		
Net Financing Cashflow		3,785	(10,209)	6,103	882		
Net Change in Cash		3,404	5,787	(15)	(4,924)		
BALANCE SHEET							
	US\$000s	2018	2019E	2020E	2021E		
Cash & Equivalents		4,157	9,888	9,873	4,949		
PP&E & Development		52,228	30,897	33,662	40,112		
Exploration		0	410	369	332		
Other Assets		7,686	2,291	970	1,501		
Total Assets		64,071	43,486	44,874	46,894		
Debt		24,440	7,575	6,052	4,037		
Other Liabilities		18,262	16,778	21,077	25,236		
Total Liabilities		42,701	24,353	27,129	29,274		
Net Assets/Shareholders Equity		21,370	19,133	17,745	17,621		
Net Cash/(Debt)		(20,282)	2,313	3,821	912		
Gearing dn/(dn+e)		49%					
nm = not meaningful na = not applicable							
NET PRODUCTION							
		2018	2019E	2020E	2021E		
Crude Oil	kb	127	89	3	3		
Nat Gas	mmcf	1,834	1,731	1,702	1,685		
TOTAL	kboe	432	378	287	284		
Product Revenue							
	A\$mn	14.0	10.5	4.3	4.3		
Cash Costs							
	A\$mn	(5.1)	(4.4)	(2.3)	(2.3)		
Ave Price Realised							
	A\$/boe	32.49	27.93	14.97	15.20		
Cash Costs							
	A\$/boe	(11.84)	(11.58)	(8.00)	(8.10)		
Cash Margin		20.65	16.35	6.97	7.10		
RESOURCES and RESERVES							
	Prospective Resources	P90	P50	P10			
Northern Territory							
Gas							
Barney Creek Fm	Bcf	3,304	8,699	20,172			
Velkerri Fm	Bcf	383	1,192	3,086			
Woogorang Fm	Bcf	524	1,185	2,371			
TOTAL		4,211	11,076	25,629			
Oil							
Barney Creek Fm	Mb	66	174	403			
Velkerri Fm	Mb	8	24	62			
Woogorang Fm	Mb	10	24	47			
TOTAL		84	222	512			
		1P	2P	3P			
US							
Gas	Bcf	50.1	57.0	61.0			
EQUITY VALUATION							
	Riskd Range (In A\$M)	Riskd Range Per Share (A\$)					
NT		Low	Mid	High	Low	Mid	High
Gas		\$72	\$108	\$244	\$0.27	\$0.41	\$0.93
Oil		\$23	\$35	\$78	\$0.09	\$0.13	\$0.30
US Onshore							
Appalachian		\$9	\$17	\$26	\$0.03	\$0.06	\$0.10
		\$104	\$160	\$347	\$0.40	\$0.61	\$1.32
Net cash/(debt)		\$5	\$5	\$5			
Corporate costs		(\$5)	(\$5)	(\$5)			
TOTAL		\$104	\$160	\$347	\$0.40	\$0.61	\$1.32
RATIO ANALYSIS							
		2018	2019E	2020E	2021E		
Shares Outstanding	M	2313	263	302	315		
EPS (pre sig items)	UScps	(1.05)	(4.29)	(1.00)	(0.96)		
EPS	Acps	(1.41)	(6.13)	(1.47)	(1.40)		
PER	x	na	na	na	na		
OCFPS	Acps	(0.15)	(9.87)	0.64	2.06		
CFR	x	na	na	na	na		
DPS	Acps						
Dividend Yield	%						
BVPS	Acps	1.2	10.5	8.6	8.2		
Price/Book	x	32.3x	3.8x	4.6x	4.9x		
ROE	%		na	na	na		
ROA	%		na	na	na		
(Trailing) Debt/Cash	x						
Interest Cover	x						
Gross Profit/share	Acps		9.4	5.6	5.4		
EBITDAX	ASM	2.3	1.0	(1.6)	(1.6)		

Source: RaaS Advisory



FINANCIAL SERVICES GUIDE

RaaS Advisory Pty Ltd

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Corporate Authorised Representative, number 1248415

of

BR SECURITIES AUSTRALIA PTY LTD

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Effective Date: 26th November 2018

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