

Kosmos Energy: The Standout Internationally-Focused E&P Company

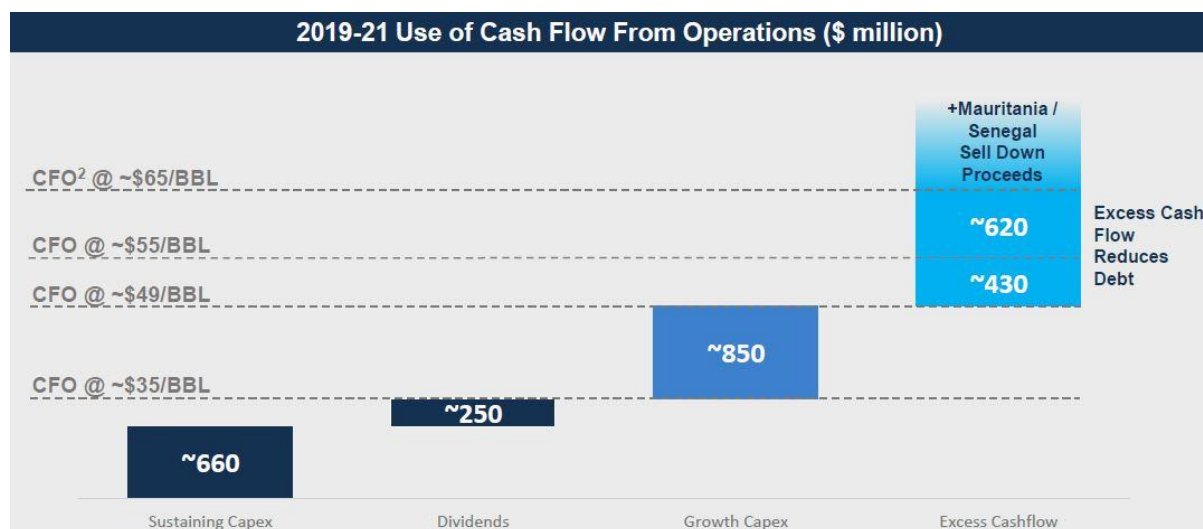
We think that Kosmos Energy (KOS US) offers everything that is required from an internationally focused E&P company. It has a highly rated management team, strong balance sheet and free cash flow generation from its existing producing assets, low risk / high value near field exploration potential, selective high risk / reward frontier exploration in which it has a proven track record, it has done recent value accretive acquisitions with room for more, it has demonstrated the ability to farm-down its assets on multiple occasions and is currently in the process of a major asset sell down, which could surprise the market to the upside. Despite this the stock trades on a significant discount to risked NAV, making it a potential acquisition target and has plenty of catalysts coming up this year to close the valuation gap.

Net Asset Valuation (\$ mm)	Value (\$mm)	Per share	% of EV
Proved and probable reserves:			
Ghana - Jubilee 2P	\$1,640	\$4.20	22%
Ghana - TEN	\$699	\$1.79	9%
US GoM - 2P	\$1,752	\$4.49	23%
Equatorial Guinea - 2P	\$549	\$1.41	7%
Tortue - FLNG Phase 1-3	\$615	\$1.58	8%
2019 G&A	-\$86	-\$0.22	-1%
Working capital	-\$79	-\$0.20	-1%
Hedge value	\$31	\$0.08	0%
Asset retirement obligation	-\$145	-\$0.37	-2%
Net debt end '18	-\$1,977	-\$5.07	
2P proved and probable valuation	\$2,998	\$7.69	67%
Contingent resources:			
Mauritania - BirAllah	\$1,191	\$3.05	16%
Senegal - Yakaar Teranga	\$672	\$1.72	9%
Nearly Headless Nick - US GoM	\$41	\$0.10	1%
Contingent development value	\$4,901	\$12.57	25%
Exploration potential:			
US GoM nearfield exploration / infill upside	\$308	\$0.79	4%
Mauritania - Bir Allah - Orca	\$53	\$0.14	1%
EG - G13	\$46	\$0.12	1%
Suriname - Block 42	\$18	\$0.05	0%
Jubilee 3P value	\$154	\$0.39	2%
TEN 3P value	\$21	\$0.05	0%
Exploration value:	\$5,501	\$14.10	6%

Source: AKap Energy estimates at \$60/bbl Brent flat

Overview

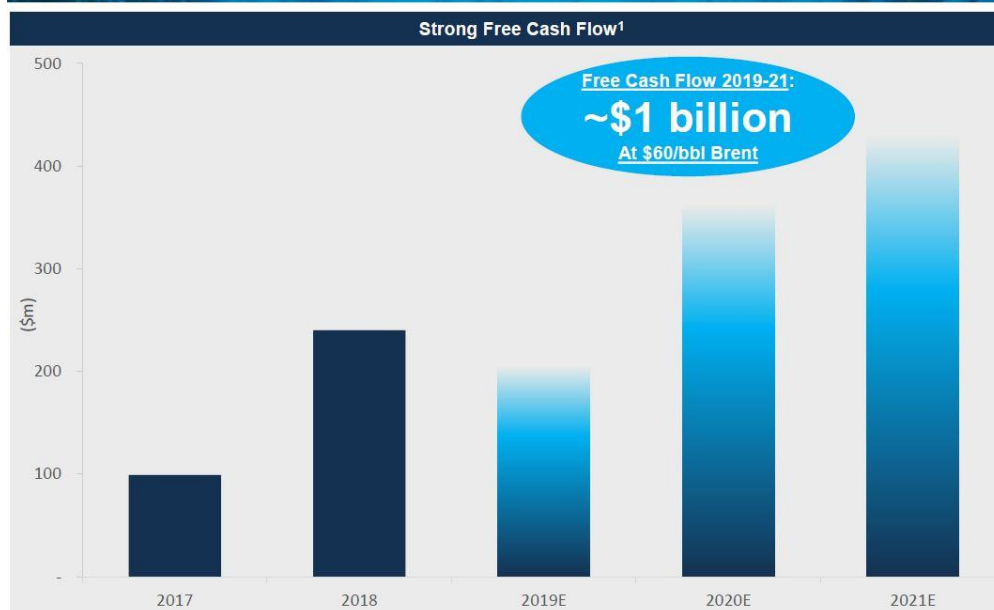
Kosmos is the stand-out international E&P company remaining true to its consistent strategy over the last decade. While the market has shifted focus away from deep water to shale, Kosmos has demonstrated its value creation ability in deep-water and has capitalised on the lack of competition for assets and opportunities. We see the potential for the shares to more than double if Kosmos can execute its Mauritania-Senegal (M-S) sell down and prove the value to the market. Our riskd NAV is US\$14/sh, which also means that we think Kosmos will capture the attention of potential acquirers, who would not only get an excellent asset base but also a world class exploration team. We think a take-out is more likely now the founding shareholders have all gone.



Source: Kosmos

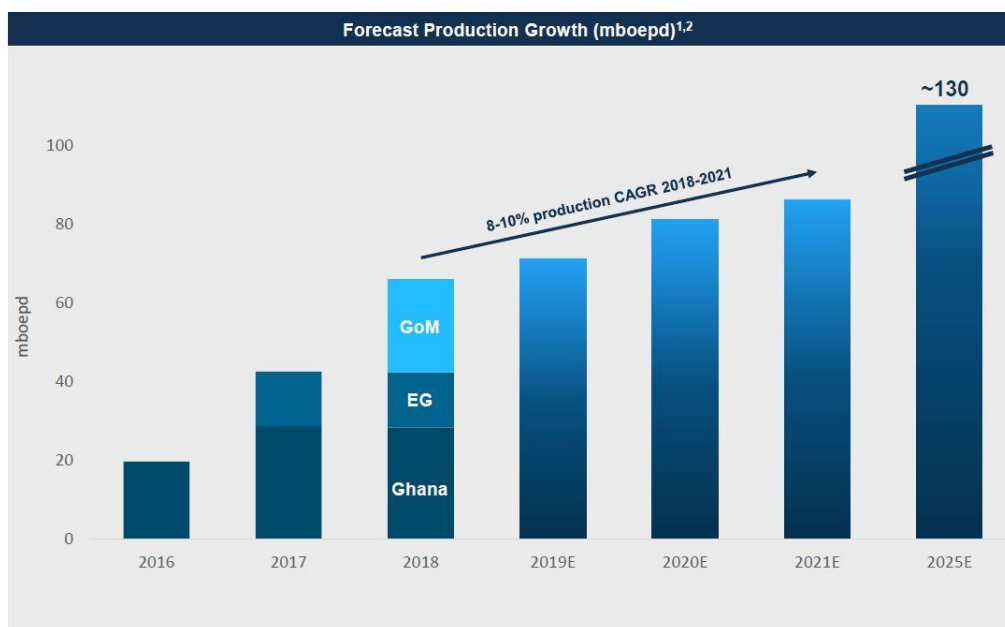
Use of cash proceeds and free cash flow: We think Kosmos can generate the equivalent of its market cap in free cash flow in the next 3 years at current oil prices. In the current investment climate, it is important for companies to demonstrate free cash flow generation potential. Kosmos should have an average free cash flow yield of ~15% per annum over the next 3 years even with over half of its capex going towards growth. On top of this we think it can achieve ~50% of its market cap in proceeds for the M-S sale. We think that the dividend, whilst not a core reason for buying the stock, keeps discipline in Kosmos' capital spending. Kosmos should have large amount of excess free cash flow to deploy towards acquisitions and share buybacks. It is also coming from a starting point of having a strong balance sheet to fall back on and a low cash flow break even (\$35/bbl).

~\$1 Billion Of Free Cash Flow Pre Dividends 2019-2021 At \$60 Brent



Source: Kosmos

Production and reserves: Kosmos has a 2P reserve life of over 20 years giving a lot of comfort over the long-term sustainability of the business. It has shown 2P reserves CAGR of almost 100% between 2016-2018 and production CAGR of slightly below this over that period. It has the potential for 10% p.a. production growth to 2021 and has visible growth post-this period from M-S.



Source: Kosmos

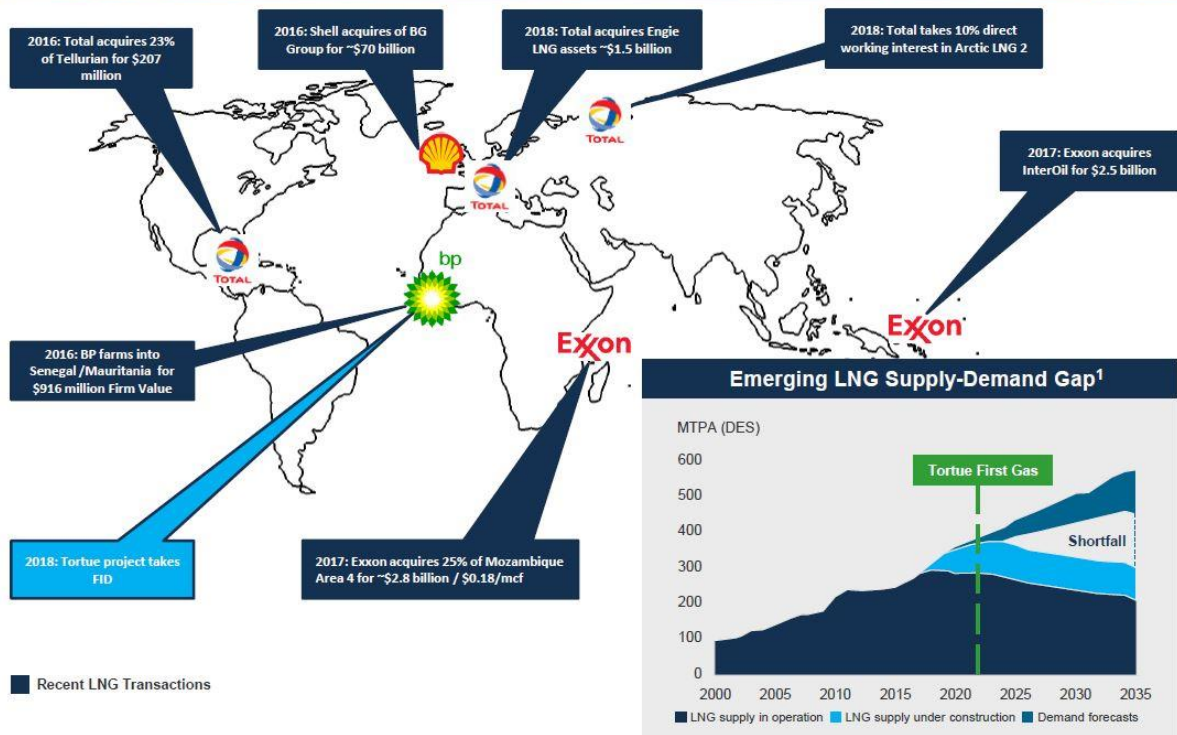
Kosmos' competitive advantages: There is value in Kosmos' exploration-led model given a lack of industry success and the eventual need for resource to develop. Kosmos stands out as being a disciplined, self-funded, frontier basin-focused explorer, with the ability to generate original and contrarian ideas in a world that needs better exploration success rates. While industry focused on trying to find "Jubilee lookalikes" 5+ years ago, Kosmos didn't follow the crowd and instead went after more out of favour areas to reassess their potential (e.g. Morocco, Mauritania, Senegal, Ireland and Suriname). Kosmos' rigorous strategy relies in the early entry to frontier plays and getting prospects down to 1/4-1/3 chance of success (unlike many frontier wells that are 1/10 or worse), ensuring cheap, large acreage positions with good fiscal terms.

In the event of a discovery, its strategy is to keep a high equity stake up until FID (preferably partnered with a supermajor). Kosmos sees itself as by far the leading player in terms of Atlantic Basin, Cretaceous exploration and believes it has the most comprehensive geological model of West Africa. It is not afraid to partner where it can benefit from partners knowledge (e.g. Shell's carbonate expertise will combine with Kosmos' West African experience in Namibia). Kosmos has opened two of only a handful of key new basins globally that have been discovered in the last decade. Kosmos has considerable development experience, with Jubilee being one of the fastest ever deep-water developments from discovery to first oil.

Majors need to ramp up exploration: The majors had pulled back dramatically from exploration due to a combination of poor frontier exploration success and oil price motivated capex cuts. Therefore they will need to add large scale resource through acquisitions going forward, which plays into the hands of Kosmos. This is evidenced by Exxon and TOTAL's clear acceleration in exploration spending and BP, Shell and Chevron all partnering with Kosmos on exploration blocks.

Value of remaining 10% stake in Tortue and other blocks: Tortue is expected to generate US\$150mm in net free cash flow once on line (assuming Kosmos reduces its stake to 10%), which is an annuity cash flow stream worth US\$1.5bn from mid-2020s assuming a 10% discount rate. There is the time value of money impact that would reduce this value to around US\$0.9bn. Kosmos doesn't have to put any money to get to first gas in 2022, given that it has a US\$0.5bn carry from BP. On top of this value is the optionality of the further 2 LNG projects in M-S. Therefore, we see Kosmos' remaining stake post any sell down as worth well over >US\$1bn.

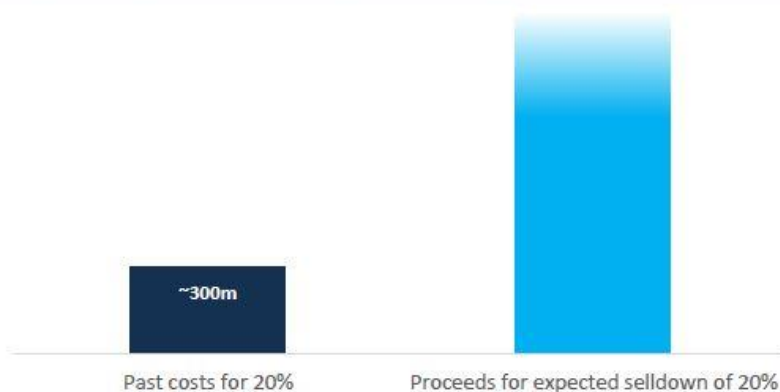
Scarcity Of High Quality LNG Assets of Scale – Mauritania and Senegal A Valuable, Well-Timed To Market Asset



Source: Kosmos

Mauritania-Senegal value: We are confident that Kosmos will be able to sell down around a 20% stake in its licences, most likely to a supermajor or potentially a national oil company. Assuming a conservative 30tcf recoverable at US\$0.25/mcf, a 20% stake would be worth US\$1.5bn or at 50tcf it could generate US\$2.5bn. We see value in the gas given the scale, attractive fiscal terms, high quality reservoir, strong development partner in BP, proximity to market (Europe) and the desire to not over-appraise. The discoveries have the scale and quality required for a mega LNG development and making it competitive with the likes of Mozambique. Based on the most recent sell-down in Mozambique by Eni to Exxon the gross value of that resource is ~\$12B (~50TCF) or US\$0.25/mcf. Historical valuations of LNG scale gas resource were more like ~\$0.4/mcf.

2019: Expected Sell Down To ~10% Working Interest



Source: Kosmos

US GoM acquisitions: We agree with Kosmos that there is a lot more potential in the US GoM with little competition. This has been echoed by Murphy recently which sold its Malaysian assets and intends to redeploy the capital into the US GoM. There are a number of private companies similar to Deep Gulf, which we see as acquisition candidates for Kosmos. Kosmos' track record on recent acquisitions (3x return on EG and 1.5x on DGE) gives us confidence over future value creation.

Murphy CEO: "We have a lot of opportunities in the Gulf of Mexico. There are many pent-up things to do in the Gulf. I think there's a lot of pent-up things to do in our industry in the Gulf since the slowdown in the shale revolution. There's a lot of workover sidetracks, a lot of things we can do in our business."

Gulf of Mexico: We Remain Bullish



IMPROVING ECONOMICS...

37%

Drilling efficiency improved on average since 2014

Example: Shell's Vito FID
\$35 Go-Forward BEP
100,000 bbls/d peak production



Shell's Appomattox

SUSTAINABLE GROWTH...



BP's Mad Dog

24 Have come online in the last 4 years

13% year-over-year volume growth

1.9 mboe expected record production this year

CONTINUED INVESTMENT...

Key FIDs in last 12 months:

- Shell's Kaikias
- BP's Mad Dog 2
- LLOG's Buckskin
- Shell's Vito

New platforms online or expected to come online in 2018-2020:

- Hess' Stampede
- Chevron's Big Foot
- Shell's Appomattox



Leveraging Existing Infrastructure

Source: Shell Midstream

Asset overview

People: We believe that the team that Kosmos has in place truly differentiates it from its peers. Although the founders have left, it has much of the same exploration team in place since the company was formed and this team was also together as previous companies (e.g. Triton). The team has benefitted from the ability to acquire huge amounts of seismic data, partnerships with supermajors and having drilled a large number of exploration wells.

Ghana: These are Kosmos' flagship assets demonstrating the value that can be created from wildcat frontier exploration. This is now a mature asset that will provide strong free cash flow to Kosmos for many years but with 6 years of >100% reserve replacement shows that "*big fields get bigger*". It has low risk / high margin production of ~35kbbbl/d net with around US\$2.5bn of net value to Kosmos or US\$6/sh and FCF generation of ~US\$400mm.

Equatorial Guinea: The EG acquisition has been a resounding success, paying back the investment in less than a year and seeing reserves increase substantially. The assets have the potential to provide a number of years of steady production and strong free cash flow generation. In 2019 Kosmos will drill an infill well and do some electric submersible pump work to maintain production levels. It will also look to drill 1 or 2 exploration wells within tie-back distance of the existing facilities. These are relatively low risk exploration wells, which would have a high unit value if successful given the ability to quickly tie them in to the existing infrastructure and recover the costs through the PSC.

US GoM: The US GoM business benefits from low operating costs (<US\$10/boe) and development costs (<US\$15/boe F&D cost) and low cash taxes leading to high margins. There is also significant near field, low risk exploration potential. In the US GoM Kosmos plans to drill up to 4 near field exploration wells. Similar to EG, these are likely to be relatively small but also relatively low risk explorations wells, which would have a high unit value if successful given the ability to quickly tie them in to the existing infrastructure - known as infrastructure led exploration (ILX). The success rate to date on this so called ILX drilling has been very high. It has been active in the last couple of US GoM licensing rounds which should provide ample exploration running room.

Valuation

Detailed field level NAV

Country	Field	P50 gross reserves	Working interest	P50 WI reserves	EV/bbl (W) \$	Unrisked value \$mm	Unrisked value \$/share	Geological CoS	Commercialisation chance	Gross risked dry hole cost	Total risked value \$mm	Total risked value \$/share
Equatorial Guinea	Ceiba 2P	37	40.4%	15	\$12.9	\$193	\$0.50	100%	100%	\$0	\$193	\$0.50
Equatorial Guinea	Okume 2P	83	40.4%	33	\$10.7	\$356	\$0.91	100%	100%	\$0	\$356	\$0.91
US	DGE assets 2P	83	100.0%	83	\$21.1	\$1,752	\$4.49	100%	100%	\$0	\$1,752	\$4.49
Mauritania/Senegal	Tortue FLNG 1-3	2441	29.0%	708	\$1.1	\$768	\$1.97	100%	80%	\$0	\$615	\$1.58
Ghana	Jubilee 2P	370	24.1%	89	\$18.4	\$1,640	\$4.20	100%	100%	\$0	\$1,640	\$4.20
Ghana	TEN	207	17.0%	35	\$19.9	\$699	\$1.79	100%	100%	\$0	\$699	\$1.79
Core/2P NAV		3220	29.9%	964	\$5.6	\$5,408	\$4.20	100%	97%	\$0	\$5,255	\$13.47
Mauritania	BirAllah	4200	28.0%	1176	\$1.5	\$1,764	\$4.52	90%	75%	\$0	\$1,191	\$3.05
Senegal	Yakaar Teranga	2042	32.5%	664	\$1.5	\$996	\$2.55	90%	75%	\$0	\$672	\$1.72
US	Nearly Headless Nick	25	22.0%	6	\$9.2	\$51	\$0.13	90%	90%	\$0	\$41	\$0.10
Contingent NAV		6267	29.4%	1845	\$1.5	\$2,810	\$7.20	90%	75%	\$0	\$1,904	\$4.88
US	Near-field / infill upside	50	100.0%	50	\$9.2	\$460	\$1.18	50%	90%	\$0	\$207	\$0.53
US	Money Penny	20	55.0%	11	\$9.2	\$101	\$0.26	50%	90%	\$20	\$34	\$0.09
US	Resolution	108	50.0%	54	\$3.0	\$162	\$0.42	33%	80%	\$50	\$18	\$0.05
US	Oldfield	30	50.0%	15	\$9.2	\$138	\$0.35	50%	90%	\$30	\$47	\$0.12
US	Gladden Deep	7	50.0%	4	\$9.2	\$32	\$0.08	50%	90%	\$25	\$2	\$0.01
Mauritania	Bir Allah - Orca	1517	28.0%	425	\$1.00	\$425	\$1.09	25%	50%	\$0	\$53	\$0.14
EG	G-13	56	40.4%	23	\$5.33	\$120	\$0.31	50%	90%	\$20	\$46	\$0.12
Suriname	Block 42 - Walker	250	33.0%	83	\$3.35	\$277	\$0.71	25%	50%	\$50	\$18	\$0.05
Ghana	Jubilee unit area upside	146	24.1%	35	\$17.5	\$615	\$1.58	25%	100%	\$0	\$154	\$0.39
Ghana	TEN upside	128	17.0%	22	\$3.9	\$84	\$0.21	25%	100%	\$0	\$21	\$0.05
Risked exploration/3P NAV		2311	17.0%	720	\$3.4	\$2,414	\$1.79	7%	29%	\$195	\$600	\$1.54
Total risked NAV		11798	29.9%	3529	\$3.0	\$10,632	\$13.20			\$195	\$7,759	\$19.89

We think that NAV is the right way to look at Kosmos as it is a take-out candidate and any acquirer would look at it this way and we think ascribe some value to the exploration. There is almost 150% upside to our \$14/sh NAV.

We see around US\$2.5bn of value from Kosmos' Senegal/Mauritania assets which are currently generating no cash flow. If we strip this out, Kosmos' EV drops to US\$2bn, which means it is trading on just over 2x cash flow at current oil prices of close to US\$70/bbl Brent.

Financial ratios and multiples (\$mm)	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Market capitalisation	\$2,367	\$2,282	\$2,282	\$2,282	\$2,282	\$2,282	\$2,282	\$2,282
Net debt	\$1,977	\$1,741	\$1,419	\$1,110	\$769	\$493	\$321	\$272
EV	\$4,344	\$4,022	\$3,700	\$3,392	\$3,051	\$2,775	\$2,602	\$2,554
Equity	\$941	\$938	\$948	\$944	\$906	\$829	\$715	\$539
Capital employed	\$2,919	\$2,679	\$2,367	\$2,054	\$1,675	\$1,322	\$1,036	\$811
EV/2P reserves	\$8.7	\$8.5	\$8.3	\$8.1	\$7.8	\$7.5	\$7.5	\$7.7
Cashflow per barrel	\$25	\$30	\$32	\$32	\$32	\$31	\$30	\$28
Net income per barrel	-\$10	\$1	\$2	\$2	\$1	-\$1	-\$2	-\$6
P/E	-13x	75x	45x	52x	154x	-115x	-44x	-21x
DACF	\$358	\$749	\$881	\$854	\$791	\$747	\$859	\$94
EV/DACF	12.2x	5.4x	4.2x	4.0x	3.9x	3.7x	3.0x	27.1x
EV/EBITDAX	3.5x	4.6x	3.6x	3.4x	3.4x	3.5x	3.8x	4.8x
ROAE	-20%	3%	5%	5%	2%	-2%	-7%	-20%
ROACE	-3%	2%	4%	4%	2%	-4%	-28%	34%
FCF yield	1.9%	13.5%	17.5%	17.3%	18.9%	16.2%	11.9%	6.7%
Dividend yield	0.0%	3.1%	3.4%	3.7%	3.9%	4.1%	4.3%	4.5%
Payout ratio	0.0%	231%	153%	195%	604%	-475%	-192%	-94%
Net debt/EBITDAX	1.6x	2.0x	1.4x	1.1x	0.9x	0.6x	0.5x	0.5x
Net debt/equity	210%	186%	150%	118%	85%	59%	45%	51%
Net debt/capital employed	68%	65%	60%	54%	46%	37%	31%	34%

Summary Financials

Assumptions	2018	2019E	2020E	2021E	2022E	2023E
Oil price, Brent \$/bbl	\$71.30	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00
Realised price \$/boe	\$68.41	\$57.30	\$56.23	\$56.50	\$56.73	\$57.05
Operational data	2018	2019E	2020E	2021E	2022E	2023E
Oil production (mboe/d)	48.3	68.2	73.5	71.5	65.9	59.4
Gas production (mmcf/d)	6.7	18.7	30.3	27.2	23.3	18.7
Total production (mboe/d)	49.5	71.3	78.6	76.0	69.8	62.5
Production growth	1%	44%	10%	-3%	-8%	-10%
Oil production as % of total	98%	96%	94%	94%	94%	95%
2P reserves	500	474	445	418	392	369
Income statement (\$mm)	2018	2019E	2020E	2021E	2022E	2023E
Total revenues and other income	\$1,276	\$1,451	\$1,613	\$1,567	\$1,446	\$1,302
Costs	-\$332	-\$462	-\$467	-\$456	-\$429	-\$397
EBITDAX (inc. EG affiliate)	\$1,231	\$870	\$1,026	\$991	\$897	\$785
EBITDAX (reported)	\$944	\$990	\$1,146	\$1,111	\$1,017	\$905
Exploration expense	-\$301	-\$120	-\$120	-\$120	-\$120	-\$120
EBITDA	\$643	\$870	\$1,026	\$991	\$897	\$785
Depletion, depreciation and amortization	-\$330	-\$595	-\$717	-\$693	-\$637	-\$571
EBIT	\$313	\$275	\$309	\$298	\$260	\$215
Interest expense	-\$101	-\$143	-\$143	-\$143	-\$143	-\$143
Derivative impact	\$31	\$0	\$0	\$0	\$0	\$0
Equity affiliates (EG)	\$73	\$0	\$0	\$0	\$0	\$0
Other	\$7	\$0	\$0	\$0	\$0	\$0
Earnings before income taxes	\$323	\$132	\$165	\$155	\$117	\$72
Income tax expense	-\$43	-\$101	-\$115	-\$111	-\$102	-\$91
Tax rate	13%	77%	69%	72%	87%	128%
Reported Net profit/(loss)	-\$94	\$30	\$51	\$44	\$15	-\$20
Adjustments	-\$95	\$0	\$0	\$0	\$0	\$0
Adjusted net income (loss)	-\$189	\$30	\$51	\$44	\$15	-\$20
Per share data	2018	2019E	2020E	2021E	2022E	2023E
Fully diluted shares in issue (mm)	390	390	390	390	390	390
Reported EPS \$	-\$0.24	\$0.08	\$0.13	\$0.11	\$0.04	-\$0.05
Growth	-58%	-132%	66%	-14%	-66%	-233%
Adjusted EPS \$	-\$0.48	\$0.08	\$0.13	\$0.11	\$0.04	-\$0.05
Growth	50%	-116%	66%	-14%	-66%	-233%
DPS \$	\$0.00	\$0.18	\$0.20	\$0.22	\$0.23	\$0.24
Growth			10%	10%	5%	5%
CFPS \$	\$1.14	\$2.01	\$2.37	\$2.29	\$2.07	\$1.81
Growth	88%	76%	18%	-3%	-10%	-13%
Cashflow (\$mm)	2018	2019E	2020E	2021E	2022E	2023E
Net income	-\$94	\$30	\$51	\$44	\$15	-\$20
DDA	\$339	\$595	\$717	\$693	\$637	\$571
Equity affiliates	\$185	\$0	\$0	\$0	\$0	\$0
Derivative impacts	-\$168	\$0	\$0	\$0	\$0	\$0
Change in working capital	\$16	\$0	\$0	\$0	\$0	\$0
Other non-cash items	\$167	\$157	\$157	\$157	\$157	\$157
Cashflow from operations	\$445	\$782	\$925	\$894	\$809	\$708
Total capex	-\$400	-\$475	-\$525	-\$500	-\$379	-\$338
Free cashflow	\$45	\$307	\$400	\$394	\$430	\$370
Acquisitions	-\$970	\$0	\$0	\$0	\$0	\$0
Divestments	\$14	\$0	\$0	\$0	\$0	\$0
Share buybacks/issuance	-\$206	\$0	\$0	\$0	\$0	\$0
Dividends	\$0	-\$71	-\$78	-\$85	-\$90	-\$94
Other	\$160	\$0	\$0	\$0	\$0	\$0
Decrease in net debt	-\$957	\$237	\$322	\$309	\$341	\$276

Catalysts

- **Sell down of stake in Mauritania-Senegal** - We think this is the most important catalyst this year as although the market took the announcement of a sell down positively, we don't think expectations are still very high in terms of the price achievable and there is scepticism that Kosmos will be able to complete a transaction.
- **Acquisitions** - We expect Kosmos to be active on the acquisition front this year with a clear focus on the US GoM. We expect proceeds from Mauritania-Senegal and excess cash flow from current high oil prices to be put into acquisitions.
- **Buybacks** - We think that there is likely to be opportunistic share buybacks if shares remain around the current level, especially given the company's confidence in monetising its stake in Mauritania-Senegal.
- **US GoM wells** - Although we don't see these as game-changing wells, they are important as success will validate the near field / infrastructure led exploration (ILX) drilling strategy and give confidence in longer term growth from the US GoM. The most material well is the ~100mmboe Resolution prospect which could be worth ~50c/sh unrisked to Kosmos.
- **Equatorial Guinea licensing round and exploration well** - The things to watch out for are the planned licensing round in EG in the coming months and in the second half of this year there is a material exploration/appraisal well planned on G-13 (targeting ~50mmboe). This is low risk / high value tie-back potential to existing infrastructure.
- **Ghana** - The main thing that the market will be hoping for this year is an uneventful year after the many issues over the past few years. On Jubilee, we are looking for better uptime performance from the FPSO and on TEN the ability to sustainably produce above nameplate capacity.
- **Orca exploration well** - This well is targeting gross resource of 13tcf in place with AVO calibrated from previous wells and the cost is carried by BP.
- **Industry exploration wells** - We think there are a number of wells worth watching from an industry perspective that will have a read-through into Kosmos' acreage in 2019. In Namibia, TOTAL is drilling a material prospect call Venus. Further drilling nearby in Suriname from Apache and Guyana from Exxon is worth watching too.

Why invest in exploration?

Uncorrelated returns to the market and now much better economics on falling costs.

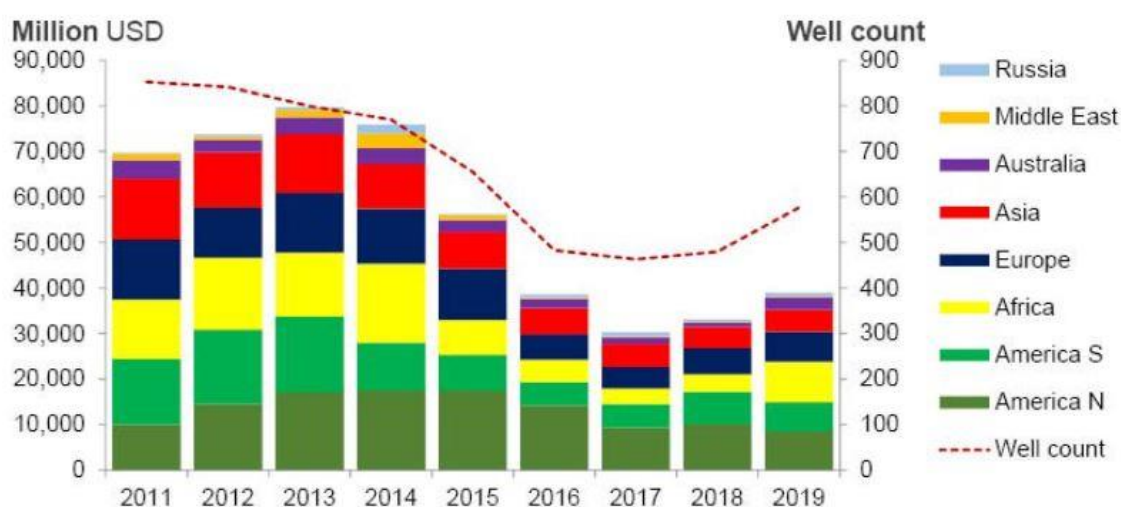
Exploration stocks provide uncorrelated returns to the market (which is what most portfolio managers look for); potential for multiple uplift in value which isn't available elsewhere. Exploration costs have fallen dramatically improving the economics. No cost inflation is evident yet (unlike US shale) – BP for example believes 75% of savings are sustainable. Development costs and time have been reduced - improving the economics (e.g. Liza in Guyana). Integrations are realising they need to replenish inventory (e.g. TOTAL, Exxon), meaning transactions are likely to return. Long-dated Brent is trading at ~\$60/bbl giving an average IRR at FID of 20% on an average deep-water development. Liza (Guyana) and Lula (Brazil) are examples of the huge value creation that is possible through frontier exploration, which isn't obtainable through shale.

What are the impediments to investment into exploration?

It is still possible (based on recent deals/equity market valuations) to buy oily resource at a discount to where finding costs have been in recent years. Even in exploration success cases (e.g. SNE in Senegal) the upside hasn't been huge. It is more of a struggle to obtain funding for international developments than US shale given the much bigger liquidity pool in the US. There remains the perception of risk post discovery in the appraisal (e.g. Paon in Ivory Coast) and development phases (50% of fields not producing to expectations according to one study). Political risk remains very much on investors' minds as does corporate governance and the idea of "lifestyle" E&P companies listed on AIM. Another issue is that the long-dated nature of these projects means that investors are worried about the cashflows only being generated after the world has reached peak oil demand.

2018 exploration review and 2019 outlook

Global offshore exploration expenditure and number of exploration wells.



Source: Rystad Energy

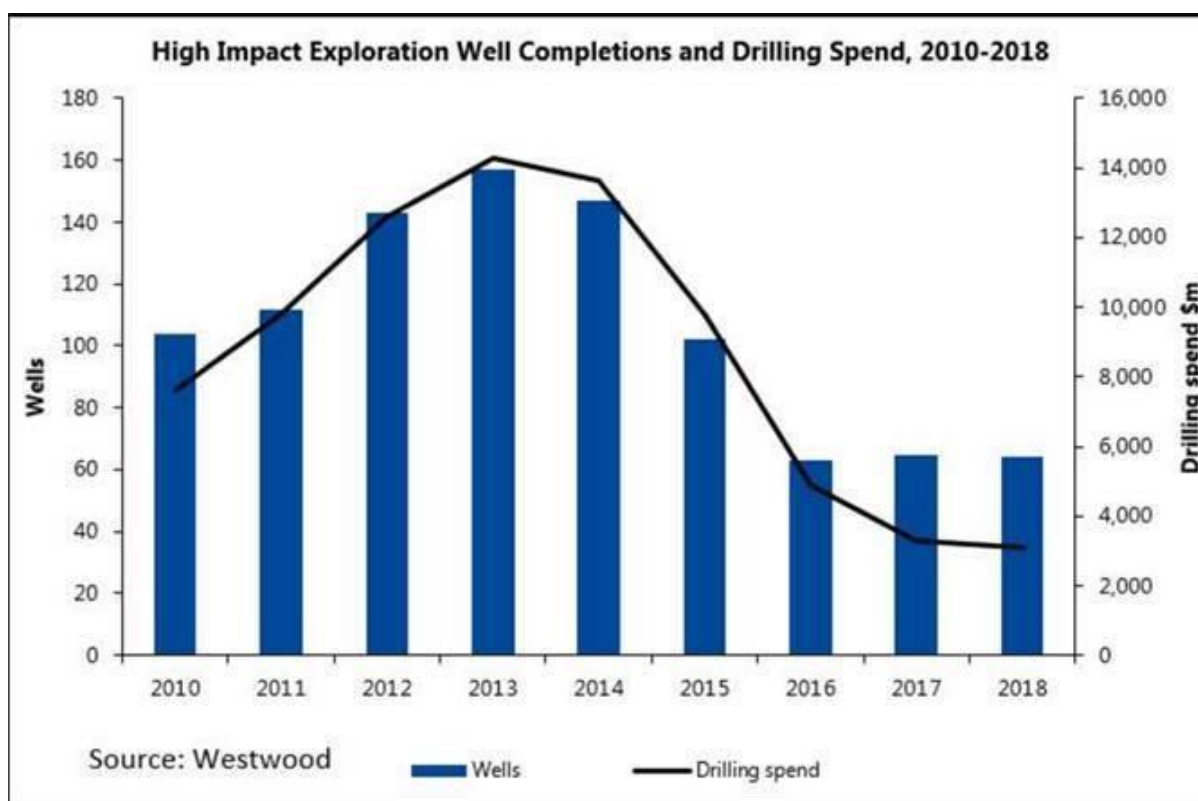
According to consultancy Woodmac, in 2018 exploration added at least 10.5 billion barrels of oil equivalent (boe) in conventional new field volumes (40% oil and 60% gas) and exploration returns hit 13%, the highest calculated in more than a decade. To put this in context the world produces ~35 bnbbbl of oil and <5bnbbbl were discovered last year from conventional exploration. While overall volumes were modest, there were some very encouraging wells with three play-opening discoveries – Ranger and Hammerhead in Guyana by Exxon, and the Dorado find, which confirmed a new liquids play in the Roebuck sub-basin, offshore Australia. The number of risky deepwater frontier wells increased from 6 in 2016 to 21 in 2018. Global offshore exploration and appraisal well count in 2018 saw a moderate rise of ~6% after bottoming out in 2017. Norway, Brazil, US Gulf of Mexico and Africa were the main contributors to the higher 2018 spend.

2019 high impact exploration discoveries



Source: Westwood Global Energy

In 2019 Woodmac expects global exploration and appraisal spending for 2019 staying close to its 2018 level of just under US\$40bn, however we expect it to surprise to the upside. According to Westwood, in 2019 the company to watch is TOTAL who is planning to drill by far the highest number of impact wells in 2019 at 22, of which 8 are frontier play tests. The regions to watch are N.W. Europe and Central and South America with 22 high impact wells each. Westwood has identified another 76 high impact wells either drilling or planned for the remainder of 2019 testing 22 bnboe, half of which are in deep water. It estimates that at least 1.3bnboe of resource has already been discovered through high impact exploration in 2019, compared to ~5.3bnboe discovered in the whole of 2018.



Source: Westwood Global Energy

Exploration or acquisition of resource

Lower costs of obtaining exploration acreage and drilling the wells creates a better value proposition and also gives investors exposure to uncorrelated returns that aren't available from US E&Ps. Exploration success rates should improve as operators are now more capital disciplined forcing them to only drill their best wells.

Deepwater cost of licence acquisition: Around 5+ years ago, in order to attain licences from Governments, heavy work commitments had to be bid (e.g. multiple wells within a few years, even in cases where seismic hadn't been shot) - e.g. in Angola signature bonuses and work programme commitments were as high as US\$0.5B. Farm-in conditions tended to be at a minimum a 2 for 1 promote and in many cases much more: for example in the heady days in 2011 we saw HRT acquire UNX, a Namibian pure play exploration company with no wells drilled on its blocks so far, for C\$720mm. The cost of licence acquisition fell substantially in the last few years with farm-outs generally going for just back costs, or in some cases even less and the work commitments stipulated by Governments were greatly reduced.

Deepwater cost of exploration and appraisal: Exploration costs have fallen dramatically in the last few years, as the cost of the service provision has come down (e.g. rig rates), the efficiency of drilling has improved (higher spec rigs and high grading of crews) and generally drilling has been focused in less hostile conditions (e.g. avoiding high pressure high temperature). Whereas a few years ago it wasn't uncommon for an exploration well in Angola to cost \$250mm, we are now seeing exploration wells in West Africa being drilled for <\$50mm (e.g. Ophir's Ayame deepwater well in Ivory Coast cost ~\$20mm).

Shale context: Although there have been some recent “new discoveries” in US shale (e.g. Alpine High in the Permian basin from Apache) the consensus is that there is unlikely to be any significant new shale plays uncovered in the US. Therefore, there isn’t really an exploration angle that investors look at when analysing the US shale companies. There are still some plays or fringe areas that are in the appraisal stage but given the number of players in the US (E&Ps and investors) most of these have will have been heavily analysed with little room for investors to gain an advantage.

Improving economics of exploration

The falling cost and increasing chance of success should help the economics work.

Higher cost/higher risk: If we assume that the average prospect size targeted is ~500mmboe and the average chance of commercial success is 10%, this gives a risked resource of 50mmboe. If we assume the total exploration cost is ~\$150mm (licence acquisition, seismic and well cost) this gives a risked finding cost of \$3/boe. If we include appraisal costs of \$350mm, at a 75% CoS on 500mmboe, this adds another \$0.9/boe so total risked E&A cost of ~\$4/boe.

Lower cost/lower risk: If we assume the total exploration cost is now ~\$75mm and 20% CoS this gives a risked finding cost of \$0.75/boe and if we include appraisal for \$200mm at 75% CoS, this adds \$0.5/boe making a total of \$1.25/boe.

Although \$/boe valuations very much depend on the quality of the resource and fiscal terms, in general it has been hard to achieve on average >\$3/boe for pre-FID resource, certainly in a low oil price world – so to be successful as an explorer you have to beat the odds (>10% chance of success) and find resource in higher value areas.

Buying versus exploring for resource

African deals for pre-FID resource over the last few years

Asset	Main region	Buyer	Seller	Date announced	Price paid (mm)	2P+2C net reserves (mmboe)	\$/boe
Lockichar Basin	Kenya	Maersk	Africa Oil	09-Nov-15	\$640	200	3.2
SNE	Senegal	Woodside	Conoco	14-Jul-16	\$442	196	2.3
Fortuna	Equatorial Guinea	SLB/Golar	Ophir	10-Nov-16	\$306	232	1.3
Tortue	W. Africa	BP	Kosmos	19-Dec-16	\$916	1175	0.8
Dussafu	Gabon	BW Offshore	Harvest	22-Dec-16	\$32	20	1.6
Lake Albert	Uganda	TOTAL	Tullow	09-Jan-17	\$900	367	2.5
Area 4	Mozambique	Exxon	Eni	10-Mar-17	\$2,800	2500	1.1
Block 20/21	Angola	Sonangol	Cobalt	19-Dec-17	\$500	500	1.0
Tano Cape Three Points	Ghana	Aker Energy	Hess	19-Feb-18	\$100	275	0.4

Source: AKap Energy estimates

Another argument against exploration is that you can buy discovered resource cheaper, which is apparent when you see many companies still trading at very low \$/bbl valuations.

Outside of the US, except for maybe Norway, there has not been a lot of liquidity for sellers that are trying to monetise discovered resource, given a limited buyer set. Looking at the

main African deals over the last 5 years the average price paid was ~\$2/boe of pre-FID resource.

Cobalt International Energy (CIE US), the most successful explorer in Angola struggled to sell its oil discoveries and agreed a deal (which fell through) with Sonangol for <\$3/boe, which is less than it invested. It was eventually forced to sell for \$1/boe last year.

In the past, one of the downsides of paying up for exploration was that you would expect the key exploration personnel to leave and start their own independent E&P once again. However, in this market we think that is unlikely to happen so an integrated would get the opportunity to high grade its exploration team by buying one with a good track record (the BP-Kosmos deal in Mauritania / Senegal is a good example).

Impact of time: exploration

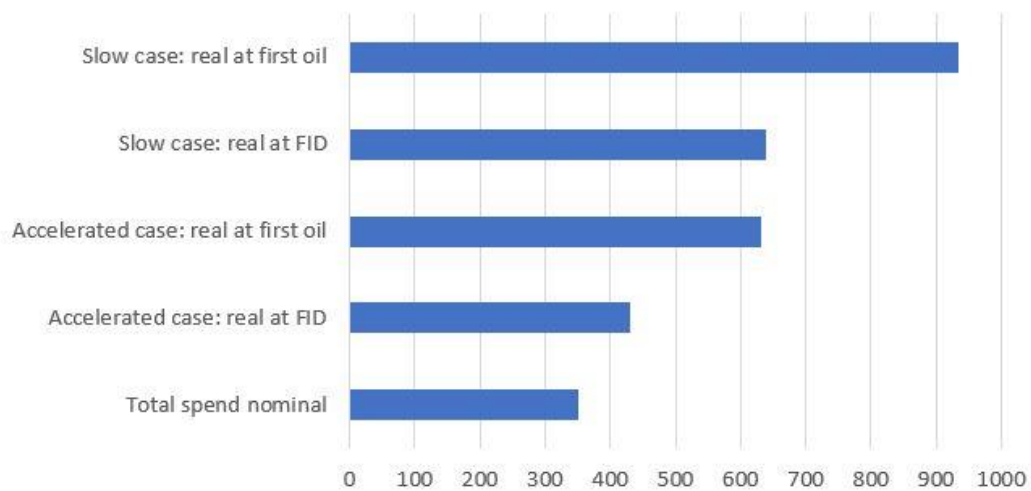
We are looking here at the impact of the time value of money on exploration, which can be dramatic when exploration is strung out over a long period.

In the chart below we have looked at what the cost of exploration is in real terms is at first oil and FID in two different cases. In both cases the total exploration spend has been \$350mm.

In the accelerated case the spending is all done in 5 years before FID and the real cost of exploration at first oil is just >\$600mm.

In the slow case the exploration is strung out over 12 years and the real cost at first oil is almost \$1B.

Total exploration spend in real terms at FID and first oil (\$mm)



Cumulative exploration spend actual and inflated by year prior to first oil

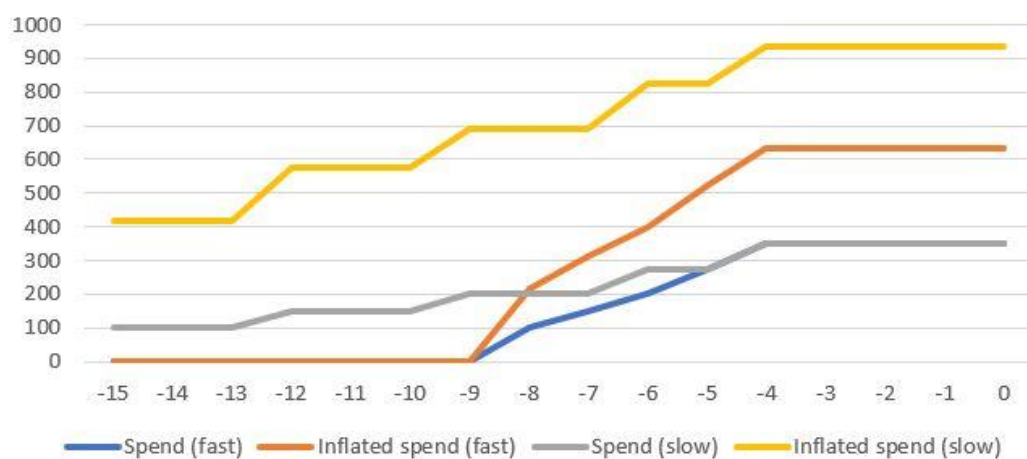


Table of spend (\$mm) and discount rate

Licence acquisition cost	100
Seismic and pre-drill work	50
Exploration well	50
Appraisal wells	150
Total spend	350
Discount rate	10%

Source: AKap Energy estimates

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— *Anish Kapadia (24/03/2019)*