AUSTRALIAN

RESEARCH

INDEPENDENT INVESTMENT RESEARCH

Melbana Energy Limited (ASX:MAY)

November 2018

INDEPENDENT INVESTMENT RESEARCH

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Melbana Energy Limited (ASX: MAY)

November 2018

Note: This report is based on information as at 13 November 2018

Investment Profile	
Share Price - Nov 13, 2018	A$0.014
12 month L/H	A$0.008/$0.028
Valuation per Share	A$0.059
Issued Capital:	
Ordinary Shares (Inc Escrowed)	1,870 m
Unlisted Options	178.2 m
Performance Rights	6.76 m
Fully Diluted	2,055 m
Market Capitalisation UD	A$26.18 m
Cash (Sept 30, 2018)	A$8.37 m
Debt (Sept 30, 2018)	A$3.10 m

Board and Management
Mr Andrew Purcell: Chairman
Mr Michael Sandy: Non-Executive Director
Mr Peter Stickland: Non-Executive Director
Mr Robert Zammit: Chief Executive Officer
Mr Errol Johnstone: Chief Geoscientist
Mr Rafael Tenreyro: Cuba Representative

Major Shareholders	
Cadence Asset Management	6.45%
M & A Advisory (Mr Andrew Purcell)	3.05 %
Board and Management	4.94 %
Top 20	25.76 %

Share Price Performance

Senior Analyst – Mark Gordon

The investment opinion in this report is current as at the date of publication. Investors and advisers should be aware that over time the circumstances of the issuer and/or product may change which may affect our investment opinion.

HIGH IMPACT DRILLING

With four fully funded high impact wells expected to be drilled on two potentially company making projects over the next two years, Melbana Energy ("Melbana" or the "Company") is now realising the fruition of a period where it has built up an unrisked Prospective Resource base of 1.1 Bboe.

Three of the wells are to be drilled in the Block 9 Production Sharing Contract ("PSC") on the northern coast of Cuba, with two of the wells planned for 2019 and one for 2020; the Company is finalising a farm-out agreement with Chinese group Anhui Guangda Mining Investment Co Ltd ("AGMI"), with execution expected in December - this will leave the Company with a free carried interest in all Block 9 activities. Cuba presents a highly prospective yet under drilled opportunity - Block 9 is along trend from and over similar structures to the major Cuban producing areas including the 11 Bbbl Varadero Oil Field, and areas currently operated by TSX-listed Sherritt International, the only other western player in Cuba.

In Australia, the Company is awaiting the results of processing of a recently completed 3D seismic survey over the substantial Beehive prospect in the Bonaparte Basin of Western Australia. With a diameter of 18 km, the Company has stated that Beehive is the largest undrilled single structure prospect in Australia, and bears geological and structural similarities to the giant Tengiz Oil Field in Kazakhstan. The survey was 100% funded by Santos and Total, as part of an option to farm-in to 80% of WA-488-P - should they elect (solely or jointly) to exercise the option, Melbana will be carried for 20% through all activities up to the completion of the initial well, with Melbana's share of costs to be recouped from any future production - Melbana will not be required to repay costs should commercial production not eventuate.

In addition to the two key projects Melbana has significant upside in the Santa Cruz incremental oil recovery opportunity in Cuba, with execution of the agreement with Cuba Petróleo Union ("CUPET"), the national oil company) expected in December. Also in Australia it has long life environmental permits to develop offshore gas processing facilities at Tassie Shoals in the Bonaparte Basin, 300 km NW of Darwin - these could provide an opportunity to treat nearby stranded gas reserves. It needs to be noted that such a long life permit would not be granted if applied for today, thus making this unique.

KEY POINTS

- **High quality, under-explored projects:** In Block 9 and Beehive Melbana has high quality, potentially company making projects that have seen little or no drilling, but are located in in highly prospective areas, near to current producers.
- **Carried for major expenditure:** The Company is carried for the costs of the upcoming planned drilling, however will still retain significant value in Block 9 and Beehive should the drilling prove successful.
- **Experienced Board and Management:** Key personnel in Melbana have extensive experience in all facets of the oil and gas game, and in addition hold shares in the Company thus aligning their interests with those of other shareholders.
- **Well funded:** With net cash of A$5.27 million, Melbana is well funded in the short term.
- **Steady news flow:** Given the planned activities, particularly drilling, the next two years should provide steady news flow.

VALUATION SUMMARY

- We have completed a sum of the parts NAV valuation for Melbana, with a risked value of A$113 million, or A$0.059/share as shown below. The per share valuations are based on the current share structure, with no allowance for any future capital raising.
- We see upside in this, particularly with success at Beehive (A$39.7 million, A$0.021/share), which we have risked at 7.5% and Block 9 (A$61.6 million, A$0.033/share), with an average risk weighting of 16.5%.
- Key catalysts for price movements will be execution of agreements and positive drilling results.

Melbana valuation

Item	Unrisked Value (A$m)	Unrisked Value/Share (A$)	Risked Value (A$m)	Risked Value/ Share (A$)	Notes
Total	**$915**	**$0.488**	**$113**	**$0.059**	**NAV**

SWOT ANALYSIS

Strengths

- **Highly prospective holdings close to operating fields in Cuba:** Block 9 presents a high quality, under-explored holding located adjacent to and along trend from producing fields (including Varadero).
- **Sherritt history of success:** The longevity and success of Sherritt in Cuba highlights that business can be done in the country by foreign companies.
- **Beehive:** This presents an opportunity, that should drilling be successful could be a company maker.
- **Management with experience and holdings:** Personnel have extensive oil and gas experience as well as holding shares in Melbana.

Weaknesses

- **US embargo on Cuba:** The current embargo restricts the ability of US companies to operate in Cuba, and hence also restricts access to US technology.
- **Time:** Different companies have different operational time frames, and hence being a minority, non-operating partner in a project can result in a junior being "captive" to the operational strategy of the major partner.
- **Operating in two countries:** This can lead to some duplication of overheads, and hence increased costs.

Opportunities

- **Discovery at Block 9 and Beehive:** This goes without saying, and is the main opportunity for Melbana.
- **Incremental production at Santa Cruz:** Successful implementation of this programme, in addition to providing cash flow, may also lead to further similar opportunities in Cuba which historically has had relatively low recoveries due to the heavy (and variable) nature of the oil and fractured carbonate reservoirs.
- **Tassie Shoal go ahead:** Although this presents option value only at the moment, this has potential to realise significant value in the longer term.
- **Monetisation of assets:** Should results of initial drilling at Block 9 and/or Beehive be positive, and add significant value, dependent upon strategy, there may be the opportunity to sell these assets at some stage to crystallise value .

Threats

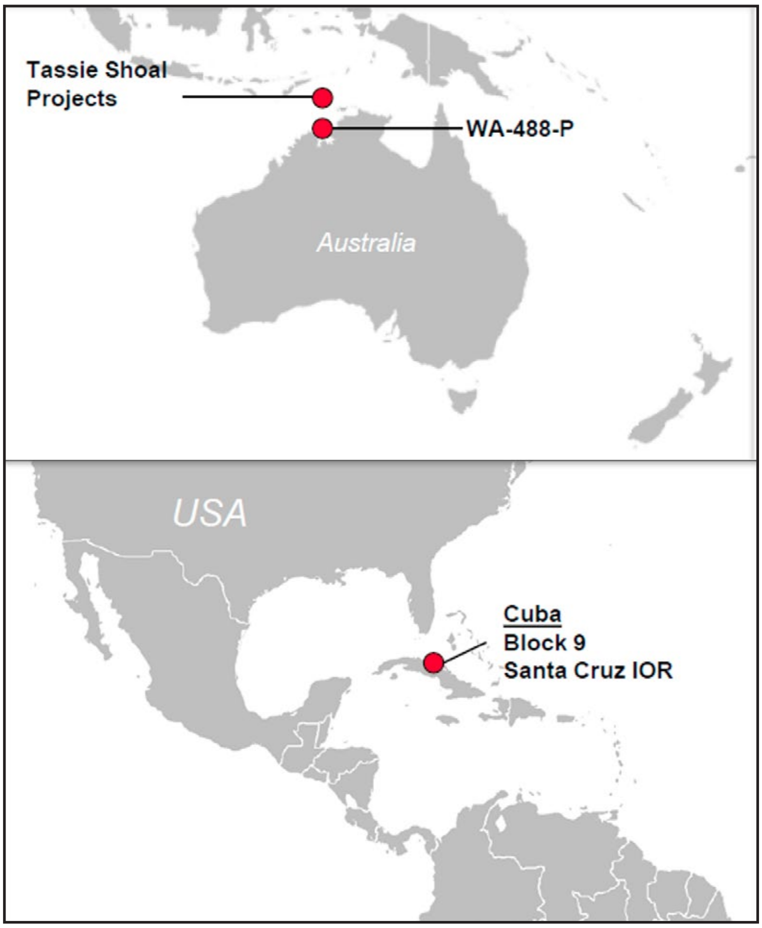
- **Lack of discovery or limited discovery**: This again goes without saying, with lack of success or only limited success being threats to any junior company.
- **Failure to execute:** This applies particularly to Beehive (and to a lesser extent to the other projects); should the potential farminees fail to exercise the option, Melbana will have to look for other partners, which will take time; this may also require another adjustment to the Licence conditions. As a mitigation to this, should the Beehive farm-out not proceed, Melbana will own the 3D data set which will be invaluable in attracting other potential partners.
- **Markets and funding**: Downturns in markets, and resultant difficulties in obtaining funding are perennial threats to junior resource companies.

OVERVIEW

STRATEGY AND PROJECT OVERVIEW

- Melbana is an ASX-listed oil and gas developer with projects in Australia and Cuba (Figure 1), and with unrisked Prospective Resources of 1,105 MMboe split between Block 9 in Cuba and WA-488-P (Beehive) in Australia.

Figure 1: Melbana project location plans



Source: Melbana

- The main focus is on the currently 100% owned Block 9 in Cuba, for which a farm-out Letter of Intent has been signed with AGMI, with the final binding agreement expected to be executed in late 2018.
- The agreement includes the requirement to drill two wells in 2019 (and three total by the end of 2020), with these targeting highly prospective, largely untested acreage along trend from and proximal to currently producing areas, including the 11 Bbbl Varadero Field, along trend to the west of Block 9.
- The Company is also negotiating with CUPET with regards to an incremental oil recovery opportunity at the operating Santa Cruz Oil Field; this opportunity, for which the Company is targeting a final commercial agreement by December 2018, has the potential to create relatively early cash flow.
- Given the lack of exploration, but with a long history of oil production, Cuba represents a compelling exploration, development and production destination.
- In Australia, the main target is the undrilled Beehive prospect within WA-488-P in the shallow water Bonaparte Basin of Western Australia - this prospect, with unrisked Prospective Resources of 388 MMboe is considered analogous in to the giant Tengiz Oil Field in Kazakhstan.
- Both Total and Santos have options to farm-in to 80% of WA-488-P, with a 3D seismic survey having been completed in August 2012; a decision to exercise the option (which includes the requirement to drill one well for which Melbana is carried until production) is due within six months of the receipt of the processed seismic data, with the data expected in February 2019.

- Interest in Beehive has been kindled by the 2011 discovery of the onshore Ungani Oil Field by Buru Energy - Beehive is of a similar age to and in a similar setting to Ungani.
- Also in Australia is the Tassie Shoal Methanol and LNG Project, which, with long term permits (including environmental) in place presents an opportunity to treat nearby stranded, CO_2-rich gas to produce both LNG and methanol at shallow water offshore facilities.

FINANCIAL POSITION

- As of September 30, 2018 the Company had A$8.366 million in cash and a loan of A$3.098 million guaranteed by the Chairman - the loan has an interest rate of 15% pa, and may possibly be repaid upon AGMI replacing the Block 9 guarantee.
- In the September, 2018 Quarter, the Company raised A$3.5 million before costs through the issue of 194 million shares at A$0.018/share; this followed a placement and partially underwritten rights issue at A$0.014/share in the September 2017 Quarter, and a shortfall placement at A$0.014/share, together raising A$7.307 million.
- In the twelve months to September 30 2018 the Company spent A$3.796 million on exploration and evaluation, and A$1.821 on administration and staff.

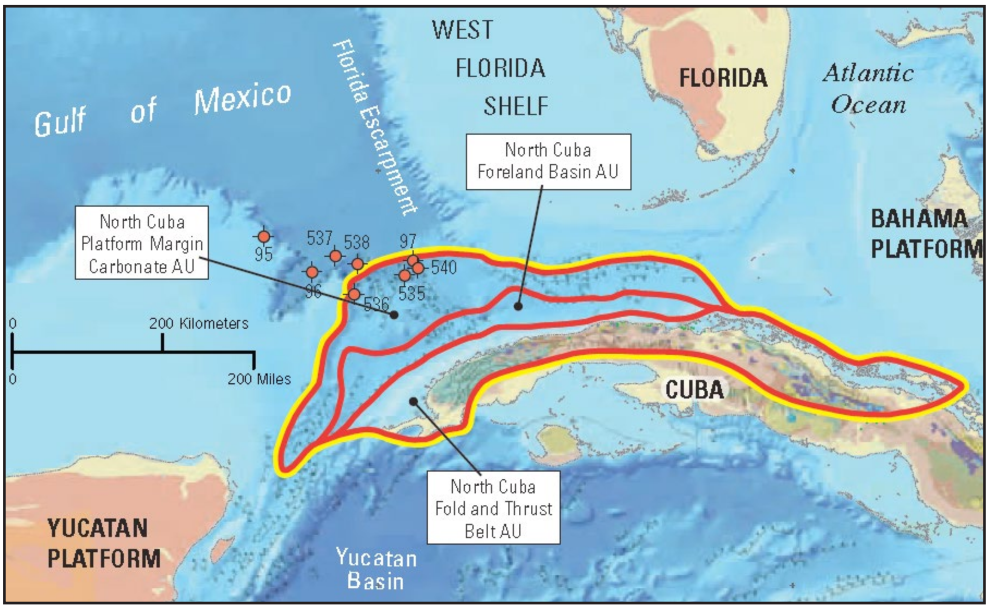
CUBAN OPERATIONS

BACKGROUND TO CUBA

Geology and Production History

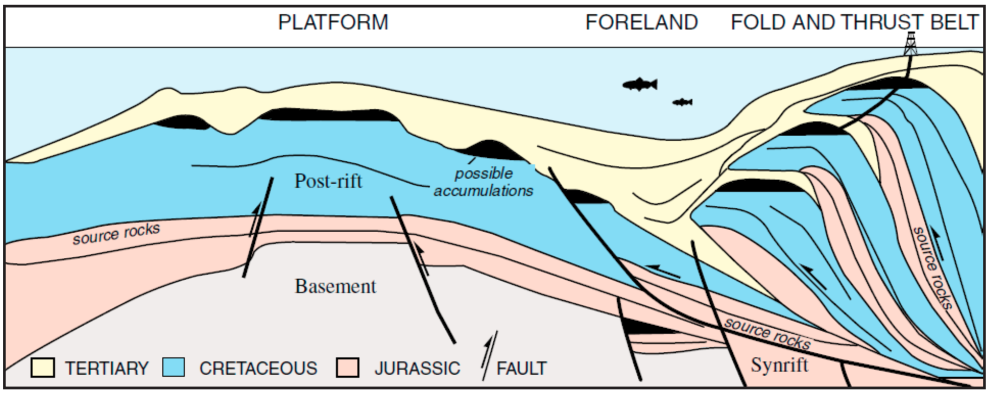
- The current producing Cuban oil fields and prospective areas are located over Mesozoic to Tertiary rocks of the North Cuba Basin (Figures 2 and 3), with the main producing and prospective areas being situated on the North Cuba Fold and Thrust Belt (Figures 2 and 3).
- In 2004, the USGS estimated that Cuba hosted "total undiscovered technically recoverable reserves in the North Cuba Basin of 4.6 billion barrels of crude oil, 9.8 Tcf of natural gas and 900 million barrels of natural gas liquids".
- Oil was initially discovered in Cuba in the nineteenth century, with first production largely from seeps and tars - one of the earliest discoveries was the Motembo Field (1881), which is located within Block 9 (although excluded from Melbana's activities); this has intermittently produced light 50° to 64.5° API oil.

Figure 2: North Cuba Basin



Source: USGS

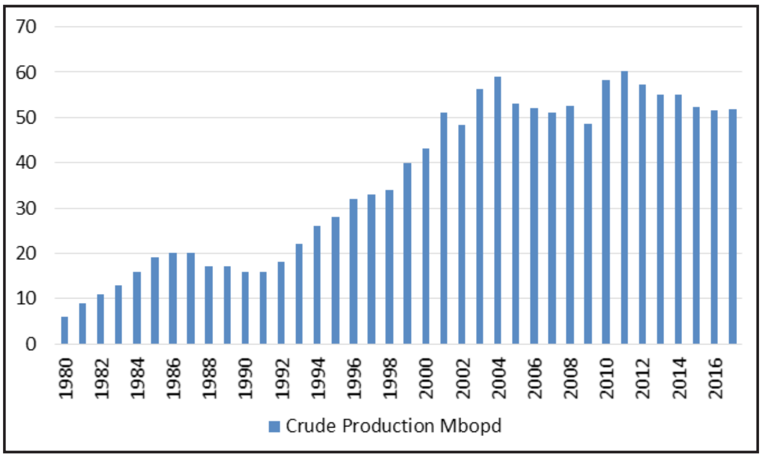
Figure 3: Conceptual cross-section, looking east



Source: USGS

- Onshore exploration and production by private operators resulted in a number of shallow discoveries, however private production ceased in the early 1960's due to nationalisation following the Cuban Revolution.
- A number of discoveries, largely of heavy, sulphur rich crude were made with the assistance of the Soviet Union, with these including the 11 Bbbl Varadero Oil Field (Figure 5), however activities again slowed with the demise of the Soviet Union.
- In response the country opened itself up to foreign investment in upstream production 1991, with this resulting in significant increases in onshore production (Figure 4), although the results from deep onshore have been less than successful.
- This activity has resulted in a peak production of ~60 Mbopd in 2004 and 2011, with this subsequently decreasing to ~50 Mbopd, representing about 25% of Cuba's requirements, making Cuba a net importer of petroleum products.

Figure 4: Cuban crude oil production



Source: USEIA

- One of the early movers (and the only western company besides Melbana operating in Cuba) is Sherritt, currently operating in the shallow offshore Block 10, and which has drilled over 200 wells since their entry into the country in 1992 immediately following the opening up of the oil industry to foreign investment.
- Sherritt has reportedly produced an aggregate of 216 MMbbl in Cuba, and in addition operates gas processing and electrical generation plants in the country, using gas feedstock that was previously flared; in addition to energy, Sherritt is a major contributor to the local economy through its JV in the Moa nickel operation.
- From 2008 to 2017 Sherritt operated wells produced an average of 23,250 boepd, over a third of Cuba's total production - this has been done at a cost of under C$10/boe.
- Production has decreased through 2018 with the expiry of the Varadero West PSC, natural well declines and the lack of development drilling; the Company however is carrying out exploration drilling on Block 10, with results from the latest well expected soon.
- One factor currently affecting Sherritt is the requirement to drill long deviated wells targeting offshore targets from onshore largely due to the presence of coastal tourism areas; some of these wells are drilling up to 4,700m laterally from the wellhead.

- Despite the increase in activity since 1991 the country remains only lightly explored - one factor affecting exploration and development in Cuba have been the historic US embargoes, including the current strengthening of restrictions following the election of the Trump government.

Oil Quality and Recoveries

- One of the features of most discoveries and operations to date is that the oil is generally heavy with high sulphur, and that quality can also be variable - prices commonly trade at a significant discount to benchmark, with an example being Sherritt, with products trading at around a 30% discount to WTI prices.
- However CUPET has recently reported the discovery of 22° API oil from the Bacuranao structure, close to Santa Cruz; occurrences within Melbana's Block 9 also highlight the potential for superior lighter crudes than the 10-14° API ones from Varadero, with these occurrences including:
  - Motembo (1881) - 50-64° API, 5 mmbbl recovered,
  - Guadal-1 well (1970) - 24° API, 30 bbls recovered,
  - Marti-5 well (1991) - 20-24° API, 44 bbls recovered, oil shows over a 850m column; and,
  - Bolanos-1 well (1998) - 22° API
- Another factor affecting production are currently low recovery factors of under 10% (partly due to the heavy crudes as well as the fractured carbonate style of the reservoirs); this however provides significant upside with the introduction of enhanced oil recovery techniques leading in part to incremental production opportunities from historic fields such as Melbana is pursuing at Santa Cruz.
- Recoveries should also be higher in Block 9 should lighter oils be found than those produced elsewhere.

Fiscal and Licencing Regime

- Operations are generally operated under Production Sharing Contracts ("PSC") negotiated with CUPET, with details of these and other fiscal terms being shown in Table 1 - there is no specific natural resources legislation - the regime is regulated under a number of laws including the Foreign Investment Law and the Cuban Corporations Law.
- Note that individual PSC terms are generally kept confidential - the production sharing proportions as shown below are a view of Woods Mackenzie.
- PSCs are generally issued for a term of up to 25 years, with this including exploration, development and production phases, with the profit oil split to the contractor decreasing with increased cumulative production (Table 1).

Table 1: Indicative Cuban PSC terms

Indicative Cuban PSC terms	
Parameter	**Figure/Comments**
Sales	At parity with International Benchmark Prices
Corporate Tax Rate	22.5%, subject to an eight year tax holiday
Royalties	No royalties
Cost Oil	Subject to negotiation and based on costs incurred, but no more than 60% of total production - over the ten years to December 2017 Sherritt averaged 20%
Profit OIl Split Variables (to Contractor, Based on Cumulative Volumes)	
< 100 MMbbl	60%
100 to 200 MMbbl	55%
200 to 300 MMbbl	50%
300 to 400 MMbbl	45%
400 to 500 MMbbl	40%
> 500 MMbbl	30%
Over the seven years to December 31, Sherritt received 45% of total profit oil, with this averaging 43% over ten years - the earlier years included a previous PSC.	

Source: Various, including Sherritt Annual Reports and Wood Mackenzie PSC split views (quoted in Hartley's September 2017 Research Note)

- To be awarded a PSC companies have to qualify, with qualification categories including any onshore and offshore (1), onshore and offshore to 100m depth (2), onshore only (3), and, finally non-operator (4) - Melbana has qualified as category 2.
- In 2014 Cuba introduced new laws including taxation rules to attract additional foreign investment - amongst other things this included halving the corporate tax rate for locally registered companies to 15% from 30%, although natural resources producers pay 22.5%, albeit with all having an eight year tax holiday.
- Foreign companies do not need a local partner to operate, and in addition, in the case of oil, profits can be repatriated and hydrocarbon products can be sold offshore tax free.

BLOCK 9 OPERATIONS

Tenure and Permitting

- Block 9 covers an area of ~2,380 km^2, with the acreage being located on the northern coast of Cuba some 130 km east of the capital, Havana, and with good access to infrastructure (Figure 5).
- The 25 year Block 9 PSC was awarded to Melbana (then MEO Energy) in September 2015, following three years of negotiations and the Company qualifying as an onshore and shallow water operator.
- The initial 8 $^1/_2$ year exploration period of the Block 9 PSC is divided into four sub-periods with withdrawal options at the end of each period; the initial period ended in November 2017 and including the review of existing exploration data and the reprocessing of selected areas of existing 2D seismic data.
- The second two year period was to include 200 km of 2D seismic surveying, however the seismic has been pushed back to the third period with drilling being brought into the second period - this decision has been supported by the high quality of the existing seismic data.
- Details of terms during any production period have not been disclosed, however Table 1 presents some indicative terms for Cuban PSCs.
- Environmental approvals have now been received for the first two (Alameda and Zapato) of the planned three well programme under the agreement with AGMI (see below); in addition a drilling rig that is available in April 2019 through a local operator is being considered, however AGMI has rigs of its own that they are considering importing into Cuba to undertake this work.

Figure 5: Block 9 location, showing main structural trend

Source: Melbana

AGMI Farm-out Letter of Intent

- On October 8, 2018, the Company announced that it had signed a non-binding Letter of Intent ("LoI") with AGMI for a farm-out of Block 9.
- Key terms of the proposed farm-out include:
  - AGMI to drill Melbana's top three exploration wells, Alameda, Zapato and Piedra; with two to be drilled during 2019 and the third, Piedra, in 2020,

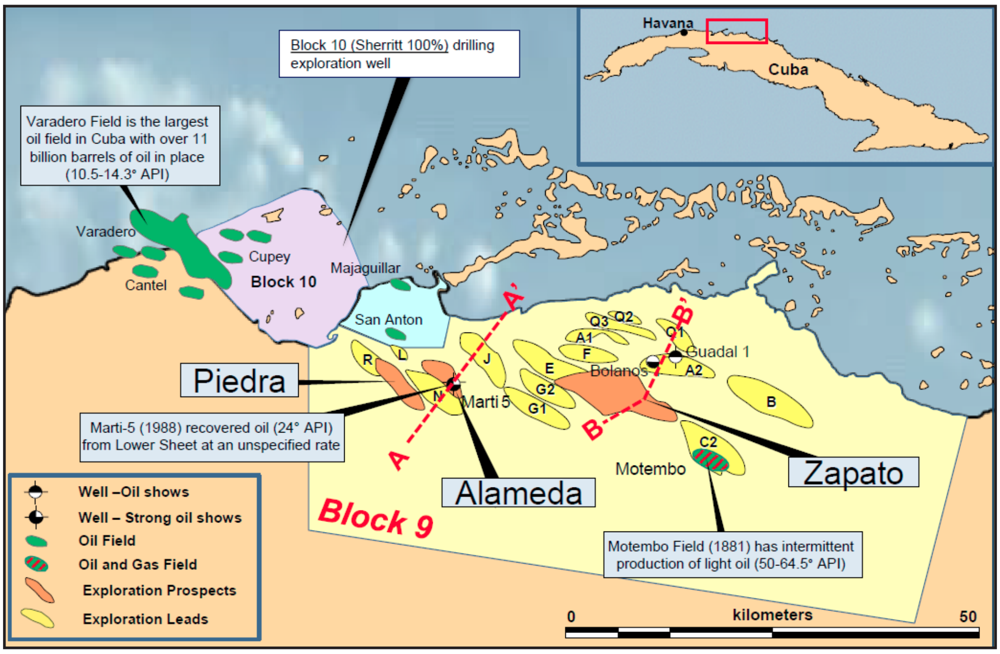
- AGMI to replace the Company's cash backed guarantee of US$2.275 million (as part of each phase of the PSC, a cash-backed bond guarantee representing ~50% of the cost of the expected work programme has to be put in place),
- Melbana back costs to be recouped in event of development,
- Melbana to retain 12.50% of profit oil under the Block 9 PSC; and,
- Melbana fully carried for 100% of all activities and costs for the 20+ year remainder of the Block 9 PSC term whilst AGMI remains a participant.

- Documentation for the binding agreement has been exchanged between both parties, with a December 2018 execution targeted; in addition AGMI is currently preparing qualification documentation for the Cuban authorities.
- AGMI is an experienced oil drilling and production company, reportedly with 20 rigs of varying capacity that allows for the drilling of wells of up to 7,000 m.
- AGMI operates in a number of areas, including Kyrgyzstan and other areas of the Americas.
- A key issue faced by Melbana with attracting a farm-out partner to Block 9 is the current broad ranging US business and trade embargo against Cuba, which limited the field.
- The embargo applies (with some narrow exceptions) to all US citizens and permanent residents, legal entities organised under the laws of the US and any entity, wherever organised or doing business which is owned or controlled by the foregoing.

Prospects, Resources and Planned Drilling

- A map of Block 9, showing key leads and prospects, is shown in Figure 6, with Prospective Resources shown in Table 2 - the Resources were estimated by McDaniel and Associates, a well respected oil and gas consultancy with extensive experience in Cuba.
- Block 9 is located in a proven hydrocarbon province, along trend from Varadero - a key feature of Varadero are major fold and thrust belt structures that fracture and fold carbonate units that are interpreted to extend into Block 9 (Figures 5 and 6).
- Three key target zones have been recognised (with 16 leads and three prospects being identified - Table 2) - the Upper Tertiary Play, the Upper Sheet Play and the Lower Sheet Play - the latter is the key target for Melbana, and is believed to tie into the Varadero Field.
- A feature of Block 9 is that the Lower Sheet Play is found deeper than at Varadero (2,000m - 3,500m as against 800m - 3,000m) - the deeper burial and associated higher thermal maturity is interpreted as being the cause of the superior oil quality.
- Three initial drill targets have been identified - Alameda, Zapato and Piedra, with Alameda itself including the Alameda, Amistad and Alameda N targets (Figures 6 to 8, Table 2).
- All three wells are to be drilled under the AGMI agreement, with Alameda and Zapato planned for 2019 and Piedra planned for 2020 - the estimated cost is in the order of US$10 to US$15 million per well.

Figure 6: Block 9, showing key prospects, Block 10 and Varadero



Source: Melbana

Table 2: Block 9 Prospective Resources - McDaniel, 2018

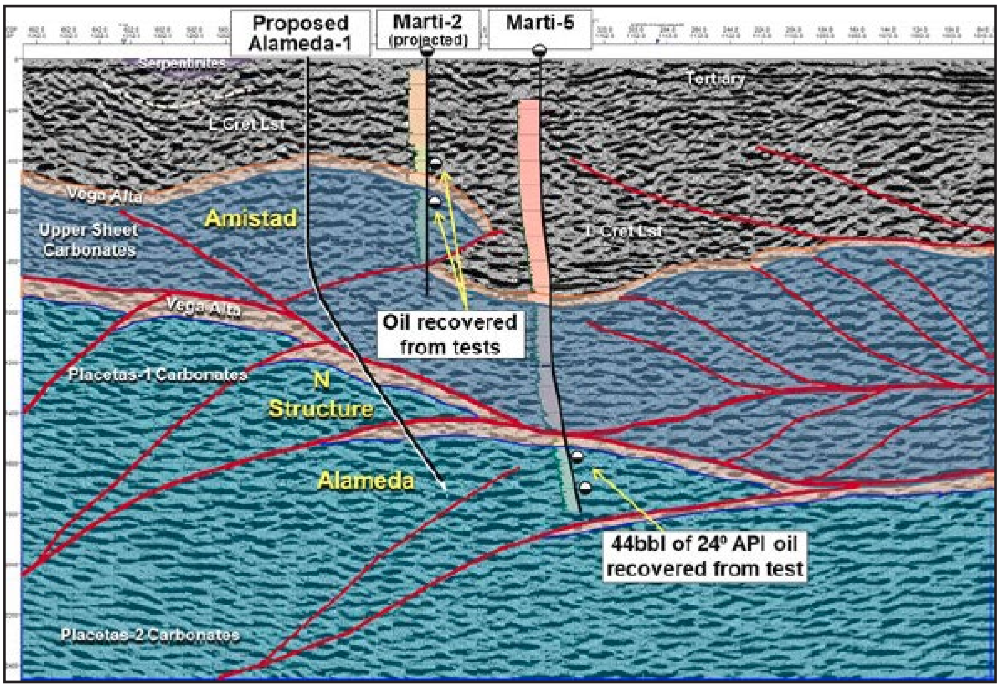
Block 9 Prospective Resources - McDaniel, 2018								
		Prospective Resources MMboe						
Prospect/Lead	**Maturity**	**Low (P90)**	**Best (P50)**	**Mean**	**High (P10)**	**CoS***	**Risked Best Resources**
Alameda	Prospect	39	72	79	128	32%	23
A1	Lead	4	11	13	23	12%	1
A2	Lead	21	50	60	112	12%	6
B	Lead	52	126	148	270	12%	15
Zapato	Prospect	38	95	114	214	23%	22
C2	Lead	29	70	84	153	16%	11
E	Lead	7	16	19	35	16%	3
F	Lead	14	34	41	76	15%	5
G1	Lead	11	26	31	58	16%	4
G2	Lead	9	22	26	49	16%	4
J	Lead	19	45	54	100	23%	10
L	Lead	1	3	3	6	23%	1
Alameda N	Lead	4	9	10	19	23%	2
Piedra	Prospect	14	34	40	76	23%	8
Q1	Lead	6	15	18	33	12%	2
Q2	Lead	1	3	4	8	12%	0
Q3	Lead	4	9	11	20	12%	1
R	Lead	8	18	22	42	23%	4
Amistad	Lead	24	60	71	132	15%	9
Total Prospective Resources MMboe		**305**	**718**	**848**	**1,554**	**15%**	**131**
Total Oil in Place MMboe		**8,185**	**15,763**	**17,825**	**30,250**		

Source: McDaniel, * Chance of Success

Alameda Prospect

- As mentioned previously Alameda includes three targets, Alameda, Alameda N and Amistad, with the first mentioned being the primary target and located in the Lower Sheet Play (Figure 7); Alameda is interpreted as being in a similar structural setting to the Varadero Field, located 35 km away.

Figure 7: Alamedo prospect section A-A'



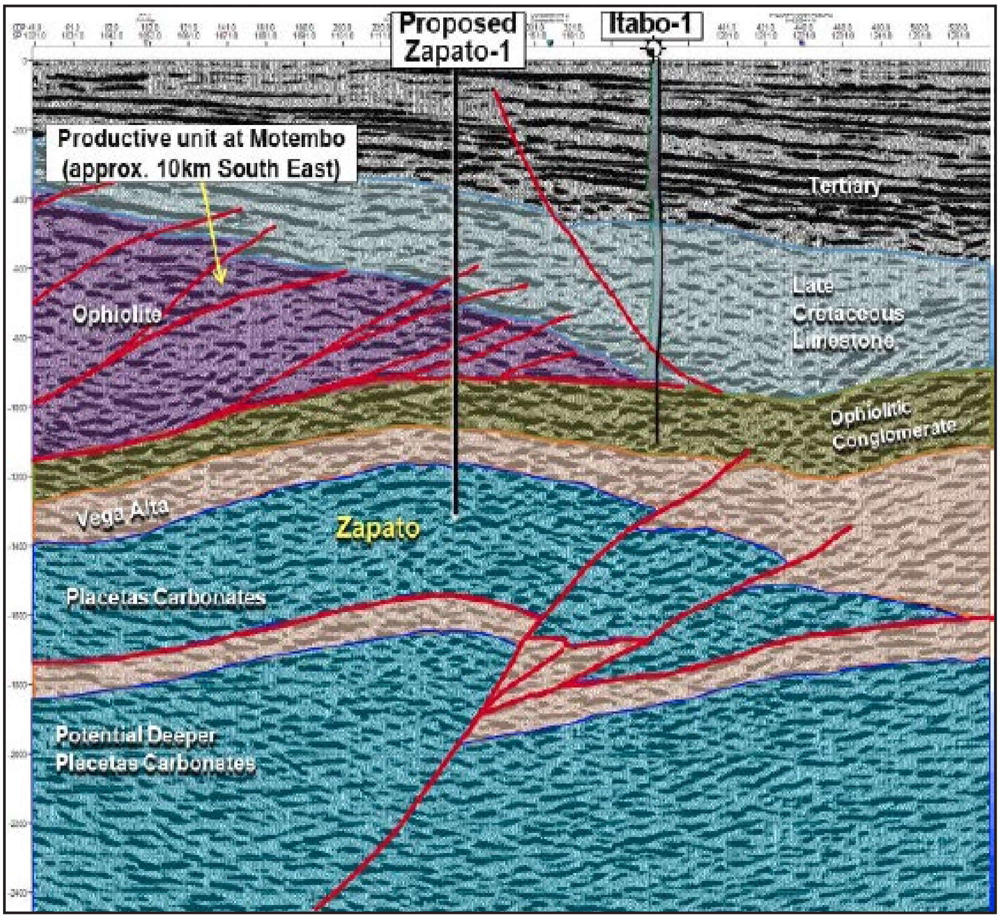
Source: Melbana

- Unrisked Prospective Resources for the three targets are 141 MMbbl from 3 Bbbl OIP, which are planned to be tested by a deviated well with a depth to the primary objective of 3,000 m to 3,700 m (Figure 7).
- Previous drilling in hole Marti-5 intersected oil shows over a 850 m interval, and recovered 44 bbl of relatively light (for Cuba) 24° API oil.

Zapato Prospect

- The second hole for 2019 will test the Zapato prospect (Figures 6 and 8), with this containing unrisked Prospective Resources of 95 MMbbl, with a chance of success of 23%, and which is located adjacent to the shallower Motembo Oil Field
- Like the primary Alameda target, this well is targeting the fractured carbonate Lower Sheet Play, with a depth to the crest of the structure of 2,000 m and vertical relief within the structure of 1,000 m (Figure 8).

Figure 8: Zapato prospect section B - B'

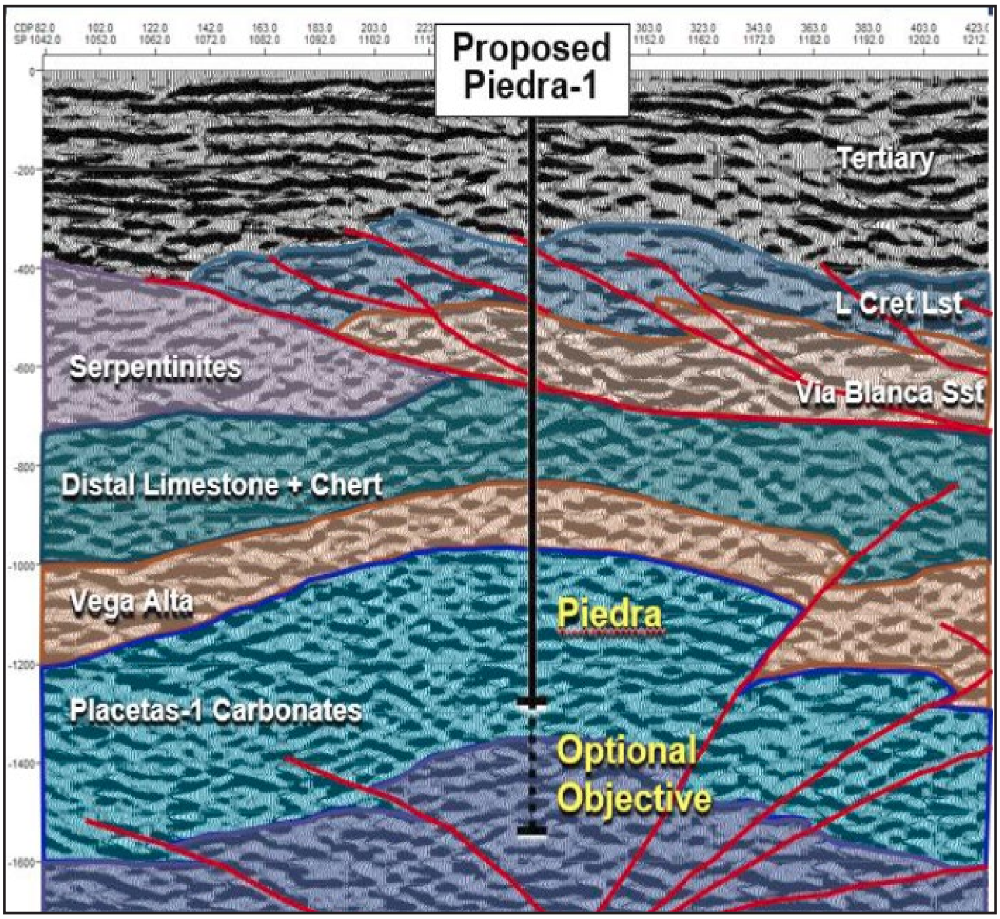


Source: Melbana

Piedra Prospect

- Piedra (Figures 6 and 9) presents a large, robust fractured carbonate structure, which is adjacent to the San Anton oil discovery, and which has unrisked Prospective Resources of 34 MMbbl.
- The crest of the Piedra structure (which is represented by a large closed gravity high, that extends to Varadero) has a depth of 1,700 m, with nearly 1,400 m of vertical relief.
- The nearby San Anton Oil Field has recovered 19.5° API from shallower sections, and the Company expects any discovery at Piedra may be of a lighter, more mature oil.

Figure 9: Piedra prospect section

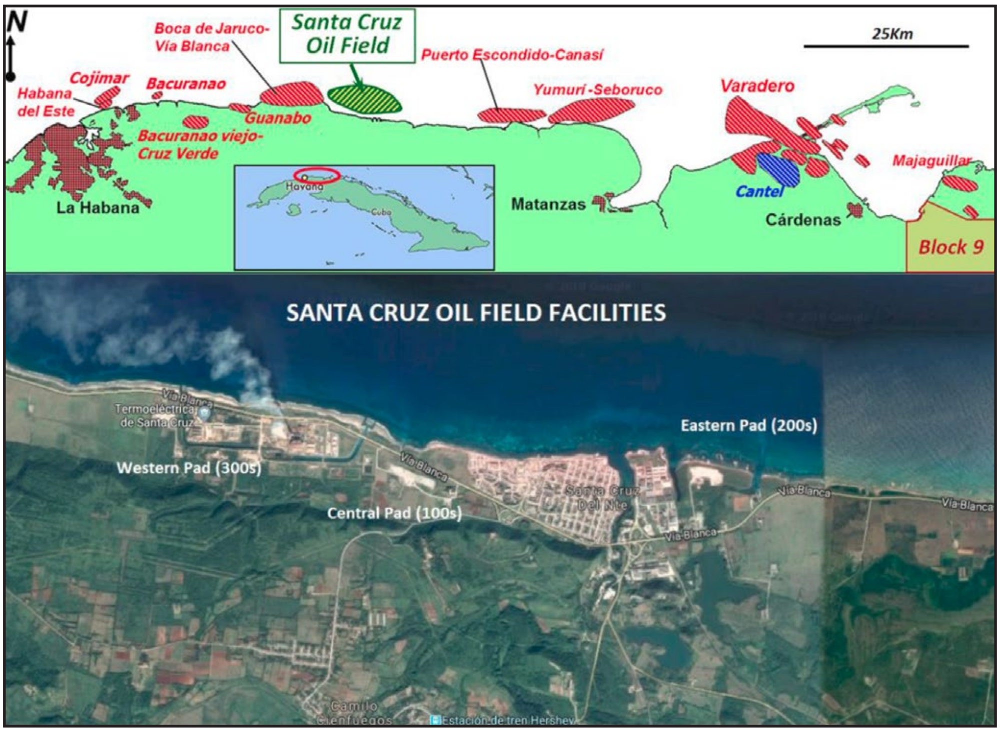


Source: Melbana

SANTA CRUZ INCREMENTAL OIL OPPORTUNITY

- In early 2018 the Company announced that it had entered into, with CUPET, an exclusive right to negotiate a long term incremental oil recovery PSC over the operating Santa Cruz Oil Field located ~100km east of Havana (Figure 10) - the Company is currently in commercial negotiations with CUPET, with execution aimed for December 2018.

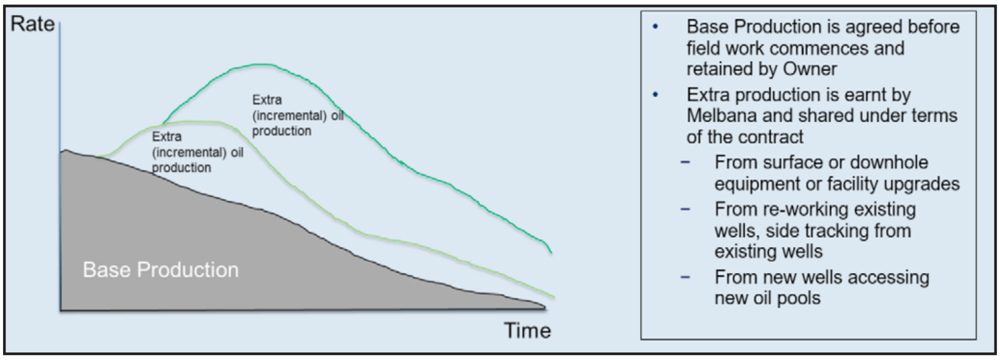
Figure 10: Santa Cruz location and facilities



Source: Melbana

- Successful negotiations and operations may provide for the potential for relatively near term production for Melbana, as well as the opportunity to partake in other similar operations.
- Under an Incremental Oil Recovery ("IOR") contract, production above an agreed base production profile is shared between the parties to the contract (Figure 11).
- A number of methods can be used improve oil recovery, including above and below surface equipment upgrades, reworking or side tracking existing wells, and drilling new wells.
- Santa Cruz, a shallow offshore (but drilled using deviated wells from onshore) operation was originally discovered by Sherritt and Pebercan in 2004 under the Block 7 PSC, with production commencing in 2006; the operation subsequently returned to CUPET control in 2009.
- Early estimates were up to 100 MMbbl of recoverable oil, from a ~20 km^2 structure with a significant oil column of 250 m; Santa Cruz reportedly produced over 1 MMbbl in its first year, and by 2013 had produced 7.4 MMbbl from 18 wells.

Figure 11: Incremental oil production



Source: Melbana

AUSTRALIAN OPERATIONS

BEEHIVE - WA-488-P

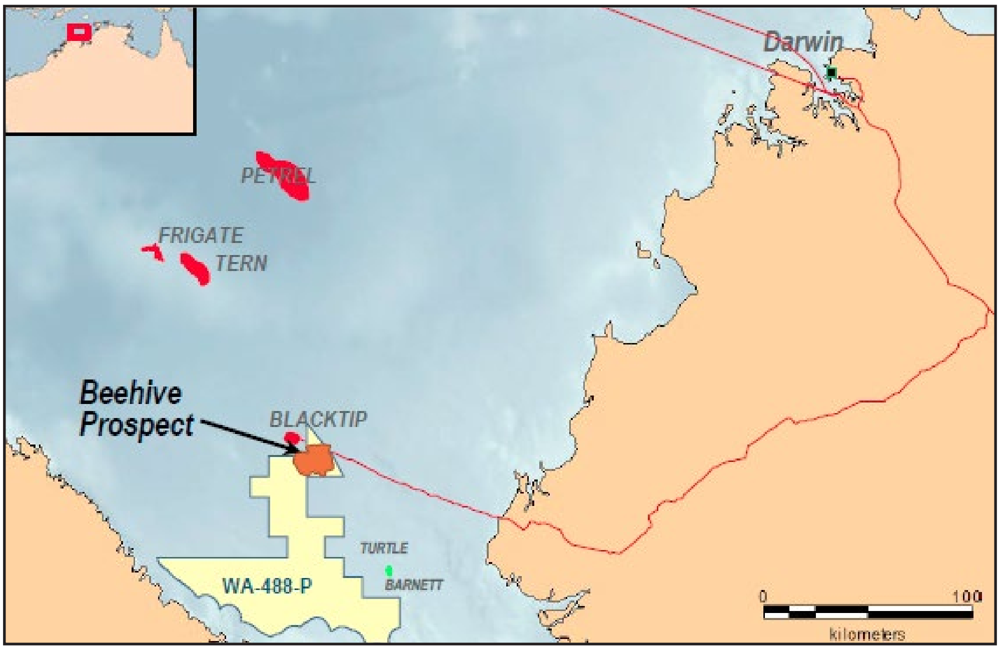
Location and Tenure

- WA-488-P, originally awarded to Melbana in 2013, is located in shallow (~40m) water of the Joseph Bonaparte Gulf of Western Australia (Figure 12).
- Although initially granted for three years, the Company has been successful in obtaining work programme extensions to undertake further technical work.

Farm-in Option Agreement

- In December 2017 the Company announced that it had signed an option agreement with Total and Santos, whereby the potential farminees could jointly or solely acquire a direct participating 80% interest in WA-488-P.
- Key terms of the agreement include:
  - Total and Santos are to fully fund a 3D seismic survey over the Beehive prospect,
  - Total and Santos will have six months following the receipt of the processed seismic data to exercise the option,
  - Should they elect (solely or jointly) to exercise the option, Melbana will retain 20% of WA-488-P, and be carried for all costs through to completion of the first well into WA-488-P,
  - Melbana will repay carried funding from its share of cash flow from future production at Beehive; and,
  - If there is no commercial production Melbana will have no repayment obligations.
- The 3D seismic survey was completed in August 2018, with processing expected to be completed by early February, at which time the six month decision to exercise period kicks in, with a decision therefore expected by August 2019 at the latest.
- The Company has estimated that the survey cost was in the vicinity of US$4 to US$5 million (with the actual figure being confidential), and that drilling may cost in the order of US$40 to US$60 million.

Figure 12: WA-488-P and Beehive Prospect location



Source: Melbana

Prospects, Resources and Geology

- The key prospect is Beehive, located adjacent to Eni's 150 MMboe Blacktip Gas Field, with Prospective Resources as shown in Table 3.
- Although what product mix that may be encountered at Beehive is not known, Melbana's view is that it will likely be oil, and not gas dominated.

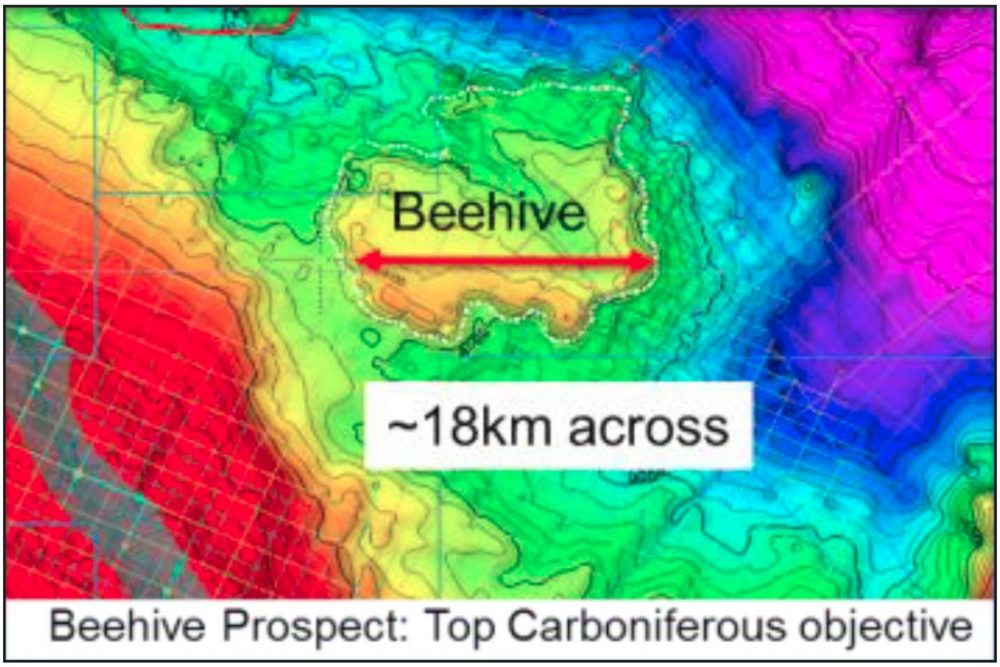
Table 3: Beehive Prospective Resources - McDaniel, 2018

Beehive Prospective Resources - McDaniel, 2018								
		Prospective Resources MMboe						
Prospect/Lead	**Maturity**	**Low (P90)**	**Best (P50)**	**Mean**	**High (P10)**	**CoS***	**Risked Best Resources**
Beehive - Carboniferous objective	Prospect	91	388	704	1645	20%	78
Total Prospective Resources MMboe		**91**	**388**	**704**	**1,645**	**20%**	**78**

Source: McDaniel, * Chance of Success

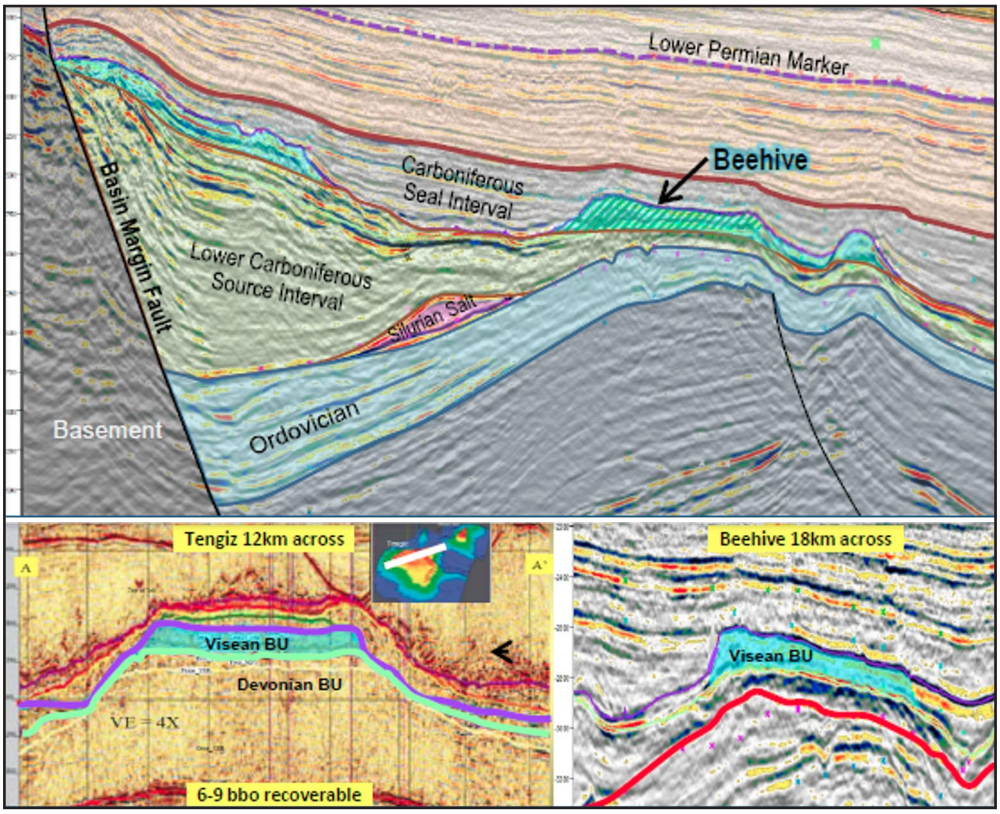
- Beehive, which is an isolated carbonate platform with a diameter of 18km, presents the largest undrilled prospect in Australia (Figures 13 and 14).
- From interpretation of the original 2D seismic surveying, the prospect has a mapped closure of 140 km^2, with vertical relief of 400 m and is at a depth of between 4,000 m and 4,500 m.
- The geology includes Carboniferous carbonates of the Cambrian to Recent Bonaparte Basin, analogous to the Canning Basin to the south - interest was regenerated in the area following the discovery of the Ungani Oil Field in the Canning Basin in 2011 by Buru Energy - the geological settings are considered similar.
- Another analogy is the giant Tengiz Oil Field, located on the Caspian Sea in Kazakhstan, which was discovered in 1979, and is one of the largest recent petroleum discoveries globally, and currently ranks as the world's 6th largest operating oil field.
- The Tengiz reservoir is ~19 km x 21 km in area, and 1.6 km thick, making it the largest producing single trap reservoir globally.
- Tengiz (owned 50% by Chevron through Tengizchevroil) currently produces ~450,000 bopd (plus gas), from estimated recoverable reserves of between 7.1 Bboe and 10.9 Bboe; plans are afoot to expand production to up to 850,000 bopd by 2022.

Figure 13: Beehive Prospect



Source: Melbana

Figure 14: Beehive section (top) and comparison with Tengiz (bottom)



Source: Melbana

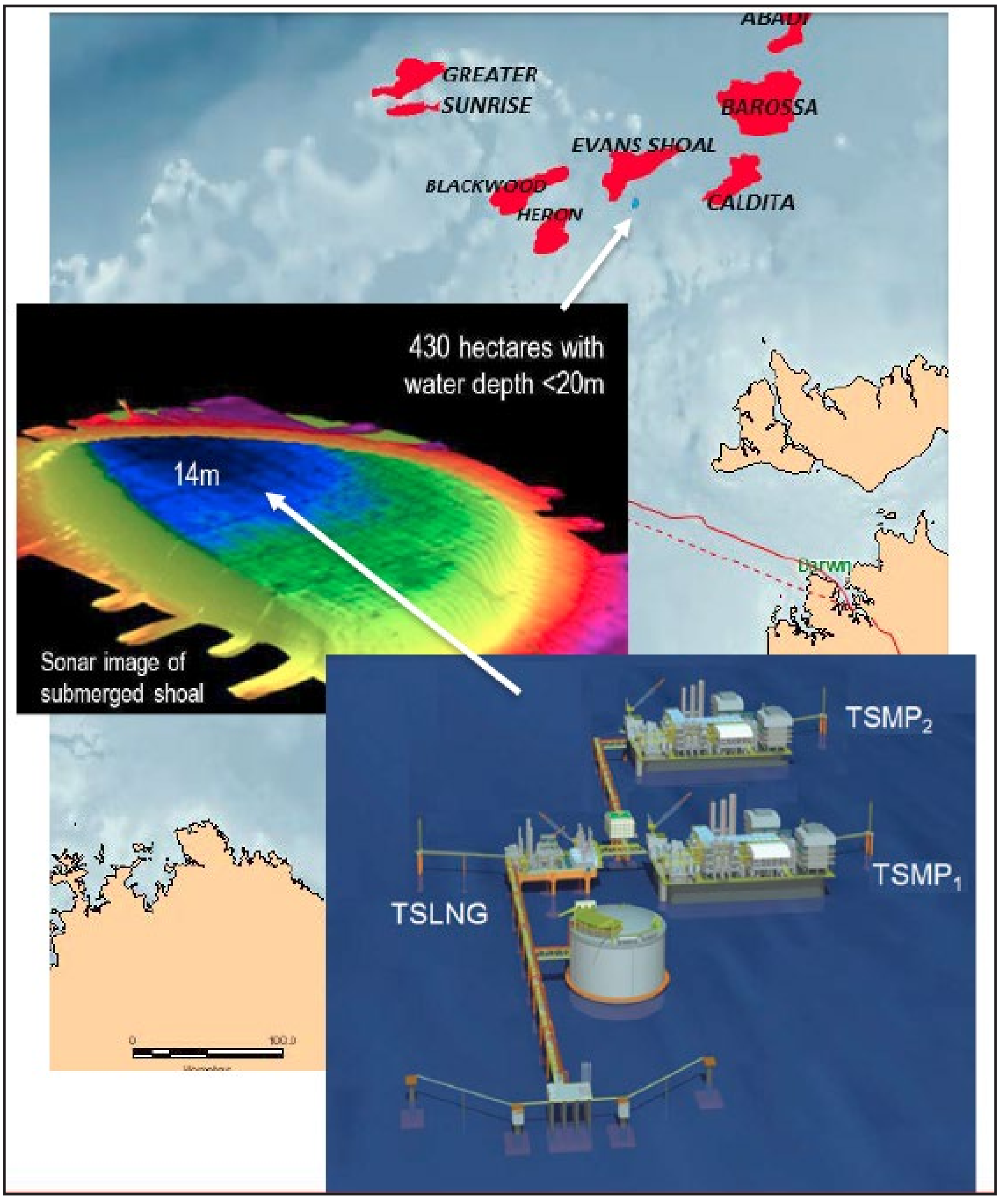
TASSIE SHOAL METHANOL AND LNG PROJECT

- Tassie Shoal, located off the north coast of the Northern Territory (Figure 15) presents an unique opportunity to provide treatment facilities for stranded gas assets in the Northern Territory offshore areas of the Bonaparte Basin - the proposed treatment facilities have Federal Australian environmental approval, with these in place until 2052 - it would be impossible to get these long term approvals granted now with a new application.
- Tassie Shoal is a denuded shoal, 400ha in size, located close to known gas reserves including the Barossa and Evans Shoal Gas Fields some 300km NW of Darwin; it has been announced by ConocoPhillips that the Barossa Gas Field is planned to be developed

to supply feedstock to the Darwin LNG facility from 2023, following the end of life of the current Bayu-Undan field in 2022.

- If this eventuates it will leave other fields, including Evans Shoal, stranded, thus providing the opportunity to treat the gas.
- Evans Shoal, with an estimated 8 Tcf of raw gas in place, is held under Retention Lease NT/RL7 by Eni Australia Ltd (65% and operator), PETRONAS Carigali (Australia) Pty Ltd (25%) and Osaka Gas of Australia Pty Ltd (10%).
- The proposed facilities would be located on platforms fixed to the shallow seabed, with methanol and/or LNG production trains.
- The viability of LNG production however would depend upon being able to economically treat and dispose of the high (30%) CO_2 content of the feedstock; in this case methanol provides an alternative production route should the resource owners elect.

Figure 15: Tassie Shoal location and conceptual site plan



Source: Melbana

CURRENT AND UPCOMING ACTIVITIES

- In Cuba, activities are concentrated on preparing for the planned upcoming drilling on Block 9, with drilling planned to commence in April, with two wells to be drilled in 2019 and one in 2020.
- Also in Cuba, negotiations are continuing on the Santa Cruz IOR opportunity, which is expected to be finalised in December this year - if successful this will lead to a ramp up in activities at Santa Cruz commencing in early 2019.

- In Australia the key activity is the ongoing processing of the Beehive 3D seismic data, with this expected to be delivered in February, and hence leading to a decision by the farminees on whether to exercise the option by August, and which will also trigger the requirement to drill the initial hole into Beehive in 2020.
- The Company is sufficiently funded for activities in the short to medium term - with Block 9 and Beehive costs being covered (subject to finalisation of agreements), the next significant costs will come with Santa Cruz, should a commercial agreement be finalised with CUPET.

VALUATION

- We have completed a sum of the parts base case NAV for Melbana, as presented in Table 4 - per share values are based on the current share structure with no allowance for any future capital raisings.
- This includes valuations for Block 9, Beehive, cash and debt; we have ascribed a nominal value for Santa Cruz and Tassie Shoal (partly to reflect money spent at Tassie Shoal) and no value for options (which are all out of the money).
- We see considerable upside with this valuation, particularly with success at Beehive, which we have risked at 5% to reflect uncertainties.
- Further details on the valuation methods are presented in the relevant following sections.

Table 4: Melbana valuation

Melbana valuation					
Item	**Unrisked Value (A$m)**	**Unrisked Value/Share (A$)**	**Risked Value (A$m)**	**Risked Value/ Share (A$)**	**Notes**
Block 9	$372	$0.199	$61.6	**$0.033**	Post-tax, NPV_{10}
Beehive	$531	$0.284	$39.8	**$0.021**	Post-Tax NPV_{10}
Tassie Shoal, Santa Cruz	$4.00	$0.002	$4.00	**$0.002**	Nominal, includes past expenditure on Tassie Shoal
Cash	$8.36	$0.004	$8.36	**$0.004**	As of September 30, 2018
Debt	-$3.10	-$0.002	-$3.10	**-$0.002**	As of September 30, 2018
Total	**$915**	**$0.488**	**$113**	**$0.059**	

Source: IIR analysis

BLOCK 9 VALUATION

- Our Block 9 valuation (Table 5) is based on the pre-tax NPV of risked oil due to Melbana under the terms of the AGMI agreement, with the assumption that the binding agreement is executed.
- Given the eight year tax free holiday the amount of tax payable in Cuba will vary dependent upon the production term; the Company also has significant tax losses of A$267 million.
- In this, we have calculated the amount of oil due to Melbana under the agreement, using the assumptions as presented in Table 6 - this assumes that the contractor receives 50% of total profit oil (or 40% of gross oil, allowing for a cost recovery of 20%), and that Melbana receives 12.5% of the contractors profit oil of 40%, or 5% of gross oil recovered.

Table 5: Block 9 valuation

Block 9 valuation										
Prospect	**Best MMbbl**	**GCoS**	**CCoS**	**TCoS**	**Risked MMbbl**	**Attrib MAY %**	**Attrib MAY MMbbl**	**NPV/ bbl A$**	**Risked NPV A$m**	**Risked NPV share A$**
Alameda	72	32%	70%	22.4%	16.1	5.00%	0.81	$27.58	$22.24	$0.012
Alameda N	9	23%	70%	16.1%	1.4	5.00%	0.07	$27.58	$2.00	$0.001
Amistad	60	15%	70%	10.5%	6.3	5.00%	0.32	$27.58	$8.69	$0.005
Zapato	95	23%	70%	16.1%	15.3	5.00%	0.76	$27.58	$21.10	$0.011
Piedra	34	23%	70%	16.1%	5.5	5.00%	0.27	$27.58	$7.55	$0.004
Total Block 9	**270**			**16.5%**	**44.6**		**2.23**		**$61.58**	**$0.033**

Source: IIR analysis

Table 6: Block 9 parameters

Block 9 parameters		
Parameters	**Amount**	**Notes**
WTI Price per bbl $US	$60.00	Long term historic price average
AUD/USD	0.75	Long term historic price average
WTI Price per bbl $A	$80.00	
Discount to WTI	20%	Assumption - Sherritt sells at ~30% discount, however Block 9 expected to be of better quality - sensitivity analysis is presented in Table 7
Received Price per bbl $A	$64.00	
Effective Tax Rate	15%	Estimate only - possible reduction of 22.5% rate under tax holiday
Chance of Commercial Success	70%	Estimate
MAY Profit Oil Interest	12.50%	As for AGMI agreement
Cost Recovery	20%	Estimate, based on average of last 10 years for Sherritt
Contractor's Interest	50%	Estimate, based on Sherritt (now 45%) and indicative figures in Table 1 - sensitivity included below
Discount Rate	10%	
PSC Production Term	15 years	Used to set NPV multiplier, estimate only
NPV Multiplier	50.7%	Calculated from DR and PSC production term, however needs to be treated as indicative only
NPV/Profit bbl A$	$27.58	Calculated from received price x NPV multiplier

Source: IIR analysis

- Table 7 presents a sensitivity of the Block 9 per share value to discount to WTI price and contractor's interest in total profit oil.

Table 7: Block 9 sensitivity per share to PSC split and oil price discount

Block 9 sensitivity per share to PSC split and oil price discount				
Oil price discount → PSC split ↓	**15%**	**20%**	**25%**	**30%**
40%	$0.028	$0.027	$0.025	$0.023
45%	$0.032	$0.030	$0.028	$0.026
50%	$0.035	$0.033	$0.031	$0.029
55%	$0.039	$0.037	$0.034	$0.032
60%	$0.042	$0.040	$0.037	$0.035

Source: IIR analysis

BEEHIVE VALUATION

- We have valued Beehive on the risked, post-tax NPV of the 2P Resources, assuming that the current option is exercised and that Melbana retains a 20% working interest.
- Our operating and capital cost estimates are based on industry comparisons for shallow water operations in Australia, with these used in a "back of the envelope calculation" to calculate the NPV per barrel - assumptions used are presented in Table 9.
- As such, we have risked our valuation at 7.5% to reflect the significant uncertainties (including possible product mix), particularly that any drilling is yet to be undertaken at Beehive; as a comparison we calculated the value of 20% of the prospect using the expected farm-out expenditure to be A$0.01/share.
- Given the risking, the Beehive valuation provides significant upside with success.

Table 8: Beehive valuation

Beehive valuation										
Prospect	**Best MMbbl**	**GCoS**	**CCoS**	**TCoS**	**Risked MMbbl**	**Attrib MAY %**	**Attrib MAY MMbbl**	**NPV/ bbl A$**	**Risked NPV A$m**	**Risked NPV share A$**
Beehive	388	20%	37.5%	7.5%	29.1	20%	5.82	$6.84	$39.80	$0.021

Source: IIR analysis

Table 9: Beehive parameters

Block 9 parameters		
Parameters	**Amount**	**Notes**
WTI Price per bbl $US	$60.00	Long term historic price average
AUD/USD	0.75	Long term historic price average
WTI Price per bbl $A	$80.00	
Capex and Opex per bbl $A	$25.00	Typical shallow water costs in Australia
PRRT - Govt Share	40%	Doesn't take account of potential PRRT credits, development capex
Corporate Tax Rate	30%	Company's A$270 million tax losses not taken into account given the quantum of potential cash flows from Beehive - effect on tax would be low
NPAT per bbl A$	$21	Estimate, based on Sherritt (now 45%) and indicative figures in Table 1 - sensitivity included below
NPV multiplier	30%	Based on 20 year production term, 5-10 years to first production and ramp-up
NPV per bbl A$	$6.84	Calculated from NPAT per bbl x NPV multiplier

Source: IIR analysis

CAPITAL STRUCTURE

- Melbana currently has 1,870 million fully paid ordinary shares on issue, and 185 million unlisted options and performance shares as detailed in Table 10.
- The Board and Management currently hold ~4.94%, with the largest shareholder (direct and indirect) being Cadence Asset Management with 6.45%.
- The Company has over 7,000 shareholders, with the top 20 holding 25.76%.

Table 10: Options

Unlisted options			
Expiry Date	**Number**	**Exercise Price**	**Cash on Exercise**
3/11/2019	4,000,000	A$0.065	A$260,000
27/09/2020	11,250,000	A$0.032	A$360,000
23/11/2020	20,000,000	A$0.018	A$360,000
19/04/2019	80,000,000	A$0.022	A$1,760,000
27/03/2020	62,939,202	A$0.03	A$1,888,176
Total/Average	**178,189,202**	**A$0.026**	**A$4,628,176**
Performance Rights	6,763,158	-	-

Source: Melbana

RISKS

- **Discovery**: This is the key risk for Melbana, with the expected upcoming well drilling at Block 9 and Beehive.
- **Agreement execution/option:** With the exception of Tassie Shoals, all of the Company's projects and upcoming activities are predicated on the successful execution of agreements and options - failure to execute any of these will result in delays on the relevant projects.
- **Funding:** This is a perennial issue for junior explorers, however with a health bank balance and being carried in major operations Melbana is in a relatively good position at the moment - this will change however once an agreement is signed for Santa Cruz, at which time the Company will need to fund the capital for activities prior to receiving cash flow from oil sales - (the quantum of this is not as yet known).
- **Markets:** Although relatively buoyant at the moment, markets can turn on a dime and funding for juniors can dry up very quickly.
- **Permitting and Sovereign Risk:** – Although Cuba may appear risky to some, the fact that Sherritt has operated there since 1992 somewhat mitigates this. Western Australia is a well regarded and mature oil and gas producing jurisdiction.

BOARD AND MANAGEMENT

- **Mr Andrew Purcell, B Eng, MBA, MAICD – Chairman**: Mr Purcell founded Lawndale Group (formerly Teknix Capital) in Hong Kong over 10 years ago, a company specialising in the development and management of projects in emerging markets across the heavy engineering, petrochemical, resources and infrastructure sectors. Prior to this, Mr Purcell spent 12 years working in investment banking across the region for Macquarie Bank then Credit Suisse. Mr Purcell also has significant experience as a public company director, both in Australia and across Asia.

  Mr Purcell is a Non-Executive Director of AJ Lucas Group Limited (ASX: AJL).

- **Mr Michael Sandy, BSC Hons (Geology), MAICD – Independent Non-Executive Director:** Michael Sandy is a geologist with 40 years' experience in the resources industry – mostly focused on oil and gas. Michael had a varied early career with roles in minerals exploration and research and a role with the PNG Government based in Port Moresby. In the early 1990s he was Technical Manager of Oil Search Limited also based in Port Moresby. Michael was involved in establishing Novus Petroleum Ltd and preparing that company for its $186m IPO in April 1995. Over 10 years, he held various senior management roles with Novus including manager of assets in Australia, Asia, the Middle East and the USA and Business Development Manager involved in numerous acquisitions and divestments. He co-managed the defence effort in 2004 when Novus was taken over by Medco Energi.

  For the last 12 years, Michael has been the principal of consultancy company Sandy Associates P/L involved in petroleum, minerals, geothermal, environmental and disaster management projects and resources industry start-ups. He is currently Non-Executive Chairman of MEC Resources (ASX:MEC)

  He was previously a non-executive director of Tap Oil Limited (ASX: TAP), Hot Rock Ltd (ASX: HRL), Caspian Oil and Gas (ASX: CIG) and Pan Pacific Petroleum (ASX:PPP) and ex-chairman of Burleson Energy Limited (ASX: BUR).

- **Mr Peter Stickland, B.Sc Hons (Geology), GDipAppFin (Finsia), GAICD – Non-Executive Director:** Peter Stickland has over 25 years global experience in oil and gas exploration. Peter was CEO of Melbana Energy from 2014 until early 2018 during which time he led the restructuring of the company and secured the Block 9 PSC in Cuba. Prior to joining Melbana Peter was CEO of Tap Oil Limited (ASX: TAP) from 2008 until late 2010 during which time he oversaw the evolution of the company into a South East Asia/Australia focused E&P Company. Earlier, Peter had a successful career with BHP Billiton including a range of technical and management. Peter was a member of the Board of Australian Petroleum Production and Exploration Association Limited (APPEA) from 2009 to 2017.

  Mr Stickland is a Non Executive Director of Entek Energy Limited (ASX: ETE) and a Non Executive Director of Talon Petroleum Limited (ASX: TDP).

- **Mr Robert Zammit, B. Ec, GAICD - Chief Executive Officer:** Robert Zammit has over 30 years international experience in the oil and gas industry. Over his career with ExxonMobil, he has worked in a variety of commercial and business development roles in Australia, Europe, Asia and the USA. Robert has had key roles leading commercial teams negotiating complex multi-billion dollar international transactions in challenging geo-political environments, including acting as Gorgon Project lead negotiator for the first ever long term sale of Australian LNG to a consortium of Indian buyers and also as ExxonMobil's Americas LNG Supply & Infrastructure Manager where he was responsible for closing the suite of commercial agreements for divertible LNG supply from Middle East interests. Robert has also undertaken a number of niche business development activities in the Asian region, including Japan, Vietnam and Indonesia. In his previous role at Melbana Energy, Robert had responsibility for the commercial and business development activities of the company.

- **Mr Errol Johnstone, B.Sc (Geology/Geophysics) - Chief Geoscientist:** Errol Johnstone has had a distinguished international career with ExxonMobil over 29 years in a variety of exploration and appraisal roles, with particular emphasis on new ventures, basin analysis and new play generation. Mr Johnstone is one of the industry's experts in Structural Geology, Regional Geologic synthesis, Sequence Stratigraphy and 2D/3D Seismic Interpretation. He has extensive experience working on multi-disciplinary taskforce studies working with Russian, Japanese, Malaysian and Indonesian geoscientists and has also been active in teaching structural geology field schools and mentoring new geoscience staff.

With experience throughout most of the Australian and Far East basins including Russia, Mr Johnstone's multidisciplinary skills in geoscience integration generated many new exploration play initiatives resulting in several significant discoveries.

- **Dr. Rafael Tenreyro, B.Sc (Mining Eng.), M.Sc (Geophysics), M.Sc (Petroleum Geo.), Ph.D. (Expl Geophysics) - Cuba Representative:** Dr. Rafael Tenreyro has over 40 years of experience in the Cuban oil industry, working in a exploration projects which lead to the discovery, evaluation and development of 14 oil fields. Most recently, he was the Exploration Director for Cupet (National Oil Company of Cuba) leading all exploration programs by Cupet and participating in exploration projects by foreign companies of Production Sharing Contracts. As well as his native Spanish, he is fluent in English, Russian and Japanese.

OIL AND GAS GLOSSARY

Glossary	
Volumes	
boe	Barrel of oil equivalent - based on energy content, and not monetary value
bbl	Barrel (= 158.987 litres)
cf	Cubic feet
m³	Cubic metre (= 35.31cf)
Units	
M	Thousand (10^3)
MM	Million (10^6)
B	Billion (10^9)
T	Trillion (10^{12})
Energy Contents	
KJ	Kilojoule (10^3 joules)
MJ	Megajoule (10^6 joules)
GJ	Gigajoule (10^9 joules)
PJ	Petajoule (10^{12} joules)
btu	British thermal units
Non Gas Liquids	
C3	Propane (the number refers to the number of carbon atoms in the molecule
C4	Butane
C5+	Pentane and heavier
Energy Equivalents	
1 Mcf	~1.162 MMbtu
1 Mcf	~1.09 GJ
1 boe	6 Mcf gas
Miscellaneous	
PSC	Production Sharing Contract
IOR	Incremental Oil Recovery
GCoS	Geological Chance of Success
CCoS	Commercial Chance of Success
TCoS	Total Chance of Success
pd	per day
pa	per annum
WTI	West Texas Intermediate crude

Source: Various

API Gravity Measurement

- API gravity, a unitless figure, measures the relative density of oil compared to water (with a density of 1000 kg/cubic meter).
- The basis API gravity number is 10°, which is equivalent to the density of water, with a higher API number indicating a lighter oil.
- There are three main grades of crude oil under the API system:
  - Heavy crude - API gravity of < 22.3°,
  - Medium crude - API gravity of between 22.3 and 31.1; and,
  - Light crude - API gravity of >31.1.
- These ranges can differ between different parties.
- To calculate API gravity, the formula API gravity = 141.5/SG - 131.5 is used.

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