



## ASX ANNOUNCEMENT

10<sup>th</sup> October 2011

### SCADDAN CTL PLANT PRELIMINARY PROCESS STUDY

- Coal to liquids (CTL) Preliminary Process Study (PPS) confirms 15,000 barrels per day CTL operation technically feasible
- Fischer-Tropsch process producing Diesel and Naphtha
- Production of 6.1 million barrels of oil equivalent per annum
- Current combined resources equate to approximately 40 years worth of feedstock based upon a 60,000 barrel per day CTL facility
- Potential for 870 million bbls oil equivalent production based upon existing resources

Australian resource company, Blackham Resources Ltd (ASX: BLK) is pleased to announce the results of its CTL Preliminary Process Study (PPS). The production yields confirm the results of the scoping study previously reported. The PPS report was prepared by a consultant after confirming mass energy balances and yields with the technology suppliers.

**Table 1 - Production parameters for 15,000 bpd plant**

15,000 bpd plant		per Day	per Annum
Plant availability 330 days	%		90.4
Lignite tonnes mined	wet tonnes	25,000	8,250,000
Mine life	years		100 years
Production output	barrels	16,100	5,313,000
Diesel	barrels	12,075	3,984,750
Naphtha	barrels	4,025	1,328,250
Sulphur	tonnes	243	80,190
Oil equivalent	barrels	18,580	6,131,396

## **CTL Preliminary Process Study**

Blackham has identified a list of six gasification technologies suitable for gasifying Scaddan lignite for the production of chemicals and fuels. As Blackham, the manager of the Scaddan CTL Project, believes the production of low temperature Fischer-Tropsch (LTFT) diesel and naphtha, via gasification, is an attractive option for value addition to the Scaddan lignite. Blackham commissioned a consultant to prepare this PPS Phase II study. The Phase I Study, completed in March 2011, established process flow diagrams that included the feed pre-treatment, and relevant salt disposal, requirements for the six gasification technologies. Nine process flow sheets were prepared, including variations in the fluidised bed (2), slurry feed entrained flow (3), dry feed entrained flow (2) and one each for moving bed and Transport gasification processes.

The PPS Phase II study aimed to establish the major plant and equipment specifications for the eight CTL process flow sheet options prepared in the Phase I report finalised in March 2011. These specifications are required to be sufficient for submission to technology vendors, and engineering, procurement and construction (EPC) contractors for the provision of plant package cost estimates ( $\pm 30$  per cent precision), in the next phase of the PPS.

The plant and equipment specifications were based on mass and energy balances (MEB) for the major process plants incorporated in the process flow sheets. The MEB are also required to provide the material usage rates for operating cost estimates ( $\pm 30$  per cent precision) in the next phase of feasibility studies.

The published information covering the lignite pre-treatment, gasification and LTFT fuels synthesis processes identified is a fair reflection of future performance expectations for the production of synfuels from the Scaddan lignite. A base case plant capacity of 25,000 tonnes lignite ( $\pm 15,000$  barrels LTFT fuels) per day was used.

## **Conclusions and Recommendations**

Mass Energy Balances were prepared for eight of the gasification technology flow sheets drawn in the PPS I study. One raw lignite gasification process was excluded due to the unavailability of suitable information. All MEB were based on a nominal processing rate of 25,000 tonnes per day raw Scaddan lignite. This rate enables the production of up to 16,000 barrels of LTFT diesel and naphtha fuels per day.

Raw lignite usage rates, LTFT fuel yields, carbon dioxide, ash, effluent and sulphur by-products production rates were compared for the eight process flow options. Process yields and utility rate data were based on the consultants May 2010 Gasifier feed pre-treatment and MEB study, the coal beneficiation laboratory results and MEB data updates from gasification technology vendors. It was concluded that LTFT fuels yields ranging from 0.40 to 0.70 bbl per tonne raw lignite were possible, based on the current level of Scaddan lignite pre-treatment and gasification technology vendor computer simulations. These yields are similar to the 0.64 value used in SEPL's project projections since 2008.

The yields analysis indicates a short list of technologies for detailed assessment:

Process flow sheet Option 1 (0.64 bbl/t lignite)  
Process flow sheet Option 2 (0.58 bbl/t lignite)  
Process flow sheet Option 3 (0.54 bbl/t lignite)

#### Process flow sheet Option 4 (0.54 bbl/t lignite)

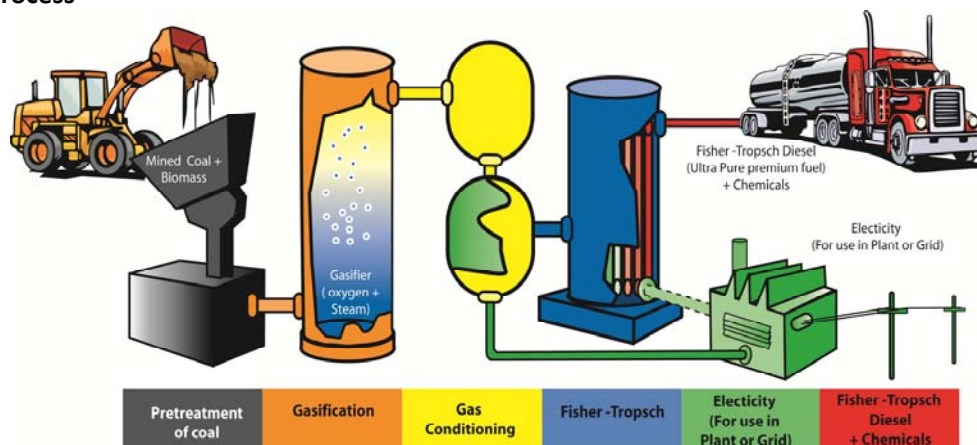
Major plant and equipment specifications were prepared for the eight technologies considered, for use in assessing the ballpark costs of a short list of gasifier designs during the preliminary feasibility study. Effluent treatment plant technologies and capacities will need detailed assessment.

This study has estimated process yields and plant requirements for eight lignite gasification technologies. It is considered important that Blackham select a short list that is sufficiently flexible for adaption to the gasifier and synthesis technologies finally chosen for the project.

#### CTL Products

The predominant products from a CTL facility would be a high quality diesel and naphtha with a by-product of sulphur. The diesel produced would be a direct import replacement product for Western Australia but also with the ability to export liquids through the Esperance Port. The study has assumed the use of the Fischer-Tropsch (FT) liquids process to produce diesel and naphtha.

#### CTL Plant Process



#### Milling and Pre-treatment

The first stage of the process is for the lignite to be milled and pretreated to permit it to be fed into the Gasifier. The de-watering process assumed in the PPS offers low energy consumption and the ability to remove much of the chlorine from the lignite. Laboratory scale performance testing of Scaddan lignite was undertaken and enabled the parameters for dewatering to be determined. During the feasibility study further work will be performed on the selection of the optimal drying process.

#### Gasification

Pre-treatment and drying of the lignite is required to ensure a suitable feedstock for most gasification technologies. The suppliers of the technologies have confirmed they believe their gasifiers are suitable for pre-treated Scaddan lignite pending fluidisation and gasification testing. Further gasification testing is required to confirm production yields.

### ***Gas Conditioning, Fischer-Tropsch Production and GT Combined Cycle***

The remainder of the plant complex consists of several well proven process units. The technologies and costs of which are based on a substantial background of commercial operation. They include the cryogenic air separation plant, combined cycle power plant, syngas conditioning plant, liquids synthesis plant and coal/ash handling plants.

### **Technologies, products and plant capacity**

The nine process flow sheet options identified in the PPS Phase 1 were investigated through contact with each technology vendor, and updates of gasification performance expectations for the feedstock confirmed.

### **Products and plant capacity**

Blackham has selected the synthesis of low temperature Fischer-Tropsch (LTFT) diesel and naphtha from syngas production by gasification of its Scaddan, Western Australia, lignite deposit. A base case processing rate of 25,000 tonnes raw lignite per day, equivalent to approximately 15,000 barrels (bbl) fuels per day was used in the comparison of the gasification technologies under consideration.

### **Mass and Energy Balances**

The process flow sheets identified for the nine gasification technology variations in the March 2011 PPS I study were used to prepare eight MEB's. Both step-wise calculations (bottom-up) and overall published results (top down) methods were used to calculate these results. In most cases it was possible to check, and correct the yields, using estimates prepared by each technology vendor. Some significant differences in expected yield were found, some of which have yet to be resolved. These problems are attributed to the very general nature of many vendor estimates. It may be possible to eliminate these at the next stage of the project, viz. the feasibility stage, where a short list of technologies are investigated in sufficient detail, using pilot plant batch sized feedstock alternatives.

The MEB results have identified a range of LTFT fuel synthesis yields from 0.4 to 0.70 bbl per tonne raw lignite, which are at this stage considered ( $\pm$  30 per cent precision), subject to confirmation in the selected technologies bench and pilot plant tests.

### **Coal Resources**

**Table 2 - Summary of Coal Resources<sup>1</sup>**

<b>Project</b>	<b>JORC<sup>1</sup> Resource Category</b>	<b>Total Mt</b>	<b>Blackham Attributable Mt</b>
Scaddan	Measured	80	50
	Indicated	490	340
	Inferred	470	340
Zanthus	Inferred	350	350
<b>Total</b>		<b>1,390</b>	<b>1,080</b>

For more information on coal resources and inventory coal please refer to ASX announcement of 21<sup>st</sup> June 2011.

## Potential Oil Production

The Scaddan and Zanthus Energy Projects have a combined coal resource of 1.4 billion tonnes containing over 10,600 PJ of energy and potential for 870 million barrels of oil equivalent mostly in the form of clean diesel. Blackham's attributable resource is 1.1 billion tonnes of coal.

**Table 3 – Potential barrels of oil**

Project	Resource Mt	Blackham Share Mt
Scaddan Energy Project	1,040	730
Zanthus Energy Project	350	350
<b>Total Resource</b>	<b>1,390</b>	<b>1,080</b>
<b>Potential barrels of oil equivalent</b>	<b>870 million bbls</b>	<b>680 million bbls</b>

Based upon PPS yield of 0.64 barrels of oil for every wet tonne of lignite. 75% of the oil product is in the form of diesel. This will be further confirmed by testing during the feasibility study.

There is also additional production potential from the 660-1,080 million tonnes of inventory coal<sup>2</sup>.

The current Scaddan and Zanthus resources equates to 40 years worth of feedstock for a 60,000 barrel per day potential CTL facility. The initial Scaddan mine plan also confirms most of the resource in the pit area converts to mineable tonnes. The current pit shell would also allow for greater than 20 years worth feedstock for a 40,000 barrel per day operation. Further drilling of the Scaddan deposit is planned to increase the potential capacity of the project.

The Scaddan CTL project offers Blackham shareholders significant leverage to rising energy prices as world economies increase their economic growth.

Blackham continues discussions with various interested potential strategic partners with a view to development or sale of the Scaddan Coal & CTL Project.

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## **About Blackham**

*Western Australian resources company, Blackham continues to evaluate the development of the Scaddan and Zanthus Energy Projects for export of coal and building of a coal to liquid (CTL) facility.*

*The Scaddan and Zanthus Energy Projects, located near Esperance, Western Australia, contain world scale coal deposits totalling 1.4 billion tonnes with over 10,600 PJ of energy at shallow depth and very low mining costs. The project has the potential to produce 860 million barrels oil equivalent, consisting mainly of a clean diesel, as well as additional power for the region.*

*The Scaddan Energy Project is surrounded by complimentary infrastructure approximately 60 kilometres north of the town and major port of Esperance and 10 kilometres east of the Esperance to Kalgoorlie highway, gas pipeline and railway line.*

*Blackham has large landholdings with in Western Australia targeting a number of commodities.*

## **Competent Persons Statement**

*The information contained in the report that relates to Resources or Inventory Coal is based on information reviewed by Mr Jason Detheridge, who is an employee of the Company. Mr Detheridge is a Member of the Australasian Institute of Geoscientists and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which is being undertaken to qualify as a Competent Person as defined in the 2004 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr. Detheridge has given consent to the inclusion in the report of the matters based on his information in the form and context in which it appears.*

*1 The JORC Code – "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves", the Joint Ore Reserves Committee of the AusIMM AIG and MCA, December 2004.*

*2 An estimate of inventory coal was prepared by Runge based upon the drill hole data. The Estimate of coal inventory is in addition to the Resources. The estimate of inventory coal at Scaddan and Zanthus prepared by Runge based upon the drill hole data. Drilling of several quality holes of a spacing of no more than 4,000m should readily convert most of the inventory area to an Inferred Resource as there is reasonable confidence in the structural continuity of the lignite from previous drill holes. However the inventory coal tonnage and quality is still considered conceptual in nature and has not had sufficient exploration to define a mineral resource and uncertainty still exists as to whether further exploration will result in the determination of a mineral resource.*

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