



21 September 2011

Manager Announcements Company Announcements Office Australian Stock Exchange Limited 10th Floor, 20 Bond Street SYDNEY NSW 2000

Via electronic lodgement

Dear Sir/Madam,

# CONCEPT STUDY DEMONSTRATES TECHNICAL AND COMMERCIAL VIABILITY OF SESE COAL PROJECT

#### **HIGHLIGHTS**

- Concept Study confirms technical and commercial viability of the 2.7 billion tonne Sese Coal Project.
- Robust cash flows and strong operating margins are possible under a variety of scenarios.
- Staged development plan:
  - Stage 1 cash flow positive from 2013 from initial 1Mtpa project
  - Stage 2 existing infrastructure is capable of supporting expansion to 5Mtpa
  - Stage 3 and 4 production of 20Mtpa and beyond possible via large-scale export tonnages and increased domestic power station fuel sales.
- Attractive project economics:

	OPEX US \$/ROM t	CAPEX US \$
Stage 1 (Contractor)	\$13/t	\$46M
Stage 2 (Contractor)	\$10/t	\$104M

 Board approval for bankable feasibility study to commence for the Stage 2 (5Mtpa) development. African Energy Resources Limited

**ASX: AFR** 

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#### **Executive Summary**

A Concept Study to evaluate the technical and commercial viability of the Sese coal project in Botswana was completed under the supervision of Mr Philip Clark, the Company's Senior Coal Consultant. The Concept Study comprised a number of modules performed by independent consultants:

> (GEMECS, Coffey Mining) Geology and mineral resources Mining and mine scheduling (Minserve Pty Ltd) Coal processing and handling (CPG Resources and QCC Ltd) Marketing and price forecasts (Wood Mackenzie) Coal chain logistics (Wood Mackenzie) Power supply/demand for the region (Parsons Brinckerhoff South Africa) (Wood Mackenzie Coal Supply Series, in-house) Operating and capital cost estimates

The Study concluded that the project could be developed through a staged approach (Figure 1). An initial, up to 1Mtpa, operation (Stage 1) can generate cash flows within two years and involves selling washed coal into domestic and regional markets. Additional coal sales to a power station, and moderate volumes of export sales could expand Sese into a 3-5Mtpa (Stage 2) operation. Existing rail and port infrastructure are able to support Stage 1 and Stage 2 operations. Stage 1 and Stage 2 were considered to be best suited to a contractor serviced operation.

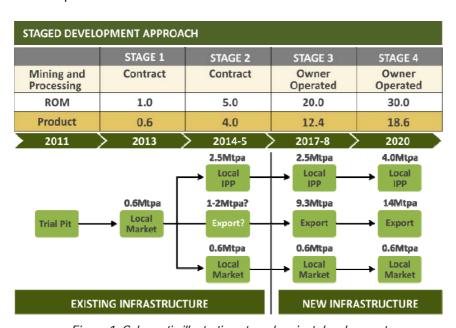


Figure 1. Schematic illustrating staged project development

Expansion of the project beyond Stage 2 is possible through increased sales of coal to power stations, and/or through increased volumes of export sales (with India the likely market). Increased volumes of export sales would require the construction of a heavy haulage railway and associated port infrastructure. The ultimate Stage 4 project could exceed 30Mtpa production assuming new infrastructure is built. Stage 3 and Stage 4 will likely be an owner operated mine.



The Concept Study has determined that strong operating cash margins may be possible under a variety of scenarios that do not require new rail and port infrastructure. As such, the Board believes that further evaluation of the project is warranted and has approved a feasibility study to refine the technical and commercial evaluation of a mining operation to deliver up to 5Mtpa (Stage 2 operation).

#### Infrastructure

A detailed assessment of rail and port infrastructure was not undertaken as part of the Concept Study, although the Company is maintaining dialogue with long term infrastructure consortia evaluating both east-coast and west-coast proposals. Stage 1 and Stage 2 projects do not involve the export of large tonnages of coal and therefore require no additional rail or port infrastructure beyond that which exists within 30km of the deposit. This allows Stage 1 and Stage 2 to be developed in a short time frame which is not captive to new infrastructure development. The volume of export coal that is commercially viable from the Stage 2 operation will be determined once export trials are concluded using material from the forthcoming bulk-sample pit. The timing of Stage 3 and Stage 4 operations will be determined by the timetable of proposed new heavy-haulage railways or expansions of power station requirements.

## **Geology and Resource**

The Sese coal deposit occurs in eastern Botswana and is hosted in the same Lower Karoo sediments as all other coal deposits in the region (Figure 2). The coal at Sese is characterised by a thick main coal seam which occurs close to the basal unconformity between the Karoo Supergroup and the Precambrian basement (Figure 3).

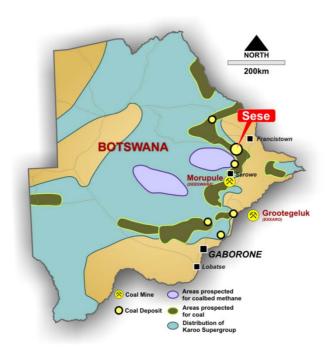


Figure 2. Location and regional geological setting of the Sese coal deposit

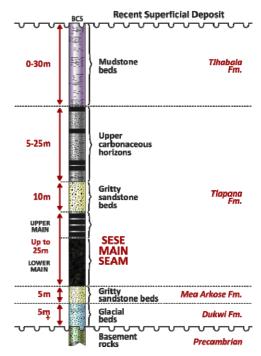


Figure 3. Simplified stratigraphic column for Sese coal deposit



The Sese Main Seam averages 14m in thickness, varying from 5m to 26m thick, and is close to surface. The Main Seam has been subdivided into the better quality Lower Main Seam (which accounts for over 60% of the total resource) and the thinner Upper Main Seam. Along the northern margin of the tenement the coal is within 15m of the surface, deepening gently to no more than 80m at the southern boundary.

Resource delineation drilling in 2010 provided information for an initial resource estimate (published on 18 May 2011) which included 500 million tonnes of Indicated Resource and 2,223 million tonnes of Inferred Resource (Table 1).

Table 1. Sese gross in-situ coal resources

SESE COAL RESOURCE, May 2011				
SEAM	RESOURCE CATEGORY	IN-SITU TONNES		
LOWER	Indicated	295 Mt		
	Inferred	1,395 Mt		
	TOTAL	1,690 Mt		
LIDDED	Indicated	205 Mt		
MAIN	Inferred	835 Mt		
	TOTAL	1040 Mt		
	TOTAL	2,730 Mt		

Samples of slimline core were tested to produce yield curves for washed coal across the entire deposit. These have demonstrated that export quality coal can be achieved through either single stage or twostage washing. Work is ongoing to optimise product specification and yields. Full seam raw coal is suitable for use as a power station fuel.

Table 2. Washed coal specification for Sese Block-B

WASHING DATA, BLOCK-B LOWER MAIN SEAM				
	Single Stage RD 1.6	Single Stage RD 1.7	Two-stage Primary RD 1.5	Two-stage Middling RD 1.5 - 1.7
Yield %	56.0	71.7	28.4	43.3
Ash %	16.2	18.0	13.8	20.8
IM %	8.0	8.0	8.0	8.0
VM %	25.6	25.2	26.2	24.3
FC %	50.2	48.8	52.0	46.9
TS %	0.27	0.26	0.31	0.23
CV MJ/kg	21.88	21.23	22.68	20.29
CV kcal/kg	5,220	5,070	5,420	4,850



# **Mining Method**

The Sese deposit has a number of characteristics ideally suited to low cost open cut mining methods:

- Large continuous seam with a strike-length of some 35km;
- Thick main seam which averages 14m thick;
- Full seam strip ratios of 1.6:1
- Little apparent structural modification, and
- Very shallow dips in a very flat surface terrain.

Mine design has been based on conventional open-cut strip mining where mining occurs along the strike of the deposit with successive strips being mined down-dip. Mining commences with a box-cut with waste initially hauled external to the pit. As mining progresses waste is hauled back in-pit to achieve a steady state dump operation. External and in-pit waste dumps would be reshaped and progressively rehabilitated throughout the life of the operation.

Mining methods considered for the operation include dragline methods, large electric rope shovels with rear dump trucks, and hydraulic excavators (diesel or electric) with rear dump trucks. The final selected option will be a factor of production rate and a trade-off between upfront capital and ongoing operating costs.

Mining cases for each of the four stages were modelled to define indicative production schedules. Mine sequencing was based on an initial cost-ranking exercise by estimating linear US\$/GJ across the deposit to identify coal with the highest margin, also accounting for minimised upfront development (example mine schedule for Stage 4 shown in Figure 4). Mining blocks are 500m long (along strike) and 200m across (down-dip). Digging equipment was assumed to operate on a continuous 24 hour roster (5,600 operating hours per annum). Different equipment inventories will be used for each stage of operation, ranging from two excavators (100t ea.) and 10 dump trucks (50t ea.) for Stage 1 and Stage 2 (larger 200t excavators and 80t to 180t dump trucks for Stage 2) to four excavators (550t) and 26 trucks (240t) for Stage 3 increasing to six excavators (550t) and 39 trucks (240t) for Stage 4.

#### **Coal Processing and Handling**

The Sese coal deposit can produce two products:

- Domestic coal for power stations, hydrocarbon conversion and regional consumption, and
- Export coal for regional and international consumption.

The export coal can be produced by processing ROM (run-of-mine) coal through either single stage or two stage washing plant.



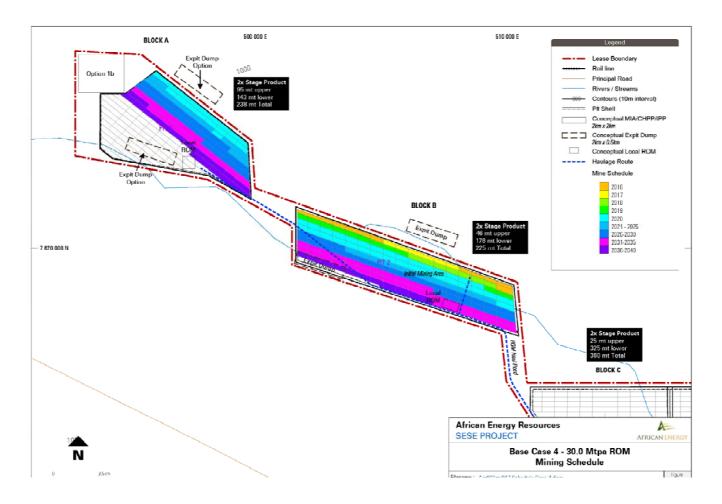


Figure 4. Example of mine scheduling for Stage 4 30Mtpa operation, first 25 years of production only

ROM coal is dry crushed to reduce size to < 50mm diameter and conveyed to a distribution bin. Domestic coal is to be produced by taking coal from the distribution bin and dry crushing and screening to <32mm diameter, totally by-passing the washing plant. This crushed stream may be blended with low quality coal from the washing plant product dependent on customer requirements.

Coal for processing to export standard is taken from the distribution bin and dry screened to remove <15mm material. This <15mm material is blended with low quality coal from the washing plant and then fed back into the domestic coal distribution bin. The >15mm material is fed into the washing plant and processed to meet customer requirements.

Two washing processes have been evaluated; air separation and dense media separation (DMS). The former has lower power and water requirements, but the trade-off is lower product yields. Dense media separators use a simple slow rotating drum with a mixture of coal and dense media adjusted to the optimum separation density. The lower density, higher energy coal floats to the surface of the media and



overflows the drum onto a screen where the media is recovered and the coal is washed to remove any residue. Further trade off studies using bulk samples are required to determine whether air separators or a DMS plant is preferred.

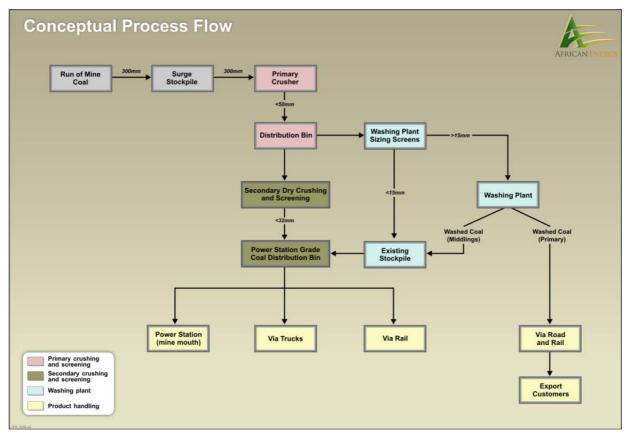


Figure 5. Indicative flowsheet for coal processing and handling

## Marketing - Coal Price forecasts

Wood Mackenzie has forecast a free-on-board (east-coast port, southern Africa) price of approximately US\$80/t for Sese export coal in 2013, increasing gradually to over US\$100/t by 2025. This assumes that Sese coal will compete with Indonesian sub-bituminous coals and that Mozambique middlings will not exert downward pressure on prices.

Price projections for supply of domestic coals into southern African power stations range from US\$1.20 to US\$1.60 per MJ/kg. Based on this assumption, Sese power station coal has a range of expected mine-gate prices between US\$25 and US\$35/t depending on product specifications.



# **Operating Cost Estimates**

Operating cost estimates have been prepared for each Stage and include provision for site preparation, drill and blast, waste mining, coal mining, general and administration and rehabilitation. The estimates have been prepared to a nominal +/- 30% to +/-35% basis (US dollars at 1 July 2011) with no provision for contingency or escalation.

Table 3. Operating Cost Estimate		Stage 1 1 Mtpa Contractor Based	Stage 2 5 Mtpa Contractor Based	Stage 3 20 Mtpa Owner Operated	Stage 4 >30 Mtpa Owner Operated
ROM coal costs					
Strip ratio		2.84	1.60	1.40	1.50
		Lower Seam	Full seam	Full Seam	Full Seam
Drill and Blast	US\$/bcm	0.90	0.90	0.90	0.90
Waste Mining	US\$/bcm	2.50	2.87	1.95	1.95
Coal Mining	US\$/ROM t	1.42	1.42	1.12	1.12
Rejects Removal	US\$/t	1.01	1.00	0.89	0.89
Support Services	US\$/ROM t	1.00	1.00	1.00	1.00
Local ROM to ROM Haulage Cost	US\$/ROM t	-	0.65	1.30	1.30
ROM Unit Costs	US\$/ROM t	12.97	9.69	8.40	6.96
Additional costs related to washing and loading					
Washing Cost (include Power)	US\$/ROM t	3.54	3.54	2.90	2.90
Product Haul / Conveyor to Siding	US\$/PROD t	-	-	3.54	3.54
Train Load (Exclude Bypass Tonnes)	US\$/PROD t	-	-	1.75	1.75
Corporate Overheads and Marketing	US\$/PROD t	0.50	0.50	0.50	0.50

These operating cost estimates have been benchmarked against the Wood Mackenzie Southern African Coal Supply Series Cost Analysis May 2011, and are consistently along the industry trend for ROM costs vs. ROM strip ratio, lending further credibility to the estimates. Cost estimates have also been confirmed with initial discussions from southern African based mining contractors. The operating costs exclude the cost of rail and port costs which have yet to be established, but which are not relevant to Stage 1 and Stage 2.



# **Capital Cost Estimates**

Capital costs estimates for each stage were generated to include all pre-production mine development, major mobile mining plant (Stage 3 and Stage 4 owner operated mines only), coal handling and processing plant (minor costs only for Stage 1 and Stage 2 related to earthworks, raw water and rejects handling), support plant, non-structural assets and pre-production operational readiness, training and management costs. The estimates have been prepared to a nominal +/- 30% to +/- 40% basis (US dollars at 1 July 2011), and include sustaining capital but no provisions for escalation or contingency.

Table 4. Capital Cost Estimate  - Project Establishment  All costs in US \$ (million)		Stage 1 1 Mtpa Contractor Based	Stage 2 5 Mtpa Contractor Based	Stage 3 20 Mtpa Owner Operated	Stage 4 >30 Mtpa Owner Operated
Mining Equipment, Support Plant	US\$ M real	3	6	168	254
Onsite Infrastructure	US\$ M real	6	19	25	25
Onsite Transport Infrastructure	US\$ M real	7	15	82	82
Offsite Transport Infrastructure	US\$ M real	5	5	5	5
Coal Handling and Preparation Plant	US\$ M real	18	18	349	508
Tailings and Reject Disposal	US\$ M real	-	19	25	40
Design and Construction Management	US\$ M real	7	23	76	99
Total	US\$ M real	46	104	730	1,013

# **Bankable Feasibility Study**

After consideration of the Concept Study results, the Board of African Energy has approved the commencement of a bankable feasibility study (BFS) to refine the operating and capital costs associated with the development of a mine to produce up to 5Mtpa ROM coal. Components of the BFS have already commenced, most notably an infill drilling programme to deliver a Measured Resource. Further details on the BFS will be released in due course.

As part of the BFS, a Botswana consultant, Ecosurv has been appointed to undertake an Environmental Impact Assessment (EIA) on behalf of African Energy. This commenced in July 2011 and has now reached the stage of community and stakeholder consultation, from which the terms of reference for the formal documentation of the EIA will be derived. It is expected that the EIA will take 12-15 months to complete.

For any further information, please refer to the Company's website or contact the Company directly on +61 8 6465 5500.

For and on behalf of the board



The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the 'JORC Code') sets out minimum standards, recommendations and guidelines for Public Reporting in Australasia of Exploration Results, Mineral Resources and Ore Reserves. The information contained in this announcement has been presented in accordance with the JORC Code and references to "Measured, Indicated and Inferred Resources" are to those terms as defined in the JORC Code.

Information in this report relating to Exploration results, Mineral Resources or Ore Reserves is based on information compiled by Dr Frazer Tabeart (an employee and the Managing Director of African Energy Resources Limited) who is a member of The Australian Institute of Geoscientists. Dr Tabeart has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person under the 2004 Edition of the Australasian Code for reporting of Exploration Results, Mineral Resources and Ore Reserves. Dr Tabeart consents to the inclusion of the data in the form and context in which it appears.

Information in this report relating to mining methods, coal processing and handling, operating cost estimates and capital cost estimates is based on information compiled by consultants under the direction of Mr Philip Clark. Mr Clark is a consultant to, and a Director of, African Energy Resources Limited and is a Member of the Australasian Institute of Mining and Metallurgy. He has over 20 years experience relevant to the style of evaluation and type of deposit under consideration and to the activity which he is undertaking 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 Clark consents to the inclusion of the data in the form and context in which it appears.

#### **Forward Looking Statements**

This report contains "forward-looking information" that is based on the Company's expectations, estimates and forecasts as of the date on which the statements were made. This forward-looking information includes, among other things, statements with respect to the Company's business strategy, plans, objectives, performance, outlook, growth, cash-flow, earnings per share and shareholder value, projections, targets and expectations, mineral reserves and resources, results of exploration and related expenses, property acquisitions, mine development, mine operations, drilling activity, sampling and other data, grade and recovery levels, future production, capital costs, expenditures for environmental matters, life of mine, completion dates, commodity prices and demand, and currency exchange rates. Generally, this forward-looking information can be identified by the use of forward-looking terminology such as "outlook", "anticipate", "project", "target", "likely", "believe", "estimate", "expect", "intend", "may", "would", "could", "should", "scheduled", "will", "plan", "forecast", "indicative" and similar expressions. The forward looking information is not factual but rather represents only expectations, estimates and/or forecasts about the future and therefore need to be read bearing in mind the risks and uncertainties concerning future events generally.

Forward-looking information is subject to known and unknown risks, uncertainties and other factors that may cause the Company's actual results, level of activity, performance or achievements to be materially different from those expressed or implied by such forward-looking information. Forward-looking information is developed based on assumptions about such risks, uncertainties and other factors set out herein, including but not limited to the risk factors set out in the Company's Annual Report.

This list is not exhaustive of the factors that may affect our forward-looking information. The Company disclaims any intent or obligations to update or revise any forward-looking statements whether as a result of new information, estimates or options, future events or results or otherwise, unless required to do so by law.

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