Indonesia – Exploring its potential

Coking Coal and Met Coke Forum, 10-11 May 2011 - Singapore
PT SMG Consultants – Who are we?

SMGC has been consulting internationally for over 45 years with a staff of highly experienced and accredited full-time professionals. Consultants cover a comprehensive range of disciplines, and their international experience covers most types of mining and minerals.
ECS International formed as a management buyout of ECS 1997

1966 ENGINEERING COMPUTER SERVICES (ECS)
Engineering Computer Service designed the Minex Software platform. ECS Mining Consultants became the consultancy arm of ECS.

OCT 2002 SURPAC SOFTWARE MERGER
On 1st October 2002 Surpac Software International and ECS International concluded a merger of the two businesses.

The consultancy division at The Surpac Minex Group separated to form an independent consulting company. SMG Consultants Pty Ltd joined The Mineserve Group. JAN 2004

MARCH 2006 SMG CONSULTANTS PTY LTD STANDALONE CONSULTANCY
SMG Consultants focused on a global business and became a standalone consultancy.

PT SMG CONSULTANTS JULY 2006 INDEPENDENT JAKARTA HEADQUARTERED CONSULTING

SMG CONSULTANTS LIMITED JULY 2010 SINGAPORE BRANCH CONSULTING

AUSTRALIAN OPERATION SOLD TO GHD JUNE 2009

PT SMG CONSULTANTS
Outline

• What are coking Coals
• Where are they found in Indonesia
• Producers and specifications
What Is Coking Coal

• Coal is classified by end use
  – Thermal coal – Heat source e.g. Power generation
  – Coking coal (Metallurgical coal) – Iron and Steel manufacture

• There is a degree of substitution between specific thermal coals and lower ranked coking coals
What Is Coking Coal

• Thermal coal is Burnt
• Coking coal takes and active chemical and physical part in a metallurgical process
• The range of quality parameters for coking coals are fundamentally different to thermal coals
• Marketing of coking coals is fundamentally different to thermal coals
• Understanding the end to end process is essential to maximise the realised value of your coking coal
Indonesian Coking Coal

- Indonesia has coking coal
- Indonesia produces coking coal
- But how much and what quality?
- Understanding your coal is essential to maximising its value in the market
Types of Coking Coals

- Premium Hard Coking
- Standard Hard Coking
- Semi Hard Coking
- Semi Soft Coking
- Low Volatile Pulverised Coal Injection (PCI)
- High Volatile Pulverised Coal Injection (PCI)

Manufacture of Metallurgical Coke

Direct injection to blast furnace
Why is the type of Coking coal important to the producer.

Coal Price Forecasts

<table>
<thead>
<tr>
<th>Coal Type</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>LT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Coking</td>
<td>313</td>
<td>248</td>
<td>225</td>
<td>193</td>
<td>155</td>
</tr>
<tr>
<td>Semi Hard</td>
<td>297</td>
<td>235</td>
<td>214</td>
<td>183</td>
<td>145</td>
</tr>
<tr>
<td>Semi Soft</td>
<td>242</td>
<td>173</td>
<td>158</td>
<td>125</td>
<td>110</td>
</tr>
<tr>
<td>PCI</td>
<td>238</td>
<td>178</td>
<td>162</td>
<td>139</td>
<td>115</td>
</tr>
<tr>
<td>Thermal</td>
<td>122</td>
<td>130</td>
<td>123</td>
<td>105</td>
<td>90</td>
</tr>
</tbody>
</table>

Percentage decrease from Hard Coking

<table>
<thead>
<tr>
<th>Coal Type</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>LT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Coking</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Semi Hard</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Semi Soft</td>
<td>23%</td>
<td>30%</td>
<td>30%</td>
<td>35%</td>
<td>29%</td>
</tr>
<tr>
<td>PCI</td>
<td>24%</td>
<td>28%</td>
<td>28%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>Thermal</td>
<td>61%</td>
<td>48%</td>
<td>45%</td>
<td>46%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Source – Credit Suisse estimates USD 2010 real terms
Coking Coal Classification

- There is no global standard by which coking coals are graded and classified

<table>
<thead>
<tr>
<th>Coal Type</th>
<th>Ash</th>
<th>Volatile Matter</th>
<th>Crucible Swelling Number</th>
<th>Gieseler Maximum Fluidity (ddpm)</th>
<th>Coke Strength after Reaction</th>
<th>Mean Maximum Reflectance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium hard coking</td>
<td>&lt;8.5</td>
<td>19 - 38</td>
<td>8 - 9</td>
<td>500 - 30,000</td>
<td>55 - 74</td>
<td>0.80 - 1.60</td>
</tr>
<tr>
<td>Standard hard coking</td>
<td>&lt;9.7</td>
<td>19 - 38</td>
<td>6 - 9</td>
<td>200 - 25,000</td>
<td>&gt;55</td>
<td>0.80 - 1.60</td>
</tr>
<tr>
<td>Semi-hard coking</td>
<td>8.0 - 10.5</td>
<td>17 - 26</td>
<td>4 - 6</td>
<td>200 - 5,000</td>
<td>50 - 60</td>
<td>0.80 - 1.70</td>
</tr>
<tr>
<td>Semi-soft coking</td>
<td>8.0 - 11.0</td>
<td>25 - 41</td>
<td>3 - 8</td>
<td>50 - 30,000</td>
<td>45 - 55</td>
<td>0.70 - 0.95</td>
</tr>
<tr>
<td>Low-volatile PCI</td>
<td>6.0 - 10.5</td>
<td>10 - 19</td>
<td>1 - 2</td>
<td>n/a</td>
<td>n/a</td>
<td>1.20 - 3.00</td>
</tr>
<tr>
<td>High-volatile PCI</td>
<td>4.0 - 10.0</td>
<td>26 - 42</td>
<td>1 - 5</td>
<td>n/a</td>
<td>n/a</td>
<td>0.70 - 0.95</td>
</tr>
</tbody>
</table>

Source: AME
Understand your coal

• There is no substitute for detailed analysis
• The producer should control their own analysis before approaching the market
• Buyers will perform independent analysis
• Then the game is on
• There is $50 to $100 per tonne at stake.
• 30% to 35% of revenue
A typical Coking coal Analysis

- **Total Moisture (AS 1038.1) (As received) %** 7.5

- **Proximate Analysis (AS 1038.3) (Air dried basis)**
  - Moisture % 1.9
  - Ash % 1.9
  - Volatile Matter % 39.9
  - Fixed Carbon % 56.3

- **Total Sulphur (AS 1038.6.3.3) (Air dried basis)**
  - Total Sulphur % 0.44

- **Forms of Sulphur (AS1038.11)**
  - Total Sulphur % 0.44
  - Pyritic Sulphur % 0.15
  - Sulphate Sulphur % 0.01
  - Organic Sulphur % 0.28
Coking coal Analysis

• Crucible Swelling Number (AS 1038.12.1) 8.0

• Calorific Value (AS1038.5) (Air dried basis)
  – Gross CV MJ/kg 34.53
  – Gross CV kcal/kg 8248

• Ultimate Analysis (AS 1038.6) (Dry ash free basis)
  – Carbon % 84.7
  – Hydrogen % 5.78
  – Nitrogen % 2.22
  – Sulphur % 0.46
  – Oxygen % 6.8
Coking coal Analysis

- **Phosphorus (Calc from Ash Analysis) %**  <0.001
- **Ash Analysis (XRF) (AS 1038.10.0)**
  - Silicon as SiO2 %  31.5
  - Aluminium as Al2O3 %  16.6
  - Iron as Fe2O3 %  23.10
  - Calcium as CaO %  5.95
  - Magnesium as MgO %  6.12
  - Sodium as Na2O %  6.01
  - Potassium as K2O %  0.93
  - Titanium as TiO2 %  0.50
  - Manganese as Mn3O4 %  0.03
  - Sulphur as SO3 %  7.59
  - Phosphorus as P2O5 %  0.05
  - Barium as BaO %  0.27
  - Strontium as SrO %  0.20
  - Zinc as ZnO %  0.02
  - Total %  98.9
Coking coal Analysis

- **Gieseler Plastometer (AS 1038.12.4.1)**
  - Initial Softening Temperature oC 385
  - Maximum Fluidity Temperature oC 445
  - Maximum Fluidity dDpm 6900
  - Maximum Fluidity dDpm (log10) 3.84
  - Solidification Temperature oC 475
  - Plastic Range oC 90
  - Date Analysed 7-Jun-10

- **(xi) Dilatometer (AS 1038.12.3)**
  - Initial Softening Temperature oC 350
  - Maximum Contraction Temperature oC 400
  - Maximum Dilatation Temperature oC 435
  - Maximum Contraction % 28
  - Maximum Dilatation % 98
  - Date Analysed 7-Jun-10
Coking coal Analysis

- **Gray King Coke Type (AS 1038.12.2) G9**
- **Ash Fusion (AS1038.15)**
  - Reducing Atmosphere Oxidising Atmosphere
    - Deformation °C: 1070 / 1230
    - Spherical °C: 1080 / 1260
    - Hemispherical °C: 1090 / 1290
    - Flow °C: 1250 / 1410
- **Chlorine (AS1038.8) (Air dried basis)**: <0.01
Coking coal Analysis

• **Trace Elements (Air dried basis)**
  
  – Antimony mg/kg <0.2
  – Arsenic mg/kg 0.9
  – Boron mg/kg 114
  – Cadmium mg/kg <0.01
  – Fluorine mg/kg <20
  – Lead mg/kg <1.0
  – Mercury mg/kg <0.01
  – Selenium mg/kg 0.20
  – Silver mg/kg <0.1
  – Thallium mg/kg 0.0

• **(xvi) Sapoznikov Indices**
  
  – Shrinkage mm 37
  – Max Thickness of Plastic Layer mm 23

• **(xvii) G - Index (ISO 335-19974E)** 88
Coking coal Analysis

- Mean Maximum Reflectance (Rv,max·%) 0.80 0.79 0.80
- Estimated Confidence (95%) of Mean 0.011 0.051 0.012
- Standard Deviation of Sample 0.05 0.08 0.05
- Maximum Value (%) 0.91 0.91 0.91
- Minimum Value (%) 0.68 0.64 0.64
- Number of Measurements 64 10 74
### Coking coal Analysis

<table>
<thead>
<tr>
<th>Group</th>
<th>Volume %</th>
<th>Volume (%)</th>
<th>SubGroup</th>
<th>Maceral</th>
<th>Volume (%)</th>
<th>Volume (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VITRINITE (mineral free)</td>
<td>92.2</td>
<td>92.9</td>
<td>Telovitrinite</td>
<td>Textinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Texto-ulminite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Eu-ulminite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Telocollinite</td>
<td>72.5</td>
<td>73.1</td>
<td></td>
</tr>
<tr>
<td>Detrovitrinite</td>
<td></td>
<td></td>
<td>Attrinite</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Densinite</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Desmocollinite</td>
<td>19.6</td>
<td>19.8</td>
<td></td>
</tr>
<tr>
<td>Gelovitrinite</td>
<td></td>
<td></td>
<td>Corpogellinite</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proigeline</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eugeline</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
</tbody>
</table>
# Coking coal Analysis

<table>
<thead>
<tr>
<th>Group</th>
<th>Volume %</th>
<th>Volume (%)</th>
<th>SubGroup</th>
<th>Maceral</th>
<th>Volume (%)</th>
<th>Volume (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mineral free)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIPTINITE</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td>Sporinite</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cutinite</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Resinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Liptodetrinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Alginite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Suberinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fluorinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Exsudatinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bituminite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>INERTINITE</td>
<td>5.1</td>
<td>5.1</td>
<td>Telo-inertinite</td>
<td>Fusinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semifusinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Funginite</td>
<td>5.1</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Detro-inertinite</td>
<td>Inertodetrinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Micrinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Macrinite</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>MINERAL</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Coking Coal Classification

• There is no global standard by which coking coals are graded and classified
• It is up to the producer to know and understand their own coal
• It is up to the producer to understand where their coal fits in the global market.
• It is up to the producer to effectively market their coal
• There is $50 to $100 per tonne at stake.
INDONESIAN COKING COAL
SPECIFICATIONS
# Selected International Hard Coking Coal Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Basis</th>
<th>Tuhup Hard Coking Coal</th>
<th>Hail Creek</th>
<th>Goonyella Riverside</th>
<th>Curragh</th>
<th>Cardinal River</th>
<th>Fording River</th>
<th>Benga</th>
<th>Bailey</th>
<th>Makhado</th>
<th>Neryungri</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PT AKT</td>
<td>Rio Tinto</td>
<td>BMA</td>
<td>Westfarmers</td>
<td>Teck</td>
<td>Teck</td>
<td>Riversdale</td>
<td>Consol Energy Inc.</td>
<td>Coal of Africa Limited</td>
<td>Mechel</td>
</tr>
<tr>
<td>Total moisture</td>
<td>% ar</td>
<td>9.0</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>8.0</td>
<td>8.0</td>
<td>-</td>
<td>6.0</td>
<td>11.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Inherent moisture</td>
<td>% adb</td>
<td>1.8</td>
<td>1.2</td>
<td>1.0</td>
<td>1.5</td>
<td>1.0</td>
<td>1.0</td>
<td>-</td>
<td>2.0</td>
<td>1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Ash</td>
<td>% adb</td>
<td>7.0</td>
<td>8.5</td>
<td>8.9</td>
<td>7.3</td>
<td>9.5</td>
<td>8.0</td>
<td>10.5</td>
<td>6.6</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Volatile matter</td>
<td>% adb</td>
<td>26.5</td>
<td>20.7</td>
<td>24.3</td>
<td>21.5</td>
<td>26.8</td>
<td>27.5</td>
<td>23.1</td>
<td>37.0</td>
<td>29.9</td>
<td>18.5</td>
</tr>
<tr>
<td>Fixed carbon</td>
<td>% adb</td>
<td>64.0</td>
<td>69.6</td>
<td>65.8</td>
<td>69.8</td>
<td>62.7</td>
<td>63.5</td>
<td>66.4</td>
<td>54.4</td>
<td>58.8</td>
<td>70.2</td>
</tr>
<tr>
<td>Sulphur</td>
<td>% adb</td>
<td>0.70</td>
<td>0.36</td>
<td>0.52</td>
<td>0.50</td>
<td>0.40</td>
<td>0.70</td>
<td>0.83</td>
<td>1.65</td>
<td>0.99</td>
<td>0.35</td>
</tr>
<tr>
<td>Calorific value</td>
<td>% adb</td>
<td>8300</td>
<td>7820</td>
<td>7860</td>
<td>7882</td>
<td>7700</td>
<td>7900</td>
<td>-</td>
<td>7780</td>
<td>-</td>
<td>7805</td>
</tr>
<tr>
<td>Crucible Swelling Number</td>
<td>-</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>6.5</td>
<td>7</td>
<td>9</td>
<td>7.5</td>
<td>9.5</td>
<td>9</td>
</tr>
<tr>
<td>Maximum Fluidity</td>
<td>ddpm</td>
<td>450 (+)</td>
<td>350</td>
<td>1100</td>
<td>100</td>
<td>750</td>
<td>150</td>
<td>251</td>
<td>15000</td>
<td>11600</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: PT Borneo Lumbung Energi; Company reports; AME

PT SMG CONSULTANTS
# Hard Coking Coal Range of Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Basis</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Moisture</td>
<td>%(ar)</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Inherent Moisture</td>
<td>% (adb)</td>
<td>0.7</td>
<td>2</td>
</tr>
<tr>
<td>Ash</td>
<td>% (adb)</td>
<td>6.6</td>
<td>10.5</td>
</tr>
<tr>
<td>Volatile Matter</td>
<td>% (adb)</td>
<td>18.5</td>
<td>37</td>
</tr>
<tr>
<td>Fixed Carbon</td>
<td>% (adb)</td>
<td>54.4</td>
<td>70.2</td>
</tr>
<tr>
<td>Sulphur</td>
<td>% (adb)</td>
<td>0.35</td>
<td>1.65</td>
</tr>
<tr>
<td>Calorific Value</td>
<td>Kcal/kg (adb)</td>
<td>7780</td>
<td>8300</td>
</tr>
<tr>
<td>CSN</td>
<td></td>
<td>7</td>
<td>9.5</td>
</tr>
<tr>
<td>Maximum Fluidity</td>
<td>ddpm</td>
<td>18</td>
<td>15000</td>
</tr>
<tr>
<td>Reflectance</td>
<td>Ro Max</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Selected Indonesian Coking Coals

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Basis</th>
<th>PT AKT</th>
<th>Mahakam</th>
<th>Barito</th>
<th>Marunda</th>
<th>KSM</th>
<th>Mamahak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Moisture</td>
<td>%(ar)</td>
<td>6</td>
<td>11</td>
<td>9</td>
<td>8</td>
<td>2.7</td>
<td>7</td>
</tr>
<tr>
<td>Inherent Moisture</td>
<td>% (adb)</td>
<td>0.7</td>
<td>2</td>
<td>1.8</td>
<td>3</td>
<td>1.8</td>
<td>4</td>
</tr>
<tr>
<td>Ash</td>
<td>% (adb)</td>
<td>6.6</td>
<td>10.5</td>
<td>7</td>
<td>7</td>
<td>4.4</td>
<td>4</td>
</tr>
<tr>
<td>Volatile Matter</td>
<td>% (adb)</td>
<td>18.5</td>
<td>37</td>
<td>26.5</td>
<td>38</td>
<td>39</td>
<td>36</td>
</tr>
<tr>
<td>Fixed Carbon</td>
<td>% (adb)</td>
<td>54.4</td>
<td>70.2</td>
<td>64</td>
<td>52</td>
<td>52</td>
<td>67</td>
</tr>
<tr>
<td>Sulphur</td>
<td>% (adb)</td>
<td>0.35</td>
<td>1.65</td>
<td>0.7</td>
<td>0.8</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Calorific Value</td>
<td>Kcal/kg (adb)</td>
<td>7780</td>
<td>8300</td>
<td>8300</td>
<td>7500</td>
<td>8100</td>
<td>7600</td>
</tr>
<tr>
<td>CSN</td>
<td></td>
<td>7</td>
<td>9.5</td>
<td>9</td>
<td>7.5</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Maximum Fluidity</td>
<td>ddpm</td>
<td>18</td>
<td>15000</td>
<td>450</td>
<td>800</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td>Reflectance</td>
<td>Ro Max</td>
<td></td>
<td>1.2</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note potential errors in Reflectance – use the correct laboratory.
Indonesian Coking Coals – in General

- Low Ash < 10%
- Very High Vitrinite > 90 – 95%
- A range of Sulphur from moderate to high 0.6% - 2%
- Moderate to very high fluidity (500 to 80,000)
- Excellent blend coals up to 20% in blend

If 20% of coal is blended with 80% of the 7 recommended Australian coking coals, at a bulk density of 900kg/m³, a CSR of at least 55 is predicted to be achieved. By blending Mamahak E Block with the recommended Australian coking coals, the undesirable high sulphur content will also be reduced to a more acceptable level.

- Command premium prices when understood and marketed effectively
INDONESIAN COKING COAL PROJECTS
Indonesia - Overview

- >14000 Island
- 2 Million sq Km
- 2 Continents
- 60 Sedimentary basins
- Coal identified on 6 islands
Indonesia – Resources - 2007

Coal Resources Identified

- Sumatera: 70Bt
- Kalimantan: 40Bt
- Sulawesi: 233Mt
- West Papua: 153Mt
- Java: 14Mt
- Malaku: 2Mt
Where is the Coking coal
Where is the Coking coal

Coking Coal Resources Identified

- Sumatera
- Kalimantan
- Murawai
- Tuhup
- Marunda
- KSM
- Mamahak
- And more

West Papua
A list of Projects (no particular order)

• PT Marunda Graha Mineral
• Asmin Koalindo Tuhup
• Bayan (inc Kangaroo)
• Cokal (formerly Altera)
• PT Multi Tambagjaya Utama
• Kartika Selbumi
• PT Suprabari Mapanindo Mineral
• Palace Resources
• Multiple others in early stage- BPCI
• Murawai
AN EXAMPLE – THE TUHUP PROJECT
The Tuhup Project

JSX – BORN (Borneo Lumbung Energi dan Metal)
The Tuhup Project

JSX – BORN (Borneo Lumbung Energi dan Metal)

History of Reserves and Resources Growth
(in mt)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven</td>
<td>127.6</td>
<td>76.6</td>
<td>43.3</td>
<td>67.5</td>
<td>34.9</td>
<td>32.7</td>
</tr>
<tr>
<td>Probable</td>
<td>127.6</td>
<td>22.9</td>
<td>20.4</td>
<td>35.2</td>
<td>49.5</td>
<td>36.5</td>
</tr>
<tr>
<td>Measured &amp; Indicated</td>
<td>76.6</td>
<td>76.9</td>
<td>32.3</td>
<td>89.7</td>
<td>87.1</td>
<td>87.1</td>
</tr>
<tr>
<td>Inferred</td>
<td>127.6</td>
<td>22.9</td>
<td>20.4</td>
<td>35.2</td>
<td>49.5</td>
<td>36.5</td>
</tr>
</tbody>
</table>
The Tuhup Project
JSX – BORN ( Borneo Lumbung Energi dan Metal)

• Produced approx 3Mt to date
• On track to 5Mtpa rate and above
• From early exploration to now highly sophisticated in terms of understanding coal and approaching market.
• Accepted in market as a premium hard coking coal ( Goonyella equivalent)
AN EXAMPLE – POSITIONING IN THE MARKET
The first announcement

27 October 2010

**strikes deal to acquire Indonesian coal assets**

*Plans to change its name to Coal of Asia to reflect new operations and growth opportunities*

**Highlights**

- **to acquire a** 75 per cent stake in extensive coal exploration projects in **Indonesia**

- The tenements cover approximately 1,970sqkm in an under-explored region and extend right up to an existing natural deep water port currently used for timber exports

- The tenements are immediately along strike from extensive coal outcrop on neighbouring tenements. **This includes a 2.5m outcrop of high-grade, semi-soft metallurgical coal**
Conclusions

- Indonesia has Coking coals
- Indonesia produces coking coals
  - Hard Coking coals
  - Semi Soft Coking Coals
  - PCI coals
- A wide range of sales prices are realised
- Understanding the coals from analysis to end use is crucial to maximising sale value.
- Get advice from people experienced in coking coals
Conclusions

• There are more coking projects out there to be found and developed
• Indonesia is on track to produce over 5Mtpa of hard coking coal by 2012 and Perhaps double that by 2013/2014
• Indonesia is on track to produce 20Mtpa of coking coal within 5 years
Thank you for your valuable time