IRP CONSULTATION WORKSHOP
How UCG (as gas and electricity producer) can support a LEAST-COST, LOWER ENVIRONMENTAL FOOTPRINT and FLEXABLE resource

Africary is proud to be a founding member of the SA UCG Association

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Cape Town
General comments on draft IRP

- What about the locals? Domestic RE, Gas to Power? New clean coal technologies is ignored!
- More emphasis on local supply / social development required!
- “Path of least regret” & “flexibility” is available with UCG’s + IGCC clean coal implementation.
- Optimization of SA’s primary energy resource COAL with UCG is the most effective, efficient and clean power generation approach.
- UCG is modular and can be fast-tracked as 7 of the 9 provinces has coal suitable for UCG.
- UCG is independent from exchange rates and gas import pricing.
- UCG can fill the intermediate power demand requirement between 2020-2030!
- Lengthy approval process for “ready-to-implement” technologies in the range 10-300 MW scale…
What is the future of CLEAN UCG?

- Raising the global average efficiency of coal plants from 34% to 40% will save 2 Gt* of CO₂ annually.

- UCG and IGCC allows for efficiencies higher than 55% and combined with UCG’s lower water requirements & negation of discard and ash dumps, provides the most cost-effective clean power solution.

- UCG power generation is urgently required because: it is our only low cost domestic gas supply option!

DID THE IRP SIMULATIONS TAKE THIS INTO ACCOUNT?

* IEA Report 2015
Cost of Clean Coal Technology

**Capital costs:**
- IGCC = US$ 1,300 /kW (dry cooled)**
- Nuclear = US$ 4,000 /kW***

* Syngas target price of 55 R/GJ
** EIA Report 2014
*** NWU reference
****http://www.timeslive.co.za/local/2011/10/28/Kusile-power-station-to-cost-R60bn-a-year1

**Actual tariffs from RE IPP and Coal IPP Procurement Programme**

**IRP 2016 cost input assumptions**

**Eskom new build = ± R1.23 /kWh****
**UCG (> 600MW) = < R1.19 /kWh**

GET ALL COSTS ON SAME COMPARITIVE LEVELIZED BASIS!!!
### Africary’s coal resource is equivalent to Karoo Shale

<table>
<thead>
<tr>
<th>Area</th>
<th>SAMREC * Classification</th>
<th>Gross Coal Volumes (million tons)</th>
<th>Gross Syngas Volumes (PJ)</th>
<th>SPE Category**</th>
<th>Gross Gas Volumes (NG equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st UCG Project (100 ha)</td>
<td>Measured</td>
<td>3.7</td>
<td>72</td>
<td>1P Reserve (Proven)</td>
<td>72 bcf</td>
</tr>
<tr>
<td>Palmietkuil Farms (600 ha)</td>
<td>Measured + Indicated + Inferred</td>
<td>3.7 + 3.3 + 20 = 27</td>
<td>447</td>
<td>2P Reserve (Proven + Probable)</td>
<td>≈0.5 tcf</td>
</tr>
<tr>
<td>Theunissen Resource (300 000 ha)</td>
<td>Inferred</td>
<td>1,000</td>
<td>16,560</td>
<td>3P Reserve (Proven + Probable + Possible)</td>
<td>≈16.6 tcf</td>
</tr>
</tbody>
</table>

* SAMREC classification as signed off by a Competent person.
**SPE = Society of Petroleum Engineers category, but the values in the table are indicative only.
SA Electricity production down by 6%
Do we require imported nuclear and gas?

SA’s own resources can support all the fuel requirements for the very long term!

Source: Statistics South Africa
In summary

- SA’s LOCAL Resource utilization not fully integrated and utilized (unquantified restraints were applied to domestic RE and gas in IRP)
- UCG is the lowest new build clean coal generation cost of electricity for SA
- Local expertise and developed technologies must also be utilized!
- UCG + IGCC clean coal power generation produces 25% less CO₂ per MWe and in large scale Combined Cycle mode can reach energy efficiencies of up to 55% compared to current 34%. Supporting the EIA target of >40%.

- IRP Base Case model MUST as first priority take into account:
  - Local resources. Local development. Domestic RE and Gas-from-coal.
  - Import and $ cost base risk impact to consumer (tax-payer) and South-Africa.
  - Reduction on CO₂ and environmental impact from current boiler technology.
  - Short time implementation.
  - Clean coal credentials far exceeds current Eskom PF boiler technology.