Sustainable Energy Briefing 22: BHP Billiton, Oil and Eskom Revenue

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During 2010, the energy debate focused on climate change and the IRP2010. This Sustainable Energy Brief focuses on three somewhat ignored issues; BHP Billiton's renegotiated Special Purchasing Agreement with Eskom, Eskom's costs and revenue, and Peak Oil. Of these, the last is of the greatest concern, as the impacts are global and profoundly frightening. Compared to the energy basis of our economies disappearing, BHP Billiton's local shenanigans seem small change.

Except that sweetheart deals with BHP Billiton seem to take the small change from the pockets of ordinary citizens and give it one of the world's largest and most profitable minerals company. Something is rotten, and if we can't sort out the relatively minor problem of BHP Billiton & Eskom, how can we ever hope to prepare for the day when oil, coal and gas become hard-to-get and expensive commodities?

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I. BHP Billiton & NERSA

For much of the last part of 2009 and the first part of 2010, there was a great deal of controversy surrounding Special Purchasing Agreements (SPA) between major users of electricity and Eskom. These four users consumed about as much electricity as over four million households, and have paid a fraction of the residential tariff. As Eskom's own financial results in 2009 indicated, these contracts were loss-making; i.e. Eskom was selling electricity at less than the cost of production. BHP Billiton's Mozal smelter in Mozambique was getting electricity at 12.3c/kWh.

Naturally, this led to quite an amount of anger and upset; especially as the SPAs are excluded from NERSA's tariff increases. These contracts have a separate pricing mechanism--what this is, we don't exactly know--and are not subject to increase in the Multi-Year Pricing Determination (MYPD) mechanisms. Further, the contents of these contracts are kept confidential and are not in the public domain; while other tariffs are available from Eskom, NERSA, and municipalities, SPAs are kept under lock and key. There are, it seems, two sets of rules: One for large corporations, another for the rest of us.

The value of these contracts has been and continues to be suspect, as they effectively represent a subsidisation of large multinational corporations (BHP Billiton & Anglo American). This year, due to public pressure, Eskom sat down to renegotiate one of the deal's with BHP Billiton regarding the Mozal aluminium smelter. To much fanfare, Eskom announced a revised contract to supply BHP Billiton's Mozal smelter in May 2010.

0n 30th of May 2010, Eskom's Acting Chairman Mpho Makwana said, "The agreement, effective 31

March 2010, removes the impact of embedded derivatives on Eskom's balance sheet, as well as all onerous conditions."[1]

While the other long-term supply contracts are still, apparently, under negotiation--these contracts are with BHP Billiton for its South African aluminium smelters and with Anglo-American for its Skorpion Zinc mine in Namibia--the BHP Billiton Mozal smelter deal was given a positive decision by NERSA, in a hearing not open to the public. All tariffs need to be approved by NERSA.

On or about the 15th of July 2010, NERSA published its record of decision (RoD). Given that the RoD is not particularly long, it is worth reproducing here (bold added to highlight key sections of the text):

> ENERGY REGULATOR OF SOUTH AFRICA
>
> The Decision
>
> Salient points: Eskom – MOZAL RENEGOTIATED AGREEMENT
>
> It encompasses the following:
>
> 1. Power from Mozambique to Mozambique [sic] meaning that a block of power emanating from HCB will be referenced to derive the tariff level.
>
> 2. **The agreement categorically acknowledges that Mozal will receive power generated by a hydro source.**
>
> 3. **The tariff level will include the energy cost as well as all costs incurred by Eskom to deliver the power at the Mozal plant gate** but excluding any wheeling costs in Mozambique which will be for the account of Mozal.
>
> 4. **The resultant tariff ensures that Eskom's costs are reimbursed in full.**
>
> 5. The tariff further acknowledges that under certain circumstances all the power may not necessarily emanate from the HCB scheme, and under these circumstances Eskom will make back-up power available to Mozal, once again in such a manner that all Eskom's costs are paid for.
>
> 6. The tariff to Mozal is ZAR denominated, escalating at the SA PPI, with no linkage to the aluminium price of the LME and therefore the tariff is free of embedded derivatives.
>
> 7. The tariff to Mozal provides for a sustainable tariff for the duration of the

[1] http://in.reuters.com/article/idINLDE64T06O20100530

agreement.

8. Eskom remains the counter party in supplying the power over a long-term period.

In the event that more detail is required in respect of the above-mentioned principles Eskom will be obligated to do so in conjunction with BHP Billition and with their ultimate consent.

From this rather sparse record of decision, at least the following can be deduced:

A) The price of electricity to BHP Billiton is based off hydro power, not Eskom's average cost of production. Therefore, it is almost certain that BHP Billiton's supply will be cheaper than other users. Not only is hydro the cheapest form of baseload power within Eskom's portfolio, BHP Billiton will absorb the bulk of Eskom's hydro supplies. This creates an automatic distortion within Eskom's pricing policy, as it removes cheap power from Eskom's supply to other users, thus creating a higher average cost of supply to these users. In effect, this takes hydro out of the costing and supply matrix used in NERSA's pricing in its MYPD calculations, and, thus, creates an indirect subsidy to BHP Billiton. NERSA's MYPD2 documentation (2009/10) prices Eskom's cost of imported hydro at 19c/kWh, while the average cost of supply is 28.2c/kWh.

B) Even though Eskom's cost will be covered by the tariff, this appears to be the cost of supply to BHP Billiton, not Eskom's total costs. If correct, BHP Billiton will not be paying towards Eskom's CAPEX expansion, unlike other users.

C) The tariff is not Megaflex, which is subject to NERSA price increases. Why is BHP Billiton excluded from the standard tariff to industry and which is published in the public domain? This creates an unequal playing field and is contrary to market theory.

D) The tariff to BHP Billiton is delinked from the aluminium price and US PPI, and linked to SA PPI.

E) Once again, the contract with BHP Billiton is a “secret deal” and not to be placed in the public domain. In particular, any further details (other than the sparse information in the RoD) can only be released with both Eskom and BHP Billiton's express consent. It is simply boggling, given the public interest in the matter, that NERSA agreed to this condition. Coupled with the fact that no public hearings were held on the deal, it seems that NERSA has abdicated its responsibility to be a public guardian of the energy sector. Instead, closed doors deals between technocrats remain the order of the day.

In all likelihood, it will require a lengthy legal struggle to get the details of this new secret deal into the public domain. It is easy enough to predict that the issue will go to court, and all the way to the Constitutional Court. This is the intention, to discourage citizens to find out what their state-owned enterprise is really up to. In this suppression of facts in terms of narrow corporate interest, NESRA has been the handmaiden to undemocratic practise.

II. Eskom's 2010 Costs and Revenue

Table 1: Eskom Average Costs vs. Revenue 2010.

Eskom Costs and Revenue 2010										
Category	Number of Customers	Percentage of Total Customers	Consumption in 2010 (GWh)	Percentage of Total Consumption	Eskom Revenue 2010	Percentage Revenue from electricity sales	Eskom Revenue 2010 R per kWh	Eskom Operating Cost (R/kWh)	between Revenue and Total Cost	Profit/Loss (Revenue/Operating Cost per Unit), Rands
Redistributers	773.00	0.0173%	90,712.00	41.50%	27,973,000,000.00	39.99%	0.3084	0.282	0.0264	2,392,216,000.00
Residential	4,325,550.00	96.9137%	10,350.00	4.73%	6,622,000,000.00	9.47%	0.6398	0.282	0.3578	3,703,300,000.00
Commercial	47,984.00	1.0751%	8,889.00	4.07%	3,642,000,000.00	5.21%	0.4097	0.282	0.1277	1,135,302,000.00
Industrial	2,925.00	0.0655%	55,816.00	25.53%	15,089,000,000.00	21.57%	0.2703	0.282	-0.0117	-651,112,000.00
Mining	1,134.00	0.0254%	31,733.00	14.52%	9,599,000,000.00	13.72%	0.3025	0.282	0.0205	650,294,000.00
Agriculture	84,415.00	1.8913%	5,010.00	2.29%	2,954,000,000.00	4.22%	0.5896	0.282	0.3076	1,541,180,000.00
Traction	510.00	0.0114%	2,854.00	1.31%	1,091,000,000.00	1.56%	0.3823	0.282	0.1003	286,172,000.00
International Utilities	7.00	0.0002%	4,109.00	1.88%	1,561,000,000.00	2.23%	0.3799	0.282	0.0979	402,262,000.00
International End Users	3.00	0.0001%	9,118.00	4.17%	1,411,000,000.00	2.02%	0.1547	0.282	-0.1273	-1,160,276,000.00
Total	4,463,301.00		218,591.00	100.00%	69,942,000,000.00	100.00%				
Source: Eskom Holdings Integrated Report 2010, pg. 301-2										

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From Table 1 and Table 2 (below), it is evident that Eskom's overall finances seem to have improved. But what is also clear, it is that Eskom is still undercharging, when compared to the average cost of production to the industrial and international end users (i.e. Special Purchasing Agreements with BHP Billiton and Anglo American), to the amount of R1.8bn. The fact that Eskom's bottom line has improved is due to increased tariffs from redistributers, residential, commercial and agricultural users.

The solution to Eskom's tariff woes is to set the minimum tariff price (excluding Free Basic Electricity) at the average cost of production. Yet, it continues, as outlined in the previous section, to allow pricing under this cost. It is this average cost of production that is used as NERSA's basis for determining the Standard Tariff in MYPD calculations.

Table 2

Eskom 2009 Costs and Revenue

Category	Number of Customers	% of Total Customers	Consumption in 2009 (kWh)	% of Total Consumption	Eskom Revenue 2009	% Revenue from electricity sales	Eskom Revenue 2009 R per kWh	Eskom Average Total Cost per Unit Sold (R/kWh)	Differential between Revenue and Total Cost	Profit/Loss (Revenue/Average Cost per Unit), Rands
Redistributers	769	0.01763%	88,345,000,000.00	41.12%	20,579,000,000.00	38.36%	0.2329	0.2763	-0.0434	-3,830,723,500.00
Residential	4,223,708	96.85167%	10,392,000,000.00	4.84%	5,552,000,000.00	10.35%	0.5343	0.2763	0.2580	2,680,690,400.00
Commercial	47,603	1.09156%	8,642,000,000.00	4.02%	2,732,000,000.00	5.09%	0.3161	0.2763	0.0398	344,215,400.00
Industrial	2,935	0.06730%	54,815,000,000.00	25.51%	11,887,000,000.00	22.16%	0.2169	0.2763	-0.0594	-3,258,384,500.00
Mining	1,144	0.02623%	32,177,000,000.00	14.98%	7,439,000,000.00	13.87%	0.2312	0.2763	-0.0451	-1,451,505,100.00
Agriculture	84,329	1.93370%	4,913,000,000.00	2.29%	2,249,000,000.00	4.19%	0.4578	0.2763	0.1815	891,538,100.00
Traction	509	0.01167%	2,918,000,000.00	1.36%	869,000,000.00	1.62%	0.2978	0.2763	0.0215	62,756,600.00
International Utilities	7	0.00016%	3,525,000,000.00	1.64%	978,000,000.00	1.82%	0.2774	0.2763	0.0011	4,042,500.00
International End Users	3	0.00007%	9,123,000,000.00	4.25%	1,356,000,000.00	2.53%	0.1486	0.2763	-0.1277	-1,164,684,900.00
Total	**4,361,007**		**214,850,000,000.00**	**100.00%**	**53,641,000,000.00**	**100.00%**				

Note: Please see SE Briefing 18 for more on 2009 & 2008 costs and revenue data. Available at: http://www.earthlife.org.za/wordpress/wp-content/uploads/2009/09/sustainable-energy-briefing-18-final.pdf

Please also note that reliable, accurate and consistent figures for the energy sector are hard to find; for example, Eskom's figures for demand in the next decade in the MYPD2 process differ, and differ significantly, than Eskom's demand figures in the IRP2010 even through those two key process were only separated by a matter of months. The SECCP considers the above figures to be best in the sector, and certainly the most useful in terms of understanding electricity pricing in terms of Eskom's financial health. So, despite recent announcements from Eskom about its financial turnaround, the SECCP will wait until Eskom's next Annual Report is published before pronouncing.

III. Peak Oil Update

"With or without technical assistance, the Burgan, is far, far down the depletion trail and barring new as yet unknown technology will reach abandonment stage within 10-20 years. The same fate awaits large numbers of supergiant fields including Ghawar, Samotlor (in Russia), Agha Jari, Ahwaz, Gach Saran, Marun (all in Iran), the Bolivar Costal fields of Venezuela, Cantarell (much in the news) in Mexico , Huntington Beach, Long Beach and Wilmington in California, East Texas and Yates in Texas and Prudhoe Bay in Alaska. The increasing decline rates for these fields is a major contributor to the worldwide black oil decline rate, now estimated at 6.7%/year and increasing. These depressing statistics mean that other sources of transportation fuel are urgently required."

--Michael Lynch, 22 Sept 2009[2]

This statement should be and is cause for panic. The Burgan oilfield in Kuwait is the world's second largest, with Saudi Arabia's Ghawar field being the largest. If the Burgan field has peaked production and Ghawar is not far behind it or has already peaked, then the world has either peaked production or very shortly will.

As the Cantarell field in Mexico has shown, the decline after peak in production can come swifter than thought. The Cantarell field peaked production at 2.14 million barrels per day in 2004, it now (Nov. 2010) stands at a production of 464,000 barrels per day. This decline is permanent, and something similar may occur in other large fields and has already done so in fields like East Texas, Samoltor, Brent, Yibal (Oman), and Prudhoe Bay (USA). Part of the explanation is the industry practise of water injection into oilfields; while injecting water into an oilfield helps to produce high production figures for a period, it often means the crash is so much harder. As Matthews Simmons states:

> Indeed, sustainability of existing reserves always comes down to managing the depletion rate. Moreover, when massive water injection keeps reservoir pressures high, this puts off normal decline rates until this miracle ends. These declines can be gigantic. Yet finding increasing depletion rates in oil and gas reserves the world over has continued to alarm me, and a trip to Saudi Arabia last year to better understand the situation raised more questions than it answered. Chief among them were the location of the "shut-in capacity" that could come to the world's rescue, why Saudi Arabia has such a high concentration of old fields, and why Aramco is making such extensive use of technology, particularly water injection...
>
> The water issue directly relates to the sustainability of the five giant Saudi fields because all five use water drive to create their fabulous wellhead oil flows. For example, the Saudis have been using water injection in Ghawar since 1965....my research has shown that water injection and other enhanced recovery techniques may very well increase depletion rates, accelerate production peaks and hasten a steady decline thereafter.[3]

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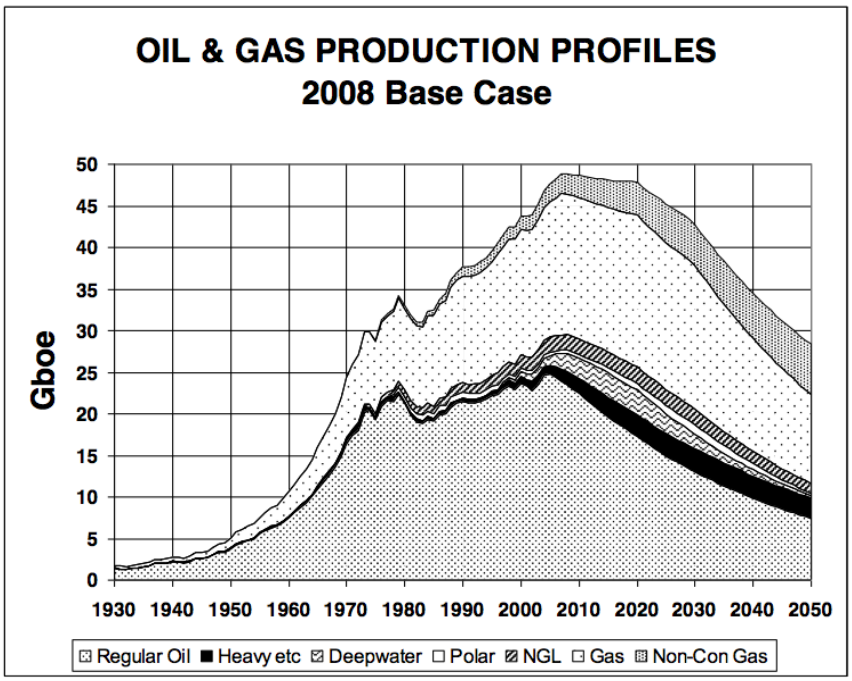
2 http://www.glgroup.com/News/Burgan-fabled-Kuwait-oil-field-in-irreversible-decline-with-high-water-cut-43526.html

3 http://www.worldenergysource.com/articles/text/simmons_WE_v7n1.cfm

This is consistent with forecasts of peak oil, such as Colin Campbell's recent forecast (April 2009, below), which includes natural gas and unconventional sources of oil & gas.[4]



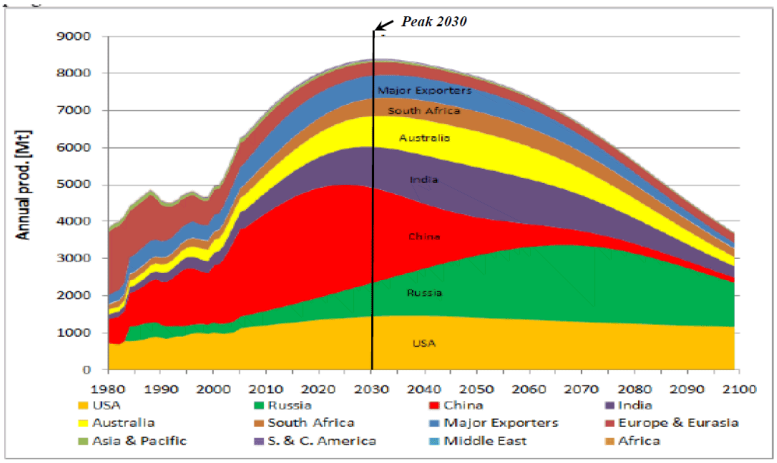
Right now, we appear to be at the peak of global production, where everything seems to be rosy. Oil production occurs, petrol is available, and nothing seems to be a problem. Except, of course, that nasty little oil price shock in 2009.

A body of theory is beginning to develop that at a certain level, the petroleum price becomes so expensive that world economies are unable to cope. A rising oil price affects the price of everything else, given petroleum's unique status of being a primary foundation of the economy.

As prices rise, the ability to service debt falters, and a financial crisis occurs. Basically, the world propped up failing financial institutions this time around (at a cost greater than America's Iraq and Afghanistan wars combined), what will happen next time the oil price climbs to USD140 a barrel? The best guess seems to be a downward cycle of spiking petroleum price, followed by recession, partial recovery, rising oil price, recession, etc. There are only two ways to deal with decline reserves of oil and gas; either reducing demand (which will work as a short to medium-term solution) or finding an alternative energy source. No alternative to petroleum readily presents itself and demand is set to climb as developing economies such as India and China are requiring increasing slices of the world's diminishing petroleum cake.

In terms of the other main energy resource, coal, a similar situation may be developing. Uppsala University put together the graph of world coal supplies, peaking at 2030.

Uppsala Forecast of Global Peak Coal, 2008

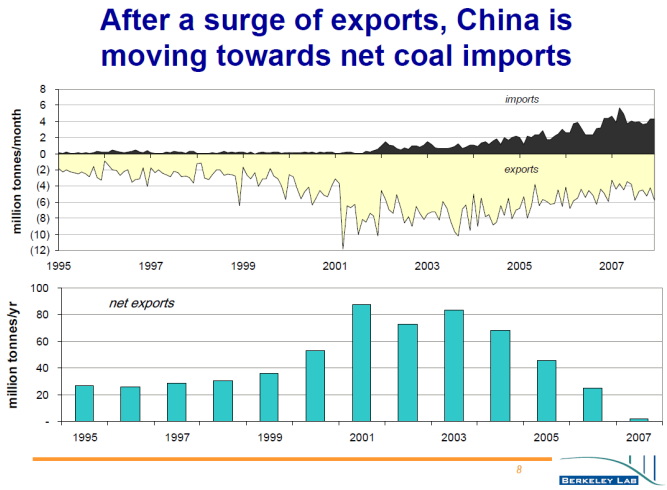


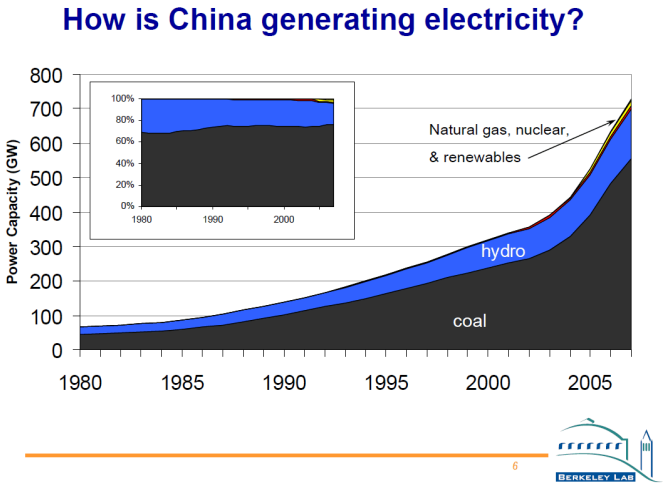
(from Hook, Zittel, Schindler, Aleklett, 2008)

Like oil, future coal resources will be harder to extract, will be more expensive, and of lower quality. This will translate into rising coal prices, and a new wave of scrambling for resources. China will be particularly hard hit,

[4] http://www.energybulletin.net/stories/2010-12-02/oil-and-economy-why-it-important-figure-out-approximately-where-we-are-headed

as the following two graphs indicate.[5]





The above make it clear that China is requiring increasing coal imports, and can no longer be an exporter of coal. This has obvious implications. Further, as the graph on the right illustrates and propaganda to one side, the massive growth in China's electricity sector is based on old-fashioned coal, not renewable energy or some kind of nuclear renaissance.

V. Concluding Remarks

It seems to be our cursed fate to live in interesting times. Analogous to the situation regarding climate change, the scientific data exists to be reasonably sure that global supplies of oil, gas, and coal have either peaked or will do so. The last time we had a comparable situation was when firewood ran out in Europe and was replace by high calorific coal. What will be the energy matrix in a post-hydrocarbon world? What is being done?

Not much, just like the problem of carbon emissions (see SE Briefing 21). We know what the problem is and yet seem to be incapable of standing tall and making hard choices. Instead, all around the world, decision-makers are either sitting on their collective hands or are seeking to secure exclusive rights over the remaining fossil fuel resources or carbon emissions.

You have been informed. Will you continue to hold onto bad ideas, like cheap power to aluminium smelters, or will you take the leap into the next epoch of human history?

While the Sustainable Energy Briefings are funded by HBS and SSNC, the views and contents therein and not necessarily those of either HBS or SSNC.

[5] http://www.aspo-usa.org/aspousa4/proceedings/Fridley_David_China_ASPOUSA2008.pdf