AN OVERVIEW OF THE COAL DEPOSITS IN SOUTHERN AFRICA

Their potential for economic development
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Karoo Basins South of the Equator

Catuneanu et al: Karoo Basins of South and Central Africa: JAES 2005
Coal deposits of Botswana
Total resource estimate = 210 billion tonnes

- Morupule & Moijabana: 9 billion tons resource, faults & dolerite dykes, Morupule – best qualities (bar code coal)
- Mamabula: Moderate to good medium ash coal, faulting
- Letlhakeng: Medium ash, faulting
- Dutlwe: 2 billion tons resource, low grade high ash
- Serule: High ash, faulting, rapid facies changes
- Foley/Dukwe/Pandamatenga/Bobonong: Variable quality, deep, faulting & dolerite dykes and sill
- Ncojane: Low quality, high ash
Coal deposits of the Democratic Republic of Congo
Resources = unknown

- Very little information available
Coal deposits of Kenya
Resources = 400 million tonnes

• Reports on discovery of minable coal
Coal deposits of Madagascar
Resources = 200 million tonnes

- Huge potential, mined in the past.
- Good quality export thermal coal reported.
Coal deposits of Malawi
Resources = 800 million tonnes

- Southern coalfields: Deep, low quality.
- Sumbu: Highly variable in thickness, continuity and quality.
- Chiromo: Deep, very thin.
- Ngana: Thin coal seams, low to intermediate quality.
- Livingstonia: Seams highly variable, some good quality coal.
Coal deposits of Mozambique
Resource = 6.7 billion tonnes

- Tete Province: Interlayered coal & mudstone, huge resources, faulting, dolerite intrusions and some opencastable coal. Coking & steam coal
- Metangula graben: Interlayered coal & mudstone, smaller resource than Tete, faulting, dolerite intrusions, opencastable coal?
Coal deposits of Namibia
Resource = unknown

• Aranos: Deep coal, relatively thin seams, low quality with some potential if washed, ±350 million tonnes
• Waterberg: Varying depth, some potential in north, generally low quality.
• Ovambo: Thin seams, low quality.
• Western Damaraland: Very thin seams, low quality.
Coal deposits of South Africa
Resources = 34 billion tonnes

- Witbank, Ermelo & Highveld
- Natal (Klip River, Utrecht, Vryheid, Nongoma, Somkele) Anthracite
- Eastern Cape (Molteno-Indwe)
- Free State
- Springbok Flats
- Waterberg
- Vereeniging-Sasolburg
- Tuli, Mopanie, Tshipise
Coal deposits of Swaziland

Resources = unknown

- Small deposits, some good coal, some anthracite.
Coal deposits of Tanzania
Resource = 1.5 billion tonnes

- Ruhuhu: Interbedded coal, 250 million tonnes
- Mhukuru: Interbedded coal, slightly dipping, high ash, 8 million tonnes resource.
- Songwe-Kiwira: Interbedded coal, dipping, 20 million tonnes resource
- Galula: Interbedded coal
Coal deposits of Zambia
Resources = unknown

- Zambezi Valley: Low quality coal
- Gwembe-Kandabwe: Interbedded coal, thick successions
- Luano Valley: Complex structure, high ash content
- Luangwa: Coal very thin and high ash content
- Barotse: Uneven coal development with variable coal quality.
Coal deposits of Zimbabwe
Resource = 10 billion tonnes

- Hwange: Very good coal, coking properties
- Lubimbi: Low grade, good in parts
- Other Zambezi basins: Some good, non coking coal
- Save-Limpopo: Interlayered, low grade, some good areas
Africa in a nutshell

- Population = 1.069 billion (2014)
- Africa’s economy about the size of the Netherland’s economy
- 25 out of 54 countries in a energy crisis (World Bank)
- From 2001 to 2005 GDP for more than half of the countries grew by over 4.5% while electricity generation capacity grew by 1.2%
- Per capita income USD 762
- About 6% of world coal resources
- Generally poorly developed infrastructure
Electricity consumption per country
Transmission lines

UMA Arab Maghreb Union (COMELEC)

EAPP East African Power Pool

WAPP West African Power Pool

CAPP Central African Power Pool (PEAC)

SAPP Southern African Power Pool

TRANSMISSION LINES

- Existing
- Proposed power pool projects
- Proposed MEPA projects
Railroads of Africa
Africa – access to electricity

This map is without prejudice to the status or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.
What are the positives for coal?
1. Abundant resources

Catuneanu et al: Karoo Basins of South and Central Africa: JAES 2005
2. Opencastable
3. Relatively cheap
4. Known and well established technology
5. Coal bed methane (CBM)
6. Underground coal gasification (UCG)
What are the negatives for coal?
1. It is black and it is dirty
2. Permian coals generally of a poor quality
3. Coal prices very low
4. Relatively far from export markets
5. In most cases infrastructure is poor or non-existing.
6. Pollution and greenhouse gas issues
7. A lot of opposition and negative publicity
What is coal up against?
1. Hydro power
Potential = 1.750 TWh
2. Oil & Gas
3. Shale gas
4. Nuclear power
5. Solar (PV)
6. Wind

Wind classes at 80 m:
- 1 (V<5.9 m/s)
- 2 (5.9≤V<6.9 m/s)
- 3 (6.9≤V<7.5 m/s)
- 4 (7.5≤V<8.1 m/s)
- 5 (8.1≤V<8.6 m/s)
- 6 (8.6≤V<9.4 m/s)
- 7 (V≥9.4 m/s)
Wind
Wind
7. Geothermal
So what are the prospects for Africa?
Or?
No actually

Electricity generation by fuel in sub-Saharan Africa in the New Policies Scenario, 2012 and 2040

2012 total generation: 440 TWh

- Coal: 56%
- Gas: 9%
- Oil: 9%
- Nuclear: 3%
- Other renewables: 1%
- Hydro: 22%

2040 total generation: 1,540 TWh

- Coal: 27%
- Gas: 25%
- Hydro: 26%
- Nuclear: 3%
- Oil: 4%
- CSP: 3%
- Solar PV: 4%
- Geothermal: 3%
- Wind: 2%
- Bioenergy: 3%

Fuelfix blog
In fact
Last thought
Massive population explosion.
Can earth absorb his?
Should humanity allow this?

Population Growth over the Last 500 Years
- China, India, Africa, Latin America, Western Europe, and United States

- China develops faster maturing varieties of grains for use in Double-Cropping
- Four-Field Crop Rotation introduced in Great Britain
- High-yield Grains Developed

Source: Angus Maddison, University of Groningen