

Security and adequacy of Supply in South Africa – a Point of View on Associated Challenges and Some Solutions

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by

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Abstract

Security and adequacy of power supply in South Africa can become a real concern if certain proactive steps are not taken or implemented timeously. If a GDP growth of 6% p.a. is to be realized a part of government's ASGISA initiative then the generation capacity has to be increased by approximately 2485 MW from now till the year 2025. Collaborative efforts by all industry players (Generators, Distributors and Customers) are required to address these challenges – strategic partnerships are required. This paper seeks to address some of the challenges facing South Africa and proposes some possible solutions. Though based on available data the assessment of the situation is a point of view by the authors.

(1. 0) Introduction

South Africa's electricity industry is fast eroding its current capacity – the system reserve margin is already very low. There is uncertainty in the future demand growth. The current electricity demand growth is 3.0 to 3.5% per annum. Higher GDP growth rates increase pressure on electricity supply system. Reduced demand elasticity is expected in the medium to longer term. Decisions about new generating plant must be fast tracked, to meet incremental growth in demand, to restore system reserve margin to an

acceptable level. Governance and decision making frameworks are being put to the test. Readily available generation options are limited in the near to medium term. OCGT solution being introduced to address peaking capacity shortages. Coal-fired plant will continue to dominate the base load market. Natural gas (for CCGT and CHP applications) and nuclear have roles to play. DSM, demand side participation and distributed generation need to feature more strongly

(2.0) Security and adequacy of supply

Secure, reliable and adequate electricity supply is critical to economic and social growth and development in South Africa

What are the issues relating to security of supply ?

- Sustained availability of existing generating plant and power system
- Improved composition of plant mix
- Broadening technology and fuel choice
- Restoring a reasonable system reserve margin
- Timely decisions on new generation expansion
- Clarification of framework for private sector participation

What are the issues relating to adequacy of supply ?

- Engagement with customer to ascertain expectations and trade-offs
- Clarification of EDI reform process to unblock supply capacity constraints, particularly in metro areas
- Harmonised and streamlined regulatory frameworks

(3.0) GDP Growth Versus Electricity Demand

According to information from STATS SA South Africa's electricity growth (up to now) seem to have kept pace with the country's GDP. However, will the historic relationship between GDP growth and electricity demand prevail?

A weakening of the 'one-to-one' relationship is expected towards lesser interdependency:

- In the short to medium term, an increasing share of GDP growth will come from large but less energy intensive infrastructure projects
- Significant growth in less energy intensive sectors of the economy such as financial services and ICT as well as tourism, representing a structural change in composition of South African GDP
- Success for Demand Side Management (DSM) initiatives, primarily targeting growth in peak demand
- Changes in energy market dynamics:
 - LPG substituting some electricity usage in domestic/commercial sectors
 - Natural gas increasing its share of commercial and industrial markets

The following information from Eskom reflects the huge challenges facing the country if the government's 6% GDP growth per annum (government's ASGISA initiative) is to be successfully achieved. In essence we need to increase our generating capacity by approximately 2485 MW every year till the year 2025.

GDP growth p.a.	Electricity growth p.a.	Total capacity required 2005-2025	Annual capacity required 2005-2025
3.0%	1.4%	11,772 MW	620 MW
4.0%	2.3%	20,824 MW	1,097 MW
5.0%	3.2%	32,257 MW	1,698 MW
6.0%	4.4%	47,252 MW	2,485 MW

(4.0) Demand Growth scenarios

Eskom's official registered system peak demand reached 34,800 MW on 29 June 2006. Its annual peak demand growth from 2006 – 2010 is estimated at 3.2% based on short to medium term economic growth forecasts

From 2010, two (Eskom) demand growth scenarios are considered:

- **Low case:** 4% GDP growth p.a.
 - **Electricity demand growth of 2.3% p.a.**
- **High case:** 6.0% GDP growth p.a. (based on ASGI-SA, Government's Accelerated and Shared Growth Initiative)
 - **Electricity demand growth of 4,4 %**

(5.0) Eskom Generation expansion & technology choice - up to 2015

Up to 2015 the following generation options are being pursued:

- De-mothballing of Simunye plant (Camden, Grootvlei and Komati)
 - Total of 3,600 MW of capacity to be added
- Arnot coal-fired expansion: 300 MW
- Liquid fuel fired Open Cycle Gas Turbines (OCGT)
 - Eskom (1,050 MW) + DME tender (1,050 MW)

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- Bramhoek pumped storage plant: 1,330 MW
- New base-load PF coal plant
 - Matimba B (2,100 to 4,200 MW) + other coal options?
- Potential natural gas fired Combined Cycle Gas Turbines (CCGT)
 - Kudu (800 MW) + Coega (1,600 MW) + Eskom/Sasol co-gen plant?

We pose the question - Is the above enough?

(6.0) Eskom Generation expansion & technology choice - after 2015

Post 2015 many technology options exist:

- **Base load options:**
 - *PF coal-fired stations*
 - CFB coal-fired stations
 - *Conventional nuclear plant*
 - Pebble-bed nuclear reactor (PBMR)
- **Mid-merit options:**
 - *Natural gas fired CCGT plant*
- **Peaking plant options:**
 - *Liquid fuel fired OCGT plant*
 - *Pumped storage plant*
- **Commercial scale renewable energy options (e.g. solar-thermal)**
- **Import from SADC region** (*see next slide*)

(7.0) Security of supply – what is required?

- Sustained high plant availability
- Timely decisions on generation expansion
 - Elaboration of government policy framework is key
- Engagement of customers and new approaches

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- DSM and dynamic market participation (DMP) – not only by Eskom but also EDI in general e.g. munics, metros, REDs
- Co-generation options (Combined Heat and Power – CHP)
- Distributed generation solutions
- Appropriate regulatory frameworks
 - New Electricity Regulation Act provides framework, but detailed regulations are lacking
- Sufficient financial resources
 - Eskom has a strong balance sheet-needs to be sustained?
 - Future tariff increases matter (to Eskom, EDI and IPP's)

(8.0) Conclusion

In concluding we propose some solutions in respect of the challenges associated with security and adequacy of supply

- Improved management of existing assets – by Eskom and the EDI in general
- More active customer engagement on DSM and DMP – by Eskom and EDI
- Increased use of distributed generation solutions – by Eskom and EDI
- Progress policy and regulatory framework on IPPs and private sector participation in new generation developments
 - Reconsider management of future generation tenders due to government capacity and skills constraints
 - Finalise and implement regulatory framework for co-generation applications
 - Engage the private sector on proposals for increased use of non-Eskom plant and expansion of such