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Rethinking Southern Africa's energy crisis

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Southern Africa's power challenge

Electricity production in southern Africa continues to fall short of the level needed to support both household and commercial needs (AfDB, OECD, UNDP 2016). The shortfall has multiple causes. The Southern African Development Community (SADC) noted in 2011 that "the SADC region has experienced unprecedented economic growth during the last decade, but investment in electricity infrastructure has sadly lagged far behind regional demand, necessitating greater regional cooperation to share the available power." (SADC 2011).

In addition to *population growth and slow infrastructure development, analysts point to insufficient operating capital, poor facilities maintenance* (see e.g. Africa Progress Panel 2015, Eberhard et al. 2008, Foster and Briceño-Garmendia 2010), and even events such as droughts contributing to the sub-continent's energy shortfall. These challenges underscore Southern Africa's struggle to provide enough electricity to meet development goals and improve livelihoods.

It is widely agreed that regional cooperation and integration in energy planning and development can help address some of these challenges and unlock the potential for economic development in Southern Africa. A recent report by McKinsey argues that "[r]egional integration, such as power pools, and promotion of renewable generation are game changers that could shape the energy landscape in sub-Saharan Africa over the next 25 years." (Castellano 2015a). Furthermore, it is estimated that long-term gains of coordinated electricity investments could be around USD 100 million per annum (Economic Consulting Associates 2009).

How can this rhetoric be turned into reality? This brief examines the barriers to greater regional cooperation on energy and sets out how they might be overcome.

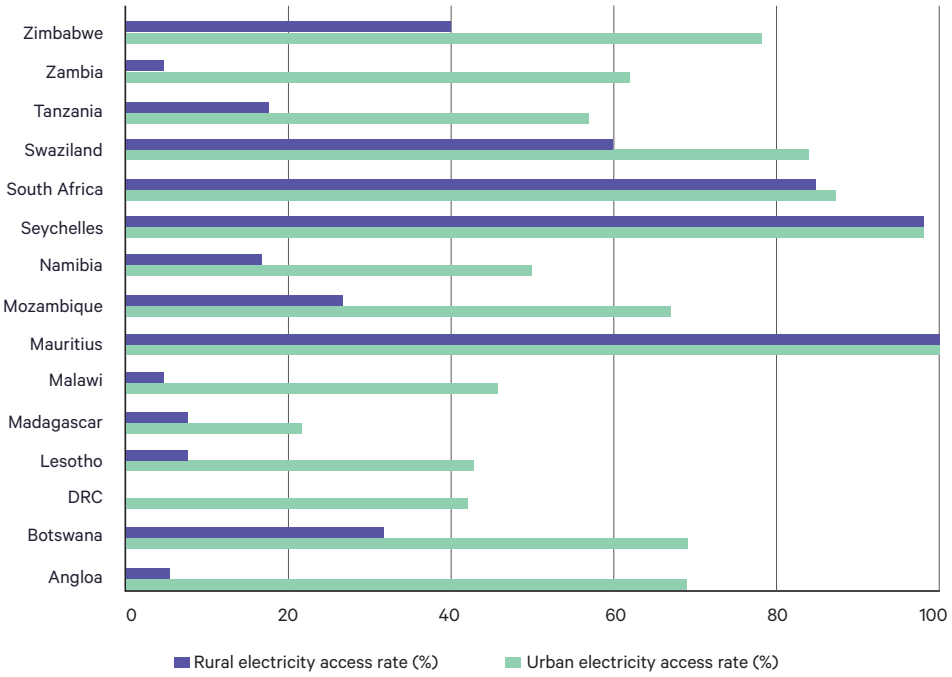
Regional shortfall

By the end of 2015, SAPP had an installed electricity generation capacity of 61 859 MW with an operating capacity of 46 910 MW against a normal peak demand of 48 216 MW (SAPP 2015). If including the current peak demand and generation capacity reserve margins, as well as a suppressed peak demand of 55 464 MW and required reserves, the current regional shortfall is 16 536 MW (SAPP 2015). The regional electricity supply is dominated by fossil fuels.

This shortfall contributes to large swaths of the region's population lacking reliable access to a stable electricity supply (see Figure 2), and severely hampers the region's economic development (see Figure 3). Zambia faces daily blackouts, sometimes for as long as eight hours (Circle of Blue 2015), while in

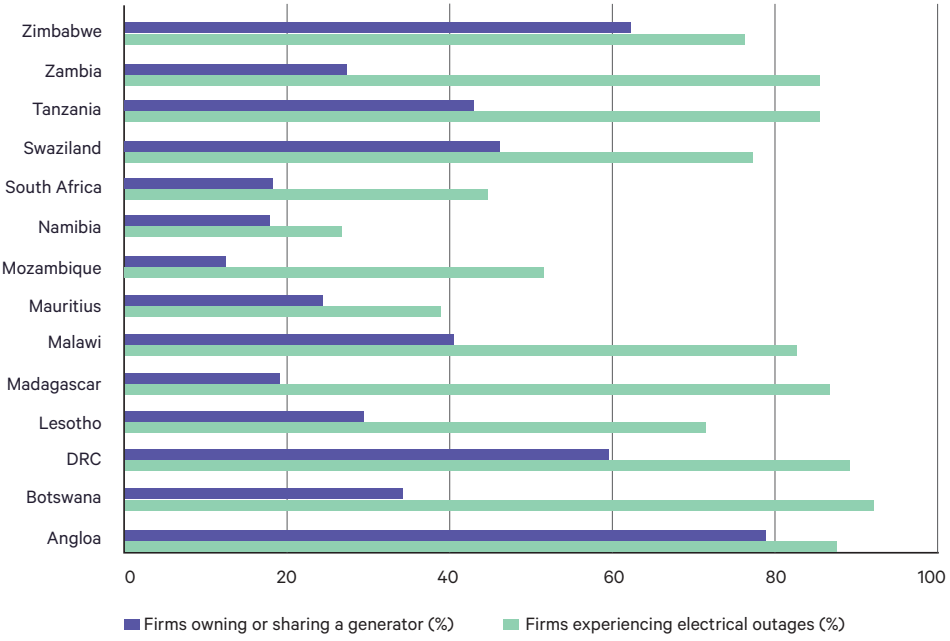
Photo (above): Solar cell charging a battery Lukolela, Democratic Republic of Congo. © OLLIVIER GIRARD / CIFOR

Figure 1. Percentage of rural and urban population with access to electricity



Source: IEA 2014

Figure 2. Percentage of firms facing blackouts and using generators



Source: World Bank 2017

Zimbabwe important industries have been instructed to cut electricity consumption (Reuters 2015). South Africa has also been struggling to meet demand: rolling blackouts have been frequent in the country since 2008 but have stabilised somewhat after heavy industries were instructed to cut consumption by 10% (The Economist 2015).

Limited investment in infrastructure

The Southern African Power Pool (SAPP) was established in 1995, bringing together the twelve non-island member states of SADC in a formal agreement that connected hydropower-dominated generation in the north of the region and coal-dominated generation in south.

SAPP has the potential to ensure secure electricity supply through trade of power generated by more diverse energy resources. But regional power trade is limited by inadequate generation and transmission infrastructure, poor policy coordination across borders, unnecessary non-tariff barriers, and inconsistency between regional goals and national priorities. Table 1 shows the demand and supply balance among SAPP member states in 2015.

The investment needs are high. According to a 2015 McKinsey report, "If every country [in sub Saharan Africa] builds what it needs, we estimate that the region would require about $490 billion of capital for new generating capacity, plus another $345 billion for transmission and distribution." (Castellano 2015b) This accumulates to a combined total of USD 885 billion. To put this in perspective, the same report estimates the combined GDP of all SADC member states (in current US dollars) as USD 668 billion (Castellano 2015b).

In Southern Africa, and also across the continent, lack of investment in new and rehabilitated generation and transmission infrastructure is commonly attributed to the insolvency of national electricity utilities, brought about by politically-motivated low tariffs, which have resulted in low revenues and little return on investment (Africa Progress Panel 2015, Eberhard et al. 2008). Other factors that contribute to lost generating capacity include mismanagement of utility companies, corruption, and bad business practice (Africa Progress Panel 2015, Foster and Briceño-Garmendia 2010). These contribute to a real or perceived lack of available capital for investment and refurbishment of existing generating capacity.

Table 1. Demand and supply balance with current peak demand in SAPP countries, 2016.

Country	Utility	Installed capacity (MW)	Operating capacity (MW)	Current peak demand (MW)	Capacity excess/ shortfall excluding reserves	Number of customers	Transmission system losses
Angola	ENE	2210	1772	1599	173	251 952	10.0
Botswana	BPC	892	410	610	-200	251 773	3.7
DRC	SNEL	2442	1098	1359	-261	861 661	9.0
Lesotho	LEC	74	70	140	-70	58 900	11.0
Malawi	ESCOM	366	351	323	28	374 400	6.0
Mozambique	EDM/HCB/MOTRACO	3074	2279	1780	499	1 010 780	6.4
Namibia	Nampower	508	354	629	-275	3449	3.2
South Africa	Eskom	46 963	44 134	34 122	10 012	5 976 557	0.1
Swaziland	SEC	61	55	232	-177	182 562	6.0
Tanzania	TANESCO	1367	1225	1051	173.9	2 013 839	6.0
Zambia	ZESCO/CEC/LHPC	2878	1385	2005	-620	831 362	6.2
Zimbabwe	ZESA	2045	1555	1521	34	579 006	4.0

At the same time, electricity subsidies responsible for keeping electricity prices low for the consumer have a number of negative effects across the electricity industry itself and on economies as a whole. A 2013 study by the International Monetary Fund (IMF) on energy subsidies in sub-Saharan Africa points out that:

> [r]eforming energy (fuel and electricity) subsidies in sub-Saharan Africa (SSA) is critical to ensuring future energy supply to realize Africa's growth potential. Although subsidies continue to absorb a large share of public resources, power generation and access levels in SSA remain well below those in other low-income countries. There is a link between those facts because energy subsidies create at least two set of problems. First, they are poorly targeted … Second, subsidies often create a disincentive for maintenance and investment in the energy sector, perpetuating energy shortages and low levels of access (Alleyne 2013).

Furthermore, as noted by the African Development Bank (2011), "[c]ountries often give priority to the development of domestic energy resources to the detriment of joint exploitation of regional energy potential." These influences are quite comparable to those that drove development of energy systems in industrialised countries, whereby power sector regulation and planning was done at national level and geared around energising national economic growth.

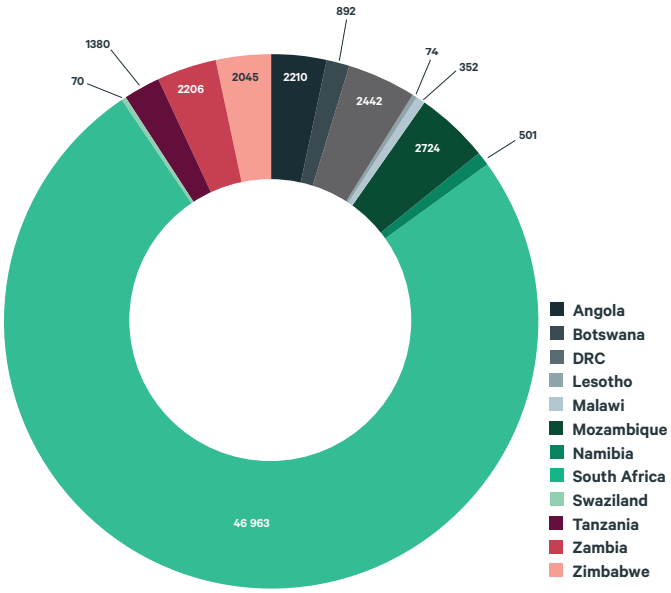
The dominance of South Africa and South African coal

Because South Africa plays such a significant anchoring role in the regional energy landscape (see figure 4), many countries are vulnerable to shocks in its energy system. The imbalance also means it is very difficult for SAPP to achieve a secure and reliable supply across interconnected energy systems.

By the time SAPP was established in 1995, South Africa was already the region's dominant energy producer and consumer. Isolation from the international community over decades of apartheid pushed the country to maximize opportunities for self-sufficiency in fuels and electric power to drive industrialisation. As a result, the country remains overwhelmingly influential in regional decisions around power trade.

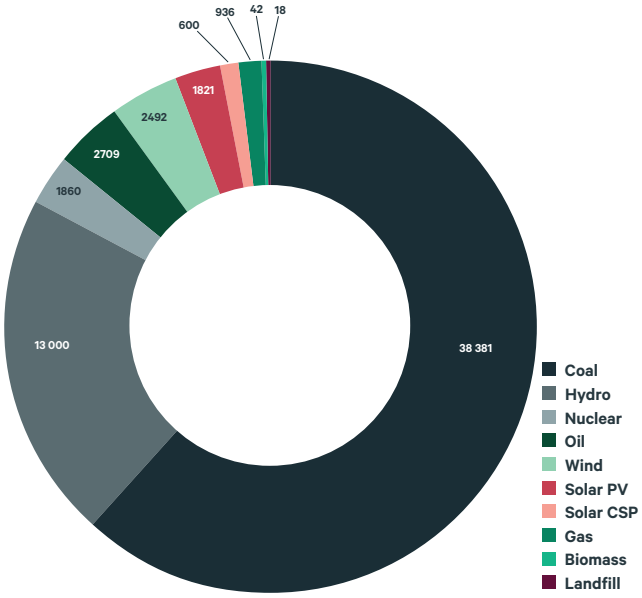
In 2011, South Africa provided 82.5% of all of SADC's electric power. And in 2014, Eskom figures suggested that it purchased 9425 GWh from outside the country. Most of this is purchased from Mozambique, where the Cahora Bassa hydropower plant provides up to 1500 MW of electricity every day – enough to power almost one million homes – under a bilateral trading arrangement (SADC 2015).

Figure 3. Total installed capacity in SAPP by country (MW)



Source: SAPP 2015

Figure 4. Total installed capacity in SAPP by source (MW)



Source: SAPP 2015

The dominance of South Africa means that events in the country can have significant reverberations across the region, contrary to the notion that regional power trade will make countries more resilient to shocks in their energy systems and the energy systems of their neighbours. This is best illustrated by the example of turmoil in South Africa's energy sector in 2008/2009 caused by a combination of interconnected shifts in supply and demand.

In 2008 electricity production fell by 22% from 23 000 GWh per month to 18 000 GWh per month. The impacts of this energy crisis spread beyond the country's borders: exports were halted to neighbouring Namibia, Botswana, and Zimbabwe – despite these exports accounting for only 6% of Eskom's capacity (Fin24 2008). As the remaining SAPP members failed to absorb the shortfall from South Africa, blackouts spread to these neighbouring countries.

South Africa's position in the regional electricity system translates into the dominance of coal in the regional electricity mix. Coal-fired power in South Africa has significant political and economic value beyond the kilowatt hours it produces. For example, according to statistics provided by the Government of South Africa, coal as a source of economic value is now more important to its economy than gold (STATS SA 2015). The coal mining industry contributed approximately ZAR 37 billion to the economy in 1993, with gold contributing ZAR 115 billion (value added at constant 2010 prices). In 2013, coal contributed ZAR 51 billion to South Africa's economy, compared with gold's ZAR 31 billion. By 2012, the mining industry – including coal, gold, platinum and other minerals, such as diamonds and uranium – employed 535 457 people (Mining Review Africa 2014), more than the entire South African workforce employed by the South African government, numbering 455 701 (STATS SA 2014). Although this is far less than the number of civil servants employed in South Africa (2.161 million) (Africa Check 2014).

Energy crisis – a chicken-and-egg problem

The energy challenge in the SADC-SAPP region is fundamentally a chicken-and-egg problem. Regional cooperation and interconnection is hampered by the very condition that it could help resolve – energy crisis.

Like SADC-SAPP nations as a group, individual states are struggling to provide adequate supplies of new electric power at scale to meet accelerating demand,[1] and without the pooling of resources and power generating capacity that might help address this challenge.

Paradoxically, energy crises press states to look inward and focus on policy levers that appear easy to reach. Yet it is regional cooperation[2] that offers greater promise, because a transboundary approach to economic development, regional integration and power sector development could offer economies of scale, resource availability and generating capacity beyond what can be achieved within a single nation-state.

Energy crises press states to look inward and focus on policy levers that appear easy to reach. Yet it is regional cooperation that offers greater promise.

Trade in electric power in SADC reflects the overall pattern of trade in the region, which is low. The scale of South Africa's power production and consumption across the region can make other member states feel politically vulnerable. And the regional repercussions of energy crises in South Africa have led other countries to be wary of new regional approaches to electricity sector generation and power sharing.

Ways forward: rethinking energy cooperation in Southern Africa

How can greater regional integration be achieved? How can SADC harness cooperation to increase energy access and foster energy development in each member state, and balance the energy mix across the region?

A number of areas of cooperation could help. The Action Plan Conceptual Framework prepared for the first 2016 SADC Energy and Water Joint Ministerial called for efforts to "rehabilitate and maintain water and energy infrastructure," as a major step to "confront SADC Energy & Water Nexus Challenges." (SADC 2016). While it might seem obvious to prioritise ensuring that existing infrastructure is fully functional, examples of failure to do so are common, including in wealthier countries. But doing so could free up both the private sector and government in making decisions on how to most effectively accelerate electricity access.

Harmonising policies and regulations among SADC member states has potential benefits, and there is much scope to do so. By 2017, 11 out of 12 SAPP countries had a national regulatory body and since 2002 they have been cooperating to share lessons under the Regional Electricity Regulators Association of Southern Africa (RERA). RERA helped to develop voluntary regional regulatory guidelines, approved by the SADC Energy Ministers in 2010, and additional steps can be taken. Strengthening the roles of RERA and SAPP to facilitate more formal coordination of regulation and energy development would support regional power trade.

Compared to electric power projects confined to a single market on a national scale, transboundary projects promise substantial economies of scale, reduced financial risk, greater market opportunities and a lower (real) price for delivered electric power. It is important that large transboundary projects are ensured of guaranteed access to markets of a size sufficient to make them financially viable. Coordination and cooperation among SADC and SAPP member states is essential to take advantage of these opportunities.

Finally, linking energy development with objectives for industrial development throughout the region could help identify clear areas of mutual benefit from regional cooperation on energy. This is in practice the way that the early development of regional energy coordination took place, and an approach that has previously proven effective in the region.

1 SAPP members combined are reported to have an electricity shortfall of 6514 MW, much of which is attributed to unmet demand from economic growth (ESI Africa 2016).

2 See e.g. the statement, "recent years have seen an increasing interest for intra-regional CBI across the continent as a key driver for both fostering economic growth, and deepening economic integration." (African Development Bank Group 2013).

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