Chapter Six

South Africa, Africa's Energy Future, and Regional Economic Integration: Energy as a Way to Power Change

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South Africa is a dominant economy in Africa's economic landscape, but other fast growing economies in Africa could challenge that status. South Africa's economy accounts for a quarter of total gross domestic product (GDP) in Sub-Saharan Africa and is the largest national investor on the continent. Its investments permeate a number of Africa's economic sectors and extend beyond traditional southern African markets, into the west, east and central parts of Africa.

Given the size of the South African economy, its demand for energy is significant, and it has a significant advantage in terms of installed capacity of megawatts (MW) and electricity access. Growing demand for energy, especially from southern African economies, could lead the region to play an influential role in shaping energy geopolitics and intra-regional trade relations. Growing demand for energy is forcing South Africa to look both inward to secure electricity supply and outward to diversify its supply of petroleum.

The question, therefore, is how South Africa can play a positive role in greater Africa in order to achieve the key imperatives of energy availability, accessibility, and affordability, while ensuring that the resultant economic growth and social development benefits the average African. It is against this backdrop that this chapter will explore the role that South Africa can play in Africa's energy future.

Overview of South Africa's Economic Role in Africa

As one of the two largest economies in Africa (with a 2013 GDP of $322.6 billion), South Africa is an influential economic player on the continent. The significance is more pronounced in the southern

African region: in 2012, the South African economy was more than three times the size of Angola's, the second largest economy in the Southern African Development Community (SADC) region.[1] South Africa, as the most industrialized country on the continent, has one of the most diverse economies in Africa. Its strong financial services sector serves much of the continent, and it is the trade and investment gateway to Africa for many hedge and private equity funds.

South Africa is also the largest African investor on the continent. By 2008, South African companies had invested $8.5 billion in the subcontinent, and it is the only African country to be featured in the top 20 investors in Africa, ranking fifth overall.[2] South African Foreign Direct Investment (FDI) in Africa has occurred beyond traditional Southern African markets, into west, east and even central Africa, in most cases with considerable success. While most FDI from outside Africa focuses on oil and gas, South African firms are branching out - moving beyond mining to a diverse range of activities such as brewing, telecommunications, retail, shipping and banking services.[3] In doing so, South African companies contribute to the diversification of African economies and to a reduction in their dependence on primary sector industries. Clean energy also provides new growth and development opportunities, not only for South Africans, but also for the region, an aspect that is discussed later in this chapter.

However, sustained growth and development requires adequate and reliable sources of energy, and in this respect, Africa falls woefully short despite its rich endowment with a variety of energy sources from coal, gas and oil to large-scale hydro-power.

Africa's Energy Situation

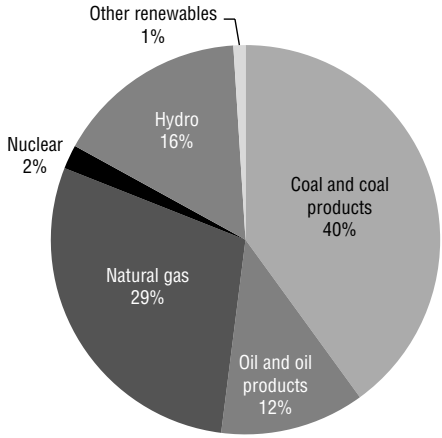
The African continent makes up 15% of the world's population, but only accounts for 5% of primary energy use. In terms of per capita

1. The World Bank. 2014. World Bank Country Data. [Online] Available at: http://data.worldbank.org/country/south-africa.

2. UNCTAD. 2013. *Economic Development in Africa Report 2013. Intra-African Trade: Unlocking Private Sector Dynamism*. United Nations, New York and Geneva.

3. Leon, T. 2004. "Africa's Economic Future: SA's Role in Promoting Development." Speech by the Leader of the Opposition, Parliament in SA at the Council on Foreign Relations Washington, D.C.

Figure 1. African Power Generation by Fuel Type in 2009.



Source: IEA Database in Irena, 2012.

energy consumption, Africans consume one third of the global average. However, if we exclude the use of traditional biomass, per capita energy consumption in Africa is as low as one sixth of the global average.[4]

This low per capita consumption is closely related to Africa's limited generation capacity. In 2011, it was estimated that the continent had only 147 GW of installed generation capacity, an amount China installs in one to two years.[5] Of these 147 GW, the vast majority is generated by fossil fuels. Figure 1 shows that in 2009, 81% of power generation in Africa came from coal, gas, and oil, with 2% generated from nuclear, 16% from hydro, and only 1% from other renewables (including solar, wind, biomass, and geothermal). Although expanded renewable programs in some African countries may have changed the picture somewhat, fossil fuels still continue to dominate the African power generation mix.

The two biggest energy challenges facing the African continent are electricity supply and access. Access to electricity in Africa is particularly low. In 2009, it was estimated that 587 million people in Africa lacked access to basic electricity services. However, access levels across

4. *Ibid*.
5. *Ibid*.

the continent as well as between urban and rural areas differ substantially. Countries in North Africa, for example, are almost entirely electrified, whereas in sub-Saharan Africa, it was estimated that only 35% of urban populations had access to basic electricity services in 2009. In rural parts of sub-Saharan Africa, access is much lower, with less than 20% of rural areas electrified in 2009. Access Levels also differ substantially within sub-Saharan Africa. In South Africa, for example, 83% of urban areas and 57% of rural areas were electrified in 2010, a figure substantially higher than the sub-Saharan average.[6] Table 1 depicts the percentage of people in sub-Saharan African countries living without electricity access.

Discrepancies between electricity access across the continent are also reflected in estimated electricity consumption. On average, per capita electricity consumption across Africa is 620kWh. However, in sub-Saharan Africa (excluding South Africa), per capita electricity consumption is more than three times lower, at only 153 kWh. When contrasted to the average per capita global consumption of 2,730kWh, electricity consumption across the continent and particularly in sub-Saharan Africa's levels are very low.[7] This energy deficit is striking, given the rich energy endowments of the continent. This also hinders further potential for economic development in Africa.

Lack of access to a reliable supply of electricity places a major burden on African economies, especially on countries in sub-Saharan Africa. Daily power outages are experienced in 30 of 48 countries in sub-Saharan Africa. Many companies and citizens, therefore, rely on diesel generators at great financial costs. Power outages are estimated to cost some sub-Saharan countries between 1 and 5% of their GDP.[8]

Studies suggest that to meet Africa's demand, an additional 250 GW of capacity will be needed by 2030. This will require substantial investment. Globally, an estimated 34 billion USD (in addition to base line investment) is needed per year to ensure universal access by 2030. An estimated 60% of this is needed in Africa alone. With African government's limited financial resources and pressing development needs,

6. *Ibid*.
7. *Ibid*.
8. *Ibid*.

Table 1. Share of Population Living without Electricity Access per Country in sub-Saharan Africa.

Seychelles	3.0%	Mali	72.9%
Cape Verde	6.0%	Swaziland	73.0%
South Africa	14.7%	Togo	73.4%
Ghana	28.0%	Zambia	74.0%
Botswana	34.0%	Cote d'Ivoire	74.2%
Equatorial Guinea	34.0%	Tanzania	76.0%
Gabon	39.9%	Ethiopia	76.7%
Sao Tome and Principe	41.3%	Mauritania	79.2%
Senegal	45.5%	Guinea-Bissau	80.0%
Cameroon	45.9%	Kenya	80.0%
Djibouti	50.0%	Rwanda	83.2%
Nigeria	55.0%	Burkina Faso	83.6%
Zimbabwe	60.0%	Uganda	85.2%
Mozambique	61.0%	Madagascar	85.3%
Gambia	64.7%	Niger	85.6%
Congo	65.0%	Guinea	87.9%
Sudan	65.0%	Burundi	90.0%
Eritea	68.1%	Democratic Republic of Congo	91.0%
Sub-Saharan Africa	68.2%	Malawi	91.0%
Angola	70.0%	Sierra Leone	95.0%
Namibia	70.0%	Chad	96.3%
Benin	71.6%	Central African Republic	97.5%
Lesotho	72.0%	Liberia	98.4%

Source: UNDP and WHO, 2009; ECREEE for West Africa in IRENA, 2012.
Note: data for West African Countries refer to 2010.

this level of investment can only be achieved through public-private partnerships.[9]

South Africa's Energy Sector vis-à-vis Africa

Although South Africa faces its own energy challenges, it is clear from the data that it is ahead of most of its African counterparts, and

9. *Ibid*.

especially countries in sub-Saharan Africa, in terms of energy generation and access. The following section will explore South Africa's energy landscape in more detail.

South Africa is a key player in Africa's energy space: it accounts for 21% of Africa's primary energy use and just over 27% of Africa's primary energy production.[10] In 2011, 40,000 MW of the 147 GW of generation capacity in Africa came from South Africa.[11] This capacity assumes greater importance when viewed in the Sub-Saharan context. When South Africa's generation capacity is excluded from sub-Saharan Africa totals, the generation capacity of 48 countries drops significantly from 68 GW to 28 GW.

South Africa is also one of the few countries in Africa with high levels of access to modern energy sources. Biomass share in total primary energy supply for the continent is 47%, while for South Africa it only accounts for 15.4%. South Africa is also the main power market in Southern Africa, estimated to account for two-thirds of power generation in the Southern African region by 2030.[12]

About 88% of Africa's proven coal reserves are found in South Africa, and South Africa is overly dependent on coal that generates 71% of its energy and 90% of its electricity. South Africa's abundant coal reserves during the Apartheid and sanctions busting era were used to convert coal into liquid fuels. This was enabled by SASOL, a privately-owned company based in South Africa, through its pioneering of the Fischer-Tropsch (FT) conversion technology for synfuels production in what is called coal-to-liquids (CTL). FT technology can also be used to convert gas to liquids (GTL).

This has made South Africa less dependent of foreign imports. Synthetic fuels production is a technology proving to be crucial in global gas markets. SASOL is investing 20 billion USD in the United States to tap into the U.S. gas markets.[13] Other innovations in technology are

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10. Eberhard,A., Rosnes, O., Shkaratan, M. and H. Vennemo. 2011. *Africa's Power Infrastructure. Investment, Integration and Efficiency*. Foster, V. and Briceno-Garmendia, C. (series eds) The World Bank, Washington DC.

and IRENA 2012.

11. *Ibid*.

12. *Ibid*.

13. Sasol U.S. 12 March 2012. Sasol Announces Largest Manufacturing Investment in Louisiana History, Creating more than 7,000 Direct and Indirect Jobs. Louisiana Economic Development

being pioneered using dry-cooling methods for coal plants (since they use a lot of water for cooling and carbon capture and storage technologies to sequestrate carbon dioxide, given that South Africa is one of the major emitters of greenhouse gases per capita terms in the world.[14]

South Africa has also undertaken significant reforms that have attempted to make electricity affordable to the poor[15] while at the same time undertaking a large-scale grid-based electrification program, premised on a technically strong utility. These initiatives have been instrumental in supporting increased access to electricity.[16] Urban electricity access has risen from 30% in 1994 to 83% in 2010, and rural access has risen from 12% to 57% over the same period.[17] This is a significant achievement in a continent where energy access remains one of the biggest challenges.

South Africa has a growing clean energy market, attracting significant foreign and local investment. It has the largest clean energy sector on the continent and ranks 9th overall in the world.[18] Over the past five years (from 2008 to 2013), South Africa's clean energy market experienced the fastest growth internationally, with an average annual growth rate of 96%.[19] In 2013, 4.9 billion USD was invested in renewable energy in South Africa—3 billion USD in solar and 1.9 billion USD in wind.[20] Investment in this sector is expected to grow with the revising of the country's Integrated Resource Plan (IRP)[21], thereby achieving a possible 17 GW of additional solar and wind by 2030.[22]

Press Release. Sasol. [Online] Available at: http://www.sasollouisianaprojects.com/news.php?action=submit&story_id=50&type=P.

14. National Treasury. 2010. Reducing Greenhouse Gas Emissions: The Carbon Tax Option. National Treasury of the Republic of South Africa, Pretoria.

15. Davidson, O. and Mwakasonda, S. A. "Electricity Access to the Poor: A Study of South Africa and Zimbabwe." Available from http://www.afrepren.org/project/gnesd/esdsi/erc.pdf

16. *Ibid*.

17. International Renewable Energy Agency (IRENA). 2012. *Prospects for the African Power Sector. Scenarios and Strategies for Africa Project*. Abu Dhabi.

18. The PEW Charitable Trusts. 2014. *Who's Winning the Clean Energy Race? 2013*. The PEW Charitable Trusts.

19. *Ibid*.

20. *Ibid*.

21. The IRP is an electricity planning tool that the government uses to project long-term energy mix options that can guide ministerial determinations for installed capacity over a 20-30 year period. It also provides for a price-path for electricity.

22. *Ibid*.

Simultaneously, South Africa has an energy efficiency program, specifically aimed at four sectors: industry and mining, commercial and public buildings, residential and transport, all of which seek to reduce final energy demand by 12% by 2015. This initiative is part of South Africa's attempt to reduce greenhouse gas (GHG) emissions by 34% by 2020 and 42% by 2025 as per its commitment under the United Nations Framework Convention on Climate Change (UNFCCC). Initiatives on the energy efficiency front include an industrial energy efficiency program, tax incentives and rebates, energy use through efficient practices and an appliance labelling program. The need to reduce the carbon intensity of the grid has produced a unique feature in the IRP—it is one of the few plans in the world that include an implicit carbon budget for electricity energy mix decisions.

Finally, South Africa is part of one of the few energy integration schemes on the continent, the Southern African Power Pool (SAPP). The underlying political and economic force behind the evolution of SAPP, which was established in 1995, has been South Africa's desire to meet future increases in demand by importing low-cost hydropower from its northern neighbors. The efficacy and effectiveness of SAPP will be discussed in more detail in the section below.

Role at Southern African Level

In the previous section detailed how South Africa will be a key player in supporting a more integrated or regional approach to energy supply, particularly in the Southern African region, where energy access and reliable, affordable supply of electricity remains a key challenge. The following section shall examine South Africa's role in Southern Africa's energy landscape.

South Africa, by means of Eskom, is by far the largest electricity market in southern Africa with the electricity systems of neighbouring countries such as Botswana, Lesotho, Namibia and Swaziland developed as derivatives of the South African network. In the past, these countries have all been net importers of electricity from South Africa. South Africa still exports about 5% of its electricity production to neighboring countries—such as Botswana, Namibia, and Swaziland. This asymmetry of power is clearly illustrated in Table 2.

Table 2. South Africa's Trade in Electricity from April 1, 2005 to March 31, 2011.

Trading Partner	Imports (in gigawatt-hours)	Exports (in gigawatt-hours)
Botswana	0	15.334
DRC	1.815	0
Lesotho	109	420
Mozambique	64.927	58.454
Namibia	105	11.551
Swaziland	0	4.866
Zambia	677	683
Zimbabwe	282	1.259

Source: Information provided by Eskom.

The data clearly shows the vulnerability of these countries to electricity shortages in South Africa which result in rolling blackouts that negatively impact their economies.[23] A regional approach using market mechanisms will go a long way in addressing these electricity shortfalls and in reducing expenditure on wasteful projects, to the benefit of electricity consumers and economies in the region[24].

But not only would a more regional approach benefit South Africa's neighbors; it would also help South Africa face its own challenges. It is under increasing pressure to look for alternatives to its "climate unfriendly coal-fired power stations."[25] To achieve its commitments to reduce GHG emissions under the UNFCCC framework, South Africa has developed a comprehensive climate change mitigation and adaptation strategy, in the form of the National Climate Change Response (NCCR) White Paper.[26] The NCCR recognizes that the greatest emission reduction will have to come from its energy generation and

23. Asami Miketa, A. and Merven, B. 2013. *African Power Pool: Planning and Prospects for Renewable Energy*, International Renewable Energy Agency (IRENA).

24. De Vos, D. 2014. Electricity: "Africa's Secret Weapon for Economic Unity," *Daily Maverick* (online), 7 April. Available at http://www.dailymaverick.co.za/opinionista/2014-04-07-electricity-africas-secret-weapon-for-economic-unity/#.U0qLNZAaJOw

25. Scholvin, S. 2014. South African Energy Policy: Constrained by Nature and Path Dependency, *Journal of South African Studies*, 40:1, 184-202. Available at: http://dx.doi.org/10.1080/03057070.2014.889361.

26. DEA. 2011. National Climate Change Response White Paper. Department of Environmental Affairs (DEA), Pretoria.

use. The South African Government is, therefore, eager to diversify its energy supply and is increasingly looking at the possibility of unlocking potential shale gas reserves in South Africa. At present, however, economic and feasibility studies must still be undertaken, and successful exploitation will require significant investment in infrastructure.[27] There are regional options such as the availability of significant conventional gas resources off of the eastern shores of southern Africa that could be exploited. Recent discoveries in the northern Rovuma basin of Mozambique estimate 180 Trillion cubic feet (Tcf) of recoverable gas reserves.[28] In Tanzania, estimates in 2013 predicted 18 Tcf in recoverable reserves with another 20 Tcf still to be discovered).[29] As exploration continues, these numbers will continue to rise .

The regional gas reserves provide an opportunity for South Africa to reduce its dependency on coal and its resultant GHG emissions. South Africa could turn to neighboring countries with gas and oil reserves. Both Mozambique and Namibia have offshore gas fields, which South Africa can exploit. At present, PetroSA has already entered into an agreement with Mozambique's state-run Petromac to look at its new gas finds.

The South African Shanduka Group (a private black empowerment firm) will develop a 117 MW gas-fired power station near Maputo. 85% of the output from this station will be sold to Eskom, and the remainder will be taken up by Electricidade de Mozambique. South Africa has, however, not been as successful in ensuring cross-border cooperation with respect to oil.[30] Furthermore, other private firms (in addition to the Shanduka Group) are exploring opportunities to access gas for power generation. For instance, SASOL, which has existing pipelines from Mozambique, could be a strong player in the regional gas market for gas finds that are yet to be monetised. SASOL's new strategy is to decrease coal consumption and to switch to gas as an energy source and for conversion to liquid fuels and other products.

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27. Hedden, S., Moyer, J.D. and Rettig, J. 2013. Fracking for Shale Gas in South Africa: Blessing or Curse? *Africa Futures Paper*: 9.

28. Fruhaf, A. 2014. Mozambique's LNG Revolution: "A Political Risk Outlook for the Rovuma LNG Ventures." OIES Paper: NG 86. Oxford Institute of Energy Studies.

29. Ledesma, D. 2013. *East Africa Gas—Potential for Export*. Oxford Institute for Energy Studies.

30. Scholvin, S. 2014.

Hydropower also provides opportunities for South Africa, and the broader region. Scholvin highlights the "odd complementarity of varying natural conditions and different stages of economic development" in southern Africa that builds a sensible case for cooperation across borders. South Africa has a high demand for electricity, but has a low hydropower potential, while in neighboring states—Angola, Mozambique, Zambia and the Democratic Republic of the Congo (DRC)—there is potential for hydropower coupled with low electricity demand.[31] However, finalizing projects that ease cross-border transport is difficult as the failure of the Westcor power project, which was meant to link the DRC's hydropower station at the Inga Dam to South Africa, demonstrated given the complexities of the terrain, financing and political sovereign issues. Although there was an agreement between Eskom and the operator from the Power Institute for East and Southern Africa (PIESA) that the project was "technically feasible…, they had the impression that discrepancies in national legislation and political quarrels over how to distribute the revenues made the project fail."[32]

In this regard the Cabora Bassa on the Zambesi River is the only project that has begun, illustrating some of the challenges of cross border electricity provision. Initially it was expected that the plant would transmit its maximum load of 2,025 megawatts to Gauteng—the major economic province of nine provinces in South Africa.

However, the war that raged in Mozambique during the 1890's and 1990's made transmission lines 'easy targets' for anti-government guerrillas; as a result, regular electricity generation only resumed in 1998. Given the eventual success of the scheme and the potential of other hydropower schemes such as Kariba Dam on the Zambia—Zimbabwe border, the Kafue Gorge Dam in Zambia and near Ruacana on the Angola—Namibia border, the question is raised whether Eskom will continue to be a net exporter of electricity in the region, where Mozambique has been the exception given the imports from

31. *Ibid*.

32. Draper, P. and Scholvin, S. 2012. "The Economic Gateway to Africa? Geography, Strategy and SA's Regional Economic Relations," Briefing Paper No 121, South African Institute of International Affairs: Johannesburg.

Cabora Bassa. However, South Africa's own growing demand will make it a net importer, rather than exporter of energy, in the future.

The extent to which South Africa could benefit from the rest of the region is clear from the figures supplied by Eskom, illustrating that Mozambique and Zambia could transmit another 5,000 and 1,000 MW respectively to South Africa. It is expected that Angola and the DRC would be able to supply 20,000 MW to the region after 2025, which would make a substantial contribution to satisfying regional demand.[33] Projects like Cabora Bassa are the result of long-term bilateral agreements and the dominant examples of regional electricity supply. In this regard, it is pointed out that as long as trade is limited to the surpluses from this and similar projects, one cannot speak of a functioning power pool, which requires an operational market mechanism for trading electricity.[34]

It has been argued that at the heart of South Africa's reluctance to fully realize the potential of the region's hydropower lie its large coal reserves. This suggests that only an energy crisis would provoke South African business and government to pursue the benefits potentially offered by the region's oil, gas and hydropower[35]. This raises the question of whether or not South Africa and the Eskom monopoly are actually interested in maximizing the potential that SAPP holds in deepening regional energy integration.

It also raises the question whether SAPP has been successful in deepening regional integration. Although it is institutionally more effective than people think, there has been limited cross-border trading to date. This is largely the result of the dominant position of South Africa *vis-à-vis* electricity generation capacity in the region. This situation is exacerbated by Eskom, which represents South Africa in front of the body.[36] To date, it has been guilty of promoting its own generating assets even in instances where it has not been in the best interests of either the region or South Africa. This is inconsistent with common practice in the rest of the world, where new technologies

33. Scholvin, S. 2014.
34. De Vos, D. 2014.
35. Scholvin, S. 2014.
36. Asami Miketa, A. and Merven, B. 2013.

have made it possible to restructure electricity on a regional basis, and retail sales of electricity are no longer seen as natural monopolies.[37]

In SAPP, energy demand is expected to grow by 4.4% per year to 2040[38]. To meet this demand, an additional 129 GW capacity will be required between now and 2040 (PIDA, 2011).[39] In terms of the current SAPP plan, the funding required for medium to long term projects alone (until 2025), is somewhere around 83 billion USD for an additional 57,000 MW. This will more than double the current regional generating capacity and would also require regional transmission investments of approximately six billion USD. Investments to meet 2040 demand predictions will be larger. South Africa can play a pivotal role in ensuring the economy (or effectiveness, or efficacy) of these regional electricity projects, if it were perceived as a serious buyer of electricity and provided the initial base load demand.

South Africa, can also play a key role in developing cleaner sources of energy. These sources can meet its own needs and help other countries in the region move towards cleaner energy sources. The successful introduction of the Renewable Energy Independent Power Producers Bidding Program in South Africa supports the view that South Africa can "[lead the] way for countries throughout Africa to capitalize on their natural energy resources and attract private sector investment."[40] However, some commentators are more pessimistic: pointing out that renewables have "remained no more than marginal, contributing less than 1% of the electricity used in South Africa."[41]

Others openly question South Africa's commitment, given its continuing investment in large scale coal fired plants, such as Kusile and Medupi, the third and fourth largest coal fired power plants in the world, respectively.[42] In addition, South Africa has been reluctant to enter into energy contracts with IPP's based in neighboring countries

37. *Ibid*.

38. PIDA, 2011

39. *Ibid*.

40. Nott, G. SA's "Energy Success Story Could Spark a Chain Reaction across Africa." Available at: http://www.werksmans.com/legal-briefs-view/sas-energy-success-story-could-spark-a-chain-reaction-across-africa/.

41. Scholvin, S. 2014.

42. Winkler, H. and Marquard, A. (2009). Changing Development Paths: From an Energy-Intensive to Low-Carbon Economy in SA. *Climate and Development.* 1(47-65).

on the basis that the unit cost would be too high. This will continue to affect the process until the size of the African energy systems are extended to enable the scale required to bring energy costs down. It is here, in bringing down costs, that South Africa could play an important role.[43]

To conclude: there are compelling reasons for energy integration on a comparable level to South Africa. It is in the region and South Africa's interest to pursue high rates of economic growth. Electricity supply constraints are a significant hurdle to future growth, but a regional approach using a combination of market and other mechanisms will go a long way in addressing present electricity challenges in the region. However, while "technical constraints such as the reliability and security of the existing grid and its expansion" pose challenges, the "biggest constraint is where national utility monopolies like Eskom feel threatened by the available market mechanisms and choose not to use them."[44] This view is supported by Mketa and Merven (2013), who argue that there is little evidence that South Africa is engaging in the long-term planning that is required or forging strategic relationships with its energy rich neighbors.[45] However, it is imperative for South Africa's decision-makers to confront the extent to which Eskom's self-interest is preventing South Africa from maximizing its position as geopolitical core and a gateway to southern Africa.[46] Unless this issue is addressed, few things will change in the near future.

Role at Pan-African Level

The above section illustrates that provided it possessed the political will; South Africa could play a significant role in developing an integrated regional energy system in southern Africa. It is also clear that this would have huge benefits not only for the region, but for South Africa as well. However, this is potentially restricted by on-going suspicions within Africa about South Africa's intentions on the continent.

43. Scholvin, S. 2014.

44. De Vos, D. 2014.

45. Asami Miketa, A. and Merven, B. 2013.

46. Draper, P. and Solvin, S. 2012.

South Africa is rumoured to promote "national economic interests, rather than more sectoral and geographically balanced economic growth within SADC". Unfortunately, many old-guard African leaders are resentful of South Africa as an assertive relative "newcomer."[47] The following section shall explore the role South Africa can play at a pan-African level.

South Africa faces its own challenges and shortcomings in its energy strategy and policies, and in its universal energy access program. Many have raised doubts as to these policies performance and relevancy. At the same time, South Africa faces a skill shortage in many sectors in its own economy. Nevertheless, the fact remains that South Africa boasts a high level of industrialization and therefore a wealth of experience in private sector interactions. It also has a large amount of institutional knowledge in bilateral and multilateral organizations, and international agencies and advanced levels of energy planning. South Africa has furthermore instituted policies and programs evaluated by review and evaluation mechanisms and that are adjusted to changing conditions. Sketched below are some suggestions on how South Africa can maximize its dominant position in the African energy landscape to address the energy needs of the continent.

South Africa's experience in managing large grids and electrification systems can be useful to other African countries that want to expand grid access and availability to its population and large industries. Additionally, the country's post-Apartheid success with near universal grid access is a remarkable achievement. This is more than an engineering feat. It is an catalyst for innovative payment and cost recovery systems. This know-how can be used within the African Union's program to expand electricity and other energy infrastructure in Africa. Cross-border sharing at the state-to-state level exists, but has the potential to be significantly reinforced if South Africa adopts a more strategic view and works constructively with other African governments.

Demand for know-how and modernization of energy systems will grow provided that in the next 35 years, the rate of urbanization in

47. Bond, P. 2010. *SA: Foreign Policy after Mandela and Mbeki*. Available at: http://www.africafiles.org/printableversion.asp?id=23682

Africa is significant. By 2050, Africa's urban population is expected to triple from an estimated 414 million urban dwellers in 2011 to 1,265 million by 2050.[48] The United Nations predicts that in 2050, more than half of Africa's population will be living in urban areas.[49] Service backlogs and the cost of the services are likely to be significant. Finding efficient and effective delivery mechanisms that are also affordable will be imperative.

The increased exploitation of energy reserves and development of related projects will require key skills in areas such as project development, procurement processes, contract negotiation and management, and risk analysis. These skills will become particularly important, especially with the increased involvement of the private sector in the continent's energy sector. South Africa can, therefore, contribute to capacity development in other African countries, particularly in smaller and less resourced countries. In doing so, it would also help reduce the transaction costs of energy projects and programs on the continent. One can observe this trend today.. An already large portion of South Africa's technical, engineering and planning expertise also extends beyond South Africa's borders.

The increasing role of renewables in the South African energy mix and in future gas is leading South Africa to develop some experience with modular utility scale technologies. Renewables—an intermittent source of energy—require experience with grid capacity and systems management. By 2030, renewable energy from South Africa's grid is expected to reach 6%-7% of the energy mix—about 19GW. The volume has potential to be higher provided that other sources—such as coal and nuclear—do not become part of the energy mix. By then, South Africa's system operator and IPPs would have gained substantial working experience with various renewables technologies such as photovoltaics (PV), wind, and concentrated solar power (CSP) that would not be only of value for neighboring states, but also for the African region as a whole.

In the long term, South Africa could play a role in supporting and encouraging the creation of regional and continental electricity mar-

48. DESA. 2012. *The World Urbanization Prospects: The 2011 Revision. Highlights.* The Department of Economic and Social Affairs of the United Nations (DESA), Washington DC.
49. *Ibid.*

kets for economic growth and human development for the entire African continent. Regionally integrated approaches to energy development, in particular for large-scale energy sector projects, would make both the energy and the economic market large enough to incentivize investments in the energy sector and facilitate the development of diverse energy resources for the benefit of the entire continent. South Africa's economy is so large that it could serve as an anchor client for a well-integrated energy and economic system that can improve the efficacy of many projects.

Also critical for this development is South Africa's ability to interconnect with neighboring countries in order to provide an alternative supply source for countries, which have small energy markets or are dependent on sources such as hydropower and are affected by nature, in addition to enabling smaller countries to pool risk together. The latter would make the development of a country or a region's power projects more attractive to both domestic and international investors, as well as to bilateral and multilateral lenders.

South Africa would be well-served to capitalize on green growth strategies using the transformation of its own energy sector. They can do this by basing their development strategy in both electricity and liquid fuels. This interest is evident in a number of areas: energy efficiency, less carbon intense grid by scaling up renewables at utility and non-utility scale, smart-grids, and the production of biofuels for motor vehicles and the aviation industry. These require new financing incentives and tools. In addition, their large-scale production is likely to bring down costs. This has already been proven for the renewables IPP bids that the South African government has run for the last three rounds. The link between energy transformation and green growth presents valuable lessons and experience relevant to the rest of the continent. Presently, South Africa is a pioneer in a hostile environment.

Conclusion

This chapter has shown that because of South Africa's strong presence in Africa's economic and energy landscape, it can play a significant role in Africa's energy development. It has also illustrated that increased collaboration with South Africa would have significant ben-

efits not only for Africa and southern Africa in particular, but for South Africa as well. Unlocking Africa's energy access to its unserved population would promote further economic development, growth and integration. South Africa can play an important role in this, but such an initiative would require vision, long-term thinking and an enlightened self-interest.

It is also apparent that for this to happen, strong political will on the part of the South African government is needed to address the Eskom monopoly and to foster the potential of a regional energy system. Unless this will is present, South Africa's role in Africa's energy landscape will be limited to acting as the African voice in the international community, assisting in technology and skills development and providing guidance in the development of successful energy programs. While this level of involvement will undoubtedly be beneficial for the African continent, it will not contribute to a wider set of gains, both for Africa and South Africa that a committed integrated regional energy approach would bring.