

Overview of the SADC energy and resources

Prospects and challenges for China-SADC cooperation

Research Paper

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CHAPTER 1

OVERVIEW OF ENERGY AND NATURAL RESOURCES IN SADC

Introduction

Energy and natural resources have an important role in the development of southern Africa's, past, present and future. In the past the mineral resources attracted keen interest in colonial Europe that led to the colonisation and European settlement of the region, resulting eventually in a liberation war in several countries, fought by the indigenous people to recover their land and resources. Although southern Africa has abundant energy resources such as hydro, solar, thermal, wind, gas and petroleum as well as nuclear capacity, the present situation is that these resources are not adequately exploited for various reasons including lack of capital and technology. The future plans therefore include mapping and appropriate planning for long-term investment in the efficient and sustainable development of these resources without damaging the environment.

Various international institutions such as the Southern African Development Community (SADC), the African Union and the United Nations have identified energy as a key factor in development. The African Union, for example, has identified energy in its 50-year strategy Agenda 2063 as one of the key infrastructure pillars for attaining its goals. The UN member states have recognized energy as a critical sector in attaining the Sustainable Development Goals (SDGs). SDG 7 on Affordable and Clean Energy recognizes the need for access to affordable, reliable, sustainable and clean energy.

The planning context is therefore,

- ❖ the African Union's Agenda 2063;
- ❖ the SADC's Regional Indicative Strategic Development Plan (Revised RISDP 2015-2020);
- ❖ the UN SDGs; and,
- ❖ the FOCAC vision expressed through the FOCAC Declaration and Action Plan (2016-2018).

The Southern African Development Community (SADC) is made up of 16 mainland and island Member States -- Angola, Botswana, Comoros, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. SADC recognizes energy as a key component of its Regional Infrastructure Master Plan (RIMP) and the revised Regional Indicative Strategic Development Plan (RISDP 2015-2020). The 12 mainland SADC member states share a regional energy grid and conduct energy trading through the Southern African Power Pool (SAPP).

The SADC region is well-endowed with energy sources and natural resources, and is also home to some of the world's largest reserves of minerals such as diamonds, platinum and gold. South Africa and Zimbabwe together account for about 80 percent of the world's platinum production. There is active debate about the abundant opportunities available to the region and its regional economic community SADC – and indeed the rest of Africa.

The lingering questions in this narrative are: Who really owns these vast natural resources, and who is really benefiting from all this wealth? What should be done to ensure that SADC – and indeed the whole of Africa – uses its vast wealth to leverage its position in global geo-politics? What role can China play in developing this resource and ensuring a win-win relationship with Africa and SADC in this regard?

An energy-sufficient and well-developed SADC is a factor in China’s own developmental plans, in particular its “Go Out Policy” under which its enterprises are encouraged to invest overseas. This strategy aligns with SADC’s current push towards industrialisation. Therefore it is necessary to identify the opportunities for strengthening China-SADC cooperation as well as the challenges encountered.

SADC Energy Inventory

The SADC region is endowed with a wide range of energy resources such as **coal** in Botswana, Mozambique, South Africa and Zimbabwe; **natural gas** in Namibia, Mozambique and Tanzania; **hydro** in Angola, Democratic Republic of Congo (DRC), Mozambique, Tanzania, Zambia and Zimbabwe; **petroleum** in Angola, Mozambique and Tanzania; and **nuclear** capacity in South Africa with **uranium** mining in Namibia and South Africa. The region is endowed with significant renewable energy sources such as wind, solar, geothermal and suitable conditions in various areas for mini-hydro (SADC and SARDC, 2016).

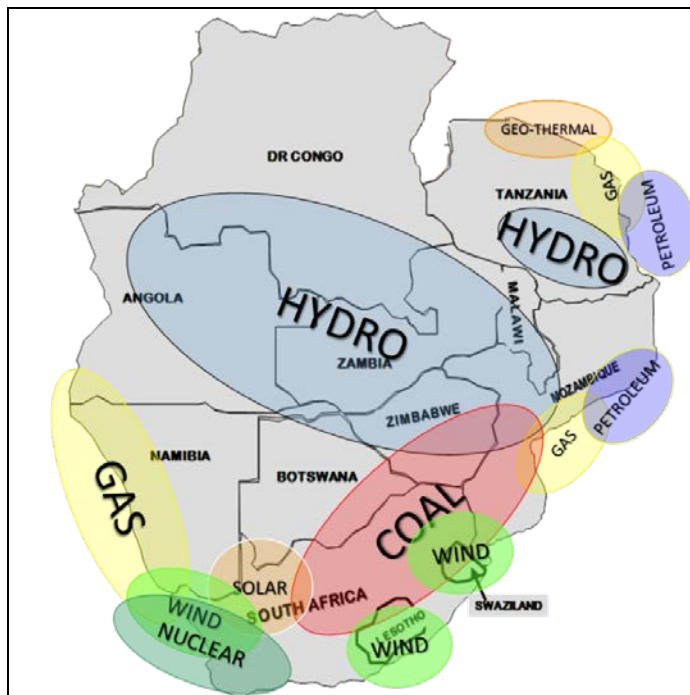
Biomass is by far the major source of energy in most SADC Member States. Traditional biomass such as wood and charcoal accounts for more than 45 percent of final energy consumption in the region, according to a report by the Renewable Energy Policy Network for the 21st Century (REN21, 2015). The report notes that if modern biomass, such as bagasse for boilers in the sugar industry, is included, the overall biomass share reaches more than 57 percent. The use of biomass varies by country, with some SADC Member States exceeding 70 percent in terms of the contribution of traditional biomass to energy consumption. This is the case for the DRC. Biomass is also a significant source of energy in Mozambique, Tanzania and Zambia, where it accounts for at least 60 percent of energy consumption, according to the report. The high share of biomass in total energy consumption in SADC can be attributed in part to the fact that a high proportion of the population lives in rural areas.

The total population of the region was almost 300 million in 2013 (SADC, 2014), with a rural-urban proportion of 60-40, and just over 39 percent of the population living in urban areas where there is greater access to electricity. The population of SADC is estimated to be growing at a rate of 1.7 percent per annum and likely to reach over 350 million by 2027, according to the SADC Regional Infrastructure Master Plan.

Electricity sub-sector

Electricity in the region is generated mainly from thermal and hydropower sources. Coal remains the main source of power generation in the region although recently governments have invested in the exploitation of other sources such as solar and wind. The SADC region has vast energy potential from hydro, solar, thermal, wind, gas, petroleum and nuclear capacity in various member states, as shown in Figure 1.1.

Figure 1.1 Energy Resources, SADC Mainland Countries



Source. Southern African Power Pool in *SADC Energy Monitor 2016*

Electricity in SADC is generated mainly through thermal or hydroelectric resources. The coal industry remains the main basis of power generation in the region and a significant share of the coal is also allocated for export. Coal exports can yield economic benefits to the region if carefully planned so as not to prejudice the local demand. Both mining and transport infrastructure are needed for coal redistribution and export.

The region has a large reserve of low-cost hydroelectricity in the north (especially Inga Reservoir drawn from the Congo River in the DRC and Kariba Dam on the Zambezi River which forms the Zambia/Zimbabwe border in the middle of the regional system), as well as large reserves of cheap coal in Botswana, Mozambique, South Africa and Zimbabwe.

Natural gas is becoming more significant to the region's energy sector, as Mozambique, Namibia and the United Republic of Tanzania develop natural gas fields offshore (SARDC, 2010). New natural gas discoveries by international oil conglomerates in these three countries during the past decade has ignited investor interest in this previously under-explored region. The nascent petroleum and gas sub-sector is plagued by volatile prices, and these resources are not directly available to the region due to foreign commitments and a lack of infrastructure necessary to exploit, process, store and distribute throughout the region.

The SADC region has some of the most significant known reserves of uranium and the mineral is being mined in Namibia and South Africa for use as fuel for nuclear power plants while exploration is underway in Botswana and Zimbabwe. Nuclear technology is included in the electricity sub-sector but what is required is to demonstrate that nuclear power can be a safe electricity generation option and win the confidence of the population and governments to endorse nuclear energy deployment in the SADC region. Only South Africa has nuclear capacity, with plans for a new nuclear programme.

Southern Africa has a large potential for renewable energy, including hydropower which is already being exploited on a commercial scale. However, the necessary infrastructure for grid connection is poor. The prices for most renewable energy technologies are coming down but more needs to be done in the form of innovative financing.

A key factor of the SADC energy sector is the fact that the region has faced an electricity deficit since 2007 due to a combination of factors that have contributed to a diminishing generation surplus capacity against increasing growth in demand. In recent years, the sub-region has experienced a power deficit situation, including growing demand against limited expansion in generation capacity.

The prevailing situation is compounded by other factors that include the current reality where access to energy takes a national rather than a regional approach, tariff levels that are not cost-reflective and caught between the viability and access conundrum, capacity issues at both national and regional levels, and energy sector reforms that are generally perceived to be moving at a sluggish pace.

Southern Africa has a low access to electricity of about 42 percent compared to around 36 percent for the East African Community (EAC) and 44 percent for the Economic Community of West African States (ECOWAS), with some SADC countries having below five percent rural access to electricity.

Uranium

The SADC region has vast deposits of uranium in Namibia and South Africa, and this is mined for use as fuel for nuclear power plants. Exploration is underway in Botswana and Zimbabwe. Only South Africa has nuclear capacity, with plans for a new nuclear programme.

Biofuels

There is great potential for biofuel feedstock production, processing and utilisation in the region. The region has witnessed substantial interest in large-scale biofuel investments. Biofuels are as a result being considered as a readily available, highly promising, innovative energy solution – provided their social, environmental and financial benefits can be optimised. Several countries have plans to integrate biofuels in their energy diversification strategies and aim to design a biofuel industry that maximises socioeconomic benefits. With the expansion of the SADC Free Trade Area, biofuels are expected to become a regionally traded commodity included in the free trade agreement.

High prices of hydrocarbon oils relative to prices of biofuels have created a strong incentive to expand production of biofuels in the region. Ethanol from sugar cane is produced and blended with petrol in Zimbabwe and some other countries that produce sugar. The other biofuel produced in the region is biodiesel, which is made from vegetable oils. Production of biofuels has been taking place on a small scale in Zambia and Zimbabwe. For example, D1 Oils, a British bio-energy company, has developed 174,000 hectares of land in Zambia for the cultivation of vegetable oil crops for the production of biodiesel.

So far, production of biofuels in the region has not had a serious impact on the production of food because cereal food crops have not been used as the relevant feed, and because production has been on a small scale, thus avoiding competition for land with food crop production. But in the future the situation could change as biofuel production increases.

Oil and gas sub-sector

Investments in the oil and gas sector are on the rise, particularly in Angola, Mozambique and the United Republic of Tanzania due to the vast resources found in those countries. However, the sector is plagued by volatile prices, which have been uncharacteristically low in the last two years, thus generally discouraging investment.

Angola is currently southern Africa's only significant oil producer, producing more than 1.25 million barrels per day. The country is estimated to have crude oil reserves of 5.4 billion barrels, which constitute 96 percent of SADC's total estimated proven crude reserves. Crude oil production in Angola has quadrupled over the past 20 years. Smaller proven reserves of oil are found offshore in Mozambique, Namibia, South Africa and Tanzania.

Natural gas is becoming an important energy resource in the SADC region, and new natural gas reserves have been discovered in Mozambique, Namibia and Tanzania during the past few years. These discoveries have interested various international investors.

Tanzania is emerging as a force in this sector as new natural gas discoveries continue to be made along its coast while Mozambique has also seen a rapid expansion of its gas industry since the commissioning of the 865km gas pipeline by South African multinational firm SASOL from Pande and Temane Gas Field in Mozambique to Sekunda in South Africa. The Rovuma area in Mozambique has seen positive natural gas exploration results which are now being developed, while Tete Province, with its vast coal deposits, is also home to significant coal-bed methane gas.

South Africa is rich in shale gas and coal-bed methane gas. Other countries such as Botswana, Malawi, Zambia and Zimbabwe have large and accessible reserves of coal, and coal-bed methane gas. These reserves have not yet been extracted commercially although extensive pilot tests have been conducted, especially in Botswana and Zimbabwe.

The petroleum and gas sub-sector is affected by the volatile and often ever-rising fluctuation in world prices of petroleum fuels, and yet little comparative, cross-border pricing data is available in the public domain although shortages have been felt in a number of countries. One factor is the high prices of hydrocarbon oils relative to prices of biofuels in the SADC region.

The summary for the SADC region is as follows:

- ❖ Countries extracting natural gas commercially -- Angola, Mozambique and United Republic of Tanzania
- ❖ Countries extracting crude oil commercially – mainly Angola
- ❖ Countries that have discovered large deposits of natural gas but are still in the process of developing towards commercial extraction -- DRC, Madagascar and Namibia
- ❖ Countries that have discovered large deposits of shale gas -- South Africa
- ❖ Countries that have discovered large deposits of coal-bed methane gas but are still in the process of developing capacity for commercial extraction -- Botswana, Mozambique and Zimbabwe
- ❖ Countries that have discovered significant deposits of oil but are still developing capacity for commercial extraction -- DRC and Madagascar.

SADC Mineral Resources

The countries in southern Africa are endowed with vast mineral resources. Between them, South Africa and Zimbabwe are host to approximately 80 percent of the world's Platinum Group Minerals (PGMs) and chromite resources. Vast deposits of coal, both thermal and metallurgical, occur and are mined in significant quantities in Botswana, Malawi, Mozambique, South Africa, Zimbabwe and Zambia. Angola, Botswana, the DRC, Namibia, South Africa and Zimbabwe provide about 60 percent of the world's rough diamonds.

Base metals, especially nickel and/or copper, are extracted profitably in Botswana, the DRC, South Africa, Zambia and Zimbabwe. Other mineral products are extracted from ore deposits which occur in large proportions in SADC countries and these include aluminium, uranium, gold, iron ore, asbestos, tin, fluor spar, manganese, limestone and zinc.

The energy mix and challenges currently afflicting the region could be addressed through exploitation of the natural, shale and coal bed methane gas deposits that have been discovered in Botswana, Malawi, Mozambique, Namibia, South Africa, Tanzania and Zimbabwe.

The mineral resources provide the SADC region with a comparative advantage and also present a springboard for socio-economic development of the countries. For example, given the growing demand for platinum as a catalyst in reducing air pollution and in jewellery, increased production of PGMs, their beneficiation and value addition would present a unique opportunity for developing world class mines and processing facilities which could form the backbone of vibrant metallurgical and manufacturing industries.

Land

Land is an essential resource, covering a total area of almost 10 million square km in southern Africa, of which less than 25 percent is arable. The region's arable and domesticated land is used for agriculture, forestry, wetlands and wildlife conservation, and human settlements. Table 1.1 shows the proportion of arable land of total land area of SADC member states.

Table 1.1 Total Land Area and Arable Land (000 ha)							
Country	Total land area 000 ha	Arable land 000 ha					
		2000	2005	2006	2007	2008	2009
Angola	124 670	3000	3300	3300	3400	3400	4000
Botswana	56 673	350	240	240	250	250	250
DRC	226 705	6700	6700	6700	6700	6700	6700
Lesotho	3 035	330	323	303	325	358	335
Madagascar	58 154	2900	2950	2950	2950	2950	2950
Malawi	9 408	2750	3000	3000	3000	3500	3600
Mauritius	203	100	93	92	90	87	87
Mozambique	79 409	3900	4500	4800	4800	4800	5050
Namibia	82 329	816	814	813	800	800	800
Seychelles	45	1	1	1	1	1	1
South Africa	122 704	14753	14700	14500	14500	14500	14350
Swaziland	1 720	178	178	178	178	178	175
Tanzania	88 604	8800	9500	9500	9500	9600	10000
Zambia	74 339	2816	2727	3013	2949	3052	3350
Zimbabwe	38 667	3580	3880	4030	4030	4230	4180

Data not available for Comoros which joined SADC in August 2017
Source: Southern Africa Environment Outlook 2008pg 102 (total land area)
FAOSTAT Data 2011 (arable land)

Crop production is the most dominant land use, however due to constraining factors such as low soil fertility and erratic rainfall patterns, only five percent of southern Africa is under permanent cropland. Grazing lands, covering 45 percent of the region's total land, and woodlands are diminishing due to land pressures resulting from population growth, land tenure and ownership regimes, and limited use of technologies suitable for intensive production.

Large tracts of land in the region are set aside as protected areas for the conservation of forests, wildlife and wetlands, with Zambia and Tanzania having the highest proportion of protected areas at 31 and 28 percent respectively, followed by Botswana (18), Namibia (14) and Zimbabwe (12) (UNEP in SADC and others, 2008). These protected areas are increasingly being joined across borders through creation of Trans Frontier Conservation Areas (TFCAs).

TFCAs are conservation initiatives that straddle national boundaries, thus falling under joint administration and re-establishing ecological integrity separated by artificial, though legal, boundaries. Some 18 existing and potential TFCAs have been identified to date, including the Greater Limpopo Trans Frontier Park established by the governments of Mozambique, South Africa and Zimbabwe and ZIZABONA (Zimbabwe, Zambia, Botswana and Namibia). The proposed TFCAs covered close to 755,000 sq km of the region by 2001, with some new parks identified in the interim.

Figure 1.3 Trans Frontier Conservation Areas in SADC



<http://www.sadc.int/fanr/naturalresources/transfrontier/index.ph>

Freshwater

Southern Africa's main freshwater resources are found in surface water bodies such as lakes, dams, rivers and wetlands, and in groundwater aquifers which are all dependent entirely on seasonal rainfall that is spatial and temporally uneven within countries and across the region. Most parts of the region receive a wet season of about five months during the summer period of October through April, with wide variations in different parts of this vast region that lies almost entirely south of the equator.

There are 15 major internationally shared river basins in SADC, with a combined drainage area covering about 78 percent of the region's continental land area, a total catchment area of 67.6 million sq km (SADC, SARDC, IUCN, UNEP, 2008). The Congo and Zambezi river basins

are the largest in the region, and the Zambezi is the most shared within SADC, with eight riparian states.

Groundwater is available in variable quantities mainly in the form of aquifers recharged through infiltration, but this is being rapidly depleted. In Botswana, 80 percent of water supply for people and animals is from groundwater sources. Most rural areas in Namibia also rely on groundwater while most farmers in the Limpopo river basin depend on groundwater from springs or pumped from drilled wells and boreholes during the dry months.

South Africa and Zimbabwe have the largest number of dams in the region and are globally ranked 11 and 20, respectively, in the list of top countries with large dams. The Zambezi river basin has more than 30 large dams, including Kariba and Cahora Bassa, which have been constructed for domestic, industrial and mining water supply, irrigation and power generation.

Major natural lakes in the region include Lakes Victoria, Tanganyika and Malawi/Nyasa/Niassa. The latter are the world's second and third deepest, respectively. Some of the wetlands in SADC include the Kafue Flats in Zambia, the Okavango Delta and Makgadikgadi pans in Botswana, the Etosha pan in Namibia, and various dambos, pans and deltas scattered throughout the region. Some of the estuaries include Limpopo, Rufiji and Cunene.

Like many other catchments in the region, the Kafue river catchment in Zambia, near Lusaka and the Manyame river catchment which serves Harare, Zimbabwe, are hot spots for water quality degradation. The Kafue receives sewage and effluent from activities such as mining, manufacturing and agriculture, as it caters for about 40 percent of the Zambian population and provides for 85 percent of the total irrigated land. Studies carried out in the Mazabuka area, showed that by year 2000, phosphate levels were found to be as high as 0.71 mg/l, which is twice the internationally recommended value of 0.3mg/l.

CHAPTER 2

OWNERSHIP OF SADC ENERGY AND OTHER RESOURCES

Introduction

Southern Africa is one of the richest regions of Africa, endowed with some of the most diverse energy and other natural resources. The region has vast energy potential from solar, wind, nuclear, hydro, thermal, gas and petroleum sources in several countries. The Inga Reservoir in the Democratic Republic of Congo holds Africa's hope as far as hydropower generation is concerned, with the proposed Inga III Hydropower Project estimated to have potential to produce about 48,000 megawatts of electricity, according to the Southern African Power Pool. The expected Inga power output will be enough to meet the needs of most of the SADC region.

The region is also home to some of the world's largest reserves of minerals such as diamonds, platinum and gold. South Africa and Zimbabwe collectively account for about 80 percent of the world's platinum production. There is significant debate about the abundant opportunities available to SADC – and indeed the rest of Africa. The lingering questions in all this narrative are who really owns these vast natural resources, and who is really benefiting from all this wealth?

This chapter seeks to explore the ownership and control of available energy resources, and also seeks to identify the opportunities for strengthening China-SADC cooperation as well as the challenges encountered in developing the resources.

SADC Energy Resources

The SADC region is endowed with significant deposits of Coal Bed Methane (CBM) gas, crude oil, shale gas and natural gas whose optimal exploitation could potentially prove to be the “missing ingredient” in terms of diversifying the region's energy mix, reducing the cost of energy and improving its accessibility to the citizens of the region, as well as reducing carbon dioxide emissions which are associated with global warming and climate change. However, the resources are unevenly distributed among the Member States and in some cases under-developed.

This, coupled with export commitments to foreign countries especially those from which the investment companies originate, and the lack of infrastructure to extract, process, store and distribute throughout the region, makes the resources unavailable to the majority of the population in the region. This situation calls for regional integration in developing the infrastructure required to distribute the resources to areas of need in order to facilitate production and boost economic activity across the region.

While national ownership and control of the natural resources has been the main agenda for most of the countries in Africa over the last decade, a shift towards Local Content Policies (LCP) is emerging with the realisation that the latter appears to be faster in driving economic development and employment, and continues to do so despite fluctuations in commodity prices as long as resources are extracted (Ovadia, 2015). The strategy aligns with SADC's current push towards industrialisation.

Electricity sub-sector

Electricity remains one of the major drivers of socio-economic development in southern Africa, particularly the industrialization agenda currently being pursued by the region. The largest sources of electricity generation are coal and other thermal sources, with South Africa producing the largest share of electricity consumed in the region. Access however remains a challenge with only 39 percent of the population which lives in urban areas connected to main grids.

In terms of control and ownership of energy resources, for the majority of southern African countries, national power utilities are primary producers of electricity although recent years have seen an increase in Independent Power Producers (IPPs). For example, in South Africa, the state-owned power utility Eskom generates, transmits and distributes electricity to about five million customers in the industrial, mining, commercial, agricultural and residential sectors, and to redistributors.

Eskom generates 95 percent of the electricity used in South Africa and 45 percent of the electricity used in Africa. The utility sells electricity directly to about 3,000 industrial customers, 1,000 mining customers, 49,000 commercial customers, 84,000 agricultural customers and more than four million residential customers (of whom the majority are prepaid customers). Most of the sales are in South Africa, with other southern African countries accounting for a small percentage.

Mozambique's state-owned Electricidade de Moçambique (EDM) supplies and regulates all power. The company has undergone a major transformation to cope with market growth and its inability to finance its own generation projects. The first IPP projects in the country, negotiated in the past few years, became active in 2015 and have paved the way for future IPP negotiations. Some IPP projects are expected to use a hybrid off-taker approach to ensure project bankability, usually comprising EDM and large industrial energy users.

The company Hidroelectrica de Cahora Bassa (HCB) operates the Cahora Bassa Dam, the second largest dam in Africa with a capacity of more than 2,000MW. HCB sells 65 percent of its existing generation to South Africa and uses South African transmission lines to re-import HCB's power to southern Mozambique. The remaining 35 percent is sold to the northern region of Mozambique and to Zimbabwe.

An emerging trend during the past few years has been the growth of mini-hydro projects. These have been prominent in several countries such as Mauritius, Malawi, Swaziland and Zimbabwe. For example, with peak demand of just over 220MW, Swaziland has 60.6MW of operational small-scale hydropower while Malawi has 6MW of small-, micro- and pico-scale hydro. The emergency of mini-hydro projects has created space for active role for private players in the SADC energy sector.

IPPs have lately begun to play a significant role in SADC's energy sector, providing a sustainable and complementary solution to electricity generation requirements. According to the Southern African Power Pool (SAPP), a significant share of electricity generation in South Africa and Zambia is already produced by IPPs. In the case of South Africa, the Independent Power Producer Procurement Programme (IPPPP) is a key vehicle for securing electricity capacity from the private sector for both renewable and non-renewable energy sources, as aligned with national policy. In 2014, approximately 2.2 terawatt hours (TWh) of renewable energy was generated by IPPs in South Africa, powering the equivalent of 700,000 typical South African homes.

IPP Procurement in South Africa is managed by the "IPP Office", a specialised procurement office as established under the leadership of the South African Department of Energy, National Treasury and the Development Bank of South Africa. The IPP procurement programme, as developed by the IPP Office, has been designed with a rolling bid-window programme format whereby procurement of energy from IPPs is done in a cyclic manner, with a procurement cycle typically being completed in a year. The bid-window format attracts continued market interest, induces increased competitive pressure amongst bidders to offer reduced pricing, allows for improvements and lessons learnt with each bid window to be incorporated in the refinement of procurement documentation in the following bid-windows, and uses standard contracts that avoid negotiations and enables consistency.

Zambia has established a public institution, Office for Promoting Private Power Investment (OPPPI), which facilitates and promotes the implementation of IPPs. This is a dedicated unit in the Ministry of Energy whose role is to promote new players to the electricity market. It is one of two institutions formed following the liberalisation of the Zambian power sector to attract private sector participation in the generation, transmission and distribution of electricity in the country. The other institution is the Energy Regulation Board whose responsibility is to regulate operations and pricing in the Zambian Electricity Supply Industry (ESI). The OPPPI interfaces directly with investors and champions support for private-sector hydropower generation and transmission projects. The creation of OPPPI has eased the process of investing in the Zambian ESI and has seen several private players entering the industry.

In the case of Angola, the power system is made-up of three independent grid systems that are expected to be integrated in the future. Angola is currently a non-operating member of SAPP but plans to connect to the pool through Namibia (via the Baynes power station) and the DRC (via the Inga hydropower station). Through a US\$1-billion loan from the African Development Bank (AfDB) Electricity Sector Transformation Programme (PTSE) approved in December 2014, the Angolan government restructured the public utility to create three separate entities: a Production Company (PRODEL), the National Transmission Company (RNT), and the National Distribution Company (ENDE).

Angola's Office of the Exploration of the Kwanza River (GAMEK), has an expanded mandate that goes beyond developing hydroelectric projects along the Kwanza River and oversees the development and construction of most major power projects. Completed projects are then transferred to PRODEL for operational management. PTSE also aims to simplify and strengthen the role of the Angolan Electricity Regulatory Agency (IRSE) by enabling the regulatory body to regulate tariffs and independent power projects.

The new Electricity Law that was approved in June 2015 codified these reforms and established the necessary legal framework for promotion of IPPs. The AfDB is providing technical support to the Angolan government to build capacity for implementing this legislation, including negotiating Power Purchase Agreements (PPAs) with IPPs and implementing feed-in-tariff rates. These steps are critical elements to attracting private investment. IPPs, however, remain uncommon in Angola while PPAs are negotiated on a case-by-case basis. Private producers from Brazil, China, Russia, and the United States contributed up to 10.6 percent of installed capacity in 2015. For example, US-based APR Energy produces 80MW of energy for use in the greater Luanda area through an energy sales contract with the government.

In view of recent significant budgetary cuts by the Angolan government, the Ministry of Energy and Water and public energy companies have turned to external financial resources as they seek to expand their electric power production and transmission capacity. An example is the 2016 signing of a US\$484.5 million contract with Egyptian company El Sewedy for equipment purchase to provide 345MW of thermal energy. This contract was financed by the company based upon Angolan government sovereign guarantee.

The Chinese government financing to Angola includes a US\$980-million loan for the 750MW thermal combined-cycle plant under construction in Soyo with construction led by China Machinery Engineering Corporation (CMEC). There is also a pending US\$4.5-billion Chinese loan to fund the Caculo Cabaça hydropower project. The Brazilian Development Bank (BNDES) finances many of the Brazilian goods and services used at the Laúca hydroelectric dam, with Brazilian construction firm Odebrecht as the primary contractor. Meanwhile, the US\$100 million rehabilitation and expansion of the Cambambe hydroelectric dam is being financed a commercial banking syndicate.

With regard to renewables, southern Africa boasts of high solar penetration levels, which provide a great potential and meaningful contribution of solar energy to power generation. There is evidence of increased and planned uptake especially in South Africa, Namibia and Swaziland and Zimbabwe where there are plans to build more solar PV plants. Botswana, Malawi, Namibia and Tanzania are developing large-scale PV projects and Tanzania has successfully focused on small-scale off-grid (often linked to mini-grids using the innovative use of standardized PPAs).

Mozambique's Energy Fund Institute (FUNAE) aims at electrification of schools and clinics using PV and other renewables. The Mozambican government has promoted solar PV and mini-hydropower solutions in rural areas, reporting that 700 schools, 600 health centres and 800 other public buildings in rural areas now have electricity from solar PV. Although spearheaded by FUNAE, this initiative has promoted the participation of private players.

Tanzania's unique Feed-in Tariff (FIT) Programme assisted the first solar project with 208 kW of PV panels. The result is 208 kW of PV panels providing electricity to 45 secondary schools, 10 health centres, 120 dispensaries, municipal buildings and businesses across 25 village market centres in the Kigoma region. As in the case of Mozambique, the programme is premised on close cooperation between the government and private players.

Zimbabwe's Rural Energy Agency (REA) has been active in implementing renewable energy projects using solar PV and targeting rural institutions such as clinics and hospitals, schools and chiefs' homesteads. Zimbabwe is moving forward on a project-by-project basis and planned projects include a 100MW solar farm in Gwanda, a 50MW solar plant in Marondera in the east of the country, and two 10 MW grid-connected PV arrays in the Harare and Melfort areas. Zimbabwe has in the past benefited from the Global Environment Facility's Solar PhotoVoltaic Pilot programme which resulted in some 10,000 units installed in rural areas.

Oil and gas sub-sector

Angola is currently Southern Africa's only significant oil producer, producing more than 1.25 million barrels per day. The country is estimated to have crude reserves of 5.4 billion barrels, which constitute 96 percent of SADC's total estimated proven crude reserves. Crude oil production in Angola has quadrupled over the past 20 years.

Smaller proven reserves are found offshore DRC, Mozambique and South Africa. The region's refineries are concentrated in South Africa, with additional refining capacity located in Angola, Madagascar, United Republic of Tanzania and Zambia. South Africa is the region's largest oil consumer (using about 68 percent of SADC's total), and the second largest oil consumer in Africa after Egypt.

Angola ranks as the second largest petroleum producing country in Sub-Saharan Africa and 14th in the world. For several months during 2016, Angola's petroleum production of 1.8 million barrels per day (bpd) surpassed that of historic Sub-Saharan African leader, Nigeria. The oil industry in Angola is dominated by the upstream sector – exploration and production of offshore crude oil and natural gas. Almost 75 percent of the oil production comes from offshore fields while ultra-deep water projects are being pursued by French firm Total in Block 32 Kaiombo field that is expected to start production in 2017, as well as by British multinational oil and gas company BP in Block 31.

The oil-rich continental shelf off the Angolan coast is divided into 50 blocks. The offshore blocks 0 to 4 are operated by American multinational energy corporation Chevron through its wholly owned subsidiary Cabinda Gulf Oil Company (CABGOC). CABGOC accounts for a significant share Angola's oil production. In fact, US companies hold a strong position in the Angolan oil market, with Chevron and Exxon Mobile jointly accounting for one-third of national production, followed by Total and BP. Other international players with smaller operations include Italian firm ENI and Norwegian multinational oil and gas company Statoil ASA. Several other US companies have been active in deep water exploration in Angola including ConocoPhillips, Cobalt and Vaalco. ConocoPhillips and Vaalco wells have shown limited results to date.

State-owned oil company, Sonangol, maintains central control over the Angolan oil and gas sector, despite the nominal regulatory powers of the Ministry of Petroleum Ministry. Sonangol determines and collects the petroleum profits due to the government, while the Ministry of Finance collects income taxes from companies. Established in 1976, Sonangol works in partnership with various international oil companies through joint ventures and Production Sharing Agreements (PSAs) to produce and supply oil. Although exploration and production of crude oil and natural gas are fairly developed, the refinery and distribution of the products derived from crude oil remains underdeveloped, resulting in the flaring of nearly 50 percent of the gas.

Natural gas is becoming more significant to the region's energy sector as Mozambique, Namibia, South Africa and Tanzania develop natural gas fields in their respective countries. South Africa is rich in shale gas and coal bed methane gas. Smaller proven reserves are also found offshore DRC.

Mozambique has seen a rapid expansion of its gas industry since the commissioning of the 865km gas pipeline by South African multinational company SASOL from Temane and Pande Gas Field in Mozambique to Sekunda in South Africa. Mozambique recently commissioned several gas thermal plants. The latest of these is the Gigawatt 120MW plant commissioned in December 2015 under a PPA with EDM. This new wave of gas power plants has paved the way for future IPP-based projects, having established a basis for negotiations with the government and EdM. Projections are that gas-based generation is expected to increase by 18.1 percent per year until 2025.

The bulk of Mozambique's natural gas production is from onshore blocks located in the Inhambane Province that are operated by SASOL. Working with the state-owned Companhia Moçambicana de Gasoduto SA (CMG) and the South African Gas Development Company Soc Limited (iGas), SASOL plans on expanding the capacity of its existing pipeline. The expansion project is valued at US\$210 million and it is estimated to come into operation in 2017.

Other players in Mozambique's natural gas industry are Texas-based Anadarko and Italian firm ENI, which has discovered over 100 trillion cubic feet (tcf) of natural gas reserves in the Rovuma Basin, in the far north of Mozambique near the border with Tanzania.

Tanzania is emerging as a force to reckon with as new natural gas discoveries continue to be made along the east coast of Africa. The Democratic Republic of Congo, and more recently Namibia, have also discovered significant reserves of natural gas offshore. Other countries such as Botswana, Malawi, Zambia and Zimbabwe, which are landlocked, have large reserves of coal and hence coal-bed methane gas, which has not yet been extracted commercially although extensive pilot tests have been conducted especially in Botswana and Zimbabwe.

In South Africa, major players in the gas and petroleum sub-sector are iGas and PetroSA, official state agencies for the development of the hydrocarbon gas and petroleum industry. The Petroleum Agency of South Africa promotes the exploration and exploitation of natural oil and gas, both onshore and offshore. Petronet owns, operates, manages and maintains a network of 3,000km of high-pressure petroleum and gas pipelines, on behalf of the Government.

Gas discoveries by international oil companies in Mozambique, Namibia and the United Republic of Tanzania during the past few years have reignited investor interest in this previously under-explored region. Going forward, one area of China-SADC cooperation would be in the development of infrastructure such as pipelines, storage facilities and refineries, with regional integration as the guiding philosophy. The starting point would be to ensure that the gas which is currently being flared, and therefore wasted in Angola, is put to good use in the region. Apart from reducing the harmful effects caused by flaring gas such as smog, soot, acid rain, global warming and toxic air emissions, this would provide some income to Angola while also providing an efficient source of energy to communities around the region that are currently dependent on biofuel.

Wind

The estimated potential for electricity generation from wind in the SADC region is 800TWh with total installed capacity amounting to less than one percent of expected potential. Unlike solar, however, this potential is not widely distributed but rather is concentrated in coastal regions (more on the west than the east coast) and in mountainous countries such as Lesotho. Nevertheless, several SADC countries such as Angola, Lesotho, Namibia and South Africa have enormous wind energy potential, and all are proceeding with development of this resource (REN21, 2015).

South Africa has the most developed wind power sub-sector in the region. Recent successes have been the commercialisation of the Sere Wind Farm (100 MW) in the Western Cape in March 2015, and the inauguration and electricity switch-on of the Kouga Wind Farm in the Eastern Cape in September 2015. The Kouga Wind Farm is expected to provide about 300 gigawatt-hours (GWh) of clean electricity annually to supply an average of 50,000 households.

Nuclear

The SADC region has some of the most significant known reserves of uranium and the mineral is being mined in Namibia and South Africa for use as fuel for nuclear power plants while exploration is underway in Botswana, Malawi and Zimbabwe. Nuclear technology is included in the electricity sub-sector but what is required is to demonstrate that nuclear power can be a safe electricity generation option and win the confidence of the population and governments to endorse nuclear energy deployment in the SADC region.

Only South Africa has nuclear capacity, with plans for a new nuclear programme. Eskom operates the Koeberg Nuclear Power Station near Cape Town, the only nuclear power station in South Africa and the entire African continent, which supplies power to the national grid. The 20 MW tank-in-pool type nuclear research reactor, owned and operated by the South African Nuclear Energy Corporation, is located at Pelindaba, near Pretoria.

Biofuels

Southern Africa has great potential for biofuel feedstock production, processing and utilization hence has attracted substantial interest in large-scale biofuel investments. The reasons for this interest stem from the potential of biofuels to reduce dependence on imported fossil fuels, their ability to assist farmers through the expansion of markets, and their contribution to lowering Greenhouse Gas (GHG) emissions. Biofuels are therefore considered as a readily available, highly promising, innovative energy solution – provided their social, environmental and financial benefits can be optimised.

SADC Member States are moving forward in using biofuels as a partial substitute for fossil fuels in the transport sector. For example, countries with a strong tradition of producing ethanol from sugar cane (Malawi, South Africa and Zimbabwe) are accelerating production of ethanol from waste molasses and are exploring dedicated cane-to-ethanol production systems.

Land

There are three common types of land tenure systems in Southern Africa. These are:

- ❖ State land;
- ❖ Private/freehold land;
- ❖ Communal land.

State land tenure systems mainly cover forests, national parks and conservation areas. In this case, the State either directly manages and controls the use of state-owned resources through government agencies or lease the resources to groups or individuals who are given usufruct rights for a specified period (SADC, SARDC, IUCN, UNEP, 2008).

Private or freehold land tenure systems afford the holder ownership that is transferrable, inheritable and provides collateral against loans. Freehold titleholders have rights to dispose of the land without reference to the State. It allows individuals accountability and encourages good resource management, and also encourages private investment (ibid).

Communal land tenure systems are based on land alienation. Under this system, land is entrusted to the State and traditional leaders. However, in the majority of cases, such land tends to have a high population density. This is the most widespread land tenure system in the SADC region where the majority of the population is based in rural areas.

Various countries in the SADC region have embarked on or are in the process of undertaking land reforms that give control of land to the State. These include Mozambique, Namibia, South Africa and Zimbabwe.

In the case of Zimbabwe, ownership of most of the land now reposes in the State while administration of land rights is done through various government structures, including traditional leaders who are the custodians of communal land. The Fast Track Land Reform Programme undertaken by the country since 2000 has seen the redistribution of land to hundreds of thousands of peasant farmers under two schemes, namely Model A1 and Model A2. The Model A1 scheme was intended to decongest communal areas and was targeted at land-constrained farmers. This model is based on the existing communal area organisation, where peasant farmers produce mainly for subsistence. The Model A2 scheme is a commercial settlement scheme comprising, small, medium and large-scale commercial settlements meant to a critical mass of indigenous commercial farmers. This scheme is, in principle, accessible to any Zimbabwean citizen with proven farming experience and/or resources. Under the latter scheme, beneficiaries were given 99-year renewable leases.

Freshwater

As in the case of land, there is state and private ownership of freshwater resources in SADC. The system in most SADC countries is that where the land is state-owned or communal, the various resources available on the land are also state-owned or communally owned. These resources include water and wildlife. However, a number of initiatives are being implemented in the region to support decision-making for the conservation and management of water resources. These include the establishment of River Basin Organisations (RBOs).

There are 15 shared river basins in SADC as shown in Table 2.1.

Table 2.1 Shared River Basins in SADC

	River basin	Number of basin states	Basin states in SADC	Basin area (sq km)	Length of river (km)	Mean annual runoff (mega cu m/yr) (at mouth)
1	Buzi	2	Mozambique, Zimbabwe	27,900	250	2,500
2	Congo	9	Angola, DRC, Tanzania, Zambia	2,942,700 of total 3,699,100	4,700	1,260,000
3	Cunene	2	Angola, Namibia	110,300	1,050	5,500
4	Incomati	3	South Africa, Swaziland, Mozambique	46,200	480	3,500
5	Limpopo	4	Botswana, Mozambique, South Africa, Zimbabwe	415,000	1,750	5,500
6	Maputo	3	Mozambique, South Africa, Swaziland	31,300	380	2,500
7	Nile	2	DRC, Tanzania	142,000 of 3,038,100	6,700	86,000
8	Okavango	4	Angola, Botswana, Namibia, Zimbabwe	708,600	1,100	11,000
9	Orange	4	Botswana, Lesotho, Namibia, South Africa	947,700	2,300	11,500

	River basin	Number of basin states	Basin states in SADC	Basin area (sq km)	Length of river (km)	Mean annual runoff (mega cu m/yr) (at mouth)
10	Pungwe	2	Mozambique, Zimbabwe	32,500	300	3,000
11	Ruvuma	3	Malawi, Mozambique, Tanzania	152,200	800	15,000
12	Save	2	Mozambique, Zimbabwe	116,100	740	7,000
13	Umbeluzi	2	Mozambique, Swaziland	5,400	200	600
14	Etosha-Cuvelai	2	Angola, Namibia	167,600	430	Ephemeral
15	Zambezi	8	Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe	1,388,200	2,650	94,000

Source: Hirji et al, *Defining and Mainstreaming Environmental Sustainability in Water Resources Management in Southern Africa*, 2002 ; in *Southern Africa Environment Outlook*, 2008, pg 72

Forestry and woodlands

Woodlands and forests provide habitat for wildlife biodiversity. Southern Africa has about 63,940 known plant species compared to some 270,000 in the whole of Africa. Of the known species in southern Africa, 3,000 are endemic to the region and about 2,000 are threatened. With the increasing occurrence of floods, watershed protection from forests has become a critical issue in all of southern Africa's national and shared river basins. Protected watersheds ensure adequate supplies of water for agriculture and power generation.

SADC is facing alarming rates of deforestation. Between 1990 and 2000, forest cover in the region dropped from 3.8 million sq km to 3.57 million sq km, representing an average decrease of 0.6 percent per annum. During this period Malawi, Zambia and Zimbabwe had the highest deforestation rates ranging from 2.2 percent to 1.4 percent while South Africa, Angola, Mozambique and Tanzania had the lowest rates of between 0.1 percent and 0.2 percent. Swaziland actually recorded a growth in forest cover of 1.3 percent over the same period.

There also is pressure to increase the area under agriculture to meet the food requirements of the growing population, at the expense of forestry. Rural and urban demand for wood fuel has increased and is expected to continue rising due to growing populations and macro-economic changes. Most urban areas in the SADC region are surrounded by cleared land, the result of intensive woodcutting to supply the urban demand for fuel wood. Rural industries use substantial amounts of wood to burn bricks, smoke fish, cure tobacco, brew beer and to dry salt. The equivalent of one hectare of woodland (50-60 cu m of solid wood) is cut to cure each hectare of tobacco.

The harvesting of non-timber forest products, such as medicinal plants and wood used to produce crafts also causes deforestation in a number of areas in southern Africa. The commercialisation of crafts such as baskets and wood curios often results in the decline of

certain tree species. The felling of trees for commercial/industrial purposes is a major cause of deforestation and loss of forest biodiversity in some SADC countries.

Wildlife

Southern Africa's wildlife habitats are defined in terms of ecozones which range from the equatorial rainforests of the DRC to the fynbos of the Cape in South Africa, and include the mangroves on the region's coastline and the desert areas of Angola, Botswana and Namibia. Apart from the influence of geology and soils, this distribution of eco-zones is also influenced by rainfall patterns.

Despite the rich wildlife resource base in the region, southern Africa is under threat of species loss from habitat fragmentation, invasion by alien species and poaching. (SADC and others, 2008) In terms of species extinction, only one known mammalian species, the Blue Antelope, has become extinct in southern Africa in recent times, although several other subspecies may have been lost. Several species have come critically close to disappearing, such as the White (Grass) and Black (Browse) rhinoceros, Black wildebeest, Cape Mountain zebra, three varieties of dolphins, the Crowned crane and others, but decisive conservation action is allowing populations to revive.

African wild dogs are an endangered species in the region surviving only in large protected areas, with innovative conservation and awareness methods. The Bearded vulture has suffered serious population depletion in southern Africa where it is now restricted to the Drakensberg mountain range of South Africa and Lesotho. The decline in bird populations have often been blamed on reduced prey, changing animal husbandry practices and direct persecution.

On a more positive note, the elephant population in Botswana, Namibia and Zimbabwe has grown so much in recent years that it now exceeds the carrying capacity of its habitat, creating problems of overstocking and habitat destruction. For example, the elephant population in Zimbabwe grew from 47,000 in 1980 to 81,500 in 2002 and 84,416 in 2006. Botswana has an elephant population of 106,000, which is double the country's carrying capacity of 50,000. Tanzania has greater carrying capacity but a high population of elephants, which has increased from 55,000 in 1989 to 141,000 in 2006, and continues to rise.

According to the IUCN Species Survival Commission the number of threatened species has increased dramatically in all SADC member states in the past 15 years, with some figures double or triple.

CHAPTER 3

POLICY AND LEGAL ENVIRONMENT

Introduction

The overall goal of the SADC energy sector is to ensure the availability of sufficient, reliable, least-cost energy services that will assist in the attainment of economic efficiency and the eradication of poverty while ensuring the environmentally sustainable use of energy resources. To achieve these broad and ambitious goals, SADC has put in place a number of legal documents, policies and institutional frameworks through the adoption of various instruments such as protocols, strategic guidelines and regulatory frameworks.

The main legal document on energy development is the SADC Protocol on Energy of 1996, which entered into force on 17 April 1998 after ratification by two-thirds of Member States. This provides a framework for cooperation on energy policy among SADC Member States.

Other key supporting governance instruments include the revised regional strategic plan (RISDP), Energy Sector Cooperation Policy with its Strategy and the Activity Plan, which outline the region's strategic development priorities for the energy sector. These frameworks are all premised on the SADC Treaty that sets the SADC agenda and is intended to create an enabling environment for economic cooperation among SADC Member States.

SADC Member States have crafted various national energy documents to support developments in the energy sector with the creation of national agencies to coordinate implementation of agreed activities, projects and programmes. A SADC Regional Electricity Regulators Association (RERA) has been established to coordinate and harmonize regulation in the energy sector.

For other natural resources such as minerals, these natural resources in SADC countries are generally owned by the state, but the right to explore and exploit the natural resources is commonly granted to companies (mostly joint ventures with foreign investors) through mining or other rights concessions. In this context, private investment is encouraged, and indeed promoted under various ownership and management control models in order to exploit the resources and realize socio-economic development

SADC Protocol on Energy

SADC Member States approved the Protocol on Energy in 1996, providing a legal framework for cooperation on energy policy. The protocol acknowledges the importance of energy in pursuit of the SADC vision of regional economic integration and a common future in southern Africa. In order to best achieve these ends, the Protocol encourages Member States to cooperate on energy development, harmonising policies, strategies, and procedures throughout the region. It also advises that these policies ensure the security, reliability, and sustainability of energy supply, with Member States cooperating on research and development of low-cost energy sources applicable to Southern Africa.

Since the adoption of the Protocol on Energy, SADC has enacted several strategic plans for energy development in the region:

- ❖ the SADC Energy Cooperation Policy and Strategy in 1996;
- ❖ the SADC Energy Action Plan in 1997;
- ❖ the SADC Energy Activity Plan in 2000; and most recently,
- ❖ the Regional Infrastructure Development Master Plan and its Energy Sector Plan in 2012.

These development strategies set out tangible objectives for SADC and its Member States for infrastructure development in energy and its subsectors of woodfuel, petroleum and natural gas, electricity, coal, renewable energy, and energy efficiency and conservation.

Although implementation of these strategies has been slow, the region has made significant strides, particularly in electricity. At present, nine Member States of SADC have merged their electricity grids into the Southern African Power Pool, reducing costs and creating a competitive common market for electricity in the region. Similarly, SADC has established the

Regional Electricity Regulatory Association, which has helped in harmonising the region's regulatory policies on energy and its subsectors.

While SADC is enacting a number of initiatives to address these issues, it has identified two chief points of focus, which are:

- ❖ Electricity Generation – Southern Africa has ample resources for electricity generation, though often lacks the capacity for development.
- ❖ Renewable Energy and Energy Efficiency – Renewable energy has grown in importance for both regional and global energy markets.

The energy policies of different Member States strive to facilitate the provision of energy services at least cost and seek to promote the use of locally available sources of energy in order to reduce reliance on imported energy sources. For example, Botswana, which has abundant coal reserves and is blessed with one of the best solar regimes in the world, promotes the use of coal and solar energy, while emphasizing application of appropriate technologies to reduce greenhouse gas emissions from the fossil fuel.

Policy and Legal Framework of SADC Mineral Resources

The legal systems usually differentiate between subsurface and surface rights holders. Subsurface rights holders possess the ownership of minerals, while surface holders own the rights to the surface of the land. For example, Article 3 of the DRC Mining Code provides that the ownership of natural resources, including minerals, constitutes a right that is separate and distinct from the rights resulting from the surface area. As a consequence, the holder of surface rights is not usually entitled to claim any right of ownership over the deposits of minerals (IANRA, 2016).

In most SADC countries, natural resources are owned by the state, but the right to explore and exploit the natural resources is commonly granted to companies through mining rights concessions. Mining rights give the company the permission to undertake mining-related activities within a designated area and set out the responsibilities and obligations that the rights entail.

Although mineral resources have largely been placed under the stewardship of state owned companies, the actual mining operations have generally been joint ventures with foreign investors. The stipulated minimum percentage stake for foreigners in a local mining company varies amongst SADC member states, ranging from as low as 10% to 51%. As an example, Botswana does not have ownership requirements but the Botswana Mines and Minerals Act permits the government to acquire a 15 percent stake in any mining license, while in Zimbabwe the Indigenization Act requires 51% local ownership of new mining ventures (CNRG, 2013), although a reduction can be negotiated.

The principal act that controls and regulates exploitation of minerals in Botswana is the Mines and Minerals Act of 1999. According to the Act, the minerals are vested in the Republic and a mineral concession must first be obtained before one can engage in any exploration or mining activity. In this regard, for an individual to conduct exploration or mining one has to have a mining concession issued by the Minister of Minerals, Energy and Water Resources.

In Zimbabwe, Zimbabwe's Mines and Minerals Act (ZMMA) (Chapter 21:05, 1961) is the principal Act governing the mineral sector. It defines minerals as any precious metal, precious stone, coal or base metal. This does not include mineral oils, natural gases, sand clay and stone including limestone, which are required and used for construction. Diamonds are classified as a precious stone. The Mines and Minerals Act governs the mechanics of claiming a piece of land and lays the ground rules for beginning to mine from it. According to this Act, the mineral resources of Zimbabwe are vested in the President. Ownership of a piece of land does not translate to ownership of the mineral rights, although provision is made for fair compensation for land improvement disturbed by mining.

The Protocol on Finance and Investment

In order to foster investment in the region, SADC established the Protocol on Finance and Investment in 2006. The Protocol on Finance and Investment outlines SADC policy on investment, requiring Member States to enact strategies to attract investors and facilitate entrepreneurship among their population. Member States are encouraged to implement legislation that creates a favourable environment for investment, such as tax incentives that ease financial burdens for private firms seeking to invest in the region.

Guided by the Investment Policy Framework, SADC is implementing a number of interventions to coordinate efforts by Member States and attract investment into the region

Development of energy resources and related distribution infrastructure, beneficiation and Value addition of minerals and other resources areas where China and SADC could collaborate in order to unlock value in the resources found in abundance in the region.

CHAPTER 4

SADC-CHINA COOPERATION IN ENERGY AND RESOURCES SECTORS

SADC Energy Sector

The African market is seen as increasingly viable by foreign investors. The rapidly increasing energy demand, underpinned by the poverty reduction agenda and combined with vast and untapped renewable energy potential, has spurred ambitions by African governments to attract and facilitate energy investments in the continent, especially in the renewable energy subsector. African leaders have, in this regard, devoted time to crafting developmental blueprints that facilitate a conducive environment to attract Foreign Direct Investment (FDI).

Through the Regional Indicative Strategic Development Plan (RISDP) as the multi-sector blueprint, SADC has provided options for a holistic regionally focused cooperation with China and other global partners, cascading from the African Union's Agenda 2063 through the FOCAC multilateral framework. Since its inception in 2000, FOCAC as a multilateral platform has provided two main functions. Firstly, it has provided a platform to "strengthen consultation and expand cooperation within a pragmatic framework", and secondly, to "promote political

dialogue and economic cooperation with a view to seeking mutual reinforcement and cooperation” (SARDC, 2016).

China is increasingly becoming Africa’s largest investment partner with direct investment estimated at more than US\$30 billion in 2014. China has now become a major development partner for countries throughout the continent, and its trade, investment, diplomatic, and political relationships with sub-Saharan African countries continue to strengthen, especially in relation to cooperation in the energy sector.

Energy is a critical enabler for growth and development. In order to ensure a safe and sustainable future for all, much of this energy needs to come from renewable sources. In view of this, the Chinese Government has put a strong emphasis on the development and use of renewable energy sources. It has also made renewable energy – in particular hydropower – an increasingly important part of Chinese investments in Africa. So far, China has planned, or provided financing and construction capacity to more than 70 hydropower projects in 29 African countries.

China’s investment was estimated to have amounted to US\$13 billion between 2010 and 2015, in the energy sector alone (SADC-SARDC, 2017). Following the SADC China Infrastructure Investment Seminar held in Beijing in July 2015, Chinese investors and financiers expressed interest in various SADC infrastructure projects in the areas of power generation, power transmission and interconnectors; and water infrastructure development relating to water supply and hydro-generation as well as irrigation and related projects.

The China Export Import (Exim) Bank is already supporting a number of energy projects in SADC Member States and has expressed willingness to focus on a number of areas going into the future, among them, financing solutions for power, including green energy development.

Oil and gas

The main producers of gas in the SADC region are Angola, Tanzania, DRC and Mozambique. Angola leads the region in deposits of gas and petroleum.

Angola is the only significant oil producer in southern Africa and because of Angola’s oil production, the SADC region is a net petroleum exporter. Angola produced an average of 1.25 million barrels of oil per day (bbl/d) in 2005, rising to about 1.7 million barrels per day in 2014. According to the *Oil and Gas Journal*, Angola had proven crude reserves of 5.4 billion barrels in 2006, which constituted 96 percent of the region’s total estimated proven crude reserves. Smaller proven reserves are found offshore DRC and South Africa.

Angola’s national oil company, Sonangol, established in 1976, works in partnership with various international oil companies through joint ventures and Production Sharing Agreements (PSAs) to produce and supply oil. Although exploration and production of crude oil and natural gas are well developed, the refinery and distribution of the products derived from crude oil remain underdeveloped, resulting in the flaring of nearly 50 percent of the gas.

China’s investment relations with Angola are mainly based on oil and the sector is the main driver of China’s expanding relations with the country. Investments in infrastructure such as housing are backed by oil resources. Crude oil composes over 95 percent of Angola’s exports, and China remains a significant player.

The United Republic of Tanzania is emerging as a force in the gas sector as new discoveries of natural gas continue to be made along its Indian Ocean coast. Mozambique has also seen a rapid expansion of its gas industry with a recent commissioning of the 865km-long gas pipeline from Pande and Temane Gas Field in south-central Mozambique to Secunda in South Africa. The Rovuma area, in the far north of Mozambique near the Tanzanian border, has seen positive results of natural gas exploration while the Tete Province, with its vast coal deposits, is also home to significant coalbed methane gas. The Democratic Republic of Congo, and more recently Namibia, have discovered significant reserves of natural gas offshore.

Other SADC Member States such as Botswana, Malawi, Zambia and Zimbabwe have large reserves of coal and hence coal-bed methane gas, which has not yet been extracted commercially although extensive pilot tests have been conducted, especially in Botswana and Zimbabwe.

Solar

The SADC region has vast potential for solar energy. According to the African Development Bank, southern Africa alone has the potential to become a “gold mine” for renewable energy due to the abundant solar and wind resources that are now hugely sought after by international investors in their quest for clean energy.

China has also been involved in various solar energy projects in the region. For example in Zimbabwe companies such as Chint Group, China No.17 Metallurgical Construction Ltd and ZTE won contracts to build three solar stations in the country. These solar power plants when complete will have positive impacts in other sectors of the economy such as mining and industry.

Hydro

The massive investments in hydropower in African countries have led to a demand for expertise and capacity. In Angola, the government has acted upon this lack of expertise and implemented a series of projects over the past few years to increase the capacity for and stability in electricity generation, transmission, and distribution. Among the most severe challenges presently facing the electricity sector in Angola are capacity and expertise with regard to overall planning, execution and management, technical and cost-efficient solutions for hydropower generation, and access to necessary and relevant technologies and products.

In Zimbabwe, the China Exim Bank signed a US\$500 million deal with Zimbabwe in 2013 to finance the expansion of the Kariba Power Station, which will entail the addition of two power generating plants. A Chinese contractor Sino Hydro is undertaking the expansion work at the power station in which two additional units are expected to add 150MW of electricity each into the national grid. The first unit is expected to be completed by December 2017 and the remaining unit will be commissioned by March 2018. This expansion will assist in reducing Zimbabwe’s need to import expensive power. Zimbabwe is currently importing a combined 400MW of electricity from South Africa’s Eskom and Hydro Cahora Bassa (HCB) of Mozambique.

Extractive Sector

Most SADC Member States are endowed with vast mineral resources. South Africa and Zimbabwe host about 80 percent of the world's Platinum Group Minerals (PGMs) and chromite resources. Vast deposits of coal, both thermal and metallurgical, are mined in significant quantities in Botswana, Malawi, Mozambique, South Africa, Zimbabwe and Zambia. Angola, Botswana, DRC, Namibia, South Africa and Zimbabwe provide about 60 percent of the world's rough diamonds. Other minerals products from deposits which occur in large proportions in SADC countries include aluminium, uranium, gold, iron ore, asbestos, tin, fluorspar, manganese, limestone and zinc.

The energy mix and challenges currently afflicting the region could well be addressed through exploitation of the natural, shale and coal-bed methane gas deposits that have been discovered in recent years in Botswana, Malawi, Mozambique, Namibia, South Africa, Tanzania and Zimbabwe. These mineral resources in SADC provide the region with a comparative advantage and present a springboard for socio-economic development.

China's rapid growth presents an excellent opportunity for a transformed relationship with Africa. Industrialization has boosted China's importation of oil and minerals which the region can address. These minerals contribute greatly to the Gross Domestic Product (GDP) and employment in several SADC Member States, and many of them depend on mineral exports for their foreign exchange earnings.

Rapid modernization and development has increased China's demand for making it the top consumer of key resources, for example, consuming about 30 percent of global aluminium and copper resources, 40 percent of iron ore and lead, and more than 50 percent of coal (Edinger and Pistorius, 2011). China is also by far the largest market for platinum jewellery, consuming around 63 percent of the global output.

Diamonds

Botswana, South Africa, Angola, Namibia and DRC are among the top diamond-producing countries in the SADC region. This mineral is the most important source of income for Botswana and the discovery has changed the pace of Botswana's development with profit of the diamonds going over US\$3 billion annually, according to the Kimberly Process statistics. The combined earnings of the diamond mines in Botswana account for roughly 77 percent of the total export earnings and about 45 percent of GDP. As of 2008, there was no direct transaction of diamonds between China and Botswana, however, China's continued high demand for diamond and other mineral resources could pave way for closer China and Botswana relations.

In Angola, the Catoca diamond mine is the fourth largest diamond mine in the world and extracts diamonds from a kimberlite pipe. The Catoca diamond mine specializes in the exploration, recovery and sale of diamonds, and is made up stakeholders that include Empresa Nacional de Angola Diamonds (Endiama), Alrosa (Russia), Odebrecht (Brazil) and LLV (China) which has 18 percent shares in the company. The Catoca company alone made a profit US\$134 million in 2016 and USD 117 million in 2015.

Rough Diamond Production Figures 2014				
Country	Volume, carats	Value, US\$	US \$/ cts	% Market share (by value)
Russian Federation	38 303 500	\$3 733 262 920	\$ 97 47	25.8%
Botswana	24 668 091	\$3 646 952 179	\$ 147 84	25.2%
Canada	12 011 619	\$2 003 262 161	\$ 166 78	13.8%
Angola	8 791 690	\$1 317 456 072	\$ 149 86	9.1%
South Africa	7 430 956	\$1 224 311 494	\$ 164 76	8.4%
Namibia	1 917 690	\$1 155 536 792	\$ 602 57	8.0%
Lesotho	346 017	\$ 342 612 761	\$ 990 18	2.4%
Australia	9 788 232	\$ 304 379 765	\$ 30 76	2.1%
Zimbabwe	4 771 637	\$ 238 581 841	\$ 50 00	1.6%
Sierra Leone	620 181	\$ 221 713 243	\$ 357 50	1.5%
DRC	15 652 075	\$ 136 505 486	\$ 8 72	0.9%
Tanzania	753 180	\$ 80 668 042	\$ 318 62	0.6%
Liberia	65 822	\$ 28 175 134	\$ 428 05	0.2%
Guinea	164 059	\$ 24 749 841	\$ 150 86	0.2%
Guyana	99 950	\$ 16 049 837	\$ 160 58	0.1%
Ghana	242 260	\$ 10 144 043	\$ 41 87	0.1%
India	37 025	\$ 6 700 000	\$ 180 96	<0.1%
Brazil	56 923	\$ 2 700 810	\$ 47 45	<0.1%
Congo Republic	53 7763	\$ 1 338 145	\$ 25 17	<0.1%
Cameroon	3 718	\$ 642 565	\$ 172 82	<0.1%
Cote d'Ivoire	1 074	\$ 112 223	\$ 104 48	<0.1%
Togo	17	\$ 1 642	\$ 98 53	<0.1%
Total	124 778 468	\$14 495 806 402	\$116 17	

Source: Kimberly Process Rough Diamond Statistics, Public

Iron ore

Driven by the rapid modernisation of its economy, construction, infrastructure and manufacturing industries, China's demand for steel has been increasing and it has mainly targeted Africa for iron ore. In Namibia, the East China Non-Ferrous Investment, a mining company, assisted the government of Namibia in exploring for the possibilities of iron ore and in 2012 a large deposit of iron ore was discovered in the Kunene Region. The company is a subsidiary of the state-owned Chinese company East China Mineral Exploration and Development Bureau.

South Africa is one of the largest producers of iron ore in the SADC region; China is the largest user of iron ore and has been supporting South Africa in this sector. Chinese investment in the steel industry is increasing in other SADC countries such as Zimbabwe with a Chinese investor expected to revive the once state-owned Zimbabwe Iron and Steel Company (ZISCO) with a billion dollar investment.

CHAPTER 5

ENERGY AND INDUSTRIALIZATION

Energy and Industrialization Nexus

Industrialisation has become an imperative for the Southern African Development Community (SADC) following the adoption in 2015 of the SADC Industrialization Strategy and Roadmap 2015-2063. This was the sub-region's operationalization of the African Union Agenda 2063, following decades of heavy reliance on the production and export of raw commodities coupled with a stagnant if not non-existent manufacturing sector. This state of play has resulted in many African economies being vulnerable to fluctuations in commodity prices, consequently leaving the continent struggling to unshackle its predominantly youthful population out of poverty.

The new focus on value addition and beneficiation, pertinent as it is, has meant that more energy is required to power emerging industries. This is against a backdrop of a region that was already experiencing power deficits which became more evident in 2007. The increased burden is acknowledged by the industrialisation policy document, which notes that “... *with the implementation of the industrialization Strategy, this [energy] gap will widen unless the supply of electricity is substantially increased, drawing on the ample hydro-power potential of the region*” (SADC, 2015). Thus the Strategy demands that:

- ❖ member states should increase public investment in energy provision both for domestic use and export to **regional partners** through the Southern African Power Pool;
- ❖ attention should be paid to the **reliability, efficiency and cost effectiveness** of energy supply;
- ❖ simultaneously, governments should step up the involvement of **independent power providers** to ease the burden on government investment spending;
- ❖ alternative sources of energy should be exploited with a particular focus on renewables;
- ❖ the region should adopt **energy efficient technologies** to reduce the cost of production and minimize greenhouse gas emissions that contribute to climate change;
- ❖ attention should be paid to greater energy pricing efficiency within the context of deeper regional co-operation. Cheap energy is a necessary condition for industrial competitiveness and to that end, Member States should draw on **lower cost regional supplies** where practicable, rather than focusing on national self-sufficiency;
- ❖ current plans for hydro-power network connectivity and proposed new generation and transmission projects should be fast-tracked including **regional joint-ventures**.

Opportunities for Cooperation with China

The SADC Industrialisation Strategy brings to the fore possible areas of cooperation with China and other external partners. First, reliability and efficient technologies is a call to invest in environmental standards which should not be seen as an obstacle but rather an investment in a sustainable future. China is increasingly becoming a world leader in affordable clean energy technologies that SADC countries can do well to embrace. For decades, the continent has relied not only on raw natural resources but generally characterized by low productivity across most sectors, often using technologies that demands high energy and material intensities, as well as

waste generation, placing greater burden on the environment. Not only does this lead to depletion and scarcity of infinite but also undermines the global competitiveness of the region's industrial sector. China has successfully manoeuvred this threat and stands ready to share with Africa through the framework of the Forum on China Africa Cooperation, among other platforms.

Second, the strategy puts emphasis on a regional rather than national approach. This is important not only as it takes advantage of already existing institutions such as SAPP but also presents economies of scale while making it more attractive for large-scale Chinese investment. Caution should be exercised not to neglect the small initiatives as they can carry the off-grid majority of citizens and equally important, a lot of mini power stations can add up to greater impact than that derived from large initiatives. Thus a multi-pronged approach would be necessary to allow small-to-medium enterprises to tap into the national and regional value chains.

“The quest for Foreign Direct Investment, be it from China or any other part of the world, must not compromise the growth of Small and Medium Enterprises (SMEs) which are the heartbeat of several of the SADC economies. China's own growth model can therefore provide useful lessons in this regard, especially as she took deliberate policy measures to create conditions for the growth of the SMEs sector by, among other measures, providing a package of growth oriented incentives.” (Madakufamba, 2017)

Third, investment outlays required in the SADC energy sector are way beyond the fiscal capacity of most governments in the region. SADC has projected a budget of US\$64 billion for the short term projects or 173 billion for the long term projects in Energy Sector part of the Regional Infrastructure Development Master Plan 2012-2027 (SADC, 2012). These are staggering amounts that most SADC governments would likely struggle to raise without the involvement of Independent Power Producers (IPPs) or external financiers. It therefore comes as no surprise that the Industrialisation Strategy calls for the involvement of IPPs and other partners.

Through South-South cooperation, Chinese investment in the African energy sector has been on the increase, amounting to US\$10 billion in the period from 2005-2011. In recent years, more investment has gone into countries such as Angola, Mozambique, South Africa, Zambia and Zimbabwe. Chinese private sector companies are also amongst the largest investors in the renewable energy subsector including major hydropower, solar, wind and biogas (UNECA, 2016).

Role of Independent Power Producers

It is important to note that while most SADC member states have heeded the call to increase investments in the energy sector, most of them face financial challenges and are not able to adequately invest in this sector alone without external help. Against this background governments have approached and encouraged IPPs to invest in their respective countries. This has proved useful in reducing the energy deficit in the entire SADC region and it has also brought about modern technologies which in most cases are environmentally friendly. According to the Southern African Power Pool (SAPP) 2016 Annual Report, about 83 percent of the 1999MW generation capacity installed was generated from renewable energy based resources such as solar, wind and hydropower especially through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in South Africa.

The magnitude of the financial outlay required for power projects means most governments in SADC cannot by themselves raise the necessary investment finance without the help of international financiers working with the private sector through IPPs and Public Private Partnerships (PPPs). For example, Eskom, South Africa's state power utility which is also one of the largest power utilities in the region had to secure funding to finance the development of the Medupi coal power plant in July 2017. Eskom signed a 1.5 billion US dollar (R19.6 billion) loan agreement with China Development Bank finance for this initiative, which is expected to go a long way in making sure that South Africa and the SADC region has additional energy. This will no doubt contribute to the expansion of the regional electricity grid since South Africa is a member of the Southern African Power Pool (SAPP).

With more IPPs being licensed, there is evidence of increased and planned uptake especially in a number of SADC Member States including South Africa, Tanzania, Zambia and Zimbabwe. Under South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), solar photovoltaic (PV) accounted to 1,899MW while Concentrated Solar Power (CSP) accounted to 400 MW among the projects approved under Window 4 of the REIPPPP in 2015. The average price per megawatt-hour (MWh) of solar PV declined sharply between REIPPPP window 1 in 2011 and window 4 in 2015 – from ZAR 3,288 (USD274) to ZAR 786 (USD65) (SADC, SARDC 2016).

In Tanzania, the government's openness to mini-grids and its unique Feed In Tariff (FIT) programme led to a first solar PV project in 2013. All of Tanzania's solar programmes to date have been off-grid, and many are part of mini-grids, often run by IPPs. Tanzania has also developed standardized Power Purchase Agreements (PPAs) that encourage investment by IPPs using renewable energy. Zimbabwe, where the FIT programme is awaiting final government approval, is moving forward on a project-by-project basis. Planned IPP projects include a 100 MW solar farm in Gwanda, a 50 MW solar plant in Marondera in the east of the country, and two 10 MW grid-connected PV arrays in the Harare and Melfort areas (REN21 2015). In Mozambique, the government has promoted solar photovoltaic (PV) and mini-hydropower solutions in rural areas, reporting that 700 schools, 600 health centres and 800 other public buildings in rural areas now have electricity from solar PV mostly through private investors (OECD/IEA 2014).

Besides IPPs playing a critical role of complementing government efforts in providing cheaper, sustainable and environmentally friendly energy, these investors still face challenges such as securing 'off takers' (guarantor of power purchase) before an investment is signed. In SADC, most IPPs have been relying on Eskom as an off taker even for regional projects. In most cases IPPs rates for the supply of electricity to consumers must be established in an agreement between the IPP and the consumer. The tariffs are also subject to approval by the responsible ministry of energy. IPPs are also highly affected by financial and political risks as evidenced in the Democratic Republic of Congo (DRC). DRC has the largest hydropower potential in Africa – the Great Inga Dam. If fully exploited the Inga Dam has the capacity to produce around 100 000 MW. Despite this huge potential DRC currently experiences electricity shortages. Thus low electricity tariffs, political instability and long tendering procedures in some SADC Member States have been identified as some of the major stumbling blocks by investors. Equally important is the political will to move on agreed projects. Thus the current situation where projects spent several decades in the offing is not attainable as far as private investors

are concerned, a point that has also been repeatedly raised by International Cooperating Partners (ICPs).

Countries such as China through strategic institutions under the BRICS framework which recently launched the Africa Regional Centre of the New Development Bank (NDB) can provide funding for energy projects in many of the SADC member states. It is however imperative to note that this can only be done provided there are clear energy investment policies in SADC countries.

China has recently restructured its power industry, helping to accommodate and encourage competitiveness of IPPs. For example the generating assets of the State Power Corporation (SPC) were transferred to five independent generating companies in 2002 through a plan known as the “Plan of Electric Industry Reform”. This was aimed at reducing the dominant power of the SPC and increasing the competitiveness of other smaller private and state-owned power enterprises in the power generation market (Pun-Lee Lam, 2005). This provides for an important lesson for SADC as the current situation whereby the energy sector is hugely dominated by state enterprises is not sustainable. Furthermore, proceeds accumulated from privatising can be used to finance other major energy projects such as the transmission and distribution networks. This will also go a long way in helping SADC countries to deal with lack of finance in the energy sector.

The Chinese government gives great importance to small power plants and this has really played a critical role in attracting IPPs to invest in these plants. For example, small hydropower plants in China are mainly aimed at supplying electricity to rural areas in collaboration with small water conservancy projects. This has helped in making sure that the country has enough energy to support its various industries since the rural community will have adequate energy from their own sources and this means that energy from elsewhere, in particular the urban areas, will be channelled to industries in the cities. In fact China ranks number one in the world in terms of small hydropower resources. At the end of 2014, there were over 47,000 mostly rural hydropower stations in operation.

The lesson which SADC can draw from this approach is that member states need not neglect small energy projects which are in a way cheaper and easier to maintain than bigger projects. In addition it is also easier to attract the private sector to invest in small community power projects since they require less capital.

Conclusion

Given the importance of energy in the drive towards industrialization in SADC, there is great scope for both public sector as well as private investment through independent power producers. Africa in general and SADC in particular can leapfrog other regions towards clean energy while still attaining global competitiveness in the quest for industrial transformation. China does not only provide a huge source of potential investment from state enterprises as well as private companies which can work in partnership with SADC Member States but also the biggest potential source of lessons for involvement of IPPs. However, important steps need to be taken by SADC countries to improve the investment environment if the region is to attract more external investment into the energy sector.

CHAPTER 6

RECOMMENDATIONS

The foundation of any sustainable development process is policy prudence together with the existence of capable systems and structures for effective policy planning and coordination. Chow (2011) notes that planning symbolizes the tradition of collectivism in Chinese society. Success in this area has been driven by the following key features and strategies effective and inclusive policy planning, monitoring and review, functional decentralization in policy planning and coordination, the role of leadership vision, stability and policy continuity and the efficient structure of Chinese bureaucracy.

Constant Review of Policies

SADC must constantly update its various protocols and legal instruments in order to capture the current trends in the ever-changing international arena. The protocols in Energy, Mining and Forestry, which are the main instruments referred to in the energy and minerals sector, need constant review for them to be relevant and effective. The SADC Protocol on Energy of 1996, for instance, does not adequately capture new trends in the energy sector such as the use of renewable energy which is fast gaining momentum. For the energy sector to effectively develop, remain relevant and attract meaningful investment, critical policies such as these need to be reviewed in line with international developments.

To address the issue of lack of continuity of economic policies, SADC and Africa as a whole should embrace a system of conducting regular reviews of policy implementation along the lines of China Five Year Plans. Now implementing its 13th FYP (2016-2020), China has constantly reviewed progress in implementation of its development agenda, reviewing targets were necessary and retaining those aspects that have worked. This has ensured that the country's development trajectory has been an incremental process, with one FYP building on the successes of the previous one.

Linkages with Development Initiatives

There is need for the SADC region to tap into various platforms and initiatives provided through international platforms. Emerging initiatives such as the One Road, One Belt Initiative fronted by China will increase the volume of trade between China, Africa and Europe, therefore there is need for the SADC region to develop effective policies which will enable it to benefit from and protect its vast mineral resources. Africa has to develop and implement policies which safeguard its resources to ensure that they are not given away at well below their true value. There is also need for these policies to emphasize the need for value addition and beneficiation as stated in the African Union's Agenda 2063 and SADC's Regional Indicative Strategic Development Plan. Only that way can Africa guarantee today's development without compromising on development opportunities for future generations.

Article 8 of the SADC Protocol on Energy provides for cooperation between the commission and non-state actors, including non-governmental organizations, and business and industrial communities, if their objectives are not at variance with the objectives of the Protocol. International Cooperating Partners such as BRICS, in this regard provide important opportunities for Africa's development and there is need for the continent to have favourable policies to attract such financial institutions. For example the BRICS Bank - Africa Regional

Centre which was recently launched in South Africa is an advantage for Africa to enhance its development initiatives through crafting favourable infrastructure and investment policies. Entry points ought to be identified by SADC in order to tap into and benefit from China's Go-Out Policy and its Five Year Plans which aim to promote Chinese investments abroad.

Market Reform and Inclusivity

There is need to improve operating efficiency and to facilitate the introduction of market mechanisms into the power industry in the SADC region. SADC should therefore learn from this Chinese experience and create an enabling environment for investment in the energy sector at both regional and national levels as investors look for stability, sustainability and returns. To realize industrialization in SADC it is therefore imperative for SADC to work with International Cooperating Partners in providing sustainable and cost-reflective energy. In addition, governments should come up with favourable policies that attract investment by Independent Power Producers (IPPs). Therefore there is need to ensure that all key stakeholders such as the private sector are included during the formulation of policies.

Pragmatism

SADC could learn from China's pragmatism by borrowing the positive aspects of the capitalist open economy and blending these with the positive traits of socialism. SADC should embrace the attitude that "it doesn't matter whether the cat is black or white as long as it catches mice". This pragmatism would be supported by clear "rules of engagement" with all investors, whether Western or from the East. In other words, any investors should know the dos and don'ts of doing business in SADC and the rules/policies/regulations should be consistently applied.

Addressing Barriers

The lack of adequate infrastructure is a challenge which is hindering the full functioning of the energy sector in the region. This is partly due to infrastructure bottlenecks and the inefficient energy supply which drives away potential investors in the sector. Therefore there is need for SADC to address these bottlenecks by giving priority to industrial development, market integration and infrastructure support for regional integration as stipulated in the Revised RISDP 2015-2020.

Development Research

Governments and organizations both in China and Africa should fund research that contributes to understanding China's engagement in Africa and addresses issues that exist in China-Africa relations. SADC should form partnerships with research institutions whose research can be used to inform policies. This is one area that the Chinese have used to maximum advantage. The Chinese government has shown interest in Africa, a development that has seen the creation of African studies centres across the country as well as funding of research projects, collaborative works, conferences, and so on.

Other recommendations include:

- ❖ strengthening regional policy planning and coordination mechanisms;
- ❖ harmonizing regional natural resources policies and reforms to boost productivity;
- ❖ negotiating joint partnerships for construction of trans-boundary infrastructure;

- ❖ attracting high-technology investment through joint ventures to allow value addition for export competitiveness and increase the value of exports;
- ❖ strengthening the linkages between research institutions and policy makers;
- ❖ need to build linkages between the extractive industries and local economies.
- ❖ need for ownership of policy options on how to transform the extractive industries; and
- ❖ need to build linkages between the extractive industries and local economies.

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