SADC ENERGY INVESTMENT

Yearbook 2016

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
SADC
TOWARDS A COMMON FUTURE

SADC ENERGY INVESTMENT

Yearbook 2016

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PREFACE

The *SADC Energy Investment Yearbook* is a new publication produced by the Southern African Research and Documentation Centre (SARDC) in consultation with the Energy Division at the SADC Secretariat. The main purpose of the publication is to document the investments in the energy sector in the Southern African Development Community (SADC), with a view to highlighting progress towards the region's stated objective of ensuring "the availability of sufficient, least-cost, environmentally sustainable energy services."

The energy sector is important to the region as conventional forms of energy such as biomass, electricity, gas and petroleum are an integral part of the daily lives of most people. Energy drives industrialisation and this is pertinent with SADC having adopted a long term strategy and roadmap for the industrialisation of the region. The SADC Industrialisation Strategy and Roadmap 2015-2063 acknowledges the serious deficit of energy in the region and envisages a widening gap unless the supply of electricity is substantially increased, drawing on the ample hydropower potential of the region. The strategy recommends that SADC Member States should increase public investment in energy provision for both domestic use and export to regional partners through the Southern African Power Pool (SAPP), with attention to the reliability, efficiency and cost effectiveness of energy supply.

The energy sector has gained profile in respect of the prominence given to renewable energy as a driver towards sustainable development throughout the world following adoption of the post-2015 development agenda by the United Nations. The ambition of this post-2015 development agenda is reflected in the 17 Sustainable Development Goals (SDGs) and 169 targets which were adopted at the United Nations Summit on 25 September 2015 and which cascade across the three key dimensions of sustainable development — economic, social and environmental dynamics. Goal 7 of the SDGs, on the provision of affordable and clean energy, resonates with SADC's stated objective for the energy sector. Its intent is pronounced in the targets to be achieved by 2030 which are:

- Ensuring universal access to affordable, reliable and modern energy services;
- Increasing substantially the share of renewable energy in the global energy mix;
- Doubling the global rate of improvement in energy efficiency;
- Enhancing international cooperation to facilitate access to clean energy research and technology; and
- Expanding infrastructure and upgrading technology for supplying modern and sustainable energy services for all in developing countries.

This publication takes stock of developments within the main energy forms within the SADC region and highlights the main investment activities. The publication is produced mainly for the policy-makers and officials of SADC Member States; SADC Secretariat and subsidiary organisations; international cooperating partners, private sector and investors; researchers and academic institutions; and the media.

It is my sincere hope that all stakeholders including regional and national energy agencies will find this book a useful guide in the conduct of their activities and that it will provide useful information for future plans. The SADC Secretariat will continue to engage all stakeholders in the energy sector and the investment community to ensure that the contents of the yearbook can be further enriched in future editions and that recommendations are considered for implementation.

Finally, I wish to thank all participants who contributed to the yearbook and especially SARDC for putting it all together.

SARDC
February 2017

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ACRONYMS

AfDB	African Development Bank
AUC	African Union Commission
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-and-Transfer
BOT	Build-Operate-Transfer
BRICS	Brazil, Russia, India, China and South Africa
BRICS NDB	BRICS New Development Bank
DAM	Day Ahead Market
DBSA	Development Bank of Southern Africa
DIS	Directorate for Infrastructure and Services
DRC	Democratic Republic of Congo
EAPP	Eastern Africa Power Pool
ETG	Energy Thematic Group
EXIMBANK	Export-Import Bank
FOCAC	Forum for China-Africa Cooperation
GW	Gigawatts
ICPs	International Cooperating Partners
ICT	Information Communication Technologies
IEA	International Energy Agency
IGMOU	Inter-Governmental Memorandum of Understanding
IPPs	Independent Power Producers
IRENA	International Renewable Energy Agency
MDBs	Multilateral Development Banks
MDGs	Millennium Development Goals
MW	Megawatts
NEPAD	New Partnership for Africa's Development
PAP	Priority Action Plan
PIDA	Programme for Infrastructure Development in Africa
PPAs	Power Purchase Agreements
PPP	Public Private Partnerships
RE	Renewable Energy
RECs	Regional Economic Communities
REN21	Renewable Energy Policy Network for the 21st Century
RERA	Regional Electricity Regulators Association of Southern Africa
RIDMP	Regional Infrastructure Development Master Plan
RISDP	Regional Indicative Strategic Development Plan
SACREEE	Southern African Centre for Renewable Energy and Energy Efficiency
SADC	Southern African Development Community
SADCC	Southern Africa Development Coordination Conference
SAPP	Southern African Power Pool
SARDC	Southern African Research and Documentation Centre
SDGs	Sustainable Development Goals
STEM	Short Term Energy Market
UNECA	United Nations Economic Commission for Africa
WAPP	West African Power Pool

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The *SADC Energy Investment Yearbook* has been a collaborative effort. The Regional Economic Development Institute (REDI) of the Southern African Research and Documentation Centre (SARDC) worked with various organizations, experts and individuals in producing this publication.

Key among them is the SADC Secretariat through its Energy Division under the Directorate of Infrastructure and Services. The process of producing this publication was informed and guided by the valuable support of the SADC Secretariat.

For the development of the publication, SARDC REDI headed by Joseph Ngwawi contracted a number of authors, contributors and reviewers. The team of authors, comprising Leonard Chitongo, Kizito Sikuka and Dana Majaha, worked hard to put together this publication.

We acknowledge with deep appreciation the guidance and support of the SARDC Executive Director, Munetsi Madakufamba, who supported the process throughout, from conceptualising the initiative through ideas and informed analysis; and Phyllis Johnson, SARDC Founding Director responsible for Special Projects, for the active engagement through technical review and knowledgeable eye for accuracy that made this publication a cut above the rest.

Special thanks also goes to the creative work of the SARDC Publishing design team, of Tonely Ngwenya, Anisha Madanhi and Anesu Ngadya, who produced an engaging product that is presented in an attractive and accessible manner.

We express our gratitude to the International Cooperating Partners involved in the SADC energy sector, and especially to the Austrian Development Agency for generous financial assistance offered for the publication of the *SADC Energy Investment Yearbook*.

The contribution and pivotal role of all institutions and individuals who supported the preparation of this publication, and may not have been credited by name is gratefully acknowledged. We say thank you for your essential support.

INTRODUCTION

There is recognition globally of the need to close the infrastructure financing gap through investment in sustainable and resilient infrastructure, including in the energy sector. A number of infrastructure initiatives have been set up at the national, regional, continental and global levels to promote investment in the energy sector in Africa.

These include the World Bank Group's Global Infrastructure Facility; the Africa50 Infrastructure Fund set up by the African Development Bank (AfDB); and the Programme for Infrastructure Development in Africa (PIDA) established by the African Union Commission (AUC) with the New Partnership for Africa's Development (NEPAD); the New Development Bank (NDB) involving the BRICS countries of Brazil, Russia, India, China and South Africa; and the Forum on China Africa Cooperation (FOCAC) Action Plan. Africa in general and the Southern African Development Community (SADC) in particular, is positioning to access these investment opportunities to develop the energy sector.

The PIDA Priority Action Plan up to 2020 for projects that affect SADC countries amounts to US$28.5 billion. These projects include four electricity generation plants — the Mpanda Nkuwa Hydropower Plant in Mozambique (1,500 MW); the Inga III Hydropower Station in Democratic Republic of Congo (4,200 MW); the Batoka Hydroelectric Plant on the Zambezi River (1,600 MW); the Lesotho Highlands Water Project Phase II hydropower component (unspecified capacity); and two transmission lines – the North South Power Transmission Corridor and the Central African Interconnection. PIDA is a blueprint for African infrastructure transformation for the period 2012-2040, and provides a strategic framework for priority infrastructure projects expected to transform the continent into an interconnected and integrated region.

The Africa50 Infrastructure Fund has been set up by the AfDB to finance regional and national projects in the energy, transport, water and telecommunication sectors. The AfDB has also established a Green Fund for Africa as a mechanism to address the needs of low-carbon growth through the development of alternative and cleaner forms of energy such as solar, wind and hydropower. According to an AfDB study, southern African has the potential to become a "gold mine" for renewable energy due to the abundant solar and wind resources that are increasingly attractive to international investors in their quest for clean energy.

The FOCAC Action Plan (2016-2018) adopted in Johannesburg in December 2015 places greater focus on infrastructure development in sectors such as energy to facilitate connectivity and economic integration in Africa. China and Africa have agreed to "enhance African countries' capacity for intensive processing of energy and natural resource products during their cooperation, ensuring increased local employment and value addition of primary products, while protecting the local eco-environment." In addition to strong support by the Chinese Government for energy development in Africa, a number of other Chinese players continue to play a significant role in supporting the energy sector in Africa in general, particularly financial institutions including the China Development Bank and the China Exim Bank.

The NDB, which started operations in July 2015 with an initial authorized capital of $100 billion, has also identified energy, particularly renewable energy as a priority area of support. In April 2016, the NDB approved its first set of loans amounting to US$811 million for supporting renewable energy projects in the five BRICS countries. Of this amount, the South African Power Utility Eskom received US$180 million, which will go towards the construction of transmission lines to connect 500 MW of renewable energy from independent power producers to the national grid. The main goal of the bank, headquartered in Shanghai, is to fund infrastructure projects in emerging economies for sustainable development.

This publication, the *SADC Energy Investment Yearbook*, tracks major investment activities within the SADC region, but will also highlight smaller energy projects which continue to make an impact at regional level.

Chapter 1 gives a general overview of the entire energy situation in the SADC region, covering issues such as the current challenges facing the energy sector as well as energy resources available in the region and some international, continental and regional commitments adopted by Member States.

Chapter 2 covers the legal, policy and institutional framework within the SADC energy sector, exploring issues such as the energy institutions and governance structure; policy instruments and legal frameworks; and strategies and institutional arrangements for regional cooperation.

Chapter 3 highlights investments made in the energy sector over the past decade covering the main energy sub-sectors of electricity; oil and gas; and renewable energy and energy efficiency investments.

Chapter 4 highlights available/possible financing mechanisms that can benefit the energy sector in the SADC region.

Chapter 5 provides key observations and policy options for possible adoption by Member States and the region.

Annexes appended to the report provide more detailed information presented as Tables. Annex 1 gives an overview of investments by the private sector in major energy projects in SADC Member States, demonstrating the increasing role that the private sector is playing in energy sector projects. Annex 2 shows the energy support matrix by SADC's International Cooperating Partners (ICPs), mainly in Europe, while Annex 3 shows Chinese public and private sector investments in energy projects in SADC Member States. Annex 4 provides the contact information of key stakeholders in the energy sector at national and regional levels.

SARDC
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Southern Africa is relatively well-endowed with energy resources. The Map illustrates the various energy resources available in mainland Member States of the Southern African Development Community (SADC). The region has vast energy potential from solar, wind, nuclear, hydro, thermal, gas and petroleum sources. However, 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 Member States exceeding 70 percent in terms of the contribution of traditional biomass to energy consumption. This is the case for the Democratic Republic of Congo (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 to the low proportion of urban dwellers. The total population in the region was about 294 million in 2013 (SADC, 2014), yet only 39 percent of the population lived in urban areas where there is greater access to electricity. It is estimated by SADC that the population of the region is growing at a rate of 1.7 percent per annum and is likely to reach over 350 million by 2027, according to the SADC Regional Infrastructure Master Plan.

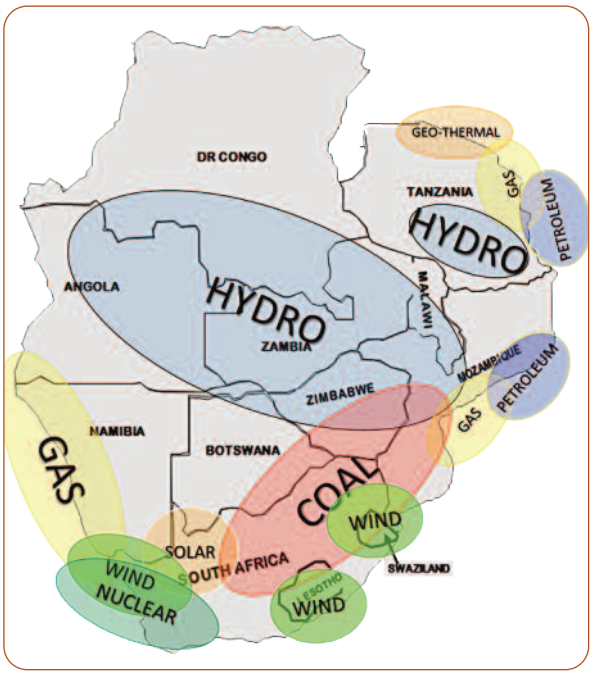
Electricity in SADC is generated mainly through thermal or hydroelectric resources. The coal industry remains the backbone of power generation in the region and a significant share of the resource is allocated for export. Coal exports are an opportunity that can yield economic benefits to the region 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 the Inga reservoir in DRC, and the Kariba Dam on 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 significant to the region's energy sector, as Mozambique, Namibia, South Africa and the United Republic of Tanzania develop the fields in their respective countries (SARDC, 2010). New natural gas discoveries by international oil companies in Mozambique and Tanzania during the past decade have ignited investor interest in this previously under-explored region. The nascent petroleum and gas sub sector is, however, plagued by volatile prices and although the region is endowed with some petroleum and gas resources, these are not directly available to the region either due to foreign commitments or the lack of necessary infrastructure to exploit, process, store and distribute throughout the region.

SADC Energy Resources, Mainland Countries

Figure 1.1



Source: SAPP presentation at RISDP Review researchers workshop, May 2013

The SADC region has significant known reserves of uranium which 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 thus 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.

The region also has significant 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 cost of most renewable energy technologies is 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 of surplus capacity against increasing growth in demand. In recent years, the sub-region has experienced a power deficit due to various reasons, including growing demand against limited expansion in generation capacity.

The prevailing instability in the sector is compounded by several factors including the current reality where access to energy takes a national rather than 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. In addition to the impact of lack of investment in new infrastructure over the years, the region's generation capacity is likely to suffer from the effects of climate change as well as the El Nino-induced weather conditions that caused dam levels to drop in most countries prior to this season, although the dams have since recovered in most parts of the mainland except Tanzania. This situation has prompted most Member States to resort to coping mechanisms that include load shedding as well as other Demand Side Management (DSM) measures, while longer term solutions are being sought to remedy the situation through improved supply.

Southern Africa has access to electricity of about 42 percent on average, 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 Member States having below five percent rural access to electricity.

Investment and financing are hampered by a number of barriers including low tariffs and poor project preparation, as well as limited off takers that can sign power purchasing agreements under single buyer models; and other required policy/regulatory frameworks. The petroleum and gas sub sector is plagued by volatile prices. Although SADC is endowed with coastal petroleum and gas resources, these are not directly available to the region, either due to foreign commitments or the lack of necessary infrastructure to exploit, process, store and distribute throughout the region.

The region is also affected by the volatility and 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.

High prices for hydrocarbon oils relative to prices of biofuels have created a strong incentive to expand the production of biofuels in the SADC region. Ethanol from sugar cane is produced and blended with petrol in several SADC Member States that produce sugar. The other biofuel that is produced in the SADC region is biodiesel, which is made from vegetable oils. Only South Africa and Zimbabwe are producing biodiesel at present.

So far, the production of biofuels in the SADC 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 the situation could change in future as biofuel production increases.

While SADC attaches importance to all energy sources, whether renewable or non-renewable, the electricity sector is one area in which regional cooperation has advanced significantly. The quest for regional energy security in SADC has always involved a delicate balance between national and regional interests. Amid acute shortages, Member States have tended to take the sovereign route of attempting to attain national self-sufficiency, rather than depending on imports from other countries. In a the Southern African Power Pool (SAPP) Plan with a planning horizon stretching from 2010 to 2020, the SAPP has revealed that the region stands to make huge cost savings of up to US$48 billion as well as enjoy better coordination if they pursued their projects collectively as a region rather than as individual Member States (SARDC, 2011).

SADC Energy's Legal, Policy And Institutional Framework

Chapter 2

2.1 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, the RISDP, Energy Sector Cooperation Policy and 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. In addition, the 15 SADC Member States have crafted various national energy documents to spur developments in the energy sector with the creation of national agencies to coordinate implementation of agreed activities, projects and programmes.

To ensure the smooth implementation of regional energy instruments, the Directorate for Infrastructure and Services (DIS) was established at the SADC Secretariat to coordinate developments in the sector. The Directorate focuses on the development and quality of strategic infrastructure in the region through six thematic sectors – Energy, Transport, Water, Information Communication Technology (ICT), Meteorology and Climate Service Centre, and Tourism (SADC, 2015).

A summary of the vision and objectives of sectors that fall under DIS, including energy, is shown in Box 2.1.

SADC Directorate for Infrastructure and Services — Table 2.1

Vision
A world class facilitation of Regional Integration and sustainable development through provision of, and universal access to, infrastructure and services.

Sectors	Objectives
Energy	To ensure the availability of sufficient, least cost environmentally sustainable energy services in the region.
Transport	To provide adequate, integrated, safe and efficient infrastructure services in roads, railways, and civil aviation, maritime and inland waterways services.
Water	To facilitate the development of a framework for sustainable, efficient and effective shared watercourses planning and management, through development of strategic water infrastructure and promotion of good water governance in the region.
Information Communication Technology (ICT)	To ensure access to affordable, modern, efficient, reliable high quality and fully integrated ICT services to all citizens of SADC.
Meteorology & Climate Service Centre	To generate and disseminate timely and credible meteorological and climate information products to stakeholders to support planning for socio-economic development, weather-related disaster risk management and the rational use, conservation and protection of natural resources.
Tourism	To market the region as a single-multifaceted tourism destination.

Source: SADC, 2015

In furtherance of economic integration in the energy sector, SADC has also established subsidiary organizations to implement various programmes, projects and activities. These organizations are the Southern African Power Pool (SAPP), Regional Electricity Regulators Association of Southern Africa (RERA) and the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE).

2.2 Institutional framework

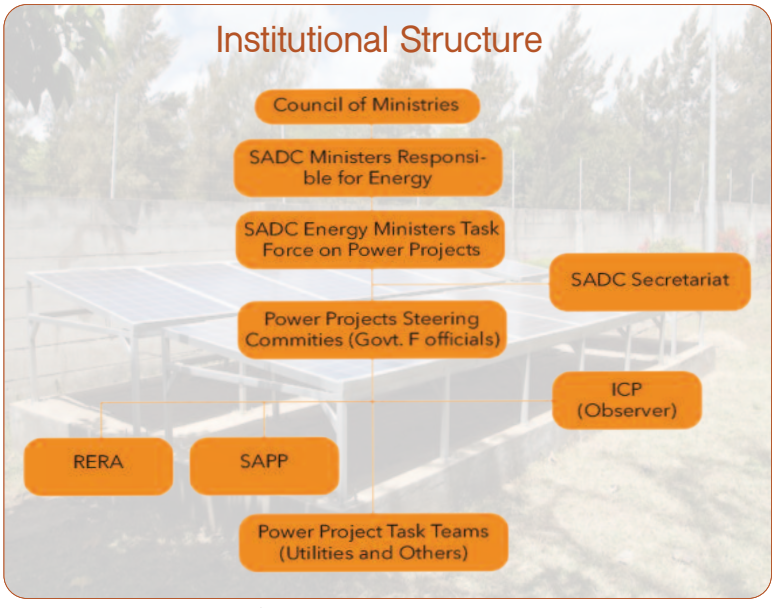
2.2.1 Governance Structure

Establishment of appropriate and effective institutional frameworks and structures has been identified as one of the critical priorities for SADC to ensure that all regional programmes, projects and activities are fully executed to promote deeper integration and socio-economic development.

To this end, various measures have been taken by SADC, including a Review and Rationalisation of the SADC Programme of Action in 1997, and a directive by the SADC Heads of States and Government in 1999 to the SADC Council of Ministers to initiate a comprehensive review of the operations of all SADC institutions. Similar review exercises are still being undertaken by SADC to ensure that the regional integration agenda is a success. One such institutional reform in the energy sector is the approval by SADC to establish SACREEE to spearhead the uptake of renewable energy and energy efficiency technologies in the region.

In terms of institutional arrangements in the energy sector, the Ministers responsible for Energy is the apex policy body in the overall energy sector. It meets annually, reporting to the SADC Council of Ministers which in turn reports to the SADC Summit of Heads of State and Government. Below the Ministers responsible for Energy is the SADC Energy Ministerial Taskforce on Power Projects (comprising ministers from Botswana, Mozambique, Namibia (Chair), South Africa and Zimbabwe), which was constituted in 2004 in response to the then impending power shortages and was therefore given the mandate to develop a roadmap to address the shortages in consultation with all Member States. Below the task force is the Power Projects Steering Committees made up of government officials, which ensure that energy projects are realized.

Framework for Project Implementation Figure 2.1



Source: SADC Secretariat website

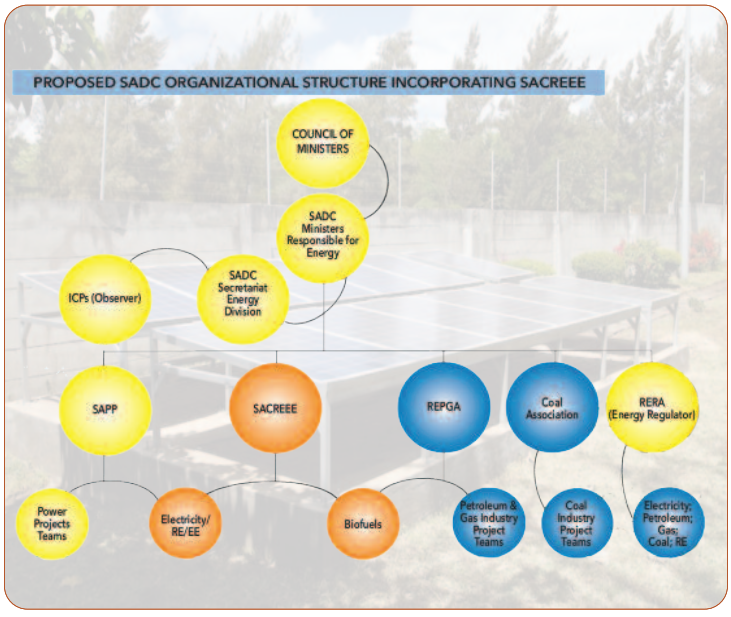
Subsidiary organisations such as SAPP and RERA report to the steering committees as do the International Cooperating Partners (ICPs). The SADC Secretariat provides technical assistance to the ministerial committees. The institutional structure for managing the regional energy sector roadmap and projects was previously depicted as shown in Figure 2.1.

The institutional structure depicted has now changed to incorporate SACREEE, which was established as a specialist institution of SADC under the provisions of a subsidiary organization guided by the particular instruments set out in the Guidelines Governing Relations between SADC and the Organizations Executing SADC

Projects and Programmes under the Principle of Subsidiarity. Figure 2.2 shows the new SADC organizational structure incorporating SACREEE.

Proposed SADC Organizational Structure incorporating SACREEE

Figure 2.2



Source: SACREEE background booklet, 2014

2.2.2 SAPP — Southern African Power Pool

An Intergovernmental Memorandum of Understanding signed by Member States in August 1995 gave birth to the Southern African Power Pool (SAPP), a 16-member regional body that coordinates the planning, generation, transmission and marketing of electricity on behalf of utilities in SADC Member States. According to SAPP, all utilities participating in the power pool have equal rights and obligations, and have agreed to act in solidarity without taking advantage of one another. In this regard, members have undertaken to share information and knowledge, be politically neutral, and develop common planning and operating criteria and procedures and to accept wheeling on behalf of other members when this is technically and economically feasible.

Power utilities in mainland SADC – with the exception of Angola, Malawi and Tanzania – are interconnected through SAPP, allowing them to trade electricity with one another through a competitive market. SAPP member utilities are listed in Table 2.2.

SAPP Member Utilities

Table 2.2

Member Utility	Status	Abbreviation	Country
Empresa Nacional de Electricidade	NP	ENE	Angola
Botswana Power Corporation	OP	BPC	Botswana
Societe Nationale d'Electricite	OP	SNEL	DRC
Lesotho Electricity Corporation	OP	LEC	Lesotho
Electricity Supply Corporation of Malawi	NP	ESCOM	Malawi
Electricidade de Moçambique	OP	EDM	Mozambique
Hidroeléctrica de Cahora Bassa	IPP	HCB	Mozambique
Mozambique Transmission Company	ITC	MOTRACO	Mozambique
NamPower	OP	NamPower	Namibia
Eskom	OP	Eskom	South Africa
Swaziland Electricity Company	OP	SEC	Swaziland
Tanzania Electricity Supply Company Limited	NP	TANESCO	Tanzania
Zambia Electricity Supply Corporation Limited	OP	ZESCO	Zambia
Copperbelt Energy Corporation	ITC	CEC	Zambia
Lunsemfwa Hydro Power Company	IPP	LHPC	Zambia
Zimbabwe Electricity Supply Authority	OP	ZESA	Zimbabwe

Source: SAPP

OP Operating Member; **NP** Non-Operating Member; **ITC** Independent Transmission Company; **IPP** Independent Power Producer

The intergovernmental MOU of 1995 was reviewed in 2006 by SADC Energy Ministers in order to allow Independent Power Producers (IPPs) to be members of SAPP. At its formation, SAPP had 12 member utilities but the number has risen following the revision of the IGMOU, which is one of four agreements that govern SAPP operations. The others are the:

- Inter-Utility Memorandum of Understanding that establishes the basic management and operating principles for SAPP;
- Agreement between Operating Members which established the specific rules of operation and pricing; and
- Operating Guidelines that provide standards and operational guidelines.

In this regard, SAPP operations are based mainly on a set of agreements among the member utilities as opposed to formal laws, which would, among other things, allow the regional body to have greater authority on issues of energy in the region. Figure 2.3 shows the SAPP structure.

SAPP Organizational Structure

Figure 2.3

Source: SAPP website

SAPP was created with the primary aim to provide reliable and economical electricity supply to the consumers in each of the SAPP members, consistent with the reasonable utilisation of natural resources and the effect on the environment. The regional power pool has also coordinated efforts to exploit the numerous energy resources that are in abundance in the region, for electricity generation. For example, SAPP has identified a number of priority energy projects for commissioning over the next few years to address energy shortages in the region. Between 2015 and 2019, SAPP plans to commission a total of 23,585MW. If this is achieved, SADC will finally be able to meet most of its power needs after several years of shortages.

The current role of SAPP has been limited to facilitating energy trading and coordinating energy projects. However, there have been calls for review of the role and functions of SAPP to allow the regional power pool to have more authority on issues of energy development in the region, and thus ensure that SAPP has the power to enforce decisions made by Member States (SARDC, 2012).

Despite its limited role and functions, SAPP is regarded as the most advanced power pool on the African continent.

SAPP was the first formal international power pool outside of North America and Europe. It was also the first power pool in Africa to establish a competitive power market

that allows countries connected to the regional grid to trade surpluses. During the early years of the power pool, the trading was confined to bilateral contracts among member utilities. The bulk of cross-border trading in electricity was governed by fixed co-operative bilateral contracts, which accounted for between 90 and 95 percent of total regional energy traded. The contracts generally covered a period from one to five years although they could be longer. They provided for assurance of security of supply but were not flexible to accommodate varying demand profiles and prices. The pricing of electricity depended on the consumption period – peak, standard or off-peak.

Recognising the importance of regional electricity trading, SAPP then operated the Short Term Energy Market (STEM) from 2001 until 2007 when the region ran out of surplus capacity. The STEM market catered for about five percent of SADC energy trade. It comprised daily and hourly contracts, mainly covering off-peak periods. STEM was a precursor to the full competitive electricity market that was successfully developed for the region in the form of the Day Ahead Market (DAM).

The auction-type market allows for sellers and buyers to input their requirements for trade in the power pool a day ahead and trade or bid for excess capacity on a real-time basis. Volumes of power traded on the DAM have increased significantly, from less than 50,000 megawatt hours (MWh) when the market started in December 2009 to around 450,000 MWh as of February 2015.

To achieve sustainable power supply in the short, medium to long term, SAPP has developed with a pool plan covering the period 2008 to 2020. The plan underscores the benefits arising from pursuing projects collectively as a region rather than as individual Member States. It forecast that by going this route, the region would not only attain better coordination and optimization of available energy resources but achieve total cost savings of about US$48 billion over the planning horizon.

The pool plan also urges SADC Member States to accelerate the interconnection of Angola, Malawi and Tanzania to the regional grid. It further advocates for what it calls a Central Transmission Corridor from the DRC to South Africa through Zambia and Zimbabwe to ease congestion and widen options.

To be accountable for the preparation and implementation of selected and agreed priority regional electricity projects in the power pool, SAPP has set up a Projects Advisory Unit (PAU) with grant funding from the World Bank. Among other responsibilities, PAU will conduct regional analytical work, and screen, select, prepare and monitor the implementation of regional priority projects.

2.2.3 RERA – Regional Electricity Regulators Association of Southern Africa

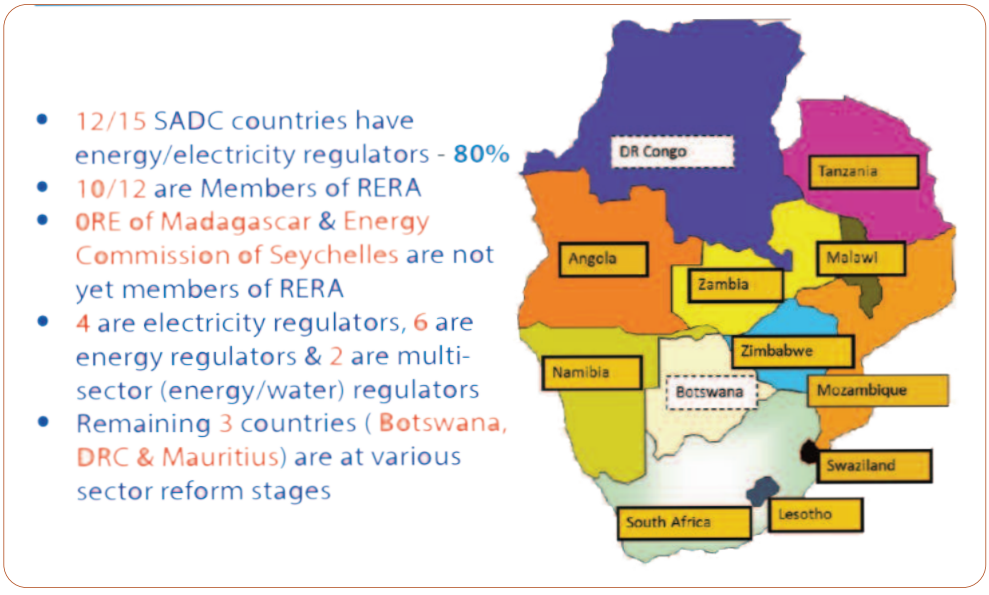
SADC Energy Ministers approved the establishment of the Regional Electricity Regulators Association of Southern Africa (RERA) on 12 July 2002 in Maseru, Lesotho and it was formally launched on 26 September 2002 in Windhoek, Namibia – the seat of the RERA Secretariat. The association was established with the following objectives:

- **Capacity building and information sharing**. Facilitate electricity regulatory capacity-building among members at national and regional levels through information sharing and skills training;
- **Facilitation of Electricity Supply Industry (ESI) policy, legislation and regulations**. Facilitate harmonized policy, legislation and regulations for cross-border trading, focusing on terms and conditions for access to transmission capacity and cross-border tariffs; and,
- **Regional regulation cooperation.** Deliberate and make recommendations on issues that affect the economic efficiency of electricity interconnections and electricity trade among members that fall outside national jurisdiction, and to exercise such powers as may be conferred on RERA through the SADC Energy Protocol.

RERA is a formal association of electricity regulators which provides a platform for cooperation between independent electricity regulators in the SADC region. Its membership is open to all electricity regulatory bodies in SADC. See Figure 2.4.

RERA Membership

Figure 2.4



Source: RERA, September 2015

Twelve of the 15 SADC Member States have energy or electricity regulators. However, only 10 of these are members of RERA. Office of the Electricity Regulator (ORE) of Madagascar and the Energy Commission of Seychelles are not yet members of the association. They are at various stages of sector reform (RERA, 2015). Four of the 12 are electricity regulators while six are energy regulators and two are multi-sector regulators, covering both energy/water issues. Botswana, DRC and Mauritius do not have regulators. Table 2.2 shows the 10 members of RERA.

RERA was established to monitor and evaluate electricity regulatory practises among members to determine regional training needs; develop, conduct or manage information and capacity-building programmes; promote and support the development of independent electricity regulators in Member States where these are not presently established; and source funding for the implementation of programmes and projects.

Other functions are to facilitate coordination of development in the areas of regional regulatory policies, legislation and regulations as well as electricity market structures in the region; promote research and prepare position papers on key aspects of regional regulation, including but not limited to examination of policies, strategies and legislation in the energy sector of the region in comparison with international trends and best practices; and investigate and deliberate on issues referred to it by members or emanating from any other source, relating to matters which impact on the development of integrated electricity supply systems in the southern African region.

Members of RERA — Table 2.3

Full Name	Abbreviation	Country
Institute for Electricity Sector Regulation	IRSE	Angola
Lesotho Electricity and Water Authority	LEWA	Lesotho
Malawi Energy Regulatory Authority	MERA	Malawi
National Electricity Advisory Council	CNELEC	Mozambique
Electricity Control Board	ECB	Namibia
National Energy Regulator of South Africa	NERSA	South Africa
Swaziland Energy Regulatory Authority	SERA	Swaziland
Energy & Water Utilities Regulatory Authority	EWURA	Tanzania
Energy Regulation Board	ERB	Zambia
Zimbabwe Energy Regulatory Authority	ZERA	Zimbabwe

Source: RERA presentation at ETG meeting, September 2015

2.2.4 SACREEE — Southern African Centre for Renewable Energy and Energy Efficiency

The Southern African Centre for Renewable Energy and Energy Efficiency (SACREEE) is a new SADC subsidiary organization on energy, approved by SADC Energy Ministers at their 34th meeting in July 2015.

SACREEE is hosted by the Government of Namibia with a mandate to support the achievement of the sustainable development objectives of SADC Member States by promoting the use of renewable energy, energy efficient technologies and energy services. The centre became operational in the second half of 2016, and is expected to work closely with other SADC energy subsidiary organisations such as SAPP and RERA.

The centre is expected to focus on the promotion of renewable energy and energy efficiency technologies and the development of markets, through sharing information and best practices, developing sound policy, regulatory, and legal frameworks, and building the capacity within SADC Member States for renewable energy and energy efficiency.

SACREEE will be governed through an Executive Board constituted from various members as agreed by the Member States. See proposed SACREEE governance structure and responsibilities in Figure 2.5.

The content of SACREEE thematic areas will be guided by a technical committee of the Board. The SACREEE management team will be headed by an executive director appointed by the Board. The management is expected implement and execute an approved annual budget and work plan.

The rational for establishing SACREEE is that the region has the capacity to address its energy challenges if its vast renewable energy sources such as hydro, wind and solar are harnessed. According to the African Development Bank, the total hydropower potential in SADC countries is estimated at about 1,080 Terawatt hours per year (TWh/year) but capacity being utilised at present is just under 31 TWh/year. A Terawatt is equal to one million Megawatts (MW). The region also has an abundance of watercourses such as the Congo and Zambezi, with the Inga Dam situated on the Congo River having the potential to produce about 40,000 MW of electricity, according to SAPP.

SACREEE Governance Structure — Figure 2.5

Source: SACREEE booklet, 2014

With regard to geothermal, the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF) estimate that about 4,000MW of electricity is available along the Rift Valley in the United Republic of Tanzania, Malawi, Mozambique and Zimbabwe. More work is required to complete the process of quantifying the available geothermal reserves in the region.

However, at present there are low levels of renewable energy penetration and use across the region. This is attributed to a number of factors, including lack of effective legislative and regulatory frameworks to support market development. The establishment of SACREEE is, therefore, expected to change the "landscape of energy development in SADC". An increase in the uptake of renewables will allow the region to achieve a renewable energy mix of at least 32 percent by 2020, which should rise to 35 percent by 2030. Currently, SADC generates about 74 percent of its electricity from thermal stations.

2.2.5 International Cooperating Partners / Energy Thematic Group

Another important institutional structure in the SADC energy sector is the Energy Thematic Group (ETG) which consists of representatives of the SADC Secretariat, SADC subsidiary organisations, International Cooperating Partners (ICPs) and a knowledge partner, the

Southern African Research and Documentation Centre (SARDC). Other target groups also participate in the ETG as associate members. These include the private sector, civil society, multilateral and bilateral financial institutions. The ETG meets twice a year, and participation in is voluntary. Austria is currently the lead ICP for the energy sector.

The purpose of the ETG is to promote SADC's regional potential and ability to utilise its energy resources to fuel its future sustainable growth in line with the SADC Protocol on Energy, and the Energy Sector Plan of the SADC Regional Infrastructure Development Master Plan. As part of the SADC-ICP dialogue structure, the ETG serves as the technical coordination and advisory group for the partnership between the two sides in the energy sector. It acts as a forum for dialogue, networking and creation of shared understanding between SADC Secretariat, the ICPs and main regional SADC partners; and a platform for coordinating energy related assistance at the regional level.

The role of the ETG is to assist SADC in facilitating coordination of the ICPs involved or interested in a specific thematic area. Other roles include building partnerships for implementation of the Revised RISDP and other key regional documents and strategies, promoting and coordinating thematic areas or programmatic approaches to implementation of regional programmes, activities and projects, as well as assisting SADC in validating and/or identifying pertinence of programmes, projects or other activities requiring intervention of ICPs; and, facilitating coordinated consultations among ICPs and assist SADC in its endeavours towards coordinated consultations with ICPs in a thematic area.

The partnership between SADC and the ICPs is based on the recommendations of a review of the 2006 Windhoek Declaration on a New Partnership, which recommended the designing of effective dialogue between the two sides. The Windhoek Declaration called for the establishment of thematic groups as a platform to give attention to specific priorities in SADC on a sector basis. It was envisaged that the thematic groups would provide an opportunity to pool resources towards the realization of the main SADC priorities.

2.3 Policy Instruments and Legal Framework

As highlighted in the introduction to this chapter, SADC has put in place a number of legal documents and policies to guide and spur development in the energy sector. The main legal document on energy development in the region is the SADC Energy Protocol. Other key supporting governance instruments are the Revised Regional Indicative Strategic Development Plan (RISDP), and the recently adopted SADC Industrialisation Strategy and Roadmap which identifies energy as a "key enabler" for industrial development in the region.

Most energy documents and policies are comprehensive and place great emphasis on the availability of sufficient, reliable and least-cost energy services. This is meant to address the broader SADC objectives that include attracting investment and promoting competitiveness and trade as a means for eradicating poverty, bearing in mind the need for the environmentally sustainable use of energy resources. The policy documents are also supportive and responsive to the SADC's strategic priorities that are targeted at industrialisation, the promotion of economic and social infrastructure, developing agriculture, gender mainstreaming, human resources development and improving social welfare.

However, a major concern that has been raised at various fora, including the meetings of SADC Energy Ministers, is that regional energy policies and other documents have not been updated to reflect developments in the sector. This has now received ministerial attention and a decision has since been reached to review the guiding principles.

SADC has also aligned its policy instruments and legal framework to other regional and international documents. These include the United Nations Sustainable Energy for All Initiative which has an objective to ensure universal energy access.

Another international commitment relevant for SADC is the UN Sustainable Development Goals (SDGs) adopted in 2015, as well as the Programme for Infrastructure Development in Africa (PIDA), which provides a framework for addressing the infrastructure deficit in Africa

Status of the Policy Framework of SADC Member States Table 2.4

Country	Energy Policy/ Strategies	Energy Master Plan	Energy/Electricity Regulator
Angola	-	-	√
Botswana	Draft	Draft	In progress
DRC	-	-	In progress
Lesotho	-	-	√
Madagascar	n/a	n/a	√
Malawi	-	-	√
Mauritius	√	√	In progress
Mozambique	√	√	√
Namibia	√	√	√
Seychelles	-	-	-
South Africa	√	√	√
Swaziland	√	√	√
Tanzania	√	√	√
Zambia	√	√	√
Zimbabwe	√	√	√
SADC	√	√	√

Source: SADC Regional Infrastructure Development Master Plan, 2012

- *Details for Madagascar and Seychelles were not available/included in the Master Plan. There is an energy regulator in Madagascar although the body is not a member of RERA*

through integrated planning and development at regional and inter-regional levels. PIDA was developed by the African Union Commission together with the United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB) and the New Partnership for Africa's Development (NEPAD). Of the 16 strategic and regionally balanced PIDA projects approved in 2012, seven are in the SADC region.

2.3.1 SADC Protocol on Energy

The SADC Protocol on Energy is the main legal document on energy development in the region that provides the broad legal and policy framework for cooperation in the energy sector. The protocol was signed in August 1996 and entered into force in April 1998 after receiving the required number of ratifications (two-thirds). The protocol aims at harmonising national and regional energy policies; strengthening cooperation in the development of energy and energy pooling; and ensuring the provision of reliable, continued and sustainable energy services in the most efficient and cost-effective manner. It also promotes joint development of human resources and organisational capacity building; as well as the strengthening of regional cooperation in research, development, adaptation, dissemination and transfer of low-cost energy technologies.

Through the Protocol, the processes of sharing of energy data and information and co-operating with non-SADC states and organisations are clearly defined. The Protocol was operationalised through the SADC Energy Cooperation Policy and Strategy and the SADC Energy Sector Action Plan approved by the SADC Council of Ministers in 1996 and 1997, respectively. The Action Plan identified four priority areas – energy trade, information and experience exchange, training and organisational capacity building, and investment and funding. The SADC Energy Activity Plan (approved by Council in 2000) further elaborated the four priority areas into a detailed programme of activities to be implemented.

Article 3(3) states that energy cooperation in the SADC region shall involve working together in the development and utilization of energy in the sub-region in the following subsectors: wood fuel, petroleum and natural gas, electricity, coal, new and renewable energy sources, energy efficiency and conservation and other crosscutting themes of interest to Member States.

Article 4 of the Protocol calls for the creation of structures within SADC to deal with the financing of energy projects; while Article 5 deals specifically with how financial provisions of regional energy programmes and projects are handled in SADC.

2.3.2 Revised RISDP

The Revised Regional Indicative Strategic Development Plan (RISDP) 2015-2020 was endorsed by the SADC Extraordinary Summit of Heads and State and Government held in April 2015 in Harare, Zimbabwe, to guide the implementation of SADC programmes during the next five years. The RISDP was initially developed and approved by Summit in 2003 for a 15-year period, but was effectively implemented from 2005, thus giving an implementation timeframe of 2005-2020. The RISDP is built on the premise that good political, economic and corporate governance are prerequisites for sustainable socio-economic development, and that SADC's objectives for poverty eradication and deeper levels of integration will not be realised if these are not in place.

Since its approval in 2003, the RISDP has guided SADC and its partners in planning the implementation of the cooperation and integration agenda. Two assessments of the RISDP were carried out in 2011 and 2012/13. Based on their findings and the recommendation of Council in 2013, a Revised RISDP has been produced for the remaining duration of the Plan. The Revised RISDP provides a guiding framework for the last phase of the RISDP that is 2015-2020. The scope and purpose of the Revised RISDP remain unchanged from those of the original document, except that emphasis has been placed on re-aligning existing priorities with resources allocation in terms of their relative importance and greater impact on regional integration. It defines specific results and timeframes in the various areas of cooperation and integration in order to facilitate monitoring and evaluation.

The purpose of the Revised RISDP is to deepen regional integration in SADC and it provides SADC Member States with a consistent and comprehensive programme of medium-term economic and social policies. It also provides the Secretariat and other SADC institutions with a clear view of SADC's approved economic and social policies and priorities.

The Revised RISDP has four major priority areas. These are Industrial Development and Market Integration; Infrastructure Support for Regional Integration; Peace and Security Cooperation as a prerequisite for regional integration; and Special Programmes of Regional Dimension.

Energy development is under Priority B on Infrastructure Support for Regional Integration, which seeks to promote the facilitation of infrastructure to support regional integration, including investment in energy, transport (surface, air and intermodal), tourism, information communication technology, meteorology and water.

The major intervention for energy in the RISDP is: "Energy to support regional economic development, trade and investment." This guided the selection of the intervention components that are being evaluated. The four pillars of the Revised RISDP are illustrated in Figure 2.6.

Four Pillars of the Revised RISDP

Figure 2.6

Source: SADC, 2015

Since the Revised RISDP is one of the latest policy documents for SADC, stakeholders in the energy sector have begun the process to align their activities, programmes and projects to the Revised RISDP. Alignment of support to the two regional documents is critical as it ensures the smooth implementation of agreed activities and programmes, thereby promoting socio-economic development and deeper integration.

It should be noted that the RISDP was the first effort by SADC to set specific quantitative targets for infrastructure development (including energy) for a 15-year period, 2004-2018. On the energy side, for example, the target was for at least 70 percent of rural communities within southern Africa to have

access to "modern forms of energy supplies". More specifically, the Plan advocated "Improving access to affordable energy services to rural communities through rural electrification and development of new and renewable energy sources", and proposed doing so through "development of renewable and low cost energy sources including solar, biomass, and wind-generated energy."

2.3.3 SADC Industrialisation Strategy and Roadmap

Another latest policy development critical to the SADC energy sector is the 2015 SADC Industrialisation Strategy and Roadmap that was approved by the SADC Extraordinary Summit of Heads and State and Government held in April 2015 in Harare, Zimbabwe. The Strategy and Roadmap, which aims at accelerating the momentum towards strengthening the comparative and competitive advantages of economies of the region, as well as allow the region to leverage its vast natural resources endowment such as energy resources, identifies energy as a "key enabler" for industrial development in the region."

Anchoring on three pillars, namely Industrialisation, Competitiveness and Regional Integration, the strategy covers the period 2015-2063 and is aligned to the African Union's Agenda 2063 – a continental strategy that aims to optimize the use of Africa's resources for the benefit of all Africans. During the period 2015-2020, SADC will strive to progress from being factor-driven to being investment-driven. From 2021-2050, the region will aim to advance to being an innovation-driven economy, while the period 2051-2063, the target for SADC is to achieve high levels of economic growth, competitiveness, incomes and employment.

On the role of energy, the strategy acknowledges that "efficient and affordable infrastructural services (consisting of energy supply) are critical inputs for reducing transaction costs for industry and trade, as well as for enhancing the economic and social wellbeing of society at large" (SADC, 2015). To address the crippling energy deficit being faced by the region, and ensure the smooth implementation of the industrialization, the strategy advocates a variety of measures, including the following:

- 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 minimise 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 hydropower network connectivity and proposed new generation and transmission projects should be fast-tracked including regional joint-ventures. Member States should accelerate the design and implementation of an appropriate institutional framework for the early development of the Inga Dam project which has enormous potential for the supply of low-cost electricity to the SADC region.

2.3.4 Regional Infrastructure Development Master Plan: Energy Sector Plan

SADC approved the Regional Infrastructure Development Master Plan (RIDMP) in August 2012. The RIDMP defines regional infrastructure requirements and conditions to facilitate the realisation of key infrastructure in the energy, water, transport, tourism, meteorology and telecommunications sectors by 2027. The Master Plan is based on the SADC Vision 2027, which caters for implementation over three phases — the short term (2013-2017), the medium term (2017-2022) and the long term (2022-2027).

In the energy sector, the Energy Sector Plan (ESP) is expected to address four key areas of energy security — improving access to modern energy services, tapping the abundant energy resources and increasing financial investment while enhancing environmental

sustainability. It defines regional infrastructure requirements and conditions to facilitate the realisation of key infrastructure in the energy, water, transport, tourism, meteorology and telecommunications sectors by 2027. Such infrastructure would enable the SADC region to attain regional integration, economic growth and poverty eradication.

The ESP defines the main areas of consideration relating to the implementation of:

- "Hard" infrastructure projects that include electricity generation plants, transmission lines; petroleum and gas refineries, pipelines, storage reserves, coal depots and port facilities, and nuclear demonstration plants.
- "Soft" interventions entail the required policies/strategies and regulatory frameworks, institutional frameworks and capacity building, financing and cooperation/collaboration arrangements that enable "hard" projects to be realised.

The ESP highlights the status of the sector, projections and gap analysis as well as its infrastructure needs. Investments and intervention needed are explored, including monitoring and evaluation of the implementation, and a way forward is discussed within the plan.

2.3.5 Regional Energy Access Strategy and Action Plan

At their meeting in Angola in April 2010, the SADC Energy Ministers agreed to undertake a comprehensive review and rationalisation of the entire energy sector governing instruments and also adopted a new SADC Regional Energy Access Strategy and Action Plan. The plan aims to combine regional energy resources as a means of ensuring the entire SADC region has access to affordable, sustainable electricity. The plan's goal is to reduce by half within 10 years (by 2020) the number of people in the region without access to energy, and then halve it again every five years until the region has universal access.

The overall objective of the SADC Energy Access Strategy and Action Plan are at the strategic level to harness regional energy resources to ensure, through national and regional action, that all the people of the SADC region have access to adequate, reliable, least cost, environmentally sustainable energy services, and at the operational level that the proportion of people without such access is halved within 10 years for each end-user and halved again in successive five-year periods until there is universal access for all end-users.

2.3.6 AU Agenda 2063

SADC aligns its policy instruments and legal framework to other regional and international commitments. These include the African Union's Agenda 2063, which is a strategic framework for socio-economic transformation of the continent over the next 50 years, initiated at the 50th anniversary Summit of AU Heads of State and Government on 25 May 2013. They committed to accelerate actions on a number of strategic areas including how to connect Africa through modern infrastructure, with a concerted push to finance and implement the major infrastructure projects.

Energy is one of the areas identified as a priority under the AU Agenda 2063. AU members agreed to harness all "African energy resources to ensure modern, efficient, reliable, cost-effective, renewable and environmentally friendly energy to all African households, businesses, industries and institutions, through building the national and regional energy pools and grids, and PIDA energy projects."

2.4 Conclusion and Recommendations

Although implementation of various legal documents, policies, institutional frameworks and strategies has been slow, the region has made significant progress in developing its energy sector. Cooperation among SADC Member States has allowed countries in the region to share surplus energy through the SAPP competitive market. In this regard, full implementation of all agreed instruments will enable SADC to develop its energy sector.

Another important observation is that a number of various legal documents, policies, institutional frameworks and strategies are outdated and need to be reviewed in line with the changing environment for them to remain relevant and useful. As a recommendation, SADC Member States need to speed up energy sector reforms, including adopting friendlier regulatory environments as well as adopting pricing structures that can attract private capital.

3.1 Introduction

The Energy Sector Plan (ESP) is part of the SADC Regional Infrastructure Development Master Plan (RIDMP) whose aim is to define regional infrastructure requirements and conditions to facilitate the realisation of key infrastructure in the energy, water, transport, tourism, meteorology and telecommunications sectors by 2027. Such infrastructure would enable the SADC region to attain regional integration, economic growth and poverty eradication. This chapter looks at the major investment projects made in energy sector in SADC region. It also focuses on related institutional and policy frameworks that are in place to promote investment in energy.

Article 3 of the SADC Protocol on Energy sets the cooperation in the development and utilisation of energy as one of its objectives. The cooperation specified in the protocol covers the following energy subsectors: wood fuel, petroleum and natural gas, electricity, coal, new and renewable energy sources, energy efficiency and conservation, and other crosscutting themes of interest to Member States.

The protocol envisaged the setting up of a commission, which was to be comprised of the Committees of Ministers and Senior Officials, the Technical Committee and Sub-Committees set up by the Committee of Ministers. Two of the pertinent functions of the commission which are relevant to this Chapter relate to, first, the facilitation of regional energy projects from conceptualisation, initiation, preparation and implementation, monitoring and evaluation; and second, the mobilisation of finance for implementing SADC energy programmes and projects.

Article 8 of the protocol also provides for cooperation between the commission and non-governmental organisations, the business and industrial communities as long as their objectives are not at variance with objectives of the protocol.

It is in the spirit of the SADC Protocol on Energy that the Energy Thematic Group (ETG) was formed to facilitate mobilisation of resources to develop sustainable energy sector projects in the region. The ETG is comprised of SADC, International Cooperating Partners (ICPs), the Southern African Power Pool (SAPP), Regional Energy Regulatory Authority for Southern Africa (RERA); and the Southern African Research and Documentation Centre (SARDC).

The African Development Bank (AfDB) estimates that Africa needs about US$95 billion annually in infrastructure investment, of which only US$45 billion is currently invested from African governments, development finance institutions and the private sector. This leaves a funding gap of US$50 billion per year.

3.2 Sector Status

3.2.1 Electricity Sub-Sector

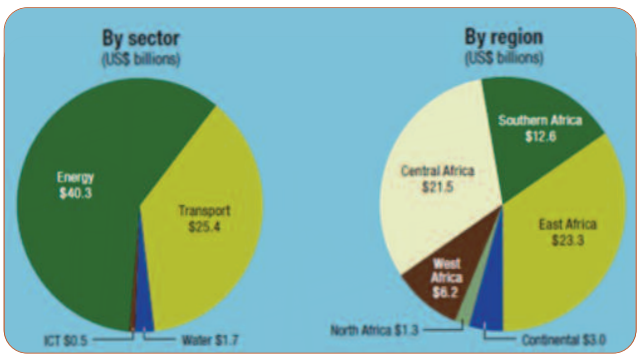
The SADC region has a low access to electricity of 24 percent compared to 36 percent for the Eastern Africa Power Pool (EAPP) and 44 percent for the West African Power Pool (WAPP), with some SADC countries having below five percent rural access to electricity. Investments and financing are hampered by several barriers, which include low tariffs, poor project preparation, no off takers that can sign Power Purchasing Agreements (PPAs) under single buyer models and other required policy/ regulatory frameworks.

The largest investments within the energy sector tend to be in the electricity sector where significant amounts are required for investment in generation plant and associated transmission equipment. Multilateral Development Banks (MDBs) constitute the main providers of funding for such projects working in partnership with local development banks or other bilateral sources of finance. A case in point is the financing of infrastructure development in Africa which has the African Development Bank (AfDB) as the executing

agency for the Programme for Infrastructure Development in Africa (PIDA), which is an initiative of African Union Commission (AUC) supported by NEPAD. In addition, various partners such as China, India, Japan and those from Europe are supporting infrastructure development, particularly in the energy sector across Africa.

The PIDA Priority Action Plan (PAP), which comprises 51 priority infrastructure backbone projects and programmes in energy, water, transport and ICT, requires investment of US$68 billion to be realised by 2020 (Figure 3.1). Of this, the biggest demand for investment is for energy accounting for US$40.3 billion or 60 percent of the programme followed by transport at US$25.4 billion (37%) and water at $1.7 billion (2.5%) and ICT accounting for only $500 million (less than 1%).

PIDA Priority Action Plan, Total Capital Costs by Sector and Region, up to 2020 Figure 3.1



Source: PIDA Financing Brief, 2014

The PIDA Priority Action Plan contains 15 priority energy projects, at least seven of which involve southern African countries (Table 3.1). The largest of the planned projects involving SADC Member States is the US$10.5 billion Central African Interconnection Project. The project involves construction of a 3,800km line from Democratic Republic of Congo (DRC) to South Africa through Angola and Namibia due to be completed by 2018 to feed electricity generated by Inga III and Grand Inga hydropower schemes in western DRC into the Southern African Power Pool. This includes an option to extend the line north to Gabon, Equatorial Guinea, Cameroon and Chad. Other significant projects are the North-South Transmission Corridor and the Inga III Hydropower Station.

PIDA Priority Energy Projects Affecting SADC Member States Table 3.1

Project	Description	Cost (US$ Millions)	Countries/River Basin
North-South Power Transmission Corridor	8,000km line from Egypt through Sudan, South Sudan, Ethiopia, Kenya, Malawi, Mozambique, Zambia, Zimbabwe to South Africa	6,000	Kenya, Ethiopia, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, South Africa
Mphanda-Nkuwa Hydropower	Hydroelectric power plant with a capacity of 1,500 MW for export on the SAPP market	2,400	Mozambique
Lesotho HWP Phase II Hydropower Component	Hydropower programme for power supply to Lesotho and power export to South Africa	800	Orange-Senqu River Basin
Inga III Hydropower	4,200 MW capacity run of river hydropower station on the Congo river with eight turbines	6,000	DRC
Central African Interconnection	3,800km line from the DRC to South Africa through Angola and Namibia and to the north to Gabon, Equatorial Guinea, Cameroon and Chad	10,500	South Africa, Angola, Gabon, Namibia, Ethiopia
Batoka	Hydroelectric plant with a capacity of 1,600MW to enable export of electricity	2,800	Zambia, Zimbabwe
Ruzizi III Hydropower	Hydroelectric plant with a capacity of 145MW to share power among Rwanda, Burundi and DRC	450	Rwanda, DRC

Source: PIDA Financing Brief, 2014

International Cooperating Partners continue to also play a major role in developing the SADC energy sector, coordinated through the SADC Energy Thematic Group. Austria is currently the Lead ICP for the SADC energy sector. Through the Austrian Development Agency (ADA)/Austrian Development Corporation (ADC), the contribution by Austria is mainly towards development of the renewable energy sector in southern Africa. Since 2009, Austria has committed €8.5 million in support of sustainable energy solutions in the SADC region and has pledged another €3.5 million until 2018 (see Annex 3).

Flagship projects supported by ADA/ADC include the establishment of the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) based in Windhoek, Namibia and the Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN), which has been running since 2009. The main objective of the SOLTRAIN project is to support SADC in changing from the use of environmentally unfriendly fossil fuels to renewable energies, with focus on solar water heating. The initiative has benefited six countries – Botswana, Lesotho, Namibia, Mozambique, South Africa and Zimbabwe.

ADC/ADC is also supporting a project to strengthen understanding of the regional dimensions of energy provision in southern Africa. The project on Communicating Energy in Southern Africa is implemented by the Southern African Research and Documentation Centre (SARDC) in partnership with the SADC Secretariat to strengthen the knowledge base and the cross-border flow of information on the energy sector in the 15 SADC Member States. This includes tracking the development of hydroelectricity and other regional energy sources. The project started in 2008 and was initially supported by the Government of Norway, previously the Lead ICP for the SADC energy sector. Key outputs of the project include production of the publication *Southern Africa Today / SADC Today* and the *Southern African News Features*; knowledge support to the SADC Energy Thematic Group; as well as production of new products, the *SADC Energy Monitor* and *SADC Energy Investment Yearbook*.

Other ICPs in the SADC energy sector include France, Germany, Japan, Norway, European Investment Bank, United States Agency for International Development, United Nations Industrial Development Organisation, and the World Bank (see Annex 3).

Another important player in the SADC energy sector is China. According to the International Energy Agency (IEA), China has contributed about 30 percent of new capacity additions in the region between 2010 and 2015. As part of a strategy to expand international investment in the energy sector, the Chinese government and its state-owned companies as well as private companies have invested substantially in SADC and the rest of Africa in recent years. It is estimated that Chinese investments in the energy sector in Africa amounted to US$13 billion between 2010 and 2015. Most of the projects are financed largely through public lending from China.

In terms of regional spread of Chinese investment in the electricity sub-sector in Africa, the SADC region accounts for about 28 percent of projects supported by China on the continent (Table 3.2).

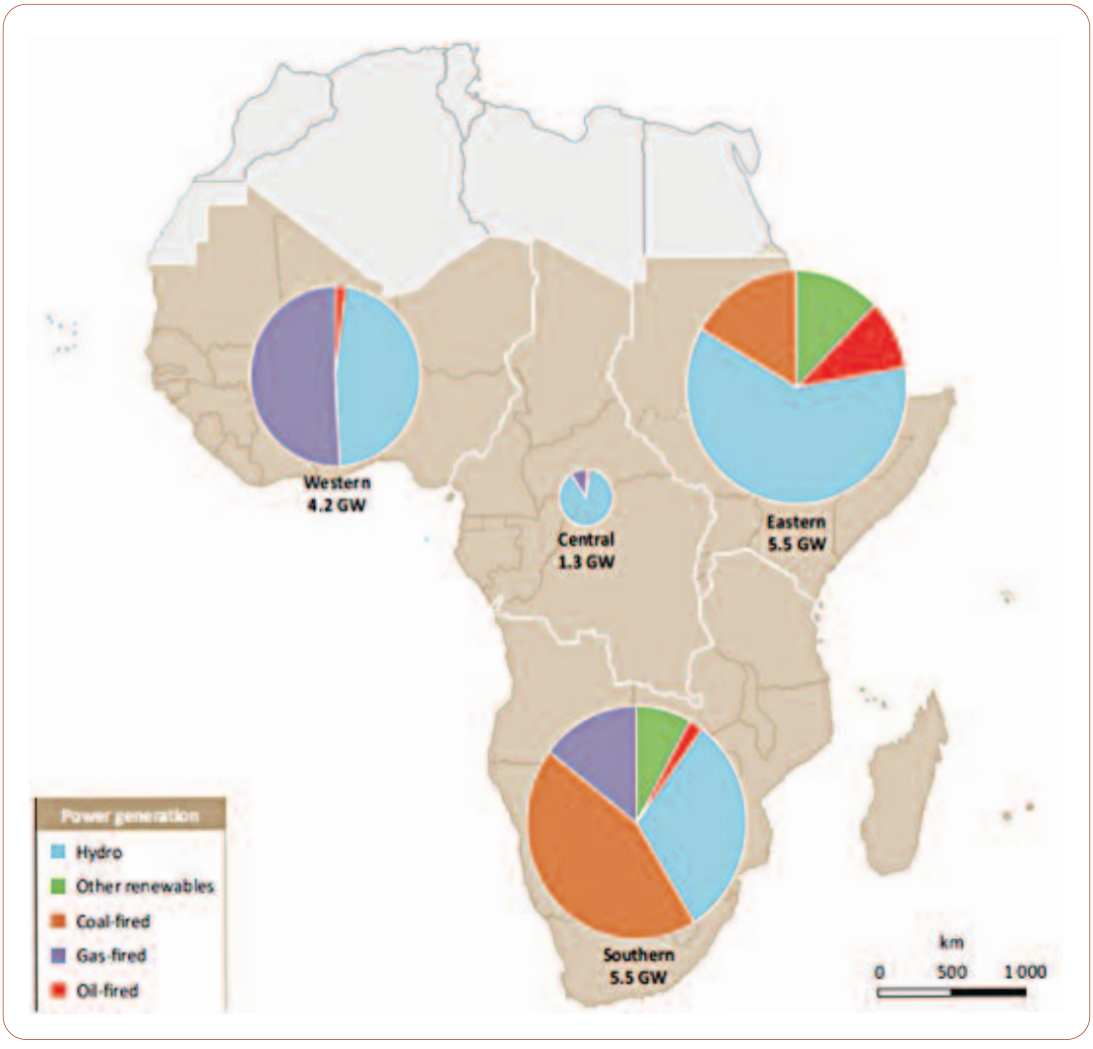
Overview of Chinese power projects in sub-Saharan Africa, 2010-2020 Table 3.2

	Generation Capacity		Transmission and Distribution Capacity			
	Completed Projects	Under Construction	Planned and Financed	Completed Projects	Under Construction	Planned and Financed
East Africa	14	9	5	10	10	1
West Africa	17	4	2	6	2	2
Central Africa	8	5	2	5	1	2
Southern Africa	15	7	8	4	5	1
Total	**54**	**25**	**17**	**25**	**18**	**6**
		96			49	

Source: IEA, 2016

Chinese Investment in Power Generation Capacity in Africa

Figure 3.2



Source: IEA, 2016

As shown in Figure 3.2, most of the Chinese investment will be channelled to coal-fired projects and hydropower generation. Some of the major Chinese-supported energy projects in SADC are listed in Annex Table 3.3.

It should be noted that although the support from China is mostly at country level or channelled to smaller projects, the support has been efficient and contributed significantly to energy security. In Zimbabwe, for example, China Exim Bank is refurbishing the Hwange Thermal Power Station from a US$1 billion loan facility.

3.3 Generation Projects

The SAPP has implemented a number of projects to boost electricity generation and transmission during the past decade. As shown in Table 3.3, a total of 13,200MW was commissioned between 2004 and 2014 against a target of 19,600MW that was planned over the period. The largest amount of new generation capacity commissioned was in 2009 when 2,187MW was added to the regional grid. This could be attributed to the preparations for the hosting of the 2010 FIFA World Cup.

A major challenge for the SADC energy sector is that many of the proposed regional power generation projects are poorly structured and packaged, and therefore fail to attract investment. A number of long-planned projects have failed to take off as the private sector has been reluctant to engage in partnerships with governments mainly due to inappropriate financing formulas. Most SADC Member States have been slow in putting in place mechanisms that promote private sector participation in the energy sector and therefore improve the attractiveness of the industry for investors.

The policy environment in most SADC Member States does not encourage private sector participation in the energy sector. Save for a few countries such as Zambia, the majority of SADC Member States are yet to fully embrace the concept of Public Private Partnerships (PPPs) despite being party to a SAPP Inter-Utility Memorandum of Understanding that formally allowed private players in the region's energy sector. Zambia has established a public institution, Office for Promoting Private Power Investment (OPPPI), which facilitates and promotes the implementation of PPPs.

Commissioned Generation Projects Table 3.3

Year	Planned Capacity (MW)	Actual Capacity Commissioned (MW)
2004	260	320
2005	520	490
2006	1041	375
2007	2441	1696
2008	2014	1747
2009	2400	2187
2010	908	848
2011	1751	1230
2012	3552	1099
2013	1992	1210
2014	2737	1999
TOTAL	**19,616**	**13,201**

Source: SAPP, March 2015

Except for South Africa, the capacity constraints have also seen most SADC Member States failing to fully embrace renewable energy and energy-efficient technologies such as solar and wind power. For instance, solar thermal-electric systems have the long-term potential to provide a significant portion of SADC's electricity and energy needs. Research has shown that most countries in southern Africa receive more than 2,500 hours of sunshine per year. Knowledge on solar energy technology is widespread in the SADC region but its use is still limited, partly due to the prohibitive initial set-up costs involved and capacity constraints.

Zambia sets the pace for private sector participation Box 3.1

The Office for the Promotion of Private Power Investors (OPPPI) is a dedicated unit in the Zambian 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.

3.4 Transmission Projects

SADC has prioritised implementation of cross-border transmission projects in an effort to link the power systems of all SADC Member States. The history of energy cooperation in the region dates back to the 1950s when the DRC partnered with Zambia to construct a 200kiloVolts (kV) line connecting the two countries. This allowed the two neighbours to trade 210MW of electricity. This was followed by a similar interconnector project between Zambia and Zimbabwe in the 1960s, and the 500kV interconnector linking Mozambique to South Africa in 1975. (Figure 3.3)

Origins of SAPP Electricity Transmission Projects
Figure 3.3

Source: SAPP, November 2015

Existing SAPP Transmission Lines
Figure 3.4

Source: SAPP, 2015

Transmission Interconnectors Commissioned since 1995 Table 3.4

Interconnector	Capacity, kV	Countries Connected	Year Completed
Matimba-Insukamini	400	South Africa and Zimbabwe	1995
Songo-Bindura	400	Mozambique and Zimbabwe	1997
Phokoje substation-Matimba	400	Botswana and South Africa	1998
Upgrade of line between Cahora Bassa-Apollo substation	533	Mozambique and South Africa	1998
Camden-Edwaleni-Maputo	400	South Africa, Swaziland and Mozambique	2000
Arnot-Maputo	400	South Africa and Mozambique	2001
Aggeneis-Kookerboom	400	South Africa and Namibia	2001
Zambia-Namibia	220	Zambia and Namibia	2007
Caprivi Link	350	Namibia	2010
Kafue-Livingstone upgrade (from 220-330kV)	330	Zambia	2013

Source: PIDA Financing Brief, 2014

Table 3.4 shows the transmission interconnectors that have been commissioned since the formation of the SAPP in 1995.

Figure 3.4 shows the existing SAPP electricity transmission grid. The dotted lines show planned transmission projects linking the various countries.

The SADC region requires an estimated US$540 million to implement planned transmission projects between 2012 and 2027 (SADC, 2012). Table 3.5 shows some of the transmission projects planned in the region.

Proposed Transmission Projects

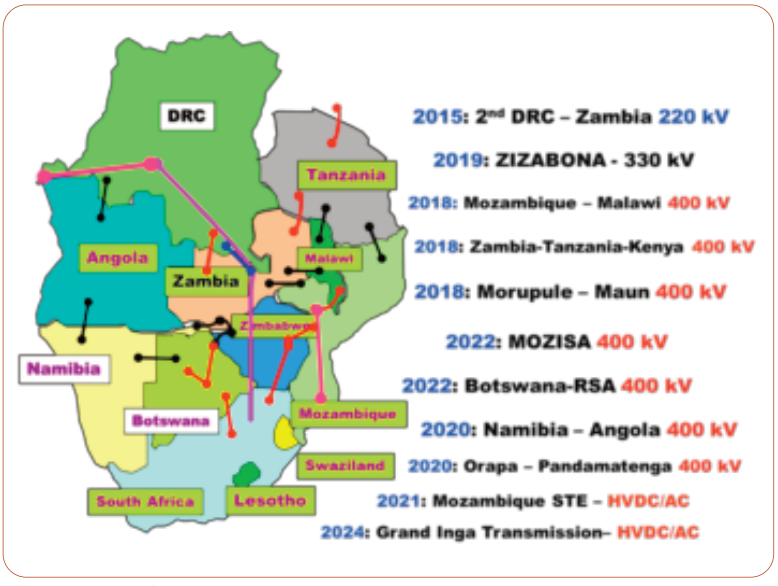
Table 3.5

Project	Estimated Cost	Funder/s
Zimbabwe-Zambia-Botswana-Namibia (ZIZABONA) Transmission Line The interconnector will link the electricity transmission of the four countries to provide an alternative electrical power transmission in the region and de-congest existing the Central Transmission Corridor that passes through Zimbabwe, thus boosting electricity trading among Member States.	US$225 million	Government of Norway, AfDB, DBSA, AFD
Mozambique-Zimbabwe-South Africa (MOZISA) Interconnector Project will comprise two parts. Part A will be construction of a 320km transmission line from Triangle in Zimbabwe to Nzehelele in South Africa, while Part B will involve construction of a 230km line from Orange Grove in Zimbabwe to Inchope in Mozambique.	US$3 million	DBSA
Mozambique-Malawi Interconnector The interconnector will enable Malawi to access the regional power market through Mozambique, whose grid is interconnected with South Africa and Zimbabwe. Utility Project Teams have been formed and a communication protocol has been set up. Expression of interest has been launched for update of feasibility studies.	US$109.7 million	World Bank
Central Transmission Corridor The Central Transmission Corridor project involves upgrading of the transmission networks in Zambia, Zimbabwe and Botswana to enable the transfer of power from the North to countries in the South and vice versa. This is regarded as a priority project for the SAPP as it alleviates transmission congestion in Zimbabwe to benefit other countries in the South.	US$100 million	TBA
Mozambique Transmission Backbone Project The Mozambique Transmission Backbone project (STE) will consists of a double transmission line from Tete Province in central Mozambique to the capital Maputo and to the SAPP-interconnected power network. It will transport electricity generated in new hydropower plants from Mphanda Nkuwa and Cahora Bassa to the markets. The backbone will comprise an 800km, 400kV high-voltage line to supply the major consumption zones within Mozambique and link with the South African market. Pre-feasibility system planning studies were concluded.	US$2.8 billion	Government of Norway leading other ICPs
Zambia/Tanzania/Kenya Interconnector Interconnector is to link Tanzania and Kenya to the SAPP grid through Zambia, and link SAPP to the Eastern Africa Power Pool, thus improving the overall access to energy in southern and eastern Africa. Zambia, Kenya and Tanzania signed an agreement in December 2014 under which they committed to start the interconnector project in December 2015 and ensure that it is completed by December 2018.	US$1.116 billion	World Bank, African Development Bank and JICA
Namibia-Angola Interconnector This will enable Angola to connect to the SAPP grid through Namibia. Terms of Reference for the project have been agreed between ENE and NamPower and a Consultant has been engaged by the Government of Angola for technical feasibility studies. Another option considered is to construct the Angola-DRC interconnector.	US$250 million	TBA
Morupule B-Maun Transmission Line This is part of Botswana's North West Transmission Grid Project. It involves the construction of a backbone transmission network of about 500km, consisting of a 400kV line from Morupule B to Maun via Orapa, with 400kV substations at Orapa and Maun. The transmission line is expected to be completed by 2018.	US$4.2 billion	World Bank and African Development Bank
Orapa-Pandamatenga Transmission Line This will involve the construction of a 400kV line from Orapa in central Botswana through Dukwi to Pandamatenga in the northwest of the country close to the borders with Namibia, Zambia and Zimbabwe. The purpose of the interconnector is to strengthen the transmission system and enable greater power trading between Botswana and other SADC countries.	TBA	TBA
DRC–Zambia Interconnector This will involve construction of a 330 kV transmission line from Solwezi in Zambia to Kolwezi in DRC.	US$94 million	World Bank

Source: SAPP, 2015

Proposed SAPP Transmission Lines

Figure 3.5



Source: SAPP, February 2016

Figure 3.5 shows a map of the proposed SAPP transmission lines.

3.5 Infrastructure Needs

3.5.1 Electricity Sub-Sector

According to the SADC Regional Infrastructure Development Master Plan (RIDMP) of 2012, assuming average economic growth rate of eight percent per annum the forecast peak load is expected to rise to more than 77,000MW by 2020 and to over 115,000MW in 2030. With total peak demand plus reserves of more than 55,000MW as of September 2015 (the figure drops to about 52,000MW when only SAPP operating member countries are considered), the region will have to invest in new generation capacity to add up to 25,000MW to meet rising demand. As shown in Table 3.6, SAPP members have earmarked an additional 24,000MW between 2015 and 2019 in order to meet the deficit and become self-sufficient. A number of generation and transmission projects are planned over the period but the big question is whether this new target of equilibrium by 2020 is feasible, considering that most of the planned projects are either at pre-feasibility or feasibility stages.

Planned Generation Projects 2015–2019

Table 3.6

Country	Committed Generation Capacity, MW					
	2015	2016	2017	2018	2019	Total
Angola	50	780	2,571	200	-	3,601
Botswana	-	30	90	364	-	484
DRC	430	-	150	-	-	580
Lesotho	-	-	-	-	-	-
Malawi	-	20	36	94	300	450
Mozambique	-	140	-	400	300	840
Namibia	-	15	-	-	800	815
RSA	1,479	2,486	2,596	1,445	2,169	10,175
Swaziland	-	-	-	-	12	12
Tanzania	150	-	900	1,440	250	2,340
Zambia	145	300	15	113	1,090	1,663
Zimbabwe	15	-	120	1,230	1,200	2,625
Total	**2,269**	**3,771**	**6,478**	**4,886**	**6,181**	**23,585**

Source: PIDA Financing Brief, 2014

Based on the peak load estimate, the SADC region will need to invest in 40,000MW additional capacity in the decade from 2020 and 2030 if it is to ensure that supply matches demand. This calls for concerted efforts by member states to ensure that the 35 generation projects and 12 transmission projects identified in the RIDMP as priority between 2015 and 2027 are implemented. Top priority generation projects are those with capacity of more than 1,000MW (Table 3.7).

If implemented according to plan, these priority projects are expected to add almost 26,000MW to the regional power grid between 2015 and 2026. However, most of them are still at various stages of implementation, including project preparation. For example, the Batoka power project between Zambia and Zimbabwe is yet to start. Failure to implement these projects could perpetuate the region's electricity problems.

SAPP Priority Generation Projects (capacity >1,000MW)

Table 3.7

Priority Ranking	Country	Project Name	Capacity [MW]	Technology	Expected Year of Commissioning
1	Mozambique	HCB North Bank	1 245	Hydro	2015
2	Mozambique	Mphanda Nkuwa	1 500	Hydro	2017
3	Zambia/Zimbabwe	Batoka	1 600	Hydro	2022
4	DRC	Inga 3	4 320	Hydro	2018
5	Zimbabwe	Gokwe North	1 400	Coal	2017
6	South Africa	Pulverised Fuel (PF) & Fluidised Bed Combustion (FBC) plant	6 250	Coal	2026
7	South Africa	Nuclear	9 600	Nuclear	2023
Total			**25 915**		

Source: PIDA Financing Brief, 2014

SAPP Priority Generation Projects (capacity <1,000MW)

Table 3.8

Priority Ranking	Country	Project Name	Capacity (MW)	Technology	Expected Year of Commissioning
1	Zimbabwe	Kariba South Extension	300	Hydro	2016
2	Namibia	Kudu	800	Gas	2016
3	Botswana	Morupule 5 and 6	300	Coal	2015
4	Namibia	Baynes	360	Hydro	2018
5	Mozambique	Benga	600	Coal	2015
6	Zimbabwe	Hwange 7 and 8	600	Coal	2015
7	Zambia	Lunsemfwa Lower	255	Hydro	2016
8	DRC	Busanga	240	Hydro	2016
9	Zambia	Kalungwishi	220	Hydro	2016
10	DRC	Zongo 2	120	Hydro	2016
11	Tanzania	Kiwira	200	Coal	2015
12	Tanzania	Kinyerezi	240	Gas	2015
13	Tanzania	Rumakali	520	Hydro	2018
14	Mozambique	Moatize	300	Coal	2015
15	Zambia	Mambilima Falls Site 1 and 2	425	Hydro	2019
16	Zambia	Mpata Gorge	543	Hydro	2023
17	Malawi	Lower Fufu	100	Hydro	2015
18	Tanzania	Ruhudji	358	Hydro	2017
Total			**6 481**		

Source: SADC Regional Infrastructure Development Master Plan, 2012

The region also intends to implement a second tier of priority projects over the planning horizon, as identified in the RIDMP. With a capacity below 1,000MW, the 18 projects should add 6,481MW to the regional grid between 2015 and 2019 (Table 3.8). The region is already doing well in this regard, given that its target of projects for commissioning between 2015 and 2019 is about 23,600MW. Implementation of these short-term projects is crucial in ensuring the rest of the SAPP Plan remains on course.

Table 3.9 gives a list of 10 priority integrated-resource generation projects that are planned between 2015 and 2027 by SAPP utilities. If fully implemented, the regional grid would have additional generation capacity of 23,220MW.

SAPP Utility Integrated Resource Plan Generation Projects Table 3.9

Priority Ranking	Country	Project Name	Capacity [MW]	Technology
1	Lesotho	Kobong Pumped Storage	1 200	Hydro
2	Zambia	Devils Gorge	500	Hydro
3	Malawi	Mpatamanga	260	Hydro
4	Malawi/Tanzania	Songwe	340	Hydro
5	Malawi	Kholombizo	240	Hydro
6	South Africa	OCGT	2 370	Gas
7	South Africa	CCGT Gas	3 910	Gas
8	South Africa	Wind	7 200	Wind
9	South Africa	Solar PV	6 900	Solar
10	Zimbabwe	Lupane	300	Gas
Total			**23 220**	

Source: SADC Regional Infrastructure Development Master Plan, 2012

3.5.2 Petroleum and Gas Sub-Sector

The SADC region is a net importer of petroleum products and this has an impact on the import bill and subsequent budgetary implications for most Member States. However, reserves of crude oil and natural gas are found in some Member States, the bulk of which are in Angola. The petroleum products are either imported or produced by refineries in the region that are found in Angola, South Africa and Zambia.

The region is endowed with large reserves of oil in excess of 5.5 billion barrels, 96 percent of which is in Angola, according to the RIDMP. Although the region is producing crude oil (for example an estimated 1.25 million barrels/day in Angola, 215 barrels/day for South Africa and 20 barrels/day for DRC), most Member States still have to import most of the refined products due to limited refinery capacity. Currently the largest oil refineries in the region are in South Africa, which has four refineries with a combined distillation capacity of more than 500,000 barrels/day. Other Member States with refineries are Angola, with an estimated 40,000 barrels/day, Madagascar (15,000 barrels/day) and Zambia (23,750 barrels/day).

The other refineries elsewhere are small, old or closed. The refineries in Tanzania and Zimbabwe were closed. Small refineries are uneconomical and since economies of scale are required for refineries to be viable, a regional refinery hub would be desirable. The Lobito refinery in Angola, planned to produce 200,000 barrels/day and proposed for joint investment in the SADC region was expected to start operating in 2009 but is not yet operational.

In relation to issues on gas, the SADC region is known to contain 9.1 trillion cubic feet (tcf) of proven natural gas reserves, constituting 1.9 percent of Africa's natural gas reserves. The natural gas resource has been realised in Angola at 1.6 tcf, Mozambique (4.5 tcf), Namibia (2.2 tcf), Tanzania (0.8 tcf) and DRC (0.035 tcf). Botswana is exploring for coal bed methane and is estimated to contain in excess7 of 12.8 tcf of coal-bed methane.

There is also limited cross border pipeline capacity for transporting oil products from ports. Most of the refined petroleum products are carried by road and rail to demand centres in the hinterland of the SADC region. Only a few cross border pipelines are in operation in the region, among them the Tazama pipeline that transports crude oil from Dar es Salaam to the Indeni Refinery in Zambia. This is an example of government-to-government joint investment by Zambia (67 percent) and Tanzania (33 percent).

The Mozambique Zimbabwe Petrozim Petroleum Products Pipeline runs from the port of Beira in Mozambique through Feruka (Zimbabwe) to Msasa located near Harare. Zimbabwe imports 80 percent of its petroleum through the pipeline. Zimbabwe is planning to construct an additional oil product pipeline from Beira to Msasa to help to address its oil demand. For natural gas, there is a Mozambique South Africa gas pipeline along the Maputo Corridor which is a PPP between the governments of South Africa and Mozambique, and Sasol of South Africa, and was built under a cross border agreement.

3.5.3 Renewable Energy

The dominant Renewable Energy (RE) in use in the SADC region is biomass, which contributes 36.66 percent to the regional energy mix, while hydro accounts for a meagre 1.95 percent and modern biomass 0.39 percent (SADC, 2012). Utilisation of the rest of the RE sources such as solar, geothermal, wind and biofuels are still negligible, at less than one percent. Use of bagasse to generate electricity is already widely used in the SADC Member States, which include Mauritius, South Africa and Zimbabwe, and is gaining momentum on the SADC mainland.

The SADC region has a huge potential for RE due to an abundance of solar and wind resources, but exploitation of these energy resources on a large scale will require new investments in the form of generation plants and the evacuation of power to demand centres. At off grid level there are few windmills in use for water pumping and solar Photovoltaic (PV) systems for households and institutions. The installed capacity is insignificant to register in the energy balance of Member States.

The main challenges identified for deployment of renewables in the SADC region include high initial investment costs. The costs of RE (solar in particular) have been prohibitive and for the intended market can be prohibitive to invest in the required infrastructure. Similarly, the fact that most RE equipment is imported, raises the landed cost of RE equipment/infrastructure. The expectations are that local manufacturing of RE products would lower costs to consumers.

Another challenge is that there is lack of regional capacity for large scale connection of RE projects to the SAPP or national grids. Such capacity should exist and that exercise to assess capacity availability needs to be established before RE plants are hooked to the grid. Only a few countries such as South Africa and Mauritius have undertaken some of that exercise. SAPP has now commissioned a project to study the impact of renewable energy integration on the SAPP grid.

The deployment of renewables in SADC has also been plagued by poor quality of equipment. For RE infrastructure to take root, good quality products should be ensured, which can be assisted by testing equipment that is to be distributed in the SADC region. Some Member States have their own testing facilities, but a harmonised standard is required as the equipment is traded across countries.

The bulk of RE equipment is produced outside the SADC region in industrialised countries and lately in the developing economies of China, India, and Brazil. There is need for investment in the manufacture of RE technologies and products as well as in research and development to lower costs of the needed equipment and infrastructure.

Another challenge is that RE has largely been promoted through short term (usually less than five years) projects/programmes that are supported by donors. RE uptake usually stops after the donor support stops. There is need to ensure that RE is embraced in regional planning.

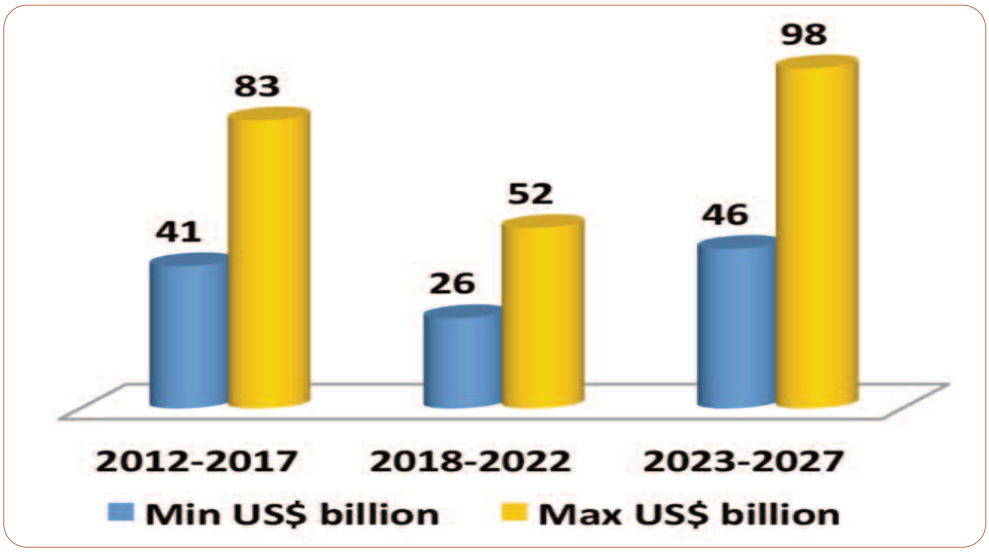
This calls for regional guidelines and models to analyse the potential impacts and benefits of incentives such as RE Feed-In Tariffs (REFIT), which have been seen as a panacea of introducing RE into the tariff structure of the national electrical system. While a number of countries have introduced REFIT, no success story has been presented as yet. South Africa abolished its REFIT before it was operational. It would therefore be important to establish whether REFIT is a route for RE investment.

3.6 Investment Requirements

3.6.1 Electricity

The SADC Energy Sector Plan (ESP) estimates total costs of additional electricity generation capacity to be within the range of US$114 billion to US$233 billion between 2012 and 2027, while associated transmission projects were estimated at US$540 million. Figure 3.6 shows the minimum and maximum expected investment during the phases covered by the ESP (2012-2017, 2018-2022 and 2023-2017), based the SAPP generation and transmission projects using a SAPP agreed criteria.

Estimated Investment Costs for SAPP Generation Projects Figure 3.6



Source: SADC Energy Sector Plan of the RIDMP, 2012

Some investment costs have been estimated for all the planned generation projects by conside ring the known minimum and maximum estimated investment costs per kilowatt (kW). Table 3.10 shows the investment requirements for the SAPP prioritised projects for the period 2015 to 2027.

Investment Requirements for SAPP Prioritised Projects 2015 – 2027 Table 3.10

Generation Projects	Minimum US$ Million	Maximum US$ Million	Period
>50% and capacity>1000MW	4 845	12 155	2017
	5 920	17 760	2022
	2 4 735	74 140	2027
Subtotal	**35 500**	**104 055**	**2015-2027**
>50% and capacity<1000MW	5 134	12 251	2017
	1 305	3 915	2022
	543	1 629	2027
Subtotal	**6 982**	**17 795**	**2015-2027**
Total>50%	**42 482**	**121 850**	**2015-2027**
<50% score	50 392	89 964	2015-2027
Grand total	**92 873**	**211 814**	2015-2027

Source: RIDMP, 2012

SAPP has identified 11 priority transmission projects but only five have been "costed", totalling about US$3 billion (SADC, 2012). The costed projects are:

- ZIZABONA Interconnector (US$225 million);
- Central Transmission Corridor (US$100 million);
- Zambia-Tanzania-Kenya Interconnector (US$860 million);
- Malawi-Mozambique Interconnector (109.7 million); and,
- Mozambique Transmission Backbone Project (US$1700 million).

3.6.2 Petroleum and Gas

With regard to the petroleum and gas sub-sector, planned refineries in South Africa, Mozambique and Angola are estimated to require investment in the range from US$1 billion to US$5 billion based on global investment in barrel/day unit costs. More work is needed to develop refinery, pipeline and storage facility projects so that a reliable estimate can be made.

3.6.3 Renewable Energy

Outside the big hydroelectric projects, a study by the International Renewable Energy Agency (IRENA) indicates that renewable energy projects in most developing countries are mainly funded by governments, banks, equity firms, insurance companies, pension funds, industry bodies, clean energy companies, and start-up project developers. The study notes that different types of investors will provide funding depending on the type of business, the stage of technology development, and the degree of associated risk. The banks will generally provide debt financing while equity funding is provided by infrastructure and pension funds. National development banks provide the bulk of the renewable energy funding and MDBs also come in to either fund projects directly or partner with local banks. The SAPP priority projects include renewable energy projects that are to be connected to the grid.

3.6.4 Energy Efficiency

At a regional level energy efficiency is being promoted through the implementation of the concept of the "Demand Side Power Station" or Virtual Power Station which is being promoted by SAPP. The power station is comprised of Compact Fluorescent Lamps, Solar Water Heaters, Commercial Lighting, and Hot Water Load Control.

According to SAPP, the Virtual Power Station initiative is based on realising more than 4,500 MW by 2016 in terms of power savings. The attainment of this target hinges on SAPP member countries adopting policies that promote the reduction of electricity usage around in the home, switching to energy efficient lighting, improving the efficiency of home appliances, buying energy efficient appliances, reducing energy needed for heating, reducing energy needed for cooling, turning to renewable energy technologies and recycling air conditioner coolant.

Projects in the energy efficiency sub-sector relate to legal or regulatory frameworks to ensure sustainable development of projects, creating incentives and energy management schemes and capacity building.

4.1 Sources of Finance

Various regional instruments on energy development in SADC recognize the need to finance infrastructure projects on energy. The SADC Energy Protocol, for example contains some of the measures such as developing appropriate financing mechanisms and introducing favourable tax regimes for both renewable energy and energy efficiency, targeting reductions in commercial energy intensity and involving utilities in energy efficiency schemes.

The Regional Indicative Strategic Development Plan (RISDP) also recognizes that major commitments of both financial and human resources are required to finance key development needs in the region in the priority areas such as Industrial Development, Market Integration and Infrastructure in support of regional integration as well as other programmes that have a regional dimension in the social sectors, food security, climate and natural resources management. Pursuant to this, the RISDP identifies and prioritises the following strategic sources of funding:

- Statutory contributions by Member States;
- Official Development Assistance (ODA);
- Attraction of local and foreign investment;
- Use of debt relief; and
- Domestic public finance and savings.

It is in this context that the Revised RISDP is geared towards promoting financing mechanisms such as:

- Public-Private Partnerships (PPPs);
- Domestic financial and capital markets;
- Private equity;
- SADC Regional Development Fund; and
- Venture capital.

However, for the above financing mechanisms to work, there is need for a conducive environment within the region for domestic revenue generation, savings and investments. In this regard, the Revised RISDP 2015-2020 articulates strategic orientation for mobilization of sustainable resources for its implementation, such as the need to maintain sound economic policies, good economic governance and domestic public finance mobilization.

With regard to the energy sector, the Energy Sector Plan anticipates the exploitation of the various investment and financing options that exist. The conventional source of funding for infrastructure in the Member States is public funding in the form of national budgets and this is considered important in delivering the needed energy infrastructure, including both "hard" and "soft" types.

A study by the NEPAD Planning and Coordinating Agency published in January 2014 in conjunction with the UN Economic Commission for Africa titled *Mobilizing Domestic Financial Resources for Implementing NEPAD National and Regional Programmes & Projects - Africa looks within,* concluded that development assistance will not deliver growth and development to Africa. Besides direct budget funding from governments, there is need to explore mechanism of how individuals can contribute to development resources in general through personal income tax and savings and companies through corporate and other business-related taxes.

4.1.1 Government Funding

Member States have continued to support SADC programmes with resources for coordination functions managed by the Secretariat. While the level of funding has remained consistent over years, the share of Member States resources to the total envelope has remained lower than that of International Cooperating Partners (ICPs). So far, there is no framework in place to measure the contribution of Member States and the private sector in funding programmes of regional dimension and implemented at national level.

Work is underway to operationalize the SADC Regional Development Fund.

The 36th SADC Summit held in August 2016 in Swaziland approved a landmark agreement that is expected to go a long way in allowing the region to take full charge of its integration agenda by funding its own developmental plans – the Agreement on the Operationalization of the SADC Regional Development Fund. It is estimated that only nine percent of regional projects are presently funded by SADC Member States while the balance of 91 percent comes from ICPs. This situation has compromised the ownership and sustainability of regional programmes.

According to a document released at the 33rd SADC Summit held in Malawi in August 2013, some groundwork had been done with regard to establishment of the fund. At the time there were suggestions that member states should take up 51 percent of the shares in the facility, against 37 percent for the private sector and 12 percent for ICPs. It was also proposed that the fund will have seed capital of US$1.2 billion, with member states expected to contribute US$612 million while the private sector would take up US$444 million of the share capital and US$144 million was to come from ICPs.

Under the proposal, subscription to shares would be made over five years in equal instalments. The first subscription would be due within the first year of the Fund coming into force. Any shares not subscribed to by the end of the fifth year would be reallocated to other member states on the basis of ability to pay. The proposal was to have the first 25 percent of the shares divided equally among member states and members will be obliged to contribute. The remaining 26 percent would be allocated based on economic ability.

The Fund will be designed to leverage grants from donors, private sector and Member States' contributions and blend these with long-term investment and capital, thus reducing the weighted average cost of capital. While the process of operationalizing the SADC Regional Development Fund is underway, a Project Preparation and Development Facility (PPDF) has been established under the first window of the SADC Development Fund, to address the deficiency in project preparatory financing.

In addition to the creation of the SADC Regional Development Fund, the region is also developing a SADC Resource Mobilisation Framework (Alternative Sources of Funding SADC Regional Programmes). The framework will explore seven different but co-related alternative sources of funding to determine how fiscal space could be created to enable SADC Member States to finance regional programmes, projects and activities.

The possible sources include how to curb Illicit Financial Flows (IFFs); the creation of a regional lottery system; harnessing the resources from a proposed philanthropy network and database of private sector companies; development of a sharing formula for import and export levies; introduction of regional transport and tourism levies. For example, the assignment on curbing IFFs and creation of fiscal space to enable SADC to fund its regional programmes will analyse illicit cross-border financial flows as a measure to prevent leakages from the region. It is estimated that Africa lost more than US$1.8 trillion to IFFs between 1970 and 2008 alone, and continues to lose resources valued at up to US$150 billion annually through IFFs or "illicit capital flight", mainly through tax evasion and mispricing of goods and services by multinational companies, according to a recent study commissioned by the African Union.

Public sector investment in SADC also comes from a variety of sources, including the World Bank, the Global Environment Facility (GEF), the African Development Bank (AfDB), the Development Bank of Southern Africa (DBSA), South Africa's Industrial Development Corporation (IDC), as well as public utilities such as Eskom. The AfDB has been particularly active in the renewable energy field, both through its own funding mechanisms and through various specialised funds such as the Sustainable Energy Fund for Africa (SEFA) and the Climate Investment Funds, in particular the Clean Technology Fund (CTF).

The AfDB together with the World Bank are strong players in the Scaling Up Renewable Energy in Low Income Countries Program (SREP), for which Lesotho, Malawi, Mozambique and Zambia have been selected as second-phase pilot countries (REN21, 2016).

4.1.2 Private Sector

Private investment is emerging as a significant source of funding within the energy sector, particularly for renewable energy projects. The World Bank tracks private participation in

infrastructure projects through its Private Participation in Infrastructure (PPI) Project Database. The database captures publicly available information on private sector participation in infrastructure projects.

Annex 1 shows the trend in private participation in energy sector projects within the individual SADC Member States from 1990 to 2015. The indication is that the bulk of the investment has been in the electricity subsector.

The trend is that not much activity happened in the decade 1990 to 2000. However activity picked up from the year 2000 with South Africa dominating private sector participation in energy projects and most projects being in the renewable energy sector with solar and wind power projects dominating.

The amounts stated in the Annex show the low levels of investment in the energy sector within the SADC region. Some of the reasons for this lack of investment relate to poor public sector management and lack of fiscal reforms. There has also been lack of skills to execute some of the basic tenets of project design, including identification and allocating risk and ensuring sound procurement practices. There was also lack of financial resources at both the regional and national levels to support such projects.

Private sector participation in the form of Build Operate Transfer (BOT), Build Own Operate (BOO), Build Own Operate and Transfer (BOOT) and Public Private Partnerships (PPP) are feasible modes of financing large infrastructure projects. Lately, infrastructure bonds and pension funds have been mobilised to finance infrastructure projects or leverage more financing from other sources such as commercial banks or multilateral banks such as the European Investment Bank, World Bank and the African Development Bank. Utilities should also use their balance sheets to borrow from the banks for their equity share. Close cooperation with the emerging economies of China, India and Brazil will also yield new financial resources.

4.1.3 International Cooperating Partners

International Cooperating Partners (ICPs) have been a major source of financing for "soft" projects such as studies, policy/regulatory framework formulations, planning and capacity building projects (Annex 2). Their resources can also be used to leverage financing from the banks. The soft projects will need to be implemented in the short term to facilitate implementation of the physical projects. The costs of implementing these strategic options will be determined on a case-by-case basis. PIDA estimates that project preparation costs at about seven percent of the investment costs, which collectively would cost about US$18 billion when all the estimated projects are to be prepared for funding.

Project preparation can be co ordinated through a project development fund such as the NEPAD Infrastructure Project Preparation Fund and DBSA support. Tapping into climate funds should be considered and therefore capacity developed to access innovative financing mechanisms. Other sources of financing for development in SADC are public finance, official development assistance, debt relief, domestic savings, foreign direct investment, and portfolio investment, Development Finance and the DFI network.

The World Bank estimates that between 1990 and 2004, Sub-Saharan Africa attracted an average of just US$2.6 billion annually in total investment for infrastructure projects with private participation. Indications are that Africa ranks last among developing regions in investment flows to such projects, with US$39.4 billion invested in the period 1990–2004, lagging behind investment in other developing regions such as Latin America (US$391 billion) and East Asia (US$199 billion). South Africa accounted for approximately half of the flows to Africa in 1990–2004 with an amount of US$19 billion. Mobile telephony accounted for more than half of the investment flows into infrastructure projects.

Other funding mechanisms that exist for SADC as available for renewable energy and energy efficiency through the various climate finance mechanisms, include market-based mechanisms such as the Clean Development Mechanism, the United Nations/World Bank implemented Climate Investment Funds and the GEF, which has joined with the AfDB to create the Africa Climate Technology and Finance Centre and Network (ACTFCN), supporting the deployment and expansion of climate change mitigation and adaptation technologies.

5.1 Conclusion

The implementation of provisions of various legal documents, policies, institutional frameworks and strategies has been slow, but the region has made significant progress in developing its energy sector. Cooperation among SADC Member States has allowed countries in the region to share surplus energy through the SAPP competitive market. In this regard, full implementation of all agreed instruments will enable SADC to develop its energy sector.

Another important observation is that a number of legal documents, policies, institutional frameworks and strategies are outdated and need to be reviewed in line with the changing environment for them to remain relevant and useful. This is very pertinent at this moment in time as SADC has reviewed the RISDP and has adopted a new strategy and road map for industrialisation.

Studies have also confirmed that development assistance is not panacea for the financing and development of the energy sector in the SADC region. There is need to explore the efficacy of using DRM strategies to raise money in the local markets through the development of capital markets and using private sector funds.

Investment and financing are hampered by a number of barriers, which include low tariffs, poor project reparation, no off takers that can sign Power Purchasing Agreements (PPAs) under single buyer models and other required policy/regulatory frameworks. The capacity for project preparation and implementation at utility and Member State levels is still very low.

5.2 Policy Options

Below is summary of key policy options that need to be considered by SADC Member States to promote the development of the energy sector in the region.

The "regional project" concept needs to be clarified, and there is a need for the development of a framework for the coordination, implementation; championing and financing of these projects. Existing frameworks such as the SAPP need to be fully utilised in this regard.

The SADC region should create an enabling environment for investment in the energy sector at both regional and national levels as investors look for stability, sustainability and returns. The environment should address the unique characteristics of energy sector projects, such long lead-times and high start-up costs.

There is need for new strategic approaches to regional cooperation with a clear regional financing framework to raise funds for project implementation. This should result in coordinated approaches to fundraising at regional, national and utility levels.

There is need to promote private sector investment in the energy project sector. This can be done through direct investments, syndication with multilateral development banks or Public-Private-Partnership arrangements;

There is need to develop mechanisms that will allow access by the energy investments to long-term funds and development of a diversity of funds through innovative credit structures and co-financing arrangements.

There is need to review a number of energy-related legal documents, policies, institutional frameworks and strategies that are out-dated and need to be reviewed in line with the changing environment for them to remain relevant and useful.

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Major Energy Projects with Private Sector Participation

Annex 1

Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
Angola	Chicapa Hydroelectric Plant	Construction	Electricity generation	2003	100	45	MW	16	ALROSA Co. Ltd. (The Almazy Rossii-Sakha Company) (55% / Russian Federation)
Angola	Aggreko Cabinda First Temporary Power Station	Operational	Electricity generation	2006	100	4.7	MW	30	Aggreko Plc (100% / United Kingdom)
Angola	Aggreko Caminhos de Ferro de Angola	Operational	Electricity generation	2006	100	4.7	MW	30	Aggreko Plc (100% / United Kingdom)
Angola	Aggreko Cabinda Second Temporary Power Station	Operational	Electricity generation	2007	100	0	MW	30	Aggreko Plc (100% / United Kingdom)
Angola	Aggreko Cabinda Second Temporary Power Station	Operational	Electricity generation	2008	100	0	MW	60	Aggreko Plc (100% / United Kingdom)
Angola	Aggreko Luanda Temporary Power Stations 1 and 2	Operational	Electricity generation	2008	100	0	MW	60	Aggreko Plc (100% / United Kingdom)
Angola	Luapasso Mini Hydropower Plant	Construction	Electricity generation	2009	50	120	MW	26	ESCOM (.. / Portugal) *Empresa Nacional de Electricidade de Angola* (ENE) (.. / Angola)
Botswana	KSE Orapa and Mmashoro IPP	Operational	Electricity generation	2011	100	104	MW	90	Kalahari Energy (50%/ Botswana) TUTEN (50% / Turkey)

Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
Lesotho	Lesotho Electricity Corporation (LEC)	Operational	Electricity distribution, generation, and transmission	2002	100	0	MW		SAD-ELEC Pty (.. / ..)
Malawi	Electricity Supply Corporation of Malawi Ltd (ESCOM)	Concluded	Electricity distribution, generation, and transmission	2001	100	0	MW	300	Eskom (100% / South Africa)
Mauritius	Deep River Beau Champ	Operational	Electricity generation	1997		0			Sugar Investment Trust (10% / Mauritius)
Mauritius	Deep River Beau Champ	Operational	Electricity generation	1998	100	0	MW	29	Sugar Investment Trust (10% / Mauritius)
Mauritius	Belle Vue Power Plant	Operational	Electricity generation	1998	78	109.3	MW	100	SIDEC (27% / France) Sugar Investment Trust (14% / Mauritius) Harel Freres (51% / Mauritius)
Mauritius	FUEL power plant	Operational	Electricity generation	1998		0	MW	40	Sugar Investment Trust (20% / Mauritius)
Mauritius	St. Aubin Power Project	Operational	Electricity generation	2004	88	0	MW	34	Societe Union St Aubin (15% / Mauritius) Sugar Investment Trust (15% / Mauritius) Mon Tresor Mon Desert (19% / Mauritius)Savannah Sugar Estates (15% / Mauritius) Sechilienne-SIDEC (25% / France)
Mozambique	*Energia de Moçambique Lda (ENMo)*	Cancelled	Electricity distribution and generation	2004	100	5.8	Number of connections (thousands)	3000	Siemens AG (.. / Germany)Rural Maintenance Ltd (.. / South Africa) ElectoTec (.. / Mozambique)
Mozambique	Kuvaninga Energia Power Plant	Construction	Electricity generation	2013	100	98.67	MW	40.29	Others (25% / ..)Enventure Partners (28% / United States) Public Investment Corporation (31% / South Africa) Pele Clean Energy (17% / South Africa)
Mozambique	Ressano Garcia Gas-Fired Plant	Construction	Electricity generation	2014	100	250	MW	100	Gigajoule Pty Ltd (42% / South Africa) WBHO (26% / South Africa) Old Mutual (32% / South Africa)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
Namibia	Northern Electricity	Concluded	Electricity distribution	1996		4	MW		Icon Investments (.. / Namibia)
Namibia	Reho-Electricity	Operational	Electricity distribution	2000		1	Number of connections (thousands)		Icon Investments (.. / Namibia)
South Africa	PN Energy Services (Pty) Ltd	Operational	Electricity distribution	1995	67	3	Number of connections (thousands)		*Electricité de France* (.. / France) E.ON (.. / Germany)
South Africa	Egoli Gas	Operational	Natural gas distribution	2000	100	15.9	Number of connections (thousands)	14000	Cinergy Corporation (.. / United States) Egoli Empowerment Holding (.. / ..)
South Africa	AES Kelvin Power	Operational	Electricity generation	2001	50	28.4	MW	600	Nedbank Capital (.. / South Africa) Investec (.. / South Africa)
South Africa	Bethlehem Hydro	Construction	Electricity generation	2005	26	7	MW	4	NuPlanet (26% / Netherlands)
South Africa	Darling Wind Farm	Operational	Electricity generation	2006	26	9.9	MW	5	Darling Independent Power Producer Pty Ltd (26% / South Africa)
South Africa	NewCogen power plant	Operational	Electricity generation	2010	100	6	MW	15	IPSA Group PLC (100% / United Kingdom)
South Africa	Abengoa KaXu Solar I CSP Solar Plant	Construction	Electricity generation	2012	51	844	MW	100	Industrial Development Corporation (49% / South Africa) Abengoa (51% / Spain)
South Africa	Abengoa Khi Solar I CSP Solar Plant	Construction	Electricity generation	2012	51	430	MW	50	Industrial Development Corporation (49% / South Africa) Abengoa (51% / Spain)
South Africa	ACED Cookhouse Wind Farm	Construction	Electricity generation	2012	100	300	MW	139	AFPOC (50% / Mauritania) Macquarie Infrastructure Group (MIG) (25% / Australia) Old Mutual (25% / South Africa)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
South Africa	Biotherm - Aries Solar PV	Construction	Electricity generation	2012	90	34	MW	10	BioTherm Energy (90% / South Africa)
South Africa	Biotherm - Dassiesklip Wind	Construction	Electricity generation	2012	100	68	MW	27	BioTherm Energy (60% / South Africa)
South Africa	Gestamp Karoo Wind Farm	Construction	Electricity generation	2012	100	185	MW	75	Others (15% / ..) Gestamp Corporation (60% / Spain) Shanduka Group (25% / South Africa)
South Africa	Inspired RustMo1 Solar Plant	Construction	Electricity generation	2012	100	25	MW	7	Others (.. / ..) Inspire Evolution Investment Management (51% / South Africa) Momentous Energy (15% / South Africa)
South Africa	Jeffrey's Bay Wind Farm	Operational	Electricity generation	2012	100	296	MW	138	Others (.. / ..) Mainstream Renewable Power (20% / Ireland) Genesis Eco-Energy (.. / South Africa) Globeleq (20% / United Kingdom)Old Mutual (20% / South Africa)
South Africa	Kathu Solar Plant	Construction	Electricity generation	2012	100	394	MW	81	Building Energy (.. / Italy)
South Africa	Konkoonsies Solar PV	Construction	Electricity generation	2012	100	34	MW	10	BioTherm Energy (60% / South Africa)
South Africa	Mainstream De Aar Solar Plant	Operational	Electricity generation	2012	100	150	MW	50	Mainstream Renewable Power (.. / Ireland) Genesis Eco-Energy (.. / South Africa) Globeleq (.. / United Kingdom)
South Africa	Mainstream Droogfontein Solar Plant	Operational	Electricity generation	2012	100	150	MW	50	Mainstream Renewable Power (.. / Ireland) Genesis Eco-Energy (.. / South Africa) Globeleq (.. / United Kingdom)
South Africa	MEMC Soutpan Solar Plant	Operational	Electricity generation	2012	100	180	MW	28	MEMC Electronic Materials, Inc (51% / United States) CHINT Group (.. / China)
South Africa	MEMC Wiktop Solar Plant	Operational	Electricity generation	2012	100	195	MW	30	Others (.. / ..), MEMC Electronic Materials, Inc (51% / United States)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
South Africa	Metro Wind Van Staadens Wind Farm	Construction	Electricity generation	2012	100	50	MW	26	Metrowind (65% / South Africa)Basil Read (35% / South Africa)
South Africa	Mulilo De Aar Solar Plant	Construction generation	Electricity	2012	100	35	MW	10	Others (20% / ..) Gestamp Corporation (60% / Spain) Mulilo Energy Group (20% / South Africa)
South Africa	Old Mutual - Greefspan Solar PV	Construction	Electricity generation	2012	100	48	MW	10	Old Mutual (50% / South Africa)
South Africa	Old Mutual - Herbert Solar PV	Operational	Electricity generation	2012	100	96	MW	20	Old Mutual (50% / South Africa)
South Africa	Old Mutual Hopefield Wind Farm	Construction	Electricity generation	2012	100	173	MW	78	Macquarie Infrastructure Group (MIG) (39% / Australia) Old Mutual (39% / South Africa)
South Africa	Scatec Kalkbuilt Solar Plant	Construction	Electricity generation	2012	100	259	MW	72.5	Others (.. / ..) Scatec (38% / Norway) Itochu Corporation (23% / Japan)
South Africa	Solar Capital De Aar Solar Plant	Construction	Electricity generation	2012	100	259	MW	75	Others (10% / ..) Solar Capital (90% / South Africa)
South Africa	SolarReserve Lesedi Solar Plant	Operational	Electricity generation	2012	100	294	MW	75	Solar Reserve (.. / United States) Kensani Holdings (.. / South Africa) Oakleaf Investments (.. / South Africa) Intikon Energy (.. / South Africa)
South Africa	SolarReserve Letsatsi Solar Plant	Construction	Electricity generation	2012	100	280	MW	75	Solar Reserve (.. / United States) Kensani Holdings (.. / South Africa) Oakleaf Investments (.. / South Africa) Intikon Energy (.. / South Africa)
South Africa	Standard Bank Kouga Oyster	Construction	Electricity generation	2012	100	222	MW	77.6	Inspire Evolution Investment Management (27% / South Africa) Bay Wind Farm Standard Bank (35% / South Africa)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
South Africa	Sumitomo Dorper Wind Farm	Construction	Electricity generation	2012	60	258	MW	100	Sumitomo Corporation (60% / Japan) Others (.. / ..) Rainmaker Energy (15% / South Africa)
South Africa	Witkop Solar Power Plant	Operational	Electricity generation	2012	100	184.7	MW	Not Available	MEMC Electronic Materials, Inc (51% / United States) CHINT Group (.. / China)
South Africa	Amakhala Emoyeni Wind Farm	Construction	Electricity generation	2013	100	410.38	MW	138	Tata Enterprises (50% / India) Exxaro Resources (50% / South Africa)
South Africa	Avon OCGT	Construction	Electricity generation	2013	100	654.1	MW	670	SUEZ (38% / France) Others (10% / ..) Mitsui (25% / Japan)
South Africa	Bokpoort CSP Plant	Construction	Electricity generation	2013	100	382.47	MW	50	ACWA Power (40% / Saudi Arabia) Kurisani Youth Development Trust (5% / South Africa) Lereko Investments (25% / South Africa) Others (30% / ..)
South Africa	Chaba Wind Farm	Construction	Electricity generation	2013	100	36.25	MW	21	*Electricité de France* (100% / France)
South Africa	Dedisa OCGT	Construction	Electricity generation	2013	100	327	MW	342	SUEZ (38% / France) Others (10% / ..) Mitsui (25% / Japan)
South Africa	Gouda Wind Farm	Construction	Electricity generation	2013	80	271.71	MW	138	Others (10% / ..) Aveng Limited (29% / South Africa) Soul City Institute (10% / South Africa) Acciona (51% / Spain)
South Africa	Grassridge Wind	Construction	Electricity generation	2013	100	109.4	MW	59.8	EDF Energies Nouvelles SA (100% / France)
South Africa	Linde Solar PV Plant	Construction	Electricity generation	2013	100	386.1	MW	40	Scatec (100% / Norway)
South Africa	Neusberg Hydro Electric Plant	Construction	Electricity generation	2013	100	56	MW	10	Hydro Tasmania (33% / Australia) Industrial Development Corporation (33% / South Africa) Old Mutual (33% / South Africa)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
South Africa	Sishen Solar PV	Construction	Electricity generation	2013	100	238.8	MW	74	Others (10% / ..) Soul City Institute (10% / South Africa) Acciona (51% / Spain)
				Aveng Limited (29% / South Africa)					
South Africa	Waainek Wind Farm	Construction	Electricity generation	2013	100	46.39	MW	24	*Electricité de France* (100% / France)
South Africa	West Coast One Wind Farm	Construction	Electricity generation	2013	100	213.4	MW	94	SUEZ (43% / France) Investec (35% / South Africa) Others (3% / ..) Kagiso Tiso Holdings South Africa (20% / South Africa)
South Africa	Mulilo Prieska Copperton Solar Plant	Construction	Electricity generation	2012	100	70	MW	20	Gestamp Corporation (60% / Spain) Mulilo Energy Group (20% / South Africa)
South Africa	Adams Solar PV 2	Construction	Electricity generation	2015	100	109.6	MW	82.5	Enel SpA (60% / Italy)
South Africa	Gibson Bay Wind Farm	Construction	Electricity generation	2015	100	173.9	MW	111	Enel SpA (100% / Italy)
South Africa	Johannesburg Landfill Gas to Electricity	Operational	Electricity generation	2015	100	26	MW	19	ENER-G (53% / United Kingdom) Central Energy Fund (CEF) (28% / South Africa) Secure Rock Enterprises (18% / South Africa)
South Africa	Karoshoek Solar One CSP	Construction	Electricity generation	2015	80	688.4	MW	100	Investec (15% / South Africa) ACS Group (*Actividades de Construccion y Servicios*) (20% / Spain)
South Africa	Khobab Wind Farm	Construction	Electricity generation	2015	100	281	MW	140	Mainstream Renewable Power (16% / Ireland) Actis (24% / United Kingdom)
South Africa	Loeriesfontein 2 Wind Farm	Construction	Electricity generation	2015	100	281	MW	140	Mainstream Renewable Power (16% / Ireland) Actis (24% / United Kingdom)
South Africa	Mulilo De Aar 1 Wind Farm	Operational	Electricity generation	2015	100	180	MW	96.48	Mulilo Energy Group (20% / South Africa) China Longyuan Power Group Limited (60% / China)
South Africa	Mulilo De Aar 2 Wind Farm	Construction	Electricity generation	2015	100	252.5	MW	138.9	Mulilo Energy Group (20% / South Africa) China Longyuan Power Group Limited (60% / China)
South Africa	Mulilo Prieska Solar PV Plant	Construction	Electricity generation	2015	85	58.75	MW	86	Total SA (27% / France), Mulilo Energy Group (18% / South Africa) Calulo Investments (25% / South Africa)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
South Africa	Nojoli Wind Farm	Construction	Electricity generation	2015	100	265.9	MW	88	Pele Clean Energy (30% / South Africa) Enel SpA (60% / Italy)
South Africa	Noupoort Mainstream Wind	Construction	Electricity generation	2015	100	160	MW	80	Mainstream Renewable Power (16% / Ireland) Old Mutual (30% / South Africa) Actis (24% / United Kingdom)
South Africa	Paleisheuwel Solar PV	Construction	Electricity generation	2015	100	109.6	MW	82.5	Enel SpA (60% / Italy)
South Africa	Pulida Solar PV Plant	Construction	Electricity generation	2015	100	265.9	MW	82.5	Shanduka Group (20% / South Africa) Enel SpA (53% / Italy)
South Africa	Second Mulilo-Sonnedix Prieska Solar PV Plant	Construction	Electricity generation	2015	100	133	MW	86	Sonnedix (60% / Netherlands) Mulilo Energy Group (20% / South Africa)
South Africa	Tom Burke Solar Park	Construction	Electricity generation	2015	100	87.7	MW	66	Enel SpA (100% / Italy)
South Africa	Xina Solar One CSP	Construction	Electricity generation	2015	80	900	MW	100	Public Investment Corporation (20% / South Africa) Abengoa (40% / Spain)
Tanzania	Tanwat Wood-Fired Power Plant	Concluded	Electricity generation	1994	84	6	MW	2.5	Tanzania Development Finance Corporation (.. / Tanzania) Globeleq (.. / United Kingdom)
Tanzania	Independent Power Tanzania Ltd	Operational	Electricity generation	1997	100	127	MW	100	MechMar Energy Sdn Bhd (.. / ..) VIP Engineering and Marketing Ltd (.. / Tanzania)
Tanzania	Songas - Songo Songo Gas to Power Project	Operational	Electricity generation, Natural gas transmission	2001	100	316	KM	250	Globeleq (.. / United Kingdom)
Tanzania	Songas - Songo Songo Gas to Power Project	Operational	Electricity generation, Natural gas transmission	2004	100	0	MW	115	Globeleq (.. / United Kingdom)

continued...

Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
South Africa	Nojoli Wind Farm	Construction	Electricity generation	2015	100	265.9	MW	88	Pele Clean Energy (30% / South Africa) Enel SpA (60% / Italy)
South Africa	Noupoort Mainstream Wind	Construction	Electricity generation	2015	100	160	MW	80	Mainstream Renewable Power (16% / Ireland) Old Mutual (30% / South Africa) Actis (24% / United Kingdom)
South Africa	Paleisheuwel Solar PV	Construction	Electricity generation	2015	100	109.6	MW	82.5	Enel SpA (60% / Italy)
South Africa	Pulida Solar PV Plant	Construction	Electricity generation	2015	100	265.9	MW	82.5	Shanduka Group (20% / South Africa) Enel SpA (53% / Italy)
South Africa	Second Mulilo-Sonnedix Prieska Solar PV Plant	Construction	Electricity generation	2015	100	133	MW	86	Sonnedix (60% / Netherlands) Mulilo Energy Group (20% / South Africa)
South Africa	Tom Burke Solar Park	Construction	Electricity generation	2015	100	87.7	MW	66	Enel SpA (100% / Italy)
South Africa	Xina Solar One CSP	Construction	Electricity generation	2015	80	900	MW	100	Public Investment Corporation (20% / South Africa) Abengoa (40% / Spain)
Tanzania	Tanwat Wood-Fired Power Plant	Concluded	Electricity generation	1994	84	6	MW	2.5	Tanzania Development Finance Corporation (.. / Tanzania) Globeleq (.. / United Kingdom)
Tanzania	Independent Power Tanzania Ltd	Operational	Electricity generation	1997	100	127	MW	100	MechMar Energy Sdn Bhd (.. / ..) VIP Engineering and Marketing Ltd (.. / Tanzania)
Tanzania	Songas - Songo Songo Gas to Power Project	Operational	Electricity generation, Natural gas transmission	2001	100	316	KM	250	Globeleq (.. / United Kingdom)
Tanzania	Songas - Songo Songo Gas to Power Project	Operational	Electricity generation, Natural gas transmission	2004	100	0	MW	115	Globeleq (.. / United Kingdom)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
Tanzania	Songas - Songo Songo Gas to Power Project	Operational	Electricity generation, Natural gas transmission	2005	100	0	MW	190	Globeleq (.. / United Kingdom)
Tanzania	Tanzania Electricity Supply Company (TANESCO)	Concluded	Electricity distribution, generation, and transmission	2002		0		0	Net Group Solutions (.. / ..)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2005	100	32	MW	12	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2006	100	0	MW	12	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2007	100	0	MW	12	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2008	100	0	MW	12	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power	Operational	Electricity generation	2009	100	0	MW	12	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2010	100	0	MW	18	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2011	100	0	MW	18	Artumas Group Inc. (100% / Canada)
Tanzania	Mtwara Region Gas-to-Power Project	Operational	Electricity generation	2012	0	0	MW	18	Artumas Group Inc. (100% / Canada)

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Country	Project Name	Project Status	Segment Year	Investment	Percent Private	Total Investment US$ Million	Capacity Type	Capacity	Sponsors
Tanzania	Aggreko Ubungo Temporary Power Station	Distressed	Electricity generation	2006	100	6.31	MW	40	Aggreko Plc (100% / United Kingdom)
Tanzania	Alstom Power Rentals Mwanza	Operational	Electricity generation	2006	100	6.31	MW	40	Alstom (100% / France)
Tanzania	Dowans Rental Power Ubungo	Concluded	Electricity generation	2006	100	15.78	MW	100	Dowans Holdings Ltd (100% / United Arab Emirates)
Tanzania	Aggreko Ubungo and Tegeta Temporary Power Station	Operational	Electricity generation	2011	100	0	MW	100	Aggreko Plc (100% / United Kingdom)
Tanzania	Symbion Dodoma Power Plant	Operational	Electricity generation	2011	100	4.7	MW	60	Symbion Power LLC (100% / United States)
Tanzania	Symbion Rental Ubungo Power Plant	Operational	Electricity generation	2011	100	129.4	MW	120	Symbion Power LLC (100% / United States)
Zambia	Zambia Consolidated Copper Mines Ltd. Power Division distribution	Operational	Electricity distribution and transmission	1997	80	274	KM	700	Zambia Consolidated Investments, GPU International (.. / ..) National Grid (39% / United Kingdom)
Zambia	Lunsemfwa Hydro Power	Operational	Electricity generation	2001	100	3	MW	38	Eskom (51% / South Africa) Wand Gorge Investment (20% / Zambia) Degarnier (29% / Zambia)
Zambia	TATA Itezhi-Tezhi HPP	Construction	Electricity generation	2011	50	230	MW	120	Tata Enterprises (50% / India)
Zambia	Itezhi-Tezhi Power Corporation Transmission line	Construction	Electricity transmission	2012	50	110	KM	142	Tata Enterprises (50% / India) Zambia Electric Supply Corporation (ZESCO) (50% / Zambia)
Zimbabwe	African Power	Operational generation	Electricity	1998	51	600	MW	920	YTL Corporation (.. / Malaysia)

Source: *Private Participation in Infrastructure (PPI) Project Database*, World Bank 2016

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ICP energy support matrix

Annex 2

FINLAND Finland is supporting renewable energy and energy efficiency in the Southern and East African region mainly through its Energy and Environment Partnership (EEP) Programme, which runs until the end of 2017. The mechanism in use is a challenge fund with rounds of Calls for Proposals. Since beginning in 2010, there have been 11 Calls for Proposals, and more than 200 projects in 13 countries have been funded. The Programme is led by Finland, and also supported by DFID and Austria.

Project/programme	Type of support	Start	End	Support	Partners/Co-financing
Energy and Environment Partnership (EEP) in Southern and East Africa	Challenge fund for renewable energy (RE) and energy efficiency (EE) initiatives (feasibility studies, pilot and demonstration projects)	2010	2013 (June)	€25 million	Regional Coordination Offices located at DBSA. Co-financing by DFID and Austria

EUROPEAN UNION The Partnership between EU and SADC aims at Poverty Eradication through various support instruments including cooperation to achieve the Millennium Development Goals (MDGs) targets. The Cotonou Agreement sets up the framework of the Partnership between the EU and SADC and is based on three pillars: - Political Dialogue (known as the "Berlin Initiative with SADC); - Trade for Development; - Development Co-operation

Project/programme	Type of support	Start	End	Support	Partners/Co-financing
Establishment of a regional energy market in the Eastern and Southern African region	Assistance to the Energy regulators through Regional Electricity Regulators Association of Southern Africa (RERA) and Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)	2016 (TBC)	2019 (TBC)	€7 million	Implemented by KPMG. Co-financing by DFID and Austria
Sustainable Energy for All	Provision of modern energy services, enhance energy efficiency, increase the current share of renewable energy in the energy mix Energy for All initiative)	2013		€32 million (contribution to the multilateral Sustainable Energy for All initiative)	
Ad hoc support to SAPP	Through the Technical Assistance Facility (TAF). Technical Advisor (TA) requested (for instance, study tour to ENTSO, TA for balancing market, capacity building on control performance standards).				
Support to COMESA, SADC, EAC	Through the TAF. Energy efficiency workshops to be held (first was held in Windhoek in 2015)				
Support to the REEESAP process	Through the TAF four experts are to develop the Renewable Energy and Energy Efficiency Strategy and Action Plan for SADC in 2016. Selection of experts on centralized level done.				

GERMANY

Besides Germany s huge bilateral engagement in the energy sector in South Africa under the focal area Green Economy, Germany is also providing support to the regional Programme "Southern African Power Pool (SAPP) Programme" via KFW Development Bank. This programme, which has subsequently been extended also to the eastern and western African power pools, aims to contribute to an environmentally and climate-friendly energy supply in the Southern African Region as well as to regional integration through energy interconnections by supporting private and public environmentally and climate friendly investments in renewable energies and energy efficiency through credit lines to the Development Bank of Southern Africa (DBSA).

Project/programme	Type of support	Start	End	Support	Partners/Co-financing
Programme Renewable Energy and Energy Efficiency in the Southern African Power Pool (Phases I-IV)	Refinancing of DBSA's renewable energy and energy efficiency investments in the SADC region	2010	2018	Concessional loan in four phases, altogether € 190 million	DBSA (commitment to Republic of South Africa, implementation by DBSA)

NORWAY

The Norwegian Development Cooperation is engaged in the energy sector in West-, East and Southern Africa. Our main regional partners are SAPP and EAPP and we have previously supported SADC and RERA. We also have a regional energy trust fund that we support through the World Bank. Below is a list of the energy programmes supported in the SADC region.

Project/programme	Type of support	Start	End	Support	Partners/Co-financing
Support to the implementation of a competitive electricity market in Southern Africa Phase III	Technical assistance, capacity building, planning, studies	2013	2017	Grant, co-financing with Sweden.	SAPP
African Electricity Regulators Peer Review Network Phase II	Capacity building	2011	2013	Grant	
Capacity strengthened of the SADC Secretariat	Financing a Power System Programme Officer	2010	2013	Grant	
Communicating Energy in Southern Africa Project	Studies and information dissemination	2007	2014	Grant	SARDC

AUSTRIA

The Austrian Development Cooperation in Africa's Energy sector is engaged in West-, East and Southern Africa mainly through the establishment of centres for renewable energy and energy efficiency (ECREEE, SACREEE, EACREEE). The main partners are the Regional Economic Communities (ECOWAS, SADC and EAC), supported also by UNIDO and other ICPs. The cooperation between Austria and SADC is based on a cooperation agreement of 2008 which focuses on the support for the region on Renewable Energy and Energy Efficiency. Other regional initiatives are SOLTRAIN to support the use of and training in Solar Water Heaters and the "Environment and Energy Partnership (EEP)", initiated by Finland and supported also by DFID. Since 2009 Austria has committed € 8.5 million in support of sustainable energy solutions to the SADC region and pledged another € 3.5 million until 2018.

Project/programme	Type of support	Start	End	Support	Partners/Co-financing
Southern African Solar Thermal Training and Demonstration Initiative, SolTrain, Phase III	Political Advocacy, Capacity Building, Technical Training, Infrastructure (Solar demonstration systems)	03/16	06/19	€ 3 million	

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Contribution to the Energy and Environment Partnership Southern and Eastern Africa, EEP S&EA, Phase II	Regional and National Feasibility Studies, Capacity Building, Technical Training, Infrastructure (Pilot (Pilot Projects, Demonstration Projects)	07/13	09/16	€ 2 million	ForMin, DFiD, SADC
Contribution to the capacity development of SADC	Technical Assistance to SADC Secretariat, Energy Division	04/14	09/16	€ 600 000	SADC
Contribution SACREEE, Establishment and First Operational Phase with Namibia University of Technology	Political Advocacy, Capacity Building, Feasibility Studies, Lobbying for RE and EE	12/13	06/17	€ 1.8 million	UNIDO, SADC
Communicating Energy in Southern Africa through SADC Research and Documentation Centre (SARDC, Harare)	Assistance to SADC Secretariat, Energy Division in communicating energy results in SADC Region	04/14	06/18	€ 575 000	SARDC / SADC
Small grant agreements for the Austrian Private Sector to Increase Energy Efficiency in SADC Member State	Capacity Building, Technical Training			€ 400 000	
Contribution to a SADC Nexus Workshop	Capacity Development	06/16	06/16	€ 30 000	
Contribution to EU-Africa Infrastructure Trust Fund	Infrastructure	01/14	06/18	€ 20 000	Trust Fund
Gender Mainstreaming in Renewable Energies in the SADC Region	Political Advocacy, Capacity Building, Feasibility Studies, Lobbying for Gender Mainstreaming	11/2015	12/2018	€ 500 000	SARDC / SADC
FRANCE -					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Caprivi Link Interconnection between Namibia and Zambia	Soft Loan	2004	2012		

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Project Preparation Fund for Studies with the DBSA	Grant funding for studies or project support	2004	today	€9.2 million	DBSA
Transmission line for the Ithezi-Thezi project in Zambia, which will strengthen the transmission network for the region, and financing of the generation part of the project through PROPARCO	Soft loan	2012	2014	US$5 million	
Strengthening of the transmission network in Namibia	TBA	2014	2017	R500 million	KFW/EIB
ESKOM's Renewable Energy Projects	Soft loan	2011	2017	€200 million	World Bank /AfDB/EIB/KfW
RE and EE Credit Line Facility in South Africa with three banks to finance projects from the private sector up to €10 million	Soft loan	2012	2015	€120 million	
Board member of the South African Centre for Carbon Capture and Storage	Grant	2009	2014	€142 350	
Partnership between ESKOM and EDF on improvement of ESKOM operations	Grant	2015	2017	€150 000	
Financing of ESKOM's investment plan in distribution	Loan	2015	2018	€150 million	
IRENA					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Renewables Readiness Assessments (RRAs) in Mozambique, Swaziland, Zambia and Tanzania	Grant funding for studies	2011	2014		

continued...

Advisory services on small hydro resource assessment for Mozambique, Swaziland and Zambia as follow up to the RRAs	Grant funding for the training	2013	2013	-	
Africa Clean Energy Corridor covering EAPP and SAPP	Grant funding for studies or project support	2013	2014		
Advisory Services for Resource Assessments – contributing to the development of a Global Atlas of Renewable Energy and capacity building in renewable energy.	Grant funding	2013	2013		
Mapping of dedicated renewable energy financing opportunities with focus on off- grid renewable energy in Africa	Grant funding for the reports				
JAPAN Japan supports governments of SADC countries to secure stable and affordable energy supply, through combining loan, grant aid and technical cooperation. This includes infrastructure development of power plant and transmission network, development of master plan and capacity development of related government institutions.					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Project for introduction of clean energy by Solar Electricity generation system, Botswana	Grant Aid	2011	2013	¥11.1 million	
Power System Development Advisor, Zambia	Technical cooperation	2012	2014	¥410 000	
Increased Access to Electricity Services Project, Zambia	Loan	2009	Ongoing	¥5.11 million	World Bank
Study For Power System Development Master Plan, Zambia	Technical cooperation	2009	Ongoing	¥1.68 million	
Project for the Capacity Development for Rural Electrification, Zambia	Technical cooperation	2009	2012	¥3 million	

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Maputo Gas Fired Combined Cycle Power Plant Development Project Mozambique	Loan	2014	Ongoing	¥172 690	
Project for Reinforcement of Transmission Network in Nacala Corridor Mozambique	Grant Aid	2015	Ongoing	¥2 million	
Project for Reinforcement of Transmission and Distribution Facilities in Oyster Bay Substation, Tanzania	Grant Aid	2008	2010	¥23.3 million	
Project for Rehabilitation of Substation and Transmission Line in Kilimanjaro region, Tanzania	Grant Aid	2011	2013	¥25 million	
Project for the Reinforcement of Power Distribution in Zanzibar Island, Tanzania	Grant Aid	2011	2013	¥30 million	
Iringa-Shinyanga Backbone Transmission Investment Project, Tanzania	Loan Aid	2010	2015	¥60.48 million	World Bank, EIB, Korea-Exim, African Development Bank (AfDB)
Project for Capacity Development of Efficient Distribution and Transmission Systems, Tanzania	Technical cooperation	2009	2015	¥6.67 million	
Project of Rehabilitation of Substations and Construction of New Lines in Dar es Salaam, Tanzania	Grant Aid	2014	2016	¥44.15 million	
Project for Formulation of Power System Master Plan in Dar es Salaam and Review of the Power System Master Plan, Tanzania	Technical Cooperation	2014	2016	¥3.2 million	
Project for Review of the Natural Gas Utilization Master Plan, Tanzania	Technical Cooperation	2014	2015	¥1.3 million	

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Kenya-Tanzania Power Interconnection Project	Loan	2016	Ongoing	¥1.68 million	AfdB
Preparatory Survey for the project for rehabilitation of INGA 2 hydropower station, DRC	Study	2016	2017	¥1 million	
Data collection survey on gas utilization, South Africa	Study	2015	2016	¥700 000	
Data collection survey on Southern African Power Pool	Study	2015	2016	¥1.2 million	SADC, SAPP
SWEDEN-					
Project/programme	**Type of support**	**Start**	**End**	**Support in Millions**	**Partners/Co-financing**
Support to the implementation of a competitive electricity market in Southern Africa, Phase III	Technical assistance, capacity building, planning, studies	2013	2015	Grant, co-financing with Norway as lead-donor	SAPP
Participation in US lead "POWER AFRICA INITIATIVE"					
EUROPEAN INVESTMENT BANK The EIB's overriding aim in the ACP and OCT regions is to help generate long-term private sector-led sustainable economic growth and reduce poverty through job creation and improved access to productive resources. The Bank also supports public sector infrastructure projects that are vital to underpin private sector development and create a thriving business environment, particularly for SMEs, which are the foundation of developing countries' economies.					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Khi-Solar Tower One Project	Loan to the project company (Private sector)	2012	2015	€50 million	IDC, IFC and DBSA
Ka Xu Concentrated Solar Power (CSP) Project	Intermediated loan through an RSA bank	2012	2015	€210 million	RMB, DBSA, IDC, IFC and Nedbank
Eskom Kiwano CSP Project	Direct loan to Eskom	2015		€75 million	World Bank, AFD, KfW and AfDB

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Itezhi-Tezhi project in Zambia (hydropower plant and related transmission line that will help meet the growth of national and regional electricity demand	Concessional loan (Public sector)	2011	2015	€50 million	EIB, AfDB, AFD, DBSA, FMO and Proparco
Kafue Livingstone project in Zambia (that will help remove several bottlenecks of power transmission inside Zambia and regionally within the SAPP market).	Concessional loan (Public sector)	2014	2016	€22 million	World Bank
Lusaka Power & Distribution (ZESCO)	Sovereign loan to the Republic of Zambia for on-lending to ZESCO. Supported by an Interest Rate Subsidy drawn from the Cotonou Subsidy Envelope.	2015		€78 million	World Bank
Energy Development & Access Project, Mozambique, with EdM Mozambique.	Sovereign loan for on-lending to EdM.Supported by an IRS drawn from the Cotonou Subsidy Envelope.	2015		€34 million	World Bank, AFD, OPEC Fund for Economic Development, Arab Fund and the Government of Mozambique
Short Term Investment Programme (STIP) with EdM Mozambique.	Sovereign loan for on-lending to EdM. Supported by an IRS from the Cotonou Subsidy Envelope.	2016		€23 million	Norway and KfW
PRACTICAL ACTION Globally, Practical Action is a non-governmental development organisation which uses technology to challenge poverty. Practical Action has over 35 years' experience and has established over 500 mini-grids powered by hydro, solar and wind generation systems globally. A recent review of those established over 10 years ago shows that over 85 percent are still in operation. In Southern Africa, we have been implementing mini-grids for more than 20 years, mainly funded by the European Union					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Sustainable Energy for Rural Communities	solar mini-grid and energy kiosks establishment, advocating for enabling policy and regulatory environment for DRE, a case for PPPs in energy access delivery	02/15	01/19	€7.2 million	EC, Hivos SNV, OFID and GEF wih some local NGOs
Rural Sustainable Energy Development	Energy access for productive use, food-energy-water nexus, anchor businesses	06/12	05/16	€2.2 million	Oxfam
SE4ALL in Southern Africa	Energy Access Advocacy, mobilising civil society to accelerate SE4All national processes in Malawi, Zimbabwe, Zambia and Mozambique	08/14	05/16	€50 000	Hivos

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Mulanje Energy Generation Authority (MEGA)	Business case for sustainable mini grid development, social enterprise development	12/13	06/17	€ 1.25 million	EC, OFID
Regional Hydro	Demonstrating a case for decentralised energy as a modern energy service for access. Developed 11 mini hydro scahemes for social services and households connections	01/10	12/12	€ 2.2 million	EC, KSM,MMCT
Supportive framework conditions employing renewable and hybrid generation in SADC	Practical Action co-authored this study which identified key policy issues and advocacy needs.	12/12	09/13	€ 170 000	EUEI PDF, RECP, SADC RERA
Sustainable Charcoal for Low Carbon Development and Community Climate Resilience	An analysis of the charcoal value chain as well as develop options for implementation of viable energy systems for household use.	05/13	06/14	€ 30 000	Christian Aid Malawi
Pre-viability Study for Electrification Through the Mini-Hydro Dam in the Locality of Nkalapa (Mavago), Luzumba Village (Sanga) and the Administrative Post of Mitande in Niassa Province of Mozambique	Mini hydro feasibility study, training in feasibility studies and communication tools development	10/12	05/04	€ 140 000	FUNAE, Mozambique
Technical Assistance to Support Gender Mainstreaming (GM) in Energy Sector Cooperation in Mozambique	Capacity Building to backstop energy stakeholder's implementation of the Gender Mainstreaming Support Programme. -Coordination of energy demonstration projects	08/11	03/14	€ 420 000	
RENEWABLE ENERGY AND ENERGY EFFICIENCY PARTNERSHIP (REEEP) REEEP is an international non-profit organization that advances markets for clean energy in developing countries. Founded during the Johannesburg UN Conference on Sustainable development in 2002, REEEP has built up unparalleled experience in managing funds and delivering outcomes for nearly two hundred clean energy projects in the developing world.					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
9th Call for Projects: Powering Water Supply in South Africa: small hydro opportunities on existing infrastructure	Grant funding by the Governments of Norway and Switzerland	2013-01-01	2014-01-01	€ 296 180	Co-finance by Entura Hydro and eThekwini Municipality
Sustainable electricity provision at the municipal level in South Africa	Grant funding from Norway	2013-01-01	2014-01-01	€ 296 180	Co-funding from EED, City of Cape Town, eThekwini, Ekurhuleni and SALGA

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8th Call for Projects: Creating Efficiencies in the Municipal Water System in Nelson Mandela Bay	Grant Funding by the Governments of the United Kingdom and Norway	2012-01-01	2014-01-01	€250 000	
Energy Regulatory Framework for Namibia	Grant Funding by Government of the United Kingdom	2009-01-01	2013-01-01	€215 000	Co funding from Ministry of Mines and Energy, Electricity Control Board
Supporting South Africa's Municipal EEDSM Programme	Grant Funding by the Governments of the United Kingdom and Norway	2009 -01-01	2011 -01-01	€81 000	REEI/Polytechnic of Namibia, Nampower, NAMCOR
Combined Legislative and Financial Mechanisms for SWH mass Rollout	Grant Funding by the Governments of the United Kingdom and Norway	2009 -01-01	2010 -01-01	€103 300	Co funding from Municipalities and theDepartment of Energy
Integrated Rural Energy Utility	Government of the United Kingdom	2009 -01-01	2010 -01-01	€114 950	In-kind Co-funding from City of Cape Town, City of Ekurhuleni SERN, Alternative Energy Development Board, Pakistan
UNITED STATES OF AMERICA					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Africa Infrastructure Programme	Technical assistance & transaction advisory services: **Namibia** • Development of a renewable feed-in-tariff programme **Mozambique** • Development of a renewable feed-in-tariff programme Inhambane Wind Project **Lesotho** • Letseng Wind ProjectReview of the grid code Development of an Electricity Sector Blueprint	2011	Sept 2015		
Southern Africa Trade Hub	Technical Assistance: **Zambia** • Development of a REFIT framework & renewable energy capacity building • **Swaziland** Development of a renewable energy policy and IPP framework Cost of supply studyDevelopment of a grid codeNo. 3: "POWER AFRICA INITIATIVE"	2011	Sept 2015		

continued...

UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Switch Africa Green (6 African countries, 2 of them from SADC: Mauritius & South Africa)	Grant funding by the EU	Jan 2014	Dec 2017	€20.5 million	UNDP, DEA SA, DTI, NCPC, ILO, UNIDO
Clean Energy mini-grid Programme (5 countries in SADC)	Assessment of feasibility, Technical assistance, capacity building, planning, implementation	June 2014			Local partners per country: government, private sector and civil society
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION (UNIDO)					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Switch Africa Green (6 African countries, 2 of them from SADC: Mauritius & South Africa)	Grant funding by the EU	Jan 2014	Dec 2017	€20.5 million	UNDP, DEA SA, DTI, NCPC, ILO, UNIDO
Waste to Energy(Countries in SADC and South Africa)	Assessment of feasibility, Technical assistance, capacity building, planning, implementation	June 2014			Local partners per country: government, private sector and civil society
Establishment of SADC Centre for Renewable Energy and Energy Efficiency SACREEE	Grant Funding together with Austria (1,5 Mio EUR	2013		€300 000 and own resources	Austrian Development Agency ADA
WORLD BANK 1 Accelerating development of priority regional power project to sustainably bridge the demand/ supply gap the region is experiencing 2 Increasing electricity access through renewable energy development 3 Reducing congestion in the SAPP network 4 Interconnecting remaining SAPP countries					
Project/programme	**Type of support**	**Start**	**End**	**Support**	**Partners/Co-financing**
Southern Africa Power Pool – Programme for Accelerated Transformational Energy Projects	Technical assistance for preparation of priority regional energy projects	Nov, 2014	Nov 2019		
Scaling-up Renewable Energy Programme, Lesotho	Technical assistance for preparation of an investment plan for scaling up renewable energy	April 2016	March 2017		

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Scaling-up Solar, Zambia	Partial Risk Guarantee to support private developers	Sept, 2016	To be decided		
Malawi-Mozambique Interconnector	Credit	Oct 2016	To be decided		
Kafue-Muzuma-Victoria Falls Regional Transmission Line Reinforcement	Credit	May 2012	Jun 2017		
Southern African Research & Documentation Centre (SARDC) SARDC provides information support to the SADC Energy Thematic Group. With support from the Austrian Development Agency, the SARDC produces several information and knowledge products meant to facilitate dialogue among energy stakeholders and information exchange. Among the information products are a bi-monthly newsletter, a weekly news features service, and the SADC Energy Portal. The portal provides a platform for sharing initiatives by ICPs active in the SADC energy sector.					
Project/programme	**Type of support**	**Start**	**End**	**Support in Millions**	**Partners/Co-financing**
Communicating Energy in Southern Africa	Assistance to SADC Secretariat, Energy Division in communicating energy results in SADC Region	04/14	06/16	€ 400 000	SADC/Austrian Development Cooperation
Gender Mainstreaming in Renewable Energies in the SADC Region	Political Advocacy, Capacity Building, Feasibility Studies, Lobbying for Gender Mainstreaming	10/15	09/18	€ 500 000	SADC/Austrian Development Cooperation
Communicating Energy in Southern Africa (Extension Phase)	Assistance to SADC Secretariat, Energy Division in communicating energy results in SADC Region	07/16	06/17	€ 175 000	SADC/ Austrian Development Cooperation

Source: SADC Energy Thematic Group ICPs support matrix, 2016

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Chinese Investment in Energy Projects in SADC Member States

Annex 3

Country	Project	Project Specifications	Cost	Funder	Date of Support
Angola	Lubango and Matala Caculo Cabaça dam	 2.2GW	US$375,523 $4.5bn	Government of PRC Industrial and Commercial Bank of China	Mar 2016 December 2016
Botswana	Morupule B	600MW power	$1 billion		July 2016
DRC	Busanga plant	240MW	$660 million	Sinohydro Corp and China Railway Group Ltd	June 2016
Lesotho	Lesotho highlands power project (LHPP)	6 000MW	$15-billion	China	Nov 2011
Madagascar	Betsiboka River basin	40.5MW	$976.49 million	China	2008
Malawi	Kam'mwamba coal-fired power plant Phombeya-Salima-Nkhotakota-Chatoloma 220 kV transmission projects	300MW	$600 million US$667 million	Exim Bank of China China	December 2015 June 2013
Mozambique	Rovuma/Gauteng pipeline,		$6bn	China National Petroleum Corporation (CNPC)	March 2016
Seychelles	Solar energy project		$6,5 million	Government of PRC	March-2012
South Africa	Mulilo Renewable Energy (MRE) Eskom's new-build programme for new power stations Renewable Energy Independent Power Production Procurement (REIPPP)		 $529 million USD2.2b.	China-Africa Development Fund China Development Bank Industrial and Commercial Bank of China and the Standard Bank of South Africa	December 2010 2015 2013
Tanzania	High-voltage transformers and transmission lines Singida Wind Farm Mchuchuma project The 535-kilometre pipeline	400 kV power transmission line. 50 megawatts (MW) 600 megawatts (MW)	$692.7 $136 million $2.7 billion $1.25 billion	Chinese private sector Export-Import Bank of China (EximBank) Export-Import (Exim) Bank of China	October 2013 March 2015 2015 Oct 2015
Zambia	Kariba North Power Project Kafue Gorge Lower Hydro-power	360 MW 750MW	$99 million $2 billion	China Exim Bank, Development Bank of Southern Africa (DBSA) China Exim Bank and Industrial and Commercial Bank of China.	February 2014 November 2015
Zimbabwe	Kariba South Power Project Gwayi Thermal Power Station Hwange Power Project	300MW 600MW 600MW	US$533 million US$2,1 billion US $1 billion	Government of PRC Government of PRC Exim Bank of China	September 2014 June 2016 Dec 2016

Source: SARDC computation

Director of Contacts

Annex 4

These are contact details of SADC Secretariat and its energy sector subsidiary organisations, power utilities, International Cooperating Partners and energy specialists in SADC Member States.

SADC Secretariat and Subsidiary Organisations

Name	Institution	Position	Phone Number	Email	Country
Remigious Makumbe	SADC Secretariat and Services	Director, Infrastructure	+267 364 1951	rmakumbe@sadc.int	Botswana
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Heads of Power Utilities					
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*Not members of RERA
- Botswana, DRC and Mauritius are at various stage of establishing regulatory authorities

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