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Original paper

Analysis of energy governance in Southern Africa

Keywords (in English)
stakeholders, policies, initiatives, Energy governance, energy access

Abstract (in English)
The poor energy situation in most African countries manifests in very low energy access and high energy poverty. To address these problems, and drive towards achieving universal energy access, African nations have, in recent time, directed attention to governance issues in energy resource development through building relevant institutions, strengthening legal frameworks, designing policies, ensuring cooperation, and harnessing investments. The concern for a governance approach to energy development is due partly to the submission that the core reason for poor energy delivery is ineffective energy governance. This study is based on Southern Africa and intends to examine the current energy access situation and explore the existing energy governance initiatives. The study used three measures of energy access (national, rural and urban) and energy consumption in order to examine the existing energy situation. The governance actions were examined by looking at national energy policies; energy partnerships (private sector; development partners), and sub-regional power pools. The study observes that the generally poor energy situation in Africa is evident in the Southern African countries. Governance actions are found to be multisource and multilevel. While these actions confirm the seriousness of the stakeholders in addressing the poor energy situation; results have been minimal. Hence, there is a need for more vigorous efforts in implementing the energy policies, engaging the private sector and creating productive cooperation among energy delivery stakeholders.

Response to reviewers
Let me thank the reviewers for their thoroughness in the review of the paper. Their efforts are well appreciated and have been taken into account and the paper revised accordingly.
Reviewer 1: I have already shown specific actions that will reduce some of the lapses noted in energy governance across the subregion. Other issues raised now relating to drafting laws and regulations are outside the scope of the paper. I also do not believe that I will have to be deterministic about the quantity of energy to be generated in each country. The work is not about capacity generation. I believe the suggestion made in the last section of the paper should suffice.
Reviewer 2:
New comments
1. are you sure table 1 ?; in my opinion it should be table 2; if the author is convinced that this is table 1, then where is the reference to table 2 in the text?
Response: The correction has been made. It is table 2.
2. BWSC, 2020?).
Response: The full meaning of the agency has been given and referencing properly done.

[Energy Governance in S-Africa Revised 20 Sept 2022.docx]

Analysis of energy governance in Southern Africa

1.0 Introduction

Harnessing energy resources and providing modern and clean energy to people are influenced by the quality of governance. Hence, the idea of energy governance has been brought to the fore in order to understand the influences of governance variables in energy production, management and delivery systems. Governance as a socio-environmental management tool has a long history (Vymetal, 2007). It is ‘as old as human history; (Bazilain, and Van de Graaf 2014). The concept became popular in the 1980s and 1990s. It was promoted by international development agencies; the UNDP. UNEP. the World Bank and similar bodies. It was introduced in response to many defects with the development approach that relied too much on the state and the glaring mass poverty in the developing countries because of state failure or the risk of it.

The challenge of gas emissions and poor energy situation in most African nations are issues that energy governance must address. Africa's greenhouse gas emission is growing, although the least among the world continents. Between 2008 and 2017, Africa’s GHG emission increased by 20% (GTZ and IRENA, 2020). Increased emission is also associated with high GDP growth rates among many African countries. These put pressure on energy resources and energy demand and make sustainable energy development compelling. It is estimated that electricity demand in Africa will increase by 55% by 2030 (GTZ and IRENA, 2020). Although Africa contributes the least to carbon emission, it will be among the most impacted by climate change (Africa Progress Panel, 2015; Africa Development Bank, 2017).

Generally, the appalling state of energy situation in Africa has been adduced by many analysts (Chirambo, 2016; Sanusi and Spahn, 2019). For example, the poor state of energy is seen in the comparison between France and Africa where Africa with over a billion population has the same installed electricity capacity as France with 80 million population (Swilling, 2016). Except for the North African countries, the African countries seem to have similar energy problems in the midst of the large energy resources that abound in the continent. Low energy access, disparity between urban and rural energy access and low energy consumption are some of the problems facing energy delivery in most parts of Africa. This study is focusing on energy governance in Southern African countries. These challenges may are associated with compromised energy governance in these countries. McCulloch, Hoyt and Ashford (2021) submit that the core reason for poor energy delivery is ineffective energy governance. In recent times, national governments, subregional and regional bodies have been making efforts to undertake many actions in order to address the poor state of energy in many parts of Africa including the Southern African countries. The study intends to examine the present status of energy consumption, appraise the energy policies, explore energy development partnerships and assess subregional and regional efforts at energy development in Southern Africa.

2.0: Energy Governance

Governance has been defined in many ways. For example, Hyden and Court (2002) defines governance as ‘the formation and stewardship of the formal and informal rules that regulate the public realm, the arena in which state as well as economic and societal actors interact to make decisions’. He states clearly that governance refers to the measures involving setting of rules for the exercise of power and settling conflict that may arise over such rules. Fukuyama (2013) defines governance as a government's ability to make and enforce rules, and also to deliver services, regardless of whether that government is democratic or not. Governance involves ‘’a whole host of approaches and techniques for improving coordination among the different levels of society’ (Vymětal 2007) and ’is about power, relationships and accountability: who has influence, who decides, and how decision makers are held accountable. It is more like the art of steering societies and organisations and conflict solving’’ (Plumptre and Graham, 1999 cited in Vymětal, 2007).

Governance reinforces the role of each actor and holds that each is fairly equally important in achieving the broad and specific goals of governance. Governance is seen as both a process and a product. However, as opined by Sanusi (2022), the product has more meaning to the people than the process; as governance is also about service delivery. It is against the concept of service delivery that Hyden et al (2005) see governance as a synonym for getting the political machinery to work better. Governance is a multi-level and multi-actor phenomenon (Lemos, and Agrawal, 2006; Newell, Pattberg and Schroeder, 2012 and Ongaro, 2020). Its purpose is ‘to guide, steer and regulate citizens’ activities through the power of different systems and relationships so as to maximise the public interest’(Keping, 2018).

But governance is qualified in order to have relevance in filling the vacuum which managing state-community affairs through the government alone cannot achieve. So, governance should be good; the contrary is bad governance. Bad governance is being increasingly regarded as one of the root causes of all evil in modern societies (UNESCAP, 1992). Good governance is seen as the public administration process that maximises public interest; a kind of collaborative management of public life by the state and the citizens; a new relationship, active and productive cooperation between the state and the citizens (Keping, 2018). Good governance is characterized by participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law (UNESCAP, 1992)

The foregoing is the conceptual environment for application of governance in resource management in general and energy resources in particular. Energy governance is a practical response of the managers of the energy sector to the pervasive application of governance principles to all aspects of human society. It means that all actions and processes engaged by both state and non-state actors, participating in the delivery of the energy system, to negotiate and resolve all matters and interests concerning the energy system along its value chain.

Wills et al (2019) identified three core principles of energy governance as:

a) Legitimate and transparent governance involving clear outcomes, transparent institutions and decision making process; aligning value in the system with the required output.

b) People at the centre where the market is meant to reward people for providing market services such as demand reduction, flexibility and demand response.

c) Adaptation regulation involves flexibility of regulations and adaptability to changing circumstances; a shift from input type legislation to output-based regulation and adapting regulations to local needs where the local people produce local plans.

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Fundamental governance issues undermining sustainable energy resource mobilization and energy delivery are keeping the electricity price low, awarding jobs in public utility to supporters, achieving reliable power supply in areas supportive of the ruling class and skewed planning process that maximise electricity access to supporters. (McColloch, Hoyt and Ashford, 2021). In economic, social and environmental terms, the energy system and the people suffer.

The need for energy governance is underlined by the persistent energy poverty, corruption in the management of fossil fuel resources, threats to global energy supply, increasing players in the energy sector necessitating multi-stakeholder participation, the task of energy transition and the increasingly complex nature of the energy market. Other factors attracting energy governance are pressure of increased energy demand and agitations for fair deal by the prospective consumers, and the increasing role of non-state actors.

Energy governance applies all principles, dimensions and elements of good governance. It is multi-level and multi-layer and adopts the idea of polycentric governance. Polycentrism connotes many centres of decision making and actions (Stephen, Marshal, and McGinnis, 2019; Carlisle and Gruby, 2019) and, in respect of natural resources governance including energy resources, , Carlisle, and Gruby (2019) posit its relevance in terms of (i) being able to adapt in the face of social and environmental change; (ii) providing good institutions suitable for complex natural resource systems; and (iii) mitigating the risk of institutional failure and resource losses

The arguments for governance in public affairs have been premised on two grounds; one, in providing public goods and secondly in addressing externalities (Florini and Sovacool, 2009). Public goods are ‘ products and services that are non-excludable and nonrival in consumption. That is, once they exist, no consumer can be excluded from consuming them, and no one's consumption interferes with the ability of other consumers to consume them.’ (Florini and Savocool, 2009). These two conditions perfectly fit into energy governance. Energy facilities possess the features of public good while their operation and exploitation is associated with external effects through emission of harmful gasses, including carbon dioxide. Indeed, ‘the energy field is replete with public goods problems and externalities, many of which cross-borders’ (Florini and Sovacool, 2009). Energy governance has been linked to clean energy, especially renewable energy ‘because the decision on whether to consume fossil fuels or adopt renewable energy rests on the capacity of the government to provide incentives for the consumption of renewable energy (Asongu and Odhiambo, 2021).

However, there are limitations in the actions of governments in energy governance: limited capacity to make and enforce rules in public interest and to limit externality; the influence of globalisation on energy demand and the fact that some energy issues ‘require decision-making across national boundaries and yet, the global political structure makes such cross-border rule-setting extraordinarily difficult (Florini and Savocool, 2009). These challenges make energy governance unique and incorporate cross-border cooperation that brings the idea of global energy governance. The term “global Energy governance” (GEG) according to Van de Graaf (2016), emerged in about the same period as the G8 picked up the theme at its Gleneagles summit in 2005. Andreas and Jan, (2010) defined global energy governance as making and enforcing rules to avoid the collective action problems related to energy at a scale beyond the nation-state. it focuses on ; the rules, norms, markets and institutions that govern international energy relations’ (Van de Graaf, 2017). Global energy governance aims at security of energy supply and demand, economic

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development, International security, environmental sustainability and domestic good governance (Van de Graaf and Colgan, 2016). It relies on cooperation and mobilisation of international energy institutions to achieve the global energy goals. It becomes relevant both to domestic energy development and cross border energy development. The components of energy governance are trade, climate change, investment, energy transition and energy security (Leal-Arcas and Filis (2013).

The relevance of these components to all nations, both energy resource rich and energy resource poor, is the institution of global agreements, global institutions and the struggle of nations to apply international protocols and agreements. Such voluntary cooperation and collaboration do not only strengthen global energy governance but also strengthen the achievement of national energy goals. The implication is that both the national operation of governance and its global counterparts are all needed and applied in energy governance, perhaps to achieve a win-win situation. But the victors are not just the nations, the victors will also include the environment, the people and the future generations. The clear lesson of energy governance is that reliable, secured, comfortable and clean energy for all can be achieved by mobilising through a governance process that combines domestic efforts with international efforts.

3.0 Methodology

Southern Africa as considered in this study consists of 12 countries. These are Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia. Sao Tome, South Africa, Swaziland (Eswatini), Zambia and Zimbabwe (Figure 1). The twelve countries have a combined 2020 population of 151.63 million people. South Africa is the most populous of these countries, controlling almost 40% of the regional population. The three most populous countries of Angola (32.87 million), Mozambique (31.26 million) and South Africa (59.31 million) control about 81% of the regional population. The island state of Sao Tome is the least populated, having only 219 000 people (UN Population Division, 2020).

There are two groups of data used for this study. The first group relates to energy the situation in the Southern African countries while the second relates to the range of governance activities adopted to advance access to energy by these countries.

Energy Situation: Four variables were used to examine the energy situation of the Southern African countries. These are national electricity access, urban energy access, rural electricity access, and per capita electricity consumption. Data in respect of the four variables were sought for each of the 12 countries.

The data on governance activities examined relate to:

a) .Energy policies. Four groups of policies providing 13 policy options are examined: (i) renewable energy targets, with one policy option; (ii) renewable energy in Nationally Determined Contributions; also with one policy option (iii) Renewable energy policies with 7 options (Feed-in-Tariff; utility quota obligation, Net metering/billing; biofuel blending/renewable transport obligation; renewable heating obligation; Tradable renewable energy certificate; Tend- Tendering) and (iv) Fiscal incentives and public financing with four options (Reduction in sales,

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energy/carbon and other taxes; Investment or production tax credit; Energy production payment; Public investment, loans, grants, capital subsidy and rebates.

Figure 1: Countries of Southern African Sub-region

b) Energy development partnership between (i) the public and the private sector with focus on independent power producers (IPPs) and (ii) Energy partnership with bilateral development organisations with attention on Power Africa.

c) (i) Efforts of continental bodies with focus on African Development Bank, and

ii) Sub-regional energy development cooperation through the Southern African Power Pool.

Data has been analysed through a descriptive process comparing countries and making classifications. Some ranking was also done and leading countries in respect of each energy type identified.

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4.0 Results and Discussion

4.1 Energy access status

Four variables have been used to examine the energy status of the Southern African countries. These are national electricity access, urban and rural electricity access, and electricity consumption per head. The performance of each country in respect of each of the variables are shown in Table 1. With respect to electricity access at the national level, it is seen that access varies widely among the 12 countries in the Sub-region. The highest accessibility rate of 100% is seen in Mauritius. It is followed by South Africa with 85% while the least of 11.2% is observed in Malawi. Other relatively good performing countries are Swaziland with 77.2%, Sao Tome, 72.2% and Botswana, 70.1% . On the other hand, the other low performing countries are Mozambique, with national electricity accessibility rate of 29.9% and Zambia, 40%. The national average clearly overshadows differences between rural and urban accessibility to electricity. Except for Mauritius, South Africa and Swaziland, there is a wide gap between urban and rural electricity rates. In South Africa, urban electricity access stands at 87.9% while the rural rate is 79.2%. Similarly, in Swaziland, while the urban electricity rate is 90.6%, the rural rate is 72.9%. Both urban and rural areas in Mauritius have 100% electricity rate. On the other hand, rural accessibility rate is less than 5% in both Malawi and Mozambique.; 4.1% and 4.9% respectively. In Mozambique, rural-rural electricity access differential is 67.6 points, 60.7 in Botswana and 65.3 in Zimbabwe. Urban-rural electricity access differential is exposing other forms of rural marginalisation not only in Southern Africa but also across most countries in Sub-Saharan Africa.

In terms of electricity consumption per head per annum, the variations observed in access are also seen in consumption. Per capita electricity consumption is as low as 93 kWh per annum in Sao Tome, 198.6 kWh per annum in Malawi and 363.4 kWh per annum in Angola. The average electricity consumption is 1109.8 kWh/annum. Eight of the countries (Angola, Lesotho, Malawi, Mozambique, Sao Tome, Swaziland, Zambia and Zimbabwe) fall below the sub-regional average. The sub-regional average is exaggerated by the exceptional performance of South Africa where the per capita consumption is 5339,8 and partly by Botswana (1529.5 kWh/capita) and Namibia (1646.6 kWh/capita). The intra-regional disparity in electricity consumption is such that an average South African consumes twice as much electricity as the two next best performing countries of Botswana and Namibia; almost as ten times as an average Angolan consumes and almost eight times that of the average electricity consumption per capita in Lesotho.

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Table 1: Measures of energy access in Southern Africa, 2020

S/N	Country	Electricity consumption per capita (kWh/annum)	Energy access(total) % of population	Energy access(urban) % of population	Energy access(rural) % of population	Urban-rural differential
1	Angola	363.4	45.7	59.5	18.6	40.9
2	Botswana	1529.5	70.1	88.3	27.6	60.7
3	Lesotho	457	31.36	68	24	44
4	Malawi	198.6	11.2	45.5	4.1	41.4
5	Mauritius	2960.6	100	100	100	0
6	Mozambique	566.8	29.6	72.5	4.9	67.6
7	Namibia	1646.6	55.2	74.6	35.0	39.6
8	Sao Tome	93.1	72.2	77.6	66.5	11.1
9	South Africa	3539.8	85	87.9	79.2	8.7
10	Swaziland	881.7	77.2	90.6	72.9	17.7
11	Zambia	607.8	40	77	11	66
12	Zimbabwe	472.1	41.1	85.4	20.1	65.3
	Regional average	1109.75	54.88	77.2	38.65	38.5

Sources: Africa Energy Portal, October,2021, .IRENA , 2021, USAID-Power Africa, 2022 (Lesotho, and Zambia)

Table 2: Three best performing countries in the energy access variables

Rank	Electricity consumption per capita (KWH/annum)	Energy access(total) % of population	Energy access(urban) % of population	Energy access(rural) % of population	Least Urban-rural disparity
1	South Africa	Mauritius	Mauritius	Mauritius	Mauritius
2	Mauritius	South Africa	Swaziland	South Africa	South Africa
3	Namibia	Swaziland	Botswana	Swaziland	Sao Tome

Source: Derived from Table 1

The leading performance in the five variables shown in Table 2 is dominated by South Africa, Mauritius, Swaziland, Namibia, and Botswana, with Mauritius featuring in all and South Africa featuring in 4 of the variables. Mauritius follows South Africa in per capita electricity consumption per year and leads in other variables of electricity access, urban and rural electricity access and in the least urban-rural electricity disparity. For most other countries, not only are their performance low in the five variables, but they also demonstrate a clear situation of energy poverty, deprivation, and marginalisation.

4.2: Energy Governance actions

Many energy governance actions have been undertaken by the countries in Southern Africa. Among these actions are policies geared towards renewable energy, partnerships through the private sector engagement, collaboration with the African Union for continental energy actions and international collaboration. These actions are now discussed under national/partnership actions and regional/subregional.

4.2.1: National Energy Governance Actions

4.2.1: 1: Energy Policies:

Table 3 shows the various renewable actions undertaken by the Southern African countries. These actions are grouped into four: renewable energy targets, renewable energy in Nationally determined contribution, regulatory policies, and fiscal incentives and public financing. While the first two have one option each, the third has 7 options and the fourth group has 4 options. In all, there are 13 policy options used in various combinations by each of the countries.

Table 3: Energy policies

Country	RET	RE in NDC	Regulatory policies							Fiscal incentives and public financing				Total options
			FIT	QO	NMB	BF	RH	REC	Tend	CT	TC	EPP	PIG	
Angola	P	√	√			√							√	5
Botswana	P		√						√	√			√	5
Lesotho	P	√	√						√		√	√	√	6
Malawi	E, P, HC	√				√	√		√	√			√	7
Mauritius	P			√					√	√			√	5
Mozambique	P, HC, T	√				√					√		√	5
Namibia	P	√					√							3
Sao Tome	P	√												2
South Africa	P	√		√		√	√		√	√			√	8
Swaziland	P	√							√					3
Zambia	P	√	√						√	√			√	6
Zimbabwe	T (N) P	√				√			√	√			√	6
	12	10	4	2	0	5	3	0	8	6	2	1	9	

KEYS: : (1) **RET- renewable energy targets;(2) RE in NDC-renewable energy in Nationally Determined Contributions**; (3) **Renewable energy policies** FIT-Feed-in-Tariff; QO-utility quota obligation, NMB-Net metering/billing; BF-biofuel blending/renewable transport obligation; RH-renewable heating obligation; REC-Tradable renewable energy certificate; Tend- Tendering. (4) **Fiscal incentives and public financing:** CT-Reduction in sales, energy/carbon/VAT and other taxes; TC- Investment or

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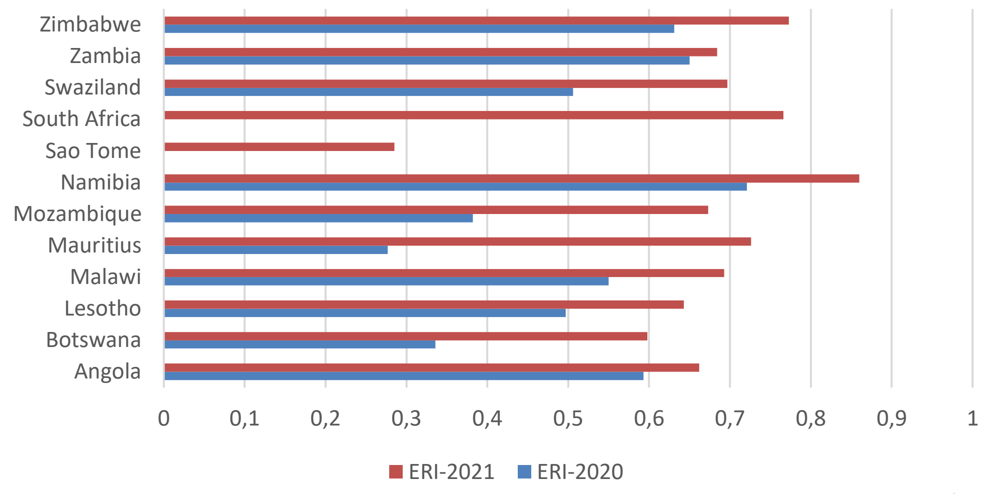
production tax credit; EPP-Energy production payment; PIG- Public investment, loans, grants, capital subsidy and rebates
Source: REN21 (2021).

In terms of renewable energy targets, all the countries have renewable energy targets. The targets are in respect of energy (final or primary-E), power (P), heating (HC) and transport (T) (Table 3). The renewable energy target is the most patronised among the 13 policy options. It is followed by renewable energy in National Determined contributions with 10 countries subscribing to it and public investments, with 9 countries adopting it. Tendering is the third most popular option with 8 countries adopting it. Target setting is global expectation which is driving towards an appropriate energy mix to encourage energy transition from gross domination by fossil fuel to a mix that can reduce GHG emissions. The NDC is a fallout from the Paris Agreement, 2015. The Paris Agreement intends to hold the increase in global average temperature to well below 2^{O} C above pre-industrial level (UN, 2015) and the NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change' (UNFCCC, 2022) and to accelerate transition to a low-carbon energy system (IEA and IRENA, 2017). These international tools attract the attention of the Southern African countries. Tendering is a familiar tool in the public procurement process. Hence, its popularity becomes evidence in renewable energy development. At the lower end of these policy options are net metering/billing and Tradable renewable energy certificate. No country has adopted these options by 2021. In respect of each country, South Africa has the highest options of 8; followed by Malawi with 7 options and Zambia, Zimbabwe and Lesotho with 6 options each. On the other hand, the least option of 2 is found in Sao Tome.

Generally, regulatory improvement is advancing quite well in the Southern African countries. This is evident in the Electricity Regulatory Index (ERI) of the African Development Bank. The ERI is a composite index that measures the level of development of electricity sector regulatory frameworks in African countries (African Development Bank, 2021). The ERI report, 2020 shows that out of the 10 Southern African countries included in the report, only 3 have substantial level of regulatory development (scoring between 0.600-0,799), 3 have medium level of regulatory development (scoring between 0.500-0.599) and four have low level of regulatory development (scoring below 0.500). However, by 2021, the report shows that one country (Namibia) has a high level of electricity regulatory development; 9 have substantial level of electricity regulatory development while only one (Sao Tome) has low level regulatory development (Figure 2).

Figure 2: Electricity Regulatory Index in Southern African Countries, 2020 and 2021



Source: African Development Bank, 2020, 2021.

4.2.1.2: Independent Power producers:

Energy governance involves deep partnership. Failing performance of national utilities and globalisation means that involving private sector hands in energy delivery could be a credible alternative. This has brought the idea of independent power producers (IPPs); energy generation sources beyond the public utilities and based on the principles of commerce and trade. The IPPs are 'typically limited liability, investor owned enterprises either for bulk sale to an electricity utility or for retail to industrial or other customers'(APEC Energy Working Group, 1998). According to Eberhard, et al (2017), there were 92 IPPs in Southern Africa by 2017. They account for about 5.2 GW of electricity. The advantages of the IPPs include the fact that they have been instrumental to renewable and decentralised energy development to reach a large number of unelectrified communities and people. Recent reports have also shown progress in the engagement of private energy producers. For example, Botswana in June 2020 granted licenses to 3 IPPs to generate 827 MW of coal-fired electricity (ESI Africa, 22 June, 2020). In Mauritius, the French GreenYellow company signed agreement with the government to generate 13.86 MW solar power plant (Tokouleu, 2022) while in Mozambique, Energypedia reports (2022) shows that 40 MW Mucuba solar power plant became operational in 2019 while the 41 MW Metero solar plant also started operation in October 2021. In addition are two other solar IPP projects for which agreements have been signed; 100 MW Chimuara plant and 30 MW Dondo project. The new projects indicate increasing popularity of IPPs in energy governance among the Southern African countries. In addition, the IPPS are intended to reduce the funding burden on governments, relieve the

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borrowing requirements of electricity companies and introduce generation technologies which utility companies may not consider as core functions (Burmeister & Wain Scandinavian Contractor, 2020). While the IPPs have been useful in complementing public utilities in energy delivery, it is also a fact that they have not sufficiently been developed and that their contribution to total energy delivery is still small. There are also local official constraints to their role. For example, in South Africa where IPPs can be said to be relatively advanced, the players have laid complaints about delay in getting power to the grid because of red tape or bureaucracy and legal challenges (Eye Witness News, 28/10/2021). Low level of participation of local companies in the core areas of the IPPs is also seen as a problem. For example, a local IPP operator in South Africa, Kurisani Mashele, was reported to have complained that local IPP operators in the country are not found in the lead roles of project development, engineering, procurement and construction (EPC) contracting, operations and maintenance contracting. While noting that the local investors are assigned high roles, she added that such roles have led to liquidation or closure (Sowetan Live, 14/01/2022). While foreign investment in the sector is important, excessive reliance on foreign investment also subjects the development of the independent power production to vagaries of international politics, the risk of high international debt and sometimes, discordant association between local need and foreign interest. The local and foreign investments in the IPPs need to be balanced across the energy production value chains.

4.2.1.3: Power Africa

An international partnership for energy development in Africa is Power Africa: This is an initiative of the government of USA. The initiative started in 2013. It is a partnership-based initiative coordinated by the United States Aid for International Development (USAID). It is executed through the tools of transaction focus, on the ground support, working beyond the grid, bridging the financial gap, Africa-led reform and empowering and empowering women (USAID, 2022). By the end of 2021, nine of the 12 Southern African countries are already connected to Power Africa.

Table 4 Summary of Power Africa Energy Activities in Southern African Countries

Country	Power Africa Achievement
Angola	Has partnered Angola to build critical energy infrastructure. Total new household electricity connections, 144.
Botswana	Major milestone reached on agreement for Mega Solar for Southern Africa. Total new connections, 2,766.
Lesotho	Switching on 'silent power' for clinics, and communities in remote areas of the country.
Malawi	Support the development of 98MW of electricity projects. Building Malawi first utility scale solar-plus storage plant power project (20MW-Solomoti Solar Project). Total new household electricity connections, 295, 985
Mozambique	Supported the USD 566 million Temane Transmission Project. Financial transactions closed for (1) Kuvaninga Energia (natural gas-

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	40 MW) (2) Mocuba Solar Project (40.5 MW). Total new connections, 193, 948.
Namibia	Supported development of 37 MW electricity generation projects in the country. Agreement reached for development of mega solar in Southern Africa. Total new household electricity connections, 14 742
South Africa	Supported development of 3,180 MW of electricity generation projects. Total new household electricity connections, 140, 085
Swaziland (Eswatini)	Supported 10 MW of electricity generation projects.
Zambia	Supported 208 MW of electricity generation projects. Closed financial transactions for Hetzhi Tezhi Hydro Project-120 MW and Bangweulu-Scaling Solar Zambia Round 1-54 MW. Total new connections, 548,671.

Source: Compiled from USAID, 2022., Country Fact Sheets, https://www.usaid.gov/powerafrica

Power Africa has supported these countries in improving their electricity situation. As shown in Table 4, Mozambique, Namibia, South Africa, Swaziland and Zambia have been supported in achieving new generation capacity. The largest of this is found in South Africa where the Initiative has supported the development of 3,189 MW electricity generation projects. Such support achieved 208 MW in Zambia and 40.5 MW in Mozambique. New household electricity connections totalling 1.196, 341 were also achieved in 7 Southern African countries. The highest household connections of 548. 671 was achieved in Zambia, followed by 295. 985 in Malawi. The lowest connection of 144 was achieved in Angola.

4.3: Regional and Subregional Energy development Cooperation

4.3.1. Continental actions:

4.3.1.1: Africa Development Bank: Southern Africa countries as part of the African continent benefit from the energy governance actions of continental bodies; African development bank and the African Union. The Bank pays particular attention to energy development. Its energy development policy is intended to provide general framework for the Bank's energy sector, to support African countries in their efforts to provide energy for all and provide opportunities for low carbon energy development (African Development Bank, 2017) Specific energy governance actions taken beneficial to Southern African countries are

Africa Renewable Energy initiative: The AREI is an effort to close the energy access gap in a climate-sensitive manner.it seeks to achieve 10 GW of new energy capacity at the end of 2020, and achieve renewable energy generation of 30 GW by 2030. Its support activities and operation are studies, assessment, policy guidance, capacity building, funding approval, support, international coordination, and exchange, multi-stakeholder participation, and social and environmental safeguards. In addition, it offers investment support channels through Feed-in-Tariffs, payment guarantees, connection support, concessional credit, capital subsidies, direct support and syndicate funding (AREI, 2015).

Decentralised Solutions: The Bank supports mini-grid, off-grid solutions, draws on Sustainable Energy Fund for Africa and adoption of clean cooking solutions

New deal on Energy for Africa: This is also a partnership driven effort. It works with a number of existing energy development initiatives. It is a strategic building block to achieve universal energy access in Africa. It intends to add 160GW of new capacity by 2025; provide on-grid transmission and good connections that will create 130 million new connections by 2025; off-grid connections to add 75 million new connections through isolated mini-grid and standalone systems; access to clean cooking energy for about 150 million households by 2025 and achieve efficient technologies along the energy value chain (African development Bank,2017)

4.3.1.2: Southern Africa Regional Power Pool

Power pool is another energy governance tool employed by the Southern African countries. Energy power pool occurs when electricity public utilities coordinate their transmission and generation and thereby enhance the purchase and sale of generating capacity and exchange of energy (Crammer and Tschirhart, 1981). The Southern Africa Power Pool (SAPP) was formed by member states of the Southern Africa Development Commission at its summit held in Kempton Park, South Africa in August 1995. At the summit, member states of SADC (excluding Mauritius) signed an Intergovernmental Memorandum of Understanding for the formation of the power pool. The revised Intergovernmental Memorandum of Understanding was signed by energy ministers of the respective member state on 23 February 2006. Four major Agreements governing the power pool are Intergovernmental Memorandum of Understanding which enabled the establishment of SAPP; the Inter-Utility Memorandum of Understanding, which established SAPP's basic management and operating principles; the Agreement Between Operating Members which established the specific rules of operation and pricing; and the Operating Guidelines, which provide standards and operating guidelines (SAPP, 2021). The member countries of the Power Pool are Angola, Botswana, Democratic Republic of Congo (DRC) Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

It is the vision of the SAPP to achieve a fully integrated, competitive energy market and a provider of sustainable energy solutions for the SADC region and beyond while its objectives are to provide reliable and stable interconnected electricity, increase power accessibility, and coordinate and enforce common regional standards of quality of supply, measurement and monitoring of systems performance SAPP, 2021).

The SAPP established the Short-Term Energy Market in April 2001 and commenced in 2014 the development of a competitive electricity market for the SADC region. By 2021, the market has four energy trading portfolios: (i) Forward Physical Market – Monthly (FPM-M), (ii) Forward Physical Market – Weekly (FPM-W), (iii) Day-Ahead Market (DAM) and (iv) Intra-Day Market (IDM).. it also worked in partnership with the World Bank to set up a Project Advisory Unit in 2015 to coordinate the preparation and development of power projects (SAPP, 2021).

Between 2011-2019, the SAPP had a total of 24,488 MW new generation capacity and planned to commission 10,040 MW within between 2021 and 2023. By 2020, the Power Pool provided 9,817 MW in excess capacity, mainly from South Africa (7,959 MW) and Angola (2,261

MW). The 2021 Annual Report also shows that in 2020/21 operating year, USD 91.1 million was realised in total revenue that was exchanged between members; 8 205.31 GWh was traded through bilateral contracts and competitive market; 1498.55 GWh was traded on the competitive market while 6707.76GWh was traded through Bilateral Contracts.

Another report Zyl, (2022), also shows that in January 2022, the energy network of the SAPP consists of 775 critical electrical substations – with over 90% named, 108 hydroelectric and pumped storage plants, 76 solar PV plants, 40 wind farms, 85 fossil fuel and biomass thermal power stations, 6 concentrated solar plants, 1 each of nuclear and hybrid power plants. In addition, power plants are linked together by 1,159 existing and proposed transmission and relevant distribution lines across the member countries of the SAPP.

Conclusion and Recommendations:

The poor state of energy in many of the Southern African countries is glaring. This is said to be a manifestation of a dynamic relationship between cost, income levels, relative price of fuels, initial capital cost, grid connectivity and energy policy (Chirambo, 2016). This result also confirms that of early study by Tazvinga, Dzobo and Mapako (2020) who submit that except for Mauritius, Seychelles and South Africa, the member states of the Southern African Development Community ‘ have very low electrification levels, with urban levels higher than rural’ . In a study of the relationship between governance and energy consumption in Sub-Saharan Africa, Asongu, and Odhiambo (2021), discovered that political and institutional governance are negatively related to the consumption of renewable energy. The range of actions being undertaken by the Southern African countries have not translated into serious tangible results.

In respect of the power pool, African Development Bank (2005) identified the conditions for a successful power pool relies on fairly developed grid interconnections; adequate generating capacity to meet demand of the pool; a legal framework for cross-border electricity exchanges; trust and mutual confidence among pool members; and regional regulation and mechanism for dispute resolution. However, the Bank also notes that most African power pools do not meet these conditions (African Development Bank, 2005). In particular, energy trading through the Pool will become more efficient and effective when the suppliers to the pool have adequate capacity to supply without jeopardising the domestic demand system. Furthermore , it has been reported that many private power providers abandon the projects after signing agreements. For example, in Malawi, by 2021, 11 IPPs licenses have been issued but only 2 (JCM and Cedar Energy Limited) were making progress developing power facilities in Salima and Mulanje respectively (Nyasa Times, February 19, 2021). That has forced the government to declare an intention to terminate the licenses since the private concerns have failed to honour the contractual agreement.

While the efforts of Power Africa are commendable, it is also a fact that its activities are not evenly spread across the countries. Minimal activities are observed in Angola where only 144 households have been connected to electricity by the initiative and in Mauritius, Sao Tome and Zimbabwe, the initiative is completely absent. Total contributions in many other countries are also low. For example, it has supported only 10MW of electricity in Swaziland (Eswatini). Allela (2021) also notes that the impact of Power Africa was minimal because of disproportionate connectivity success with solar lanterns. Despite the environmental effects of fossil fuel, it is also an uncomfortable development that some of the recent energy development activities are placing emphasis on coal as in the case Botswana where ESI Africa (June 22, 2022) reported that 3 IPPs licensed in 2020 were all coal-fired plants.

In general, it is interesting to observe that energy governance is on the platform of government activities and regional/sub-regional bodies. This offers some hope. The range of energy governance activities have reflected domestic, sub-regional, regional, and extra regional actions. Against these facts, more attention is needed from these countries in terms of stronger capacity to implement policies and get such policies to a logical conclusion that guarantees sustainable energy resource management and fulfills the social and economic components of sustainable development. Energy resources must be harnessed to achieve an appropriate energy mix that meets global expectation and grant greater energy access to all; especially achieving a decentralised energy system through renewables. This is necessary to bridge the current rural-urban energy disparity. Equity to all is part of sustainable development; rural-urban energy access disparity clearly undermines sustainability. More specifically, the following recommendations must be undertaken.

a) The respective countries should improve their energy policies, Most of the countries have few policy options especially the regulatory, and fiscal policies. For example, Angola should increase its regulatory policies beyond the 2 out 7 options that it has and do the same for fiscal incentives and public policies where it has only 1 out of 4 options. Similarly, Botswana should increase its regulatory policy options to more than one. Namibia, Sao Tome and Swaziland have a lot of work to do in increasing their energy policy options. These three countries are at the lower end of the energy policy spectrum. Sao Tome presently does not have any regulatory, fiscal incentives and public financing policy options. The country must correct this governance defect.

b) Existing bilateral governance arrangements must be distributed fairly among the countries of the sub-region. Power Africa activities must be improved in Angola and Botswana while the programme should be extended to three countries of Zimbabwe, Sao Tome, and Mauritius where it is presently absent.

c) The legal instrument setting up IPPs must be capable of engaging private actors with required capacity to provide power according to the contract agreements. Such a legal instrument must also give adequate allowance and protection to local private sector energy operators.

d) As much as the African Development Bank gives a broad umbrella for energy development in the subregion, it must also be sensitive to the specific needs of the individual country. The Bank must also be realistic in setting country projects and work with country natural and financial resources.

e) Furthermore, participating countries in the SAPP must improve their contributions. For example, it is seen that the excess power capacity has been contributed only by Angola and South Africa, with South Africa having the overwhelming major contribution. The security of energy supply to the pool and the subregion is better guaranteed when many of the benefiting countries contribute more to the pool. For example, Mozambique, Zambia and indeed, Zimbabwe should contribute more to the pool. It is also recommended that the sub-region work as a block with the regional energy governance initiatives to improve the pace of implementation of such initiatives. For example, the effective and speedy implementation of the energy support facilities provided by the African Development Bank will need the cooperation and teamwork of the Southern African sub-region.

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Sustainable development of energy resources of the countries in Southern Africa will involve sound care for the environment, people-centred energy system; spatial justice that recognises all places and economic gains that involve employment generation, thriving private sector investment, functioning utilities, a mix of centralised generation and distribution system and fulfilling international energy transition and climate change Agreements. The private sector remains very central to energy delivery. Hence, current obstacles to the effective functioning of the sector must be addressed. Energy governance must ensure the engagement of private sector operators with strong capacity to operate while more productive cooperation should be ensured to maximise the results of sub-regional and continental initiatives for energy development and delivery.

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