

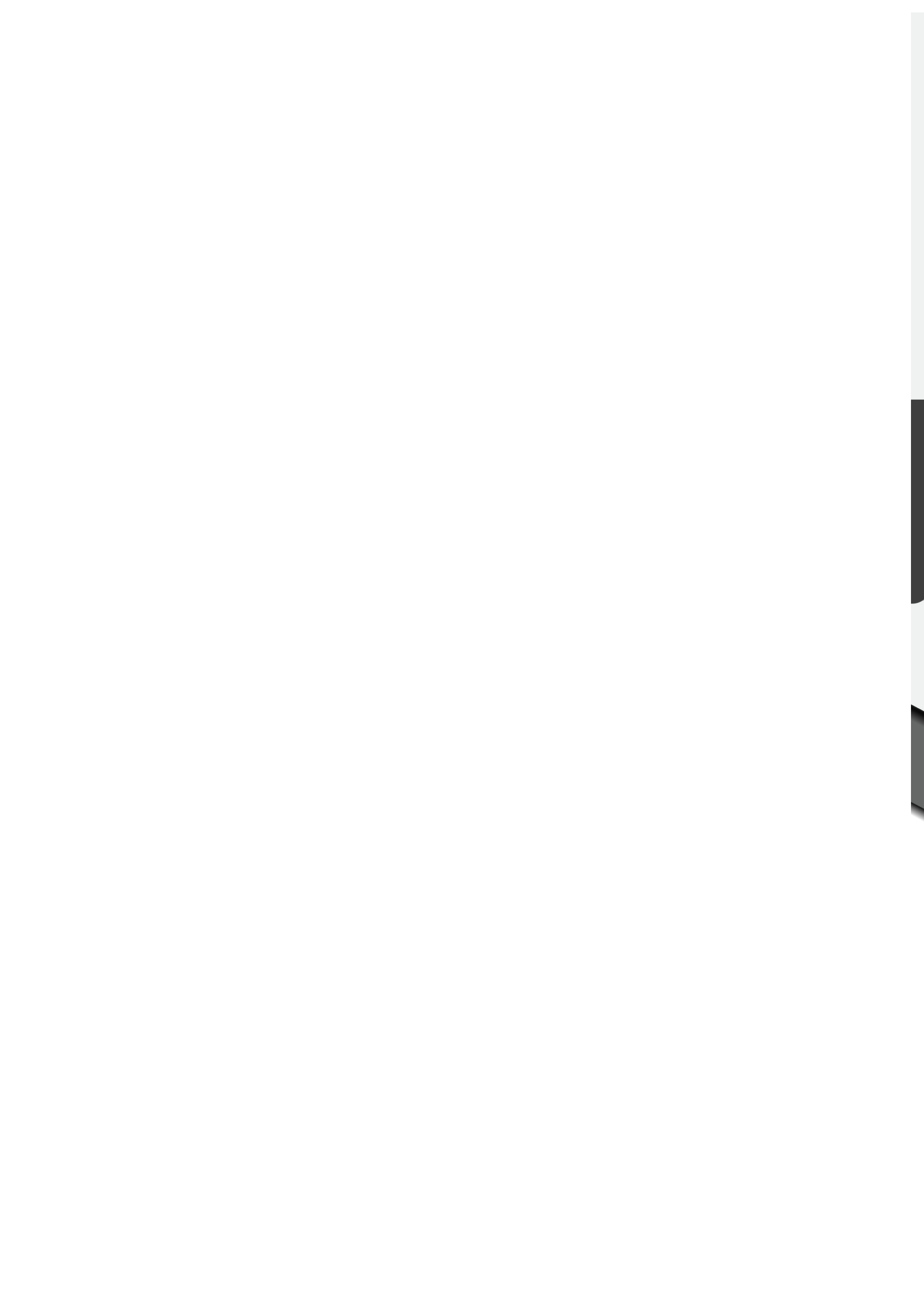


# Effective regulatory systems for service delivery and structural transformation in Africa

## Infrastructure development and the case of power pools



United Nations  
Economic Commission for Africa



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## Executive summary

The present study is being undertaken at an opportune moment, when various stakeholders are seeking ways to achieve national, regional and global development goals, with infrastructure development, inclusive of the energy sector, as a key and central driver. In the energy sector infrastructure development is a means for both fostering regional integration and achieving sustainable development through exploiting clean and renewable energy sources. Access to reliable and affordable electricity lies at the heart of service provision, human development and economic growth. However, the challenges to infrastructure development are well-known. Power is Africa's largest infrastructure challenge, with energy deficiencies constituting a significant proportion of the continent's infrastructure gap, posing a major dilemma for its structural transformation agenda.

Power pools as an institutional mechanism are well placed to contribute to improved energy supply, given that they are key stakeholders in the development of the energy sector. They facilitate regional power trade and they can contribute to the harmonization of regulation at the regional level through their functions, which require the convening of representatives of the various member countries.

Power pools can also be instrumental in boosting power generation and supply, thus enhancing cross-border trade, unlocking barriers to investment in infrastructure and increasing reliability and accessibility owing to cost savings. They contribute to economies of scale and reduce capital and operating costs by improving the coordination of electricity transmission and distribution among countries. Moreover, they also provide an opportunity for harnessing alternative low-cost energy sources that are available on the continent. Notwithstanding their potential, power pools remain underutilized and underdeveloped, and the regulatory dimension is a missing link in Africa's drive to develop its infrastructure.

The study seeks to enhance understanding of the opportunities and challenges with regard to harmonizing regulatory systems for infrastructure development, with a focus on power pools. Desk-based research and secondary data analysis are used to analyse existing institutional and regulatory frameworks for power pools in Africa, with a focus on the opportunities and challenges that they present. Primary qualitative data and information collected through interviews and discussions corroborate findings from the literature review phase and facilitate the drawing of practical conclusions. While the Eastern Africa power pool is the principal focus, the study also incorporates data and information from other power pools.

The study includes an emphasis on the critical importance of addressing gaps and weaknesses in regulatory systems in order to maximize the possible benefits of power pools. While work on interconnecting systems is ongoing, regulatory systems are also evolving and are under development in the power sector on the continent within the context of ongoing energy policy reforms. The potential for increased private investment, which is made possible by favourable business environments enabled by effective regulation, provides the impetus for accelerating the pace of reforms.

The study includes recommendations recognizing that the regulatory system involves a range of stakeholders in energy regulation, including utilities, national regulators, financiers and consumers, from the sub-regional to the regional level. It therefore provides an outline of roles and responsibilities accordingly, with the goal of contributing to strengthening the centrality of regulation in infrastructure development, for service delivery and structural transformation in Africa. Its key messages include:



- **Infrastructure development in the energy sector is a key driver and enabler to the processes of structural transformation, regional integration and sustainable development.** Structural transformation that is characterized by increasing rates of industrialization and urbanization requires infrastructure to enable production and to facilitate consumption. Similarly, infrastructure development, including the expansion and modernization of the power sector, is also a clear and direct means of enhancing regional integration through cross-border electricity trading. On the other hand, the development of infrastructure through the exploitation of clean energy sources promotes sustainable development, thus reducing social and economic costs.
- **Africa's power deficiencies constitute a significant proportion of the continent's infrastructure gap, thus presenting the structural transformation agenda with a dilemma.** To overcome the dilemma, concerted efforts for improvement are needed to meet the growing demand for energy to power the structural transformation process. Electrification rates on the continent remain low, with 70 per cent of countries at rates below or equal to 30 per cent. Only a handful of countries, including Egypt, Morocco, South Africa and Tunisia, have rates above 50 per cent. The low energy supply on the continent creates higher social and economic costs, while also decreasing the competitiveness of African-based industries and manufacturing sectors, diminishing job growth and dragging down annual growth in the gross domestic product. Poor infrastructure, including in energy, makes locations unattractive to investors and creates opportunity costs, including the loss of employment and incomes. The energy sector in Africa is also confronted by serious deficits in institutional arrangements and mechanisms.
- **Power pools as an institutional mechanism offer an opportunity to contribute to improved energy supply for structural transformation.** There is ample evidence on the positive benefits of power pools, highlighting the need for continuing efforts to develop and strengthen them. Power pools are critical stakeholders in the development of the energy sector, by facilitating regional power trade, and by contributing to the harmonization of regulations at the regional level through their functions, which require the convening of representatives from member countries of the power pools. Power system interconnections can, through power pools, also contribute to sustainable development when alternative sources and a diversified energy mix are harnessed. Notwithstanding their potential, they remain an underdeveloped and minimally utilized institutional mechanism.
- **Addressing gaps and weaknesses in regulatory systems, including their legal, regulatory and administrative frameworks, is one of the building blocks for enhancing the efficiency of power pools.** While more interconnecting systems are being built, regulatory systems are also evolving within the context of ongoing energy policy reforms. The potential for increased private investment, which is possible through conducive business environments, enabled by effective regulation, provides the impetus for accelerating the pace of reforms. Findings from the Eastern Africa power pool indicate that, while regulatory substance (the “what” of regulation) is at an advanced stage, work on both regulatory governance (the “how” of regulation), and regulatory impact leaves much to be desired. A comprehensive analysis of all power pools using up-to-date data and information therefore needs to be undertaken to establish which regulatory system is best for the context within which the power pools are operating.

- **Effective regulation, including in the energy sector, cannot take place if key principles of governance are not complied with and if the independence of the regulator is not ensured.** Effecting regional-level regulation should thus go hand in hand with enhancing and improving the general governance situation at the national level. However, it is important to recognize that, while independence is a desirable attribute of the regulator, its functionality remains paramount. It is important to focus more on the functionality and effectiveness of regulatory bodies than on their autonomy or independence. While independence is ideal, it does not always guarantee regulatory effectiveness.
- **From a regional perspective, putting in place a common legal and regulatory framework is one of the prerequisites for operationalizing and ensuring the effectiveness of regional power pools.** A harmonized regulatory framework is necessary to provide uniformity of trading rules among members of each pool and private players in the pool. It reduces barriers to trade, provides a dispute settlement mechanism and creates certainty in the power trading environment. Africa's power pools face an array of constraints and challenges of a financial, capacity-building, institutional and regulatory nature. The lack of a common region-wide legal and regulatory framework for electricity trading and of an appropriate mechanism for dispute resolution is a key hindrance to cross-border power trading, which results in uncertainty and ineffectiveness in the trading environment at the regional level.
- **Current trends in investments and regional frameworks reveal a positive outlook for African infrastructure, in particular for the power sector, in which power pools are being developed.** The rapid growth of energy demand, accompanied by a growing middle class on the continent, has pushed individual countries and regional economic communities to act strategically and to take regional planning and integration more seriously. Concerted efforts by regional actors including the African Union Commission and the NEPAD Planning and Coordinating Agency, as well as by the African Development Bank and the Economic Commission for Africa, to develop the continental and consensual Programme for Infrastructure Development in Africa, have stimulated the growth of infrastructure development projects and opportunities for investment.
- **The need for political will and commitment is essential to drive regional solutions to the supply of electricity and to promote competition in electricity markets in the long term.** In particular, the harmonization of electricity laws and regulations requires high-level political advocacy and buy-in at the presidential and parliamentary levels.

# I. Introduction

Regulation is at the heart of expanding access to electricity on the continent. While work on interconnecting systems is ongoing, regulatory systems are also evolving in the power sector on the continent within the context of energy policy reforms. In the case of power pools, there is variation in the extent to which existing regulatory systems support their objectives. The potential for increased private investment, which is possible through favourable business environments enabled by effective regulation, provides the impetus for accelerating the pace of regulatory reforms.

The importance of regulation in the development of the power sector is recognized, in particular with regard to attaining the objectives of accessibility and affordability. Current efforts by the African Union and its partners through the Africa Power Vision provide an overarching vision for powering Africa, which is consistent with Agenda 2063 and is also based on the continent's priority energy projects outlined in the Programme for Infrastructure Development in Africa.<sup>1</sup>

At the global level, the Sustainable Development Goals are intended to be integrated into national development plans, with an emphasis on infrastructure development. Commitments contained in Goal 9 ("Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"), and as mandated in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, led to the launch of the global infrastructure forum in 2016 to bridge the infrastructure gap. The Action Agenda, which outlines the means of implementing the Goals and enumerates financial and non-financial instruments, underscores the importance of investing in sustainable and resilient infrastruc-

<sup>1</sup> The Programme for Infrastructure Development in Africa focuses on 51 cross-sectoral programmes structured into over 400 projects that are to be implemented between 2012 and 2040 to promote regional infrastructure. With respect to energy, the PIDA Energy Vision is aimed at connecting the continent's power pools to enable a large increase in interregional energy trade and, therefore, to reduce electricity prices for the wider public.

ture including transport, energy, water and sanitation as a prerequisite for achieving the Goals. It also contains a call for a recommitment to service delivery through the social compact, in which "no one will be left behind", through inclusive growth. In the same context, the 2016 Global Sustainable Development Report is devoted to addressing the nexus between infrastructure resilience and inequality. More importantly, the operationalization of the more recent proclamation on the third industrial development decade for Africa (2016-2025) (General Assembly resolution 70/293) will require energy as an input.

While an African Union, continent-wide strategy and action plan for the development of a harmonized regulatory framework for the electricity market in Africa exists as a means to improving the quality and security of energy supply on the continent, more needs to be done. The strengthening vision for existing and new actors, including power pools, which have the potential to make a contribution, remains an unfinished business. The continent is still faced with the challenge of building modern, relevant and effective regulatory frameworks and systems that can support infrastructure development.

It is against this background that the Governance and Public Sector Management Section of the Macroeconomic Policy Division at ECA undertook this study, which is aimed at contributing to and informing ongoing national, subregional and regional policy processes on infrastructure development for structural transformation.

## Objectives and scope

The study seeks to enhance understanding of the opportunities and challenges with regard to harmonizing regulatory systems for infrastructure development, with a focus on power pools. Using a framework from Kapika and Eberhard (2013), the study provides an analysis of the regulatory system of the Eastern Africa power pool, while highlighting the importance of solid regulatory and institutional frameworks for the development

of infrastructure and, in particular, of power pools in Africa.

Specific objectives are to:

- a) Analyse the current state of the electricity market in Africa as it relates to the structural transformation agenda of the continent;
- b) Understand the context of existing power pools, with a view to identifying gaps, challenges and opportunities;
- c) Identify and further emphasize the need for effective regulatory systems for power pools and how they can be strengthened for infrastructure development in Africa;
- d) Provide input to ongoing processes on infrastructure development from the perspective of economic governance.

Power pools have been selected as a focus for a number of reasons: they are key stakeholders in the development of the energy sector by facilitating regional power trade; they can contribute to the development and harmonization of regulation at the regional level through their functions, which require the convening of representatives of member countries; and, notwithstanding their potential, they remain an underdeveloped and a minimally tapped institutional mechanism.

## Methodology

The study used a combination of methods to achieve the stated overall objective. Desk-based research and secondary data analysis were undertaken to analyse existing institutional and regulatory frameworks for power pools in Africa, with a specific focus on the challenges that they face and the opportunities that they present.

Primary qualitative data and information collected through interviews and discussions were

used to corroborate findings from the literature review phase and to facilitate practical conclusions. Owing to time and financial resource constraints, field work for this study was limited to consultations at the headquarters of the Eastern Africa power pool, which was deliberately chosen as a case study because of its proximity to the headquarters of ECA. The data and information from the field work (annex 5) were further supplemented by a review of key official documents made available by the power pool to deepen the analysis and to further substantiate the study's findings and recommendations.

An ad hoc expert group meeting was held to review the draft study report. At the meeting, preliminary findings, conclusions and recommendations were presented and critically analysed assessed and evaluated to help to strengthen evidence-based key policy messages and recommendations, which further enrich the content and structure of the study.

Following the introduction is a section that links infrastructure development with critical policy initiatives in the areas of structural transformation, regional integration and sustainable development, presenting it as a driver and enabler of outcomes in these areas. The section after that places the effective regulation of power pools within the context of good economic governance by probing trade-offs between regulatory independence and effectiveness. The subsequent section establishes and presents the regulatory status of all the power pools, focusing on and examining the Eastern Africa power pool, while also presenting the challenges with regard to harmonizing legal and regulatory regimes in Africa's other power pools. Lastly, several conclusions and policy recommendations are presented, focusing on the ways and means of contributing to improved regulatory harmonization.

## II. Infrastructure development in the context of structural transformation, regional integration and sustainable development

Infrastructure development is linked to, and is a driver and enabler of outcomes for regional integration, structural transformation and sustainable development (figure 1). The process of structural transformation, which is characterized by increasing rates of industrialization and urbanization, requires infrastructure to enable production and to facilitate consumption. Africa’s urbanization rates – the highest globally – will require the provision of basic services, including health, education, sanitation and roads, among other things. The attainment of visions for industry by member countries is founded on the availability of a modernized and functional infrastructure base. In fact, investments in infrastructure as countries transform are a current source of growth on the continent. Similarly, regional integration requires the integration of infrastructure with electricity trading across borders, which is made possible through power pools. Moreover, the develop-

ment of infrastructure through clean energy promotes both sustainable development and a well-functioning infrastructure base, thereby reducing social and economic costs.

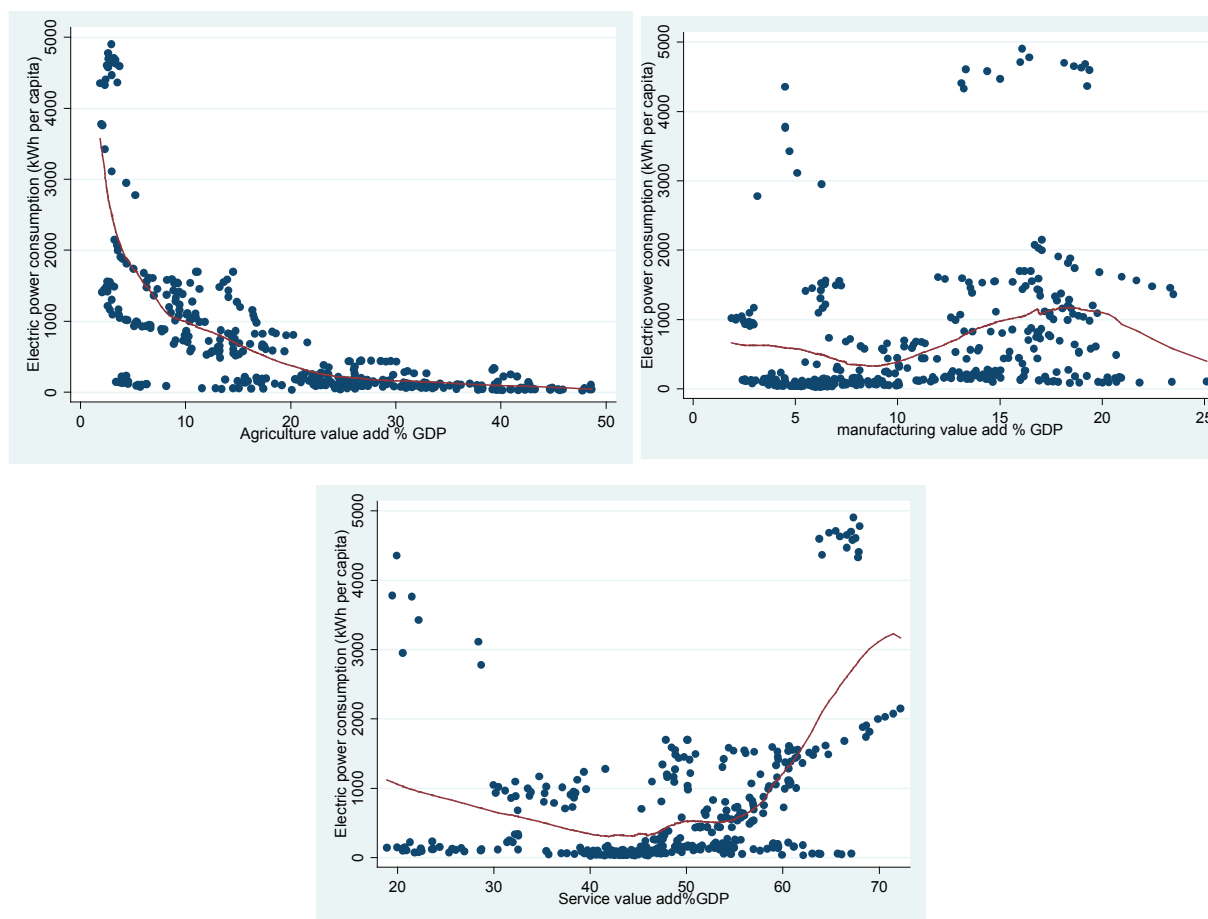
The process of structural transformation, which triggers a change in the composition of gross domestic product (GDP), ensuring that the manufacturing and services sectors have a progressively larger contribution than agriculture, strengthens the need for energy to power activities (Economic Commission for Africa, 2015). Here, resources and, in particular, new investments, are channelled within and throughout sectors from low to highly productive activities. As shown in figure 2, electricity consumption increases as services comprise a larger percentage of GDP, and decreases when agriculture is the largest proportion.

Figure 1: Infrastructure links structural transformation, regional integration and sustainable development



Source: Economic Commission for Africa staff.

Figure 2: Trends in electricity usage and levels of structural transformation



**Source:** Economic Commission for Africa calculations, with data from the International Energy Agency and the World Bank.

However, evidence (box 1) points to the inadequacy of electricity supply throughout the continent. Electrification rates remain low, with 70 per cent of countries at rates below or equal to 30 per cent (table 1). Only a handful of countries including Egypt, Morocco, South Africa and Tunisia, have rates higher than 50 per cent (Infrastructure Consortium for Africa, 2011). Electricity consumption per capita is also low, with 54 per cent of countries consuming at 200kWh/capita. Egypt, Namibia, South Africa and Tunisia take the lead in consumption rates. Similarly, consumers in many African countries are said to be paying prices that range from three to six times those paid by other consumers worldwide (Castellano et al., 2015).

There is nevertheless a positive correlation between electrification rates and per capita GDP, with countries whose electrification rates are less than 80 per cent of the population having lower per capita GDP (Castellano et al., 2015). In addition to the availability of electricity, this correlation also relates to its reliability: household connections to the power grid are more scarce in sub-Saharan Africa than in any other developing region. The average price of power in sub-Saharan Africa is double that in other developing regions for a number of reasons, including supply-side constraints such as the lack of generation capacity and weak financial and technical capacities

(Kapika and Eberhard, 2013). Poor servicing and maintenance of existing power infrastructure throughout much of the continent is another relevant factor. Emergency power from backup generators, which is four times more expensive than grid power (Kapika and Eberhard, 2013; Castellano et al., 2015), is accordingly the most relied-upon source, raising the cost of energy. Private enterprises ultimately usually need to accommodate this cost as part of the difficulty of doing business.

This is in addition to noting the high costs of financing infrastructure development. The cost of addressing Africa's infrastructure needs is esti-

## Box 1: Summary of facts on infrastructure in Africa

- More than half of Africa's recent improved growth performance is attributable to infrastructure development.
- Africa's infrastructure networks lag behind those of other developing countries. Its difficult economic geography presents a particular challenge for the region's infrastructure development.
- Africa's infrastructure services are twice as expensive as elsewhere, reflecting both the lack of economies of scale in production and high profit margins caused by lack of competition. Transport costs in Africa are 100 per cent higher than those elsewhere in the developing world.
- The infrastructure challenge varies greatly by country type. Fragile States face an impossible burden and resource-rich countries lag, notwithstanding their wealth.
- Africa's institutional, regulatory and administrative reforms are a work in progress but are already proving their effect on operational efficiency.
- Power is Africa's largest infrastructure challenge, owing to regular power shortages and high premiums for emergency power.
- Less than 30 per cent of sub-Saharan Africa has access to electricity, compared with 65 per cent in South Asia and more than 90 per cent in East Asia. Per capita consumption of electricity is, on average, lower than for the rest of the developing world. This consumption is falling.
- A total of 93 per cent of the continent's viable hydropower potential, estimated at one tenth of the world's total, is yet to be exploited.

**Source:** adapted from Eberhard et al., 2011; Forster et al., 2011; Infrastructure Consortium for Africa, 2011.

mated at some \$93 billion annually (Foster and Briceño-Garmendia, 2010, p. 1), about one third of which is for maintenance – more than twice the 2005 estimate of the Commission for Africa. A large share of the continent's infrastructure is domestically financed, with the central government budget being the main driver of infrastructure investment. Even if major potential efficiency gains were captured, Africa would nevertheless still face an infrastructure funding gap of \$31 billion annually, mainly in power (Ibid).

The energy sector in Africa is also challenged by deficits in institutional arrangements and mechanisms. For example, while World Bank funding for the Owen Falls Dam in Uganda had increased the availability of and access to electricity in the 1960s, by the mid-1970s, however, performance had begun to decline. The reasons presented for this include inappropriate national policies on energy pricing, infrastructure investments, institutional development and methods of governance. This was in addition to enterprise-related factors, including conflicting objectives and lack of management accountability, leading to technical, operational and financial problems (World Bank, 1993).

Using data from the International Energy Agency, the Infrastructure Consortium for Africa (2011) notes, for example, that, in order to meet future energy demand in Africa by 2040, \$43 billion of annual capital investment will be required. Of that

amount, \$5.4 billion are required for transmission (regional interconnectors). However, the current total annual investment in African energy projects is less than \$5 billion dollars.

Moreover, Africa is endowed with potential energy sources, and electricity demand on the continent is projected to increase. Approximately 93 per cent of the continent's viable hydropower potential, estimated at one tenth of the world's total, is yet to be exploited (Eberhard et al., 2001, p. 1). This is approximately 937 Terawatt hours. Only 7 per cent of Africa's hydropower potential has been exploited (Elmissiry, 2013). Reserves exist in countries including Angola, Cameroon, the Democratic Republic of the Congo, Ethiopia, Gabon, Madagascar, Mozambique and Nigeria, by capacity. the Programme for Infrastructure Development in Africa forecasts that, between 2011 and 2040, energy demand will grow from 590 to 3,100 Terawatt hours. Similarly, while sub-Saharan Africa now consumes less electricity than Brazil, by 2040, its demand will reach a level equal to today's consumption in Latin America and India combined. By 2030, commercial and industrial energy demand – at the heart of industrialization and structural transformation – in sub-Saharan Africa is forecast at the level of Japan (Castellano et al., 2015).

Consequently, low energy supply on the continent imposes social and economic costs. It decreases the competitiveness of African-based

Table 1: Percentage of people with access to electricity in selected African countries

Country	All people				
	Urban	Rural	Total	Bottom 20 per cent	Top 20 per cent
Angola	75	14	47	8	85
Botswana	63	23	46	15	79
Burkina Faso	47	3	13	2	38
Côte d'Ivoire	88	31	57	41	38
Ethiopia	96	12	22	7	45
Ghana	89	47	68	37	91
Madagascar	38	6	12	1	44
Malawi	38	4	9	1	31
Mali	92	57	65	49	80
Mozambique	47	2	16	1	51
Niger	61	6	15	2	47
Nigeria	93	48	64	33	88
Rwanda	48	6	12	1	46
Sao Tome and Principe	69	48	59	49	72
Senegal	93	32	59	36	84
Sierra Leone	42	2	17	3	43
South Africa	94	81	89	78	99
Swaziland	70	30	40	4	83
Togo	80	10	37	6	76
Uganda	39	7	15	3	42
United Republic of Tanzania	52	9	20	4	58
Zambia	59	16	31	8	78
Median	66	13	34	7	65

Source: Trimble and Kojima, 2016.

industries and manufacturing sectors, diminishes job growth and drags down annual GDP growth. Poor infrastructure, including in energy, makes locations unattractive to investors and creates an opportunity cost, including loss of employment and income (African Development Bank, 2000). The infrastructure deficit on the continent is thus a hindrance to structural transformation and requires concerted efforts for improvement in order to meet growing demand for energy to power this process.

Infrastructure development, including the expansion and modernization of the power sector, is seen as a clear and direct means of enhancing regional integration. The integration of cross-border physical infrastructure, including in the power sector, is both a means and an end to the promotion of regional economic integration. For example, in 2015, it was envisaged that Uganda's 10-year, multibillion-dollar plan to upgrade its transportation network and power generation would benefit the entire East African region through increased access to electricity. Expectations have been that Uganda's envisaged electricity surplus will be exported to neighbouring countries and that better roads, bridges, railways and new pipelines would facilitate the movement of citizens throughout countries and the transpor-

tation of goods to seaports, enabling East African Community partner countries to maximize the benefits of regional integration.

At the same time, and in the area of electricity, the establishment and formation of power pools, which are known to alleviate some of the issues of access, reliability and affordability that are currently faced on the continent, is possible only under regional integration. It is estimated that regional integration could save more than \$40 billion in capital spending and save the African consumer nearly \$10 billion annually by 2040 as the reduced cost of energy falls from \$70 to \$64 per Megawatt hour (Castellano et al., 2015, pp. 4-5).

Power system interconnections, made possible through power pools, can also contribute to sustainable development when alternative sources and a diversified energy mix are harnessed. This is especially possible through the development of environmentally friendly sources of energy, including hydropower, which reduce annual carbon dioxide emissions (Eberhard et al., 2011, p. 39; Economic Commission for Africa, 2003). The power sector in Africa, excluding South Africa, – already contributes less than 1 per cent of global carbon dioxide emissions (Ibid., p. 6). To maintain Africa's low contributions to global carbon



emissions and to ensure access to cleaner and efficient energy services promoting sustainable consumption, the continent could, in a number of sectors, leapfrog directly from current traditional energy consumption patterns to sustainable energy options (Department of Economic and Social Affairs, 2004; Economic Commission for Africa, 2016, p, 78). Kenya, for example, is promoting alternative sources of energy, including solar energy for rural electrification, as stipulated in its Vision 2030, which has sustainability at its core.

## Rationale and opportunities for power pools in Africa

### 1. Linking electricity provision with macroeconomic objectives of poverty eradication and inclusive growth through service delivery

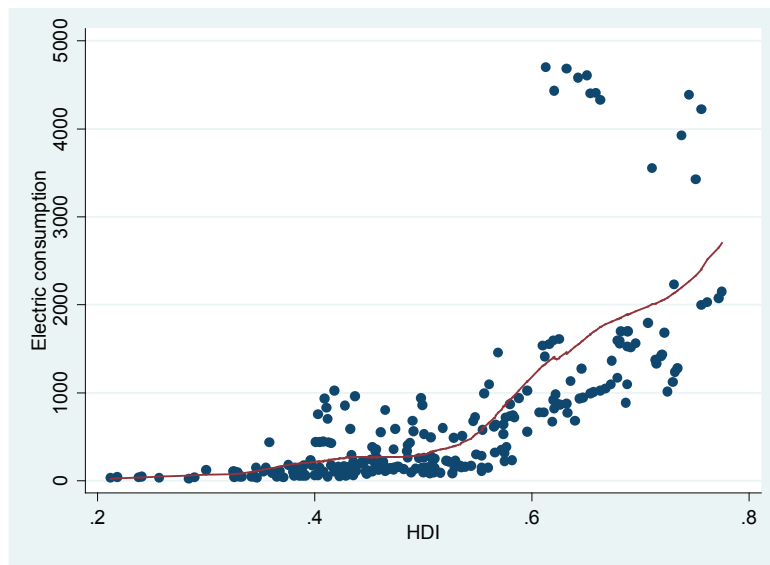
The rationale behind setting up power pools in Africa, as anywhere in the world, is the enlarging of the market for electric power beyond national borders, which would stimulate investment capacity in countries with a comparative advantage in generation. The pools would also smooth temporary irregularities in supply and demand in national markets, owing to differences in peak hours.

The provision of basic social services and public goods such as education, health and infrastruc-

ture, including energy infrastructure, is key to helping to address poverty and other challenges to human development and the empowerment of marginalized and vulnerable social groups. This explains in part why there is a very strong commitment in the Addis Ababa Action Agenda to a social compact, to provide fiscally sustainable and nationally appropriate social protection systems and measures for all, including floors, with a focus on those furthest below the poverty line and the vulnerable, persons with disabilities, indigenous persons, children, youth and older persons.

It is noteworthy that an adequate and reliable supply of electricity is necessary and essential for the provision of basic services in health, communications, education and others. Figure 3 shows a positive correlation between electricity consumption and human development, as measured through the Human Development Index. Jimenez and Olson (1998), for example, find that, if the improved provision of electricity also improves health care, given that vaccines and medication can be properly stored, with exams and tests being adequately conducted and operations undertaken. Some studies (Barnes, 1988; Broadman, 1982; Foley, 1990; Venkataraman, 1990) have also found a positive link between the availability of electricity and an improvement in the rates of literacy and primary school completion. Similarly,

Figure 3: Relationship between per capita Kilowatt hour electricity consumption and the Human Development Index



Source: Economic Commission for Africa calculations with data from International Energy Agency and the United Nations Development Programme.

Table 2: Power pools in Africa

Power pool	Date of establishment	Member countries
Eastern Africa Power Pool	2005	Burundi, Djibouti, the Democratic Republic of the Congo, Egypt, Ethiopia, Kenya, Libya, Rwanda, South Sudan, the Sudan, Uganda, the United Republic of Tanzania
West Africa Power Pool	2001	Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea-Bissau, Liberia, Mali, the Niger, Nigeria, Senegal, Sierra Leone, Togo
Southern African Power Pool	1995	Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, United Republic of Tanzania, Zambia, Zimbabwe
Central Africa Power Pool	2003	Angola, Burundi, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe
Comité maghrébin de l'électricité	1989	Algeria, Libya, Mauritania, Morocco, Tunisia

**Source:** Infrastructure Consortium for Africa, "Regional power status in African power pools report" (2011); Eastern Africa Power Pool; West Africa Power Pool; Southern African Power Pool.

improved access to electricity is known to lower the cost of doing business while also increasing investment and driving economic growth, given that firm productivity improves and is enhanced (Reinikka and Svensson, 1999). A lack of electricity perpetuates inequalities emanating from poor service delivery, thus furthering discrepancies in quality of life and challenging inclusive and sustainable development.

Poor economic governance weakens opportunities for the delivery of quality social services, which undermines human development that could be attained through structural transformation. Evidence suggests that the water, sanitation and sewage sector is "vulnerable to massive distortion in resource allocation and significant procurement-related corruption, and to the opaque budgeting and financial management practices of weak institutions, typical of the civil service" (Plummer et al., 2007). Similar conclusions have been reached about the education, health and electricity sectors. The availability of services is strongly correlated with the prevalence of accountability and the quality of government regulations.

## 2. Strengthening power pools as an institutional resource and mechanism

Power pools (table 2) are an existing institutional mechanism on the continent, and evidence of their positive benefits, highlights the need for continuing efforts towards their development. These benefits range from cost savings to reducing investment costs (Economic Commission for Africa, 2003). In addition to cost-effectiveness, other benefits include enhanced reliability of energy supply, reduced capital and operating costs through improved coordination among power utilities, optimization of generation resources with large units and regional integration. The harmonization of regulatory frameworks for infrastructure development, in particular in the energy sector, can thus take place alongside ongoing continent-wide efforts for regional integration.

Return on cross-border transmission investment, for example, is estimated at 20 to 30 per cent in most power pools (Eberhard et al., 2011). Regional power trade could also see usually worse-off countries, including the Democratic Republic of the Congo and Ethiopia, emerging as major hydropower exporters (annex 1). Small countries,

## Box 2: Anatomy of power pools

A power pool is an arrangement between two or more interconnected electrical systems, which are planned and operated to supply power in the most reliable and economical manner for their combined load requirements. Through these sectoral technical bodies, outputs from various power plants are “pooled” together, scheduled according to cost, technical and contractual characteristics, and dispatched according to this “merit order” to meet demand. Power pools are power-trading and interconnection projects, usually with a clear mandate and sufficient autonomy to implement responsibilities, and a dedicated funding mechanism and career opportunities that attract and retain high-calibre staff. They should also receive substantial capacity-building. The members of a power pool are mostly national electricity utilities (or private companies with a direct interest in the power sector and operating in the region), which have in common clear functions and roles within their national contexts and are less susceptible to immediate political pressures than less technical public agencies.

Cross-border electricity exchange in Africa is mostly characterized by bilateral agreements between vertically integrated power utilities. The first cross-border interconnection was the 132 kV transmission line linking Uganda’s Owen Falls hydropower station to Nairobi for bulk power supply to Kenya since 1958.

Power pooling arrangements vary. Present day examples of these entities include the Central Africa Power Pool for the Economic Commission for Central Africa States; the Comité maghrébin de l’électricité of the Arab Maghreb Union; the Eastern Africa Power Pool for the Common Market for Eastern and Southern Africa; the Southern African Power Pool for the Southern African Development Community; and the West Africa Power Pool for the Economic Community of West African States.

**Source:** Adapted from Eberhard et al., 2011; Economic Commission for Africa, 2003; Infrastructure Consortium for Africa, 2011; Ku, 1997.

such as Botswana, that lack national hydropower resources would benefit from the economies of scale and reduced risks that arise from power pooling.

Existing power pools are not operating at their optimal level, and regional power trading is limited (Eberhard et al., 2011). In a study by the Infrastructure Consortium for Africa (2011), the differing status of power pools in African countries were identified. The Southern African Power Pool is the most advanced, with bilateral contracts signed between member countries, with a competitive day ahead market and an institutional set-up, including market rules and regulations. The Eastern Africa Power Pool, while being the last power pool to be established, has the potential to become fully operational, given that it designs and develops its own power market institutions and rules. However, most power pools in Africa have been found not to meet the requirements and conditions for operationalization (Economic Commission for Africa, 2003, 2005). As of 2016, for example, regional trading had not taken off in the Economic Community of West African States (ECOWAS) through the West Africa Power Pool, although provisions for this exist “on paper”. Even

with a clear mandate and the existence of rules and guidelines in the West Africa Power Pool, rules to enable power trade are only now being put in place. There is yet to be a regional market, given that most trading occurs bilaterally between member countries. The West Africa Power Pool needs a regional control centre and a market operator to settle transactions as it endeavours to become fully functional.

Power pools face an array of constraints and challenges of a financial, capacity-building, institutional and regulatory nature. From a regulatory standpoint, the lack of both a regional legal and regulatory framework for electricity trading and an appropriate mechanism for dispute resolution are major limiting constraints. According to the World Bank, a common legal and regulatory framework is a critical factor in the creation of regional power pools (World Bank, 2008). Regulatory and contractual legislation is also required to manage issues relating to the exchange of energy within and among many countries. Some of the power pools, such as the Central Africa Power Pool, remain fragile in terms of their institutional setup (Infrastructure Consortium for Africa, 2011). In comparative terms, the Comité maghrébin de

l'électricité has the highest connectivity and the best infrastructure, and is linked to the Middle East and Europe. Nevertheless, although power pools have been in existence for many years, their role in driving regional power projects remains challenged.

While funding gaps are a challenge to infrastructure development, if the continent's energy potential is to be realized, improvements will have to be made from an institutional point of view, including a focus on capabilities and improvements in regulation and institutional set-up (African Development Bank, 2013). Given the expansive nature of infrastructure, institutional strengthening also has to occur at the regional level. Moreover, regulatory harmonization and independence and governance design as policy choices can help to facilitate good governance mechanisms and processes, leading to positive outcomes.

### **3. Importance of regulation: strengthening power pools through effective regulatory systems**

Effective regulation is at the core of preserving the public interest, especially in instances of market failure and market absence (Baldwin et al., 2012). The rationale for regulation is extensive, but in the case of utilities, in which monopolies and natural monopolies exist, regulation counters the tendency to raise prices and lower output through predatory pricing, and can harness the benefits of scale economies. By enhancing competition, regulation can help to protect and safeguard the interests of consumers, especially in sectors such as power and water, which are connected to the achievement of social goals.

The issue of regulation is new to the continent. In the case of power pools, which involve multiple stakeholders in various jurisdictions, regulation is needed to maximize the efficiency and effectiveness of their multiple needs and interests. Power pools are created to maximize competition both in the areas of power generation and pricing, and to facilitate openness (equal access) to all market participants. Regulation in power pools operates at both the national and regional levels, governs the exchange of power inclusive of pricing, trans-

portation, and distribution, guides the development of agreements to trade, and is a conflict resolution mechanism.

Noting the variation in tariffs throughout the continent (annex 3), Trimble and Kojima (2016) highlight two factors--including financial sustainability and the ability of households to afford tariffs-- that are important if the continent is to meet demand, while also expanding access. The issue of tariffs in Africa remains a conundrum. On the one hand, they are considered the highest, while, on the other hand, power sector subsidies are considered substantial (Kojima et al., 2014). Tariff-setting methodologies are a major challenge, given that they are not transparent and cost-reflective, thereby deterring investments. These issues can be addressed through effectiveness in regulation.

The regulatory environment in Africa's energy sector is seen as quite complex and uncoordinated, varying significantly between countries. Some 30 African countries have currently established independent electricity regulators, including Burkina Faso, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, the Gambia, Ghana, Kenya, Mali, Nigeria, Rwanda, Senegal and Uganda (KPMG, 2015, p. 10). Some countries, including Ghana, Kenya, Nigeria and Uganda, have also unbundled their State-owned utilities, while others, including South Africa and the United Republic of Tanzania, have not unbundled.

According to Eberhard et al. (2011), worldwide experience shows that improving the regulatory system and environment, including the legal, regulatory and administrative framework, is one of the building blocks for both the implementation of, and efficiency in power pools.

*A regulatory system is the combination of institutions, laws and processes that afford Governments control over the operating and investing decisions of enterprises that supply infrastructure services. As presented by Kapika and Eberhard (2013), the regulatory system can be evaluated in the following three respects: regulatory governance, regulatory substance and regulatory impact.*

The various power pools in Africa are faced with critical gaps in institutional setups and are operating in differing regulatory environments. It is therefore important to take a holistic approach that looks at the administrative, institutional and regulatory issues, which provide for a strong foundation, while also influencing the efficiency and effectiveness of infrastructure through good economic governance.

### III. Effectively regulated power pools/utilities in the context of economic governance in Africa

Regulation is direct government control over specific sectors of the national economy. Governments choose to exercise control over specific sectors for a variety of reasons. For example, the pharmaceutical industry is regulated to protect public health; the ownership of firearms is restricted in the interests of public safety; and the use of the electromagnetic spectrum is regulated to facilitate orderly radio communications. Regulation is most commonly imposed on enterprises that have a monopoly on, or are dominant in the provision of a specific good or service, with the objective of protecting consumers from the abuse by a dominant enterprise. In a competitive market, the consumer can choose to purchase the good or service from a different provider if he/she is dissatisfied with the price or quality being offered. Consumers who depend on monopoly providers have no such choice and, especially in cases in which the enterprise is providing a basic good or service, which they need to be protected against exploitation.

Until fairly recently utility services, including electricity, have been assumed to be natural monopolies. In other words, competition in the provision of those services was deemed to be economically unfeasible. Even today, although such competition has been introduced in a number of countries, in most areas of the world, such services continue to be provided by monopolies. Some form of regulation has therefore been exercised in most countries to limit opportunities for consumer exploitation, especially in the pricing of their services. In a majority of countries utility services have traditionally been provided by State-owned enterprises, with the executive arm of the Government exercising the functions of owner, operator and regulator. The United States of America is an exception to the general rule, given that most utilities in that country are privately owned, and the disadvantages of service provision being regulated by the political administration quickly became obvious. The history of independent util-

ity regulation in the United States stretches over more than 100 years.

In the latter part of the twentieth century, more countries began to involve private enterprises in the provision of utility services. Several reasons accounted for that change, two of which were particularly decisive. One was the realization that private enterprises could provide these services more efficiently, that is, at lower global supply costs, for comparable standards of service. The other reason, of special importance in developing countries, was that Governments were finding it difficult to provide the financial resources necessary for investment in these services, without severe disadvantage to social sectors, such as education and health, in which private enterprise was not willing to invest. Moreover, the operating costs often had to be subsidized as a result of inefficient operations or of tariffs that were kept artificially low in the mistaken belief that the poor would benefit from this. For some Governments, the revenues to be realized from the sale of utility assets were an added incentive for privatization. However, it soon became obvious that, if the regulation of utility services continued to be undertaken by the ministry with responsibility for the relevant sector(s), private entrepreneurs would consider that to be a disincentive to investment. The perceived disadvantages of government regulation are many, but include inconsistent pricing policies, often influenced by political objectives; a short-term focus, normally not extending beyond the next election; unpredictability, especially after changes in Government; inconsistent pricing policies (prices may not reflect costs); a lack of transparency in decision-making; limited accountability to stakeholders; budgetary constraints affecting the quality of decisions; and bureaucracy.

A number of multilateral and bilateral funding agencies began to “encourage” their “client” countries to establish independent agencies to regulate the provision of utility services, thereby cre-

ating an atmosphere more conducive to private investment.

These, and other considerations, led to a rapid increase in the number of regulatory agencies worldwide, including in Africa, in the 1990s.

## IV. Justification for effective regulatory systems in electricity production and distribution

Discussions on regulatory systems distinguish between three aspects or elements of regulation. These are regulatory rules, which are concerned with issues such as rate-making, laws, licence issuances and contracts, regulatory bodies and the regulatory process. While regulatory bodies are responsible for administering and enforcing the rules, the regulatory process, on the other hand, is about the set of measures or steps that regulatory bodies take to discharge their responsibilities. In the present study, the discussion of regulation is limited to regulatory bodies and the regulatory process, which comprise regulatory governance (Smith, 2000).

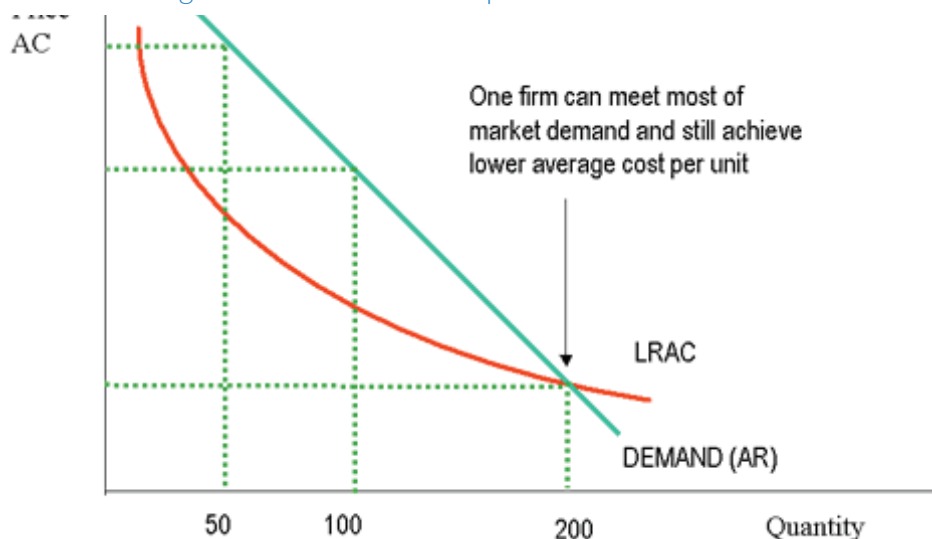
The direct effect of regulation on the wider populations is felt most when regulators make rules and decisions regarding industries that exhibit “natural monopoly” features. These are industries that provide services such as electricity, water, sewage and roads. Furthermore, these industries are critical factors in Governments’ efforts to reduce poverty and to promote growth and development in Africa. To understand the rationale for regulation and to better appreciate its effect, a brief discus-

sion of the economics of the public good and monopolies is in order.

From a theoretical point of view, the rationale used for building and maintaining the regulatory system is tied directly to the potential welfare gains a natural monopoly can provide. Basic principles of economics teach that a “natural monopoly” exists when there is opportunity for economies of scale to be exploited over a very large range of outputs. Natural monopolies are often characterized by industries in which there is a high ratio of fixed to variable costs. For example, the fixed costs of establishing electricity transmission lines are very high, but the marginal (variable) cost of supplying extra units of output may be very small. In cases such as the above, the average total cost will continue to decline as the scale of production increases because fixed costs are being put to work over higher and higher levels of output (figure 4).

The main objective of regulation is to correct the potential economic and social harm resulting from the presence of the natural monopoly described above. Some of the potential harm

Figure 4: Welfare gains from natural monopolies



Source: Economic Commission for Africa staff.



that could arise from such economic relationships are the stifling of innovation and investment in the industry, anti-competitive behaviour by any operator or group of operators, unreasonable price increases and limited access to services. In this regard, regulation is far more than the simple application of guides and rules defined in a law or contract. It requires, on the part of regulators, the application of a degree of discretion in their decisions to protect both customers and service providers. The application of this discretionary power has to be moderated by the presence of elements of good governance.

### Regulatory governance: process

Regulatory governance, as in all other forms of governance, is measured by the basic principles of governance, namely, accountability, transparency and participation. Moreover, regulatory governance has one unique and very important defining feature: independence. In political governance, particular in representative democracies, accountability is responsible for constraining the extent to which elected representatives and other office-holders can wilfully deviate from their mandated responsibilities, thus reducing malpractice such as corruption. The concept of accountability is also widely applied in economic and corporate governance. In this regard, it is taken to mean being held to account, scrutinized and required to give an account or explanation.

The second important element of regulatory governance is transparency and participation. The guiding principle that all regulatory institutions should adhere to is that approaches and practices should be objective, fair and open. Justice must not only be done, but also be seen to be done.<sup>2</sup> Part of the regulator's responsibilities is the duty to keep the public fully informed of its actions, with regulatory proceedings being open and transparent to all stakeholders.

Participation is the hallmark of democracy and good governance. In a regulated market the principal players that actively participate in policy

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<sup>2</sup> United States Agency for International Development, "Best practices guide: implementing power sector reform". Available from [http://pdf.usaid.gov/pdf\\_docs/Pnacq956.pdf](http://pdf.usaid.gov/pdf_docs/Pnacq956.pdf).

design and implementation are the Government, the consumers and the producers. They all have to contribute to the regulatory process. In countries with more advanced systems of regulatory governance, regulators benefit from results obtained through independent research and studies carried out by community-based organizations and other relevant consumer groups. Producers also carry out their own research and studies and present their findings to the regulators with the aim of influencing the outcome of regulatory decisions. Other means of participation include public hearings in which the public is given the opportunity to have a say in the process before any regulatory decisions are reached. If any party feels that the regulators do not adequately address its concerns, then it has the option of litigating its case in court. In short, with regard to participation, the following common principles need to be applied: any party subject to regulation has the right to participate and decisions that may not be objected to are not desirable.

Regulation plays a very crucial role in maintaining and promoting good governance. For regulation to have the desired impact on societal and economic development, the fundamental precondition of independence must be met. Independence in utility regulation contains the following three basic elements:

- a) An arm's-length relationship with regulated firms, consumers and other private interests;
- b) An arm's-length relationship with political authorities;
- c) The attributes of organizational autonomy, such as earmarked funding and exemption from restrictive civil service salary rules, necessary to foster the requisite expertise and to underpin those arm's-length relationships (Smith, 1997).

An arm's-length relationship with both the regulated firm and consumers is an essential element of independent regulation. The regulated firms are often big and financially powerful, with far more resources and expertise. Their capacity to directly or indirectly influence policy outcomes has to be

taken into account. In the same vein, consumers can also wield a considerable influence on regulators.

Consumers vary in size and type. Utility customers are generally categorized into the following three main groups: residential, commercial and industrial. While the residential group, in general, represents the weakest in terms of possessing resources that can be used to influence regulators, the commercial and industrial groups have enormous resources and can exert very real pressure. Regulators accordingly need to adopt an arm's-length approach with regard to these interest groups when managing regulatory institutions.

Political authorities are another group that can challenge the independence of regulators. In a democratic system of governance, citizens elect their political representatives on the basis of what they can deliver to their constituents. In many countries the debate around utility rates is a major election topic. In such circumstances, regulators are constantly under pressure to rule in favour of consumers/voters at the expense of producers/investors. Regulators need to withstand the pressure from politicians and to implement their responsibilities in accordance with their legal mandate.

The third and very important aspect of an arm's-length approach to regulation is the need to have organizational autonomy. Regulatory institutions need earmarked resources giving them the relative freedom to make organizational decisions. For example, hiring experts at higher-level salaries in certain fields may be crucial for the proper implementation of the institution's function. In such situations regulators need not be tied to strict civil service salary scales and terms and conditions of employment.

In advanced countries, measures are taken to ensure the independence of regulators. Among these are ensuring that individuals who head regulatory bodies have fixed-term appointments, with dismissal possible only for illegal activities. Doing so will limit the ability of Governments or political figures to use threats of dismissal as a way

of influencing regulatory decision-making. Other measures include maintaining a separate source of funds for the operation of the regulatory body. It sometimes happens that the regulated industries themselves should provide funding through licence fees and other forms of service charges. Lastly, a very important attribute that independent regulators, especially in utility regulation, should have is the power to approve the tariff without sanctions from government officials, thereby preventing direct political input into setting the process (Kennedy, 2003). Governments often find that they have economic responsibility. Ministers are accordingly usually unwilling to allow someone else to approve prices. Utility regulators may set the tariff but may not approve the price.

### **Regulatory governance: institutional framework (bodies)**

In many developed countries, the institutions that are tasked with enforcing the rules and regulations of an industry are commonly called commissions. Their presence is, in general, more pronounced in the following industries: securities (capital market), insurance and banking and monopolistic markets such as utilities. Defining the structure, scope and powers of a given regulatory institution is essential for the establishment of a successful commission. These definitions include the following: independence from political process and independence from regulated enterprise; a broad mandate to protect the public interest; and technical expertise in the functions and business of the regulated enterprise.

While regulation and regulatory institutions do indeed vary from industry to industry and from country to country, the general features and processes that they adopt resemble the following:

- d) Public statutes outlining the standards or statements of expectations;
- e) A process of registration or licensing to approve and permit the operation of a service, usually by a named organization or person;
- f) A process of inspection or another form of ensuring standards compliance, or reporting

and managing non-compliance with these standards;

- g) Where there is continuing non-compliance, a process of delicensing can be triggered whereby that organization or person is judged to be operating unsafely and may be ordered to stop operating to ensure compliance with the law.

Another very critical dimension of utility regulation is the trust and confidence of the public in the regulatory institution. One way of reassuring the public is by maintaining and demonstrating the independence of the commission. The public must have confidence in the system and in the individuals who serve as commissioners. A commissioner is expected to maintain a high degree of integrity in both rhetoric and action. The staff of the regulatory commission are required to adhere to a strict code of conduct. The commission or the regulator needs to make every employee aware of these codes and to ensure that they are applied.

In general, the code of conduct could include:

- a) A prohibition of any ownership, gratuity or other material economic interest in the regulated utility;
- b) A prohibition of any ownership, gratuity or other material economic interest in any consumer or consumer group affected by any commission decision;
- c) A prohibition of ex parte communication with parties in a pending matter;
- d) A prohibition of political influence or interference.

To effectively implement its mandate, a regulatory commission needs to be staffed by competent and motivated personnel. The regulatory body should be structured in a manner that clearly demarcates accountability and responsibility. In countries such as the United States, where regulatory practices are very advanced, the regulatory bodies have adopted the following general organizational structure:

- a) Administrative staff;
  - i. Budget;
  - ii. Personnel;
  - iii. Records and archives;
- b) Advocacy staff, including attorneys, economists, accounts and engineers;
  - i. Rate tariff analysis;
  - ii. Development of public policy issues and positions;
  - iii. Representation of consumers and other public interest groups, especially those not otherwise represented in any given proceeding;
  - iv. Hearing officers or administrative law judges conducting hearings and recommending decisions to the commission;
- c) Commission advisory staff, including attorneys, economists, accountants and engineers;
  - i. Direct expert advice to commissioners;
  - ii. Policy analysis;
  - iii. Rate and tariff analysis.

As one can see from the above, the commission or the regulatory body has a separate advocacy department that is concerned with the welfare of consumers. The commission has also its own hearing officers who preside over cases in which there is disagreement between producers and advocacy. The commissioners' or regulators' decisions are always informed by the result of these processes.

In terms of regulatory governance in Africa, a significant number of countries embraced independent regulatory institutions as part of reforms implemented to address the crisis experienced in the power sector in the 1990s. Doing so saw a shift of the regulatory function from government min-

istries to new autonomous entities, even if some countries were noticeably reluctant to set up independent regulatory agencies. By the end of 1997 only Ghana, Kenya, Malawi and South Africa had set up independent regulatory agencies. By 2001, they had been joined by another handful of countries (Karekezi and Kimani, 2002, p. 6). As an example of slow evolution, the regulatory authority of the United Republic of Tanzania became operational in 2006, even though the legislation for its establishment had been passed in 2001.

In general, the functions of the regulator are to issue licences, to approve and enforce tariffs and to approve power purchase agreements, while also enforcing quality standards. However, there are some differences in the mandate and functions of the regulator among countries. In some national legislation the regulator's functions have been extended to other sectoral responsibilities, such as planning and procurement. Kenya's sectoral legislation ensures that the regulator is responsible for planning, specifically to prepare the indicative national energy plan,<sup>3</sup> while, in Zambia, the regulator is empowered to enact subsidiary regulations. Ghana is a unique example, with two regulatory agencies, one for issuing licences and the other to set tariffs and enforce standards. Thus, various arrangements are possible in different contexts (table 3).

### Independent regulation and prioritizing effectiveness

As noted above, countries considering the introduction of the regulation of utility services were invariably advised by the funding agencies and consultants to establish "independent regulators". There is, however, no universally accepted definition of what is meant by "independent" in this context, and the question "independent of whom" may therefore be legitimately asked. To some, the regulator's independence refers to arm's-length relationships with regulated service providers. For example, the World Trade Organization, in its schedule of specific commitments for telecommunications services, defines an "independent regulator" as the regulatory body separate from

<sup>3</sup> See mandate of the Energy Regulatory Commission of Kenya. Available from [www.erc.go.ke/](http://www.erc.go.ke/).

and not accountable to any supplier of basic telecommunication services. To many others, "independence" implies freedom from interference by the executive arm of the Government in the conduct of regulatory affairs. Another group, that was formed primarily by the providers of utility services, may be concerned that the regulator, in the hope of obtaining popular approval, may become a consumer advocate, paying undue attention to consumer demands for lower prices or unreasonably high levels of service.

A truly independent regulator will function at an arm's-length relationship with all stakeholders. Arm's length in this context means that regulatory decisions are not influenced by special considerations (favourable or unfavourable) given to any of the parties involved. Such decisions and any resultant actions have to be taken in accordance with transparent processes and within the context of a clearly defined legal framework. It is the regulator's responsibility to establish, to the greatest extent feasible, the proverbial level playing field in which the interests of all stakeholders are considered. No stakeholder should receive preferential treatment or have reasonable grounds to consider itself unfairly disadvantaged.

While independence is a critical attribute of the regulator, its effectiveness remains paramount. The concept of a fully independent regulator has not been favourable to some African countries for a number of reasons, including the political economy of the country in question. As a result, some Governments have been reluctant to grant full autonomy to institutions outside the conventional State structures. It is therefore important to focus more on the functionality and effectiveness of regulatory bodies than on their autonomy or independence. While independence is ideal, it does not always guarantee regulatory effectiveness. Egypt and Morocco, for example, have regulatory bodies which are effective, although not independent from Government. The focus should therefore be on regulatory bodies' effectiveness and not always on their independence.

The real effectiveness of a regulatory body can be assessed by looking at a set of elements. These

Table 3: Regulatory authorities in Eastern Africa Power Pool member countries

Country	Institutional design
Burundi	(Data unavailable)
Democratic Republic of the Congo	The National Energy Commission is responsible for monitoring the energy sector in the country. The Commission consists of an advisory committee, chaired by the Minister for Energy, and a permanent secretariat, la Société nationale d'électricité
Djibouti	Ministry of Energy and Natural Resources, established under the Office of the President, sets the rules and regulations for the sector. The regulatory function is performed by the Directorate of Energy of the Ministry
Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency
Ethiopia (separate independent regulator)	The Ethiopian Energy Authority is established under the Ministry of Council Regulation No. 308/2014 to accomplish duties and responsibilities that are given by the Energy Proclamation No. 810/2013 with the objective of regulating energy efficiency and conservation, in addition to the powers and duties vested in it to regulate the electricity sector
Kenya	The Energy Regulatory Commission is established under the Energy Act 2006, with functions to regulate electrical energy, petroleum and related products, renewable energy and other forms of energy
Libya	Libyan Electricity Market Regulatory Authority
Rwanda	Rwanda Utilities Regulatory Authority, created under Law No. 39/2001 of 13 September 2001 with the mission to regulate specific public utilities, namely, telecommunications services, electricity and water. Electricity is regulated through three units within the Authority namely, the Energy Unit, the Legal, Licensing and Enforcement Unit and the Industry and Consumer Affairs Unit, to cater to all technical, economic and legal aspects of regulation
Sudan	Sudan Electricity Regulatory Authority
United Republic of Tanzania (separate independent regulator)	The Energy and Water Utilities Regulatory Authority is an autonomous multisectoral regulatory authority established by the Energy and Water Utilities Regulatory Authority Act (Chapter 414, Laws of Tanzania). It is responsible for the technical and economic regulation of the electricity, petroleum, natural gas and water sectors in the United Republic of Tanzania
Uganda (separate independent regulator)	The Electricity Regulatory Authority was established in 2000 in accordance with the Electricity Act 1999 (Chapter 145, Laws of Uganda) to regulate the generation, transmission, distribution, sale, export and import of electrical energy in Uganda and to guide the liberalization of the electricity industry, while managing licensing, rates, safety and other matters concerning the industry

Source: Eastern Africa Power Pool.

include the functionality or dysfunctionality of its decisions, the impact of the regulator's decisions, for example, whether the decisions are moving the regulator towards achieving the set objectives and the goals of regulation, such as cost-efficiency and quality of service (Brown, et al., 2006, p. 41). Other determinants of effectiveness relate to staff capacities and the skills and financial resources needed to implement daily tasks, as well as the political support required. However, any assessment of effectiveness has to take into account the

context in each country, including the political conditions.

The degree of independence varies depending on the institutional design adopted in the specific country. Three major types of regulatory institutions have been identified: the independent non-ministerial regulatory agency, the autonomous ministerial entity and the advisory non-ministerial regulatory entity (Brown, 2001). The independent non-ministerial regulatory agencies are established as separate and fully independent

agencies with final decision-making authority. On the other hand, the autonomous ministerial entities are created within the Ministry of Energy, with the Minister retaining the final decision-making authority. The third category of regulatory institution advises the Minister, who is not legally bound to implement its recommendations. For example, in Namibia the regulator does not have full power to issue licences but only makes recommendations to the Minister responsible for energy (Kapika and Eberhard, 2013, p. 10). However, in all three approaches to regulation, the relevant Ministries retain their overall policy guidance functions in the sector (Eberhard et al., 2011).

### Regulations governing power pools

Regulation of the cross-border electricity trade in Africa has evolved over the years, beginning with the historical bilateral agreements that were signed between State-owned vertically integrated power utilities (Economic Commission for Africa,

2003). Some of the first bilateral agreements were signed between the Democratic Republic of the Congo and Zambia in 1950, between Uganda and Kenya in 1955 with their respective State-owned, vertically integrated utilities. Over the years, these agreements have been amended to address growing national demand for electricity. Power-pooling arrangements were later established as a result of increased awareness of the need to promote cooperation in the power trade at a subregional level and to address the challenge of uneven distribution of power resources among countries.

Power pools are regional institutions that are designed to bring together individual power authorities of member countries under one umbrella organization, with the aim of enhancing the generation, transmission and distribution of power (see box 3 for an illustration). There are currently five subregional power pools in Africa. They are set up to address the primary concern of Gov-

#### Box 3: Southern African Power Pool

The Southern African Power Pool was created with the primary aim of providing a reliable and economical electricity supply to the consumers of each of its members, consistent with the reasonable utilization of natural resources and its effect on the environment.

##### Vision

- To facilitate the development of a competitive electricity market in the Southern African region
- To give the end-user a choice of electricity supply
- To ensure that southern Africa is the region of choice for investments by energy-intensive users
- To ensure sustainable energy developments through sound economic, environmental and social practices

##### Objectives

- To provide a forum for the development of a world-class, robust, safe, efficient, reliable and stable interconnected electrical system in the southern African region
- To coordinate and enforce common regional standards of quality of supply and the measurement and monitoring of systems performance
- To harmonize relationships between member utilities
- To facilitate the development of regional expertise through training programmes and research
- To increase power accessibility in rural communities
- To implement strategies in support of sustainable development priorities

##### Values

- Respect others and develop mutual trust
- Honesty, complete fairness and integrity in dealing with issues
- Selfless discharge of duties
- Full accountability to the organization and its stakeholders
- Encourage openness and objectivity

Source: Southern African Power Pool.

ernments regarding the lack of growth in national power grids capable of delivering reliable electricity supply to their citizens at affordable prices.

Based on the economic geography of the power sector in sub-Saharan Africa, the regional power market has many potential benefits. The Southern African Power Pool was created as the first power pool in 1995 as a specialized institution of the Southern African Development Community (SADC) through the signing of an intergovernmental memorandum of understanding in August 1995 (Kambanda, 2013). Power trade among the utilities is regulated by an inter-utility memorandum of understanding between State-owned power utilities of member countries. Other power pools were established much later as specialized agencies of their relevant regional economic communities.

All power pools have some form of overarching legal frameworks for cooperation in energy sector development (table 4). This is broadly articulated in the treaties and protocols of the relevant regional economic communities. Specific instruments were enacted to establish and operationalize power pools as specialized agencies of the sub-regional bodies. In SADC and the Common Market for Eastern and Southern Africa (COMESA), the signing of intergovernmental memorandums of understanding led to the establishment of power pools, while, in the case of ECOWAS the power pool was created by a decision of the summit of Heads of State and Government. The power trade is regulated at three levels: the national regulatory bodies, the regional regulatory associations, which are a loose network of national regulators within a specific power pool, and the regional regulatory institutions.

African Governments have increasingly adopted new regional, bilateral or multilateral approaches that emphasize better coordination and “pooling” of electricity trade. These efforts are aimed at creating more efficient and dynamic regional power grids with the potential to lower capital investment requirements across time, while also minimizing operational costs.

A critical factor of success in creating regional power pools is the extent to which Governments and the operators of their relevant national power grids, typically referred to as the transmission system operators, are able to define and observe the provision of a common legal and regulatory framework to facilitate the attainment of regional objectives. These may include issues such as granting permission for utilities to enter into contracts and providing guarantees regarding obligations resulting from an interconnection contract. Regulatory issues may also include enhancing currency convertibility for the payment of energy purchases, binding arbitration, force majeure and applicable law. In short, power pool regulation establishes key principles to be complied with when establishing and enforcing rules of practice covering technical planning, operations and the commercial aspects of regional power system integration.

Power pools are essential institutions for economic development. They are also excellent vehicles for regional economic and social integration. However, notwithstanding high hopes for the power pools, power trade among countries in the region remains limited owing to various reasons. The harmonizing of regulations is one way in which conditions more favourable for trading can be created.

Table 4: Legal instruments in selected power pools

Power pool	Legal and regulatory framework	Institutional design
West Africa Power Pool	<p>The ECOWAS revised treaty and energy protocol provides for regional coordination in energy development among member countries.</p> <p>The West Africa Power Pool was established by a decision of the twenty-second summit of the ECOWAS Heads of State and Government in November 1999, and was subsequently adopted as a specialized institution of ECOWAS in 2006.</p> <p>The ERERA Establishment Act and ERERA Operations Act prescribes its powers and functions, as well as the functions of the regulatory council and of the dispute settlement mechanism.</p> <p>Regional market rules and guidelines</p> <p>West Africa Power Pool regional market rules were approved by the Regulatory Council in 2015</p> <p>West Africa Power Pool operational manual</p> <p>West Africa Power Pool business plan for the period 2012-2015</p> <p>Transmission tariff methodology</p> <p>Power sector regional regulation mechanism</p> <p>Principles of regulating clean energy in the ECOWAS region</p>	<p>Four governing bodies of the West Africa Power Pool are responsible for the decision-making process: the general assembly, the executive board, the organizational committees and the general secretariat</p> <p>The ECOWAS Regional Electricity Regulatory Authority (ERERA), established in 2008 as a specialized institution of ECOWAS, is the regional regulator for cross-border electricity exchanges within the subregion</p> <p>The regulatory council is the governing body of ERERA, with a technical unit responsible for regulatory matters</p> <p>The consultative committee of regulators and operators assists the regulatory council in its decision-making through the holding of stakeholder consultative meetings</p>
Eastern Africa Power Pool	<p>The COMESA treaty is the overarching framework for cooperation in the energy sector in the sub-region.</p> <p>The COMESA model energy policy framework (2008) provides guidelines for the harmonization of energy policies among member countries</p> <p>Following its establishment, an inter-utility memorandum of understanding was signed by the national utilities of member countries</p> <p>Eastern African Power Pool regional master plan (2014)</p> <p>Interconnection code rules on market, operations and procedures are still work in progress</p>	<p>The organizational structure comprises the Council of ministers (the main decision-making body), the steering committee, the permanent secretariat and the technical subcommittees</p> <p>An Independent regulatory board was established in 2012 to regulate electricity trade in the power pool.</p> <p>The Regional Association of Energy Regulators of Eastern and Southern Africa provides a platform for capacity-building among national utilities.</p>
Southern African Power Pool	<p>The governance framework for cooperation in energy development is defined in the following: the SADC treaty and the SADC protocol on energy, the SADC energy cooperation policy and strategy (1996), and the SADC energy action plan (1997)</p> <p>SAPP was established when SADC members signed the inter-governmental memorandum of understanding in 1995</p> <p>The inter-utility memorandum of understanding signed between national utilities sets out the management and operating principles of the Southern African Power Pool</p> <p>Other regulatory frameworks include the agreement between operating members, which prescribes rules of operation and pricing, and the operating guidelines, which set out market standards and operating guidelines</p> <p>Market rules</p> <p>Day-ahead market rules</p> <p>Day-ahead market participation agreement</p>	<p>The SADC energy ministers are responsible for major policy decisions</p> <p>The SADC directorate of infrastructure and services</p> <p>The executive committee acts as the Board of the Southern African Power Pool and its governing authority</p> <p>The management committee oversees the administration of the Southern African Power Pool</p> <p>Various subcommittees under the direction of the management committee include subcommittees on planning, operations and the environment</p> <p>The coordination centre administers and monitors the activities of the Southern African Power Pool</p> <p>The Regional Electricity Regulators Association of Southern Africa was established in 2002, with the objective of harmonizing regulatory frameworks of member countries.</p>

Source: *Instruments establishing the Power Pools*



## V. Harmonizing regulatory regimes in power pools

A common legal and regulatory framework is one of the prerequisites for establishing regional power pools (World Bank, 2008). A harmonized regulatory framework is necessary to provide uniformity of trading rules among countries and among private players in the power pool. It reduces trade barriers, provides a dispute-settlement mechanism and improves effectiveness in power trading. Over the years, regional economic communities have taken notable steps to promote regional cooperation in the energy sector, with the aim of harmonizing national energy laws and policies. First, treaties establishing regional economic communities contain explicit commitments on cooperating in infrastructure development, in particular in the energy sector. Second, regional bodies were established to coordinate the harmonization process among member countries. For example, SADC established the Regional Electricity Regulators Association of Southern Africa as a platform for cooperation between independent electricity regulators within SADC member countries. Beyond forming the Regional Association of Energy Regulators for East and Southern Africa, the COMESA region took a further step towards developing guidelines for energy policy cooperation.

Notwithstanding the progress made to date, legal and policy harmonization in the energy sector is still far from being attained. This is most apparent in the electricity subsector, in which cross-border power trade in Africa has historically been regulated by long-term bilateral agreements. Africa's power pools hardly meet the regulatory prerequisites necessary for their establishment and operation. Countries currently rely on bilateral agreements or market rules to regulate cross-border trade. Various factors explain the lack of harmonized frameworks for regional power trade in Africa, noting that regulation takes place at three levels: the national regulatory bodies, regulatory associations, which are a loose network of national regulators within specific power pools, and the regional regulatory institutions.

### 1. Regulatory experiences of the various power pools

The power pools are at different stages of development when it comes to regulation and have varying institutional designs. As of 2016, the West Africa Power Pool had the strongest regulator: the Regional Electricity Regulatory Authority, which was formed when member countries signed a treaty. Other power pools could learn useful lessons from this: for example, the Regional Electricity Regulatory Authority, as an institution of ECOWAS, has a clear mandate and functions. The independent regulatory board of the Eastern Africa Power Pool, on the other hand, was formed through the signing of a memorandum of understanding, weakening its regulatory power. The Central Africa Power Pool is currently working on a legal document to create a regional market, following the adoption of market rules in 2009 by Heads of State. Although the grid code is already adopted, there is a need for a regional regulator to manage this process. The regional regulatory framework, market structure, and rules of the Comité maghrébin de l'électricité are yet to be defined and to be implemented, and, although the region is well interconnected, the actual level of power exchange is still far below the expected level, which is an indication of how a good regulatory framework can attain this. The Southern African Power Pool is also in need of a regional regulator to attain regulatory powers and to complement regulators at a national level.

The key elements of an effective regulatory system are defined by structure, clarity of scope and mandate, which determine the powers of regulatory institutions. In Africa, regulatory development and evolution currently vary, with the various power pools having the different mandates and approaches to rule-making and processes set out below.

## **West Africa Power Pool**

### **Rules**

The rule-making process in ECOWAS is well developed, compared with that in other power pools. The plan is to put in place a robust framework and, subsequently, to develop the market. The ECOWAS treaty and energy protocol provides the overarching framework for collaboration in cross-border electricity trade. These regional instruments are supplemented by the national legislation of member countries.

### **Institutional design**

The West Africa Power Pool has a strong regulator in the Regional Electricity Regulatory Authority, which was established by supplementary legislation as a specialized institution of ECOWAS. The Authority sets the market entry requirements, although any utility wanting to participate at the regional level must also be licensed in the national market.

### **Process**

This follows a hierarchy of decision-making processes. Rules are initiated by the relevant ECOWAS committee, in consultation with the utilities. The consultative process with the regulatory body is participatory, involving various stakeholders. The Regional Electricity Regulatory Authority is responsible for approving the rules that must ultimately be adopted by the Council of Ministers. The Authority's regulatory council plays the role of implementation and enforcement. The Authority provides opportunities for replication and lesson learning by other power pools.

## **Eastern Africa Power Pool**

### **Rules**

The Eastern Africa Power Pool has made significant progress in developing regulatory and institutional frameworks, including the intergovernmental and inter-utility memorandums of understanding, which led to the establishment of the Power Pool. Beyond this, COMESA subregion spearheaded the development of guidelines for power trade in the entire subregion. Examples include: guidelines on power purchase and joint grid electrification, as well as investor guidelines for the electricity sector. It is expected that these will be adopted at the

technical and ministerial levels in the Eastern Africa Power Pool.

### **Institutional framework**

The independent regulatory board was established as the regulatory arm of the Eastern Africa Power Pool. The national electricity regulators of the member countries also belong to the Regional Association of Energy Regulators for Eastern and Southern Africa, through which they benefit from capacity-building programmes. The Association does not play a regulatory function but provides a platform for capacity-building and information-sharing among its members.

### **Processes**

The independent regulatory board reports directly to the Council of Ministers and is accountable to the national regulatory agencies. However, its dispute resolution mechanism is not yet operational.

## **Southern African Power Pool**

### **Rules**

The SADC treaty and the SADC protocol on energy provide the framework for regional cooperation in the development of energy. The intergovernmental memorandum of understanding established the Southern African Power Pool, while the memorandum of understanding set out management and operating guidelines. While the Power Pool has reached an advanced stage of development, member countries have made unilateral efforts to develop their rules by including tariff systems and wheeling arrangements.

### **Institutional design**

The Regional Electricity Regulatory Association was established as an organ of SADC and not as part of the Southern African Power Pool institutional structure. The Association consists of the national regulatory bodies of SADC member countries. Its major functions are to facilitate the harmonization of energy policies, to build capacity and to provide a platform for sharing experiences among member countries. SADC countries are also members of the Regional Association of Energy Regulators for Eastern and Southern Africa. A total of 10 of 19 members are part of the Regional Association of Energy Regulators for Eastern and Southern Africa, although

all countries participate in its meetings. SAPP does not have a regional regulator. This is considered to be the next major step that the regional economic community will work towards attaining.

### Central Africa Power Pool

#### *Legal and regulatory framework*

A total of 9 of the 12 member countries in the Central Africa Power Pool have a national regulator. The Power Pool has yet to finalised regional level regulation. The regional regulatory body is expected to be fully created in the near future. There are many interconnections occurring in the region. There is need for a regional regulator to manage the process, with the West Africa Power Poo providing lessons in this regard.

### Comité maghrébin de l'électricité of the Arab Maghreb Union

#### *Legal and regulatory framework*

The Comité maghrébin de l'électricité is the only power pool that preceded the establishment of the regional economic community. It was established in 1972 by three utilities from Algeria, Morocco and Tunisia. Two other utilities from Libya, Mauritania joined later. The Arab Maghreb Union was established much later and adopted the Comité as its specialized agency. Its key objective is to promote power industry integration in the Maghreb region.

#### Box 4: Eastern Africa Power Pool member countries



Source: Eastern African Power Pool.

### *Institutional framework*

The Comité maghrébin de l'électricité consists of a steering committee and the general secretariat. As is the case with other power pools, the planning and implementation of regional activities is done through its six committees, which include the planning and studies commission, the technical commission and the interconnections commission.

## 2. Regulatory system of the Eastern Africa Power Pool: challenges and opportunities

Findings from the survey instrument on the Eastern Africa Power Pool (annex 5) show that the Power Pool is an entity whose regulatory substance (the “what” of regulation) is at an advanced stage but whose regulatory governance (the “how” of regulation) and regulatory impact leave much to be desired. This is because they are still under development and are highly dependent on the actions and decisions of others, including the Council of Ministers and the steering committee”, as was stated by officials at the Power Pool. It is also in these two dimensions of regulation that key gaps currently exist, and in which opportunities for advancement and evolution lie, in order to mitigate challenges.

As an intergovernmental entity, the Eastern Africa Power Pool was established in 2005 through the signing of an intergovernmental memorandum of understanding between seven member countries represented by ministers of energy. Subsequently, the inter-utility memorandum of understanding was signed by the national utilities of those members which had signed. The Power Pool currently covers 11 member countries (see box 5) that exercise their membership through their representatives in the various organs of the Power Pool. The Power Pool is established in the spirit of the New Partnership for Africa’s Development to address power supply shortage, poor access (table 1) and supply reliability and quality, as indicated in the preamble to the intergovernmental memorandum of understanding.

The Eastern Africa Power Pool is located in a dynamic region where energy demand, popula-

Table 5: Electrification rates in Eastern Africa member countries (Per cent)

Country	National	Urban	Rural
Burundi	5	28	2
Democratic Republic of the Congo	9	19	2
Djibouti	50	61	14
Egypt	100	100	99
Ethiopia	24	85	10
Kenya	20	60	7
Libya	100	100	99
Rwanda	21	67	5
Sudan	35	63	21
United Republic of Tanzania	24	71	4
Uganda	15	55	7

Source: International Energy Agency, "World energy outlook 2015".

tion and economies are growing fast, in the light of existing low levels of electrification (table 5). The region already represents 39 per cent of Africa in terms of population and is the most endowed area in terms of renewable energy resources (International Renewable Energy Agency, 2014). Existing interconnections in the region include the Egypt-Libya, Ethiopia-the Sudan, Ethiopia-Djibouti and Kenya-Uganda interconnections (part of the subprogramme of the Programme for Infrastructure Development in Africa on the Ethiopia-South Africa eastern transmission backbone, which are all used for bilateral exchanges on the basis of long-term power purchase agreements, and the Burundi-Democratic Republic of the Congo--Rwanda interconnection that is used to share energy from the jointly owned Ruzizi II hydropower plant. Annex 2 also shows ongoing transmission projects.

A number of interconnection projects are currently under implementation in the region, and the existence of the Eastern Africa Power Pool can, according to the Power Pool secretariat, be used to justify investment needs as surplus power that could be traded within the region through the power pool. In addition to the already identified large hydropower, geothermal and biomass resources, discoveries of new oil and gas deposits are now enriching the region's energy resources. With the completion of the ongoing power infrastructure projects and those in the pipeline, the Eastern Africa Power Pool is evolving into Africa's biggest power pool in terms of connectivity, installed capacity and geographic coverage. Regional power market studies carried

out by Power Pool indicate attractive financial benefits and improved system reliability, with most of its member countries having a national regulator (table 6). It is noteworthy that the strength of national level regulators has an effect on the effectiveness and strength of those at the regional level. Indeed, a major strength of Power Pool is that it has established the independent regulatory board, an achievement in line with its progress on regulatory substance. However, as was stated by Power Pool officials, a good power pool needs to comply with common operations, planning and implementation standards, as well as with resources and leadership. They also stated that there was a need to strengthen the institutional capacity of the EAPP.

### 3. Independent regulatory board of the Eastern Africa Power Pool: a potential regional regulator

#### Establishment

On 20 January 2012, the national regulators/energy ministry representatives of Burundi, the Democratic Republic of the Congo, Egypt, Ethiopia, Kenya, Rwanda, the Sudan, the United Republic of Tanzania and Uganda held a meeting in Nairobi to deliberate on regulatory issues of the Eastern Africa Power Pool. They also formed the Power Pool regulatory forum to lead and facilitate the establishment of the independent regulatory board. At the meeting, the forum elected the United Republic of Tanzania as Chair and Ethiopia as secretary and agreed on a temporary secretariat to be co-located with the headquarters of the Power Pool. On 14 February 2012, after deliberating intensively on all

current issues, the forum formulated recommendations to be presented to the Council of Ministers.

On 30 March 2012 the Council of Ministers, at its fifth meeting held in Addis Ababa, converted the Eastern Africa Power Pool regulatory forum into the independent regulatory board (see box 5 and annex 4), to be located at the Power Pool's permanent secretariat in Addis Ababa for the foreseeable future, until conditions are deemed appropriate for a review.

## Overview

The independent regulatory board, guided by the policy decisions of the Council of Ministers and deriving its authority from the intergovernmental memorandum of understanding, imposes the regional market rules and grid code on the Eastern Africa Power Pool and its participants. The Board monitors and enforces adherence to the rules, arbitrates in disputes, sets regulated tariffs and wheeling charges for regional transmission lines and carries out all duties pertinent to the role.

According to the declaration of the fifth Council of Ministers, the independent regulatory board will

Table 6: Regulation in Eastern Africa Power Pool member countries

Country	National regulator	Regulatory activities handled by	Status of the regulatory sector
Burundi	Burundi Agency for Regulation and Control of Water and Electricity (Agence de contrôle et de régulation du secteur de l'eau potable et de l'électricité)	Ministère de l'énergie et des mines	No institutional framework for electricity regulation
Democratic Republic of the Congo	Not available	Ministry of Energy	No institutional framework for electricity regulation
Djibouti			
Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency	Egyptian Electric Utility and Consumer Protection Regulatory Agency	Not fully independent, is under Minister of Electricity and Energy
Ethiopia	Ethiopian Energy Authority	Ethiopian Energy Authority but under the Minister of Water and Energy	The Ethiopian Energy Authority exists legally, but the transmission and supply of electrical energy through the integrated national grid system is exclusively reserved for the Government, which acts through its agent, Ethiopian Electric Power
Kenya	Energy Regulatory Commission	Established in 2007 under the Energy Act as an autonomous, independent energy sector regulator	Modern legal and regulatory framework exists
Libya			
Rwanda	Rwanda Utilities Regulatory Agency	Rwanda Utilities Regulatory Agency	Under the Ministry of Infrastructure. The Board intervenes mostly in the telecommunications sector
Sudan	Electricity Regulatory Authority	Electricity Regulatory Authority	Under the Ministry of Energy and Mining. The Electricity Regulatory Authority reports to the Ministry
Uganda	Electricity Regulatory Authority	Electricity Regulatory Authority	Modern legal framework exists
United Republic of Tanzania	Energy and Water Utilities Regulatory Authority	Energy and Water Utilities Regulatory Authority	The Energy and Water Utilities Regulatory Authority Act is a modern legal framework

Source: Eastern Africa Power Pool and National Energy Legislations.

report to the Council as opposed to the Steering Committee (under the 2005 intergovernmental memorandum of understanding). The Board reports directly to the Council in the sense that it presents an annual report of its activities to the Council in order to comply with the best practices of transparency and accountability.

The vision of the independent regulatory board is to be a world-class regional power sector/energy regulator that fosters investment and enhances the reliability of the power/energy supply in the Eastern Africa region. Its mission is to provide regulatory services to the regional power market in an efficient, transparent and non-discriminatory manner and thereby contribute to its sustainable development.

### **Mandate**

The detailed mandates of the independent regulatory board are the following:

- i. Issue operating licences to qualified market participants in accordance with the approved market rules and regional grid code;
- ii. Regulate relevant activities of the signatories of the inter-utility memorandum of understanding;
- iii. Approve formulas for calculating the Eastern Africa Power Pool regional transmission and wheeling tariffs in the approved methodology or methodologies;
- iv. Formulate and propose any modifications to the financing formulas of regional institutions, such as the Power Pool's permanent secretariat and the coordination centre;
- v. Approve modifications to subsequent versions of the Power Pool's regional market rules and its interconnection code, standards, procedures and specifications, and enforce standards procedures and specifications;
- vi. Recommend changes to the national legislation of the Power Pool's member countries to facilitate the development of the Power Pool's

regional power trade and the continuing progress of the Power Pool towards realizing a competitive electricity market;

- vii. Follow up on and monitor the performance of the regional power trade, propose modifications as necessary and present an annual performance report to the Council of Ministers;
- viii. Settle any electricity cross-border or trading disputes that may arise between the members of the Power Pool's regional power market;
- ix. Ensure the transparency and availability of information for all stakeholders; Coordinate, monitor and enforce environmental guidelines for regional projects;
- x. Impose penalties and sanctions on non-compliance with market rules, grid codes and any other applicable rules and regulations.

### **Financial and human resources**

The independent regulatory board receives its financial and human resources from the Eastern Africa Power Pool general secretariat, following a decision by the Council of Ministers that it be located at the Power Pool's general secretariat. Unfortunately, there has not been enough financing to enable the institution to attain the level required by power pool market regulations.

### **Member regulators**

The independent regulatory board has 11 member countries: Burundi, the Democratic Republic of the Congo, Djibouti, Egypt, Ethiopia, Kenya, Libya, Rwanda, the Sudan, the United Republic of Tanzania and Uganda. The member countries' national regulatory bodies or ministries responsible for energy/electricity affairs in countries that have not established an independent energy/electricity regulator are shown in table 7.

## **4. Strengths and weaknesses of the independent regulatory board**

The independent regulatory board was formally established in March 2012. It is currently coordinating various activities, including the Ethiopia-Kenya-Tanzania transaction wheeling

Table 7: Alternative regulators in Eastern Africa Power Pool member countries

Country	Entity
Burundi	Burundi Agency for Regulation and Control of Water and Electricity
Democratic Republic of the Congo	(Agence de contrôle et de régulation du secteur de l'eau potable et de l'électricité)
Egypt	Ministry of Energy and Water Resources (has no regulatory body)
Ethiopia	Egyptian Electric Utility and Consumer Protection Regulatory Agency
Kenya	Ethiopian Energy Authority
Rwanda	Kenyan Energy Regulatory Commission
Sudan	Rwanda Utilities Regulatory Authority
United Republic of Tanzania	Sudan Electricity Regulatory Authority
Uganda	Tanzanian Energy and Water Utilities Regulatory Authority
	Electricity Regulatory Authority

Source: Eastern Africa Power Pool.

agreement and tariff study. With the support of development partners it has developed a dispute resolution mechanism and a uniform system of accounting useful for tariff calculations, as well as several other documents.

According to Eastern Africa Power Pool officials, the independent regulatory board is not yet strong. Emphasizing to potential partners the importance of power pools in infrastructure development can alleviate major weaknesses, thereby helping to make it fully operational.

A study conducted by the Eastern Africa Power Pool confirmed that the national energy policies of all member countries support regional power trade. While the harmonization of operational standards is very important in enhancing this trade, full harmonization has not been made a priority to enable interconnectivity. The focus up to date has been on ensuring that utilities trade across borders. Nevertheless, harmonization of technical parameters is required if systems are to remain sustainably synchronized and if cross-border trade is to operate smoothly.

## 5. Challenges in harmonizing regulations for power pools

### Inadequate political support

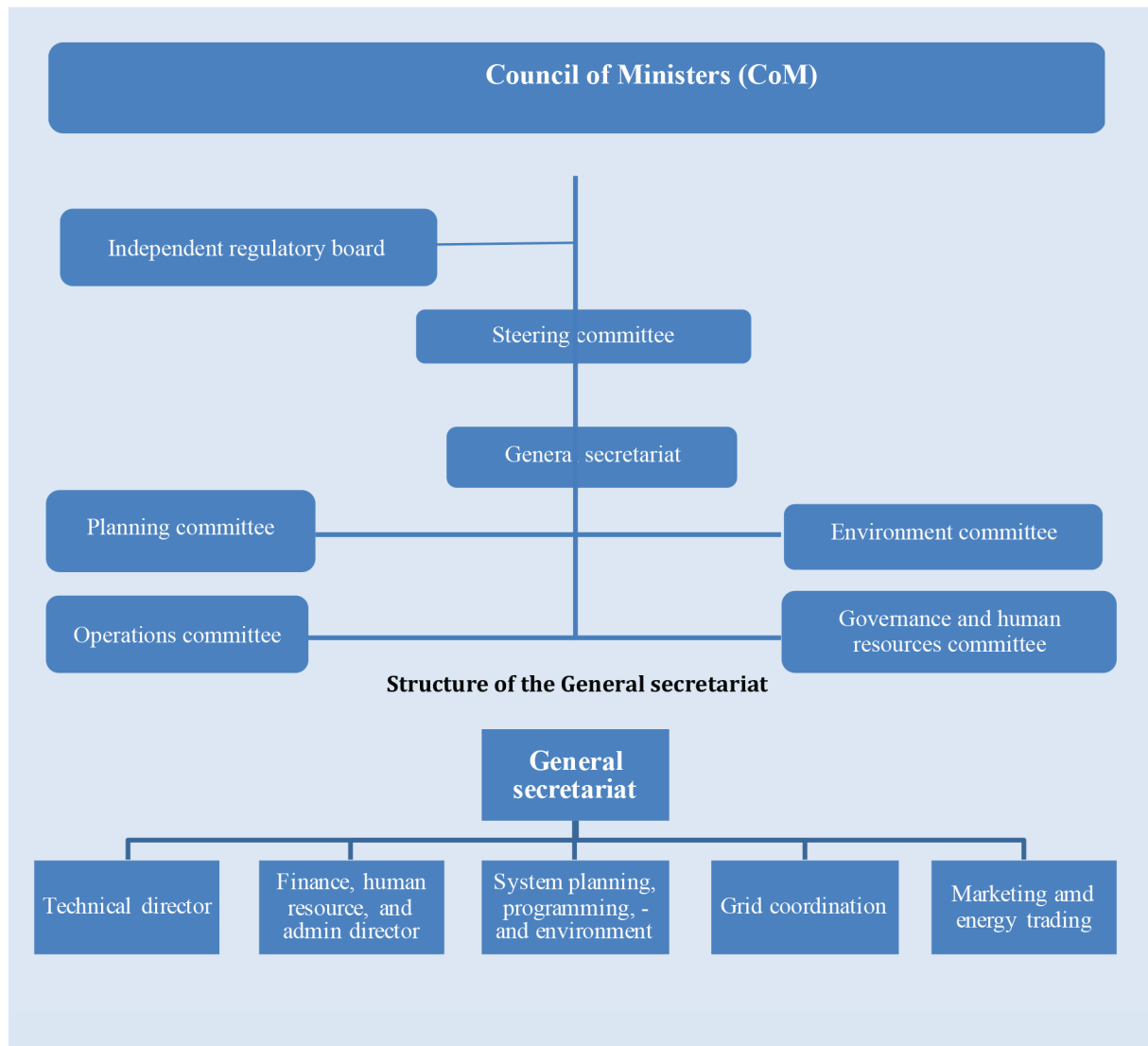
A strong commitment from political leaders is essential to move forward the regional agenda. High-level political advocacy and buy-in is needed at presidential and parliamentary levels, in particular for the legal harmonization process (Foster and Briceño-Garmendia, 2010, p. 154). With respect to

cross-border electricity trade, there also needs to be political consensus among the Governments on putting in place a common regulatory framework. The lack of sustained political commitment at both the regional and national levels remains an unresolved impediment to policy and regulatory harmonization. While political leaders express strong commitments at the initial stages of regional infrastructure projects, this has not been translated into real action on the ground. In some regional economic communities, Governments have taken unilateral decisions to depart from consensual political choices on key infrastructure projects, only to send the rest of member countries back to the drawing board. Conversely, such wavering political commitment has been attributed to the existence of protectionist tendencies among regional countries (Economic Commission for Africa, 2003). Governments are still cautious about ceding some national sovereignty in a strategic sector such as energy. Political support can go a long way in implementing regional plans, as seen in the Nordic power pool, in which a political initiative to guarantee prices played an important role in improving power generation capacity (Amundsen and Bergman, 2006, p. 156). Without guaranteed political support the harmonization process cannot be fully implemented.

### Institutional constraints

Africa's regional economic communities are still characterized by multiple institutional structures, including executive committees, sectoral committees, coordination centres and planning agencies, with vague mandates and without the resources

Box 5: Organization structure of the Eastern African Power Pool



**Source:** Eastern African Power Pool.

**Note:** Please see annex for definition of roles and responsibilities.

to implement regional plans. There is accordingly a high level of complexity and unclear functional responsibilities among the regional agencies and organs (Foster and Briceño-Garmendia, 2010). This problem has spilled over to power pools that have, to date, created various bodies lacking both a legal mandate and the authority to enforce decisions and ensure compliance with market rules. For example, the Comité maghrébin de l'électricité does not have a mandate to provide oversight and enforce regulations for the power pool (Infrastructure Consortium for Africa, 2011 p. 36). On the other hand, although regional economic communities have taken positive steps to establish regulators' associations, not all member countries are affiliated. For example, only 9 of 12 Southern African Power Pool members are affli-

ated to the Regional Electricity Regulators Association of Southern Africa (Balya, 2012, p. 6).

Another institutional challenge relates to the lack of clarity concerning the role of national electricity regulators within the power pool arrangement. In general, regional programmes can be successful only when there is clear coordination between national and regional institutions. In the case of power pools national regulators should be able to complement regional bodies, while providing oversight and following up on regional programmes at the country level, thus legitimizing regional institutions. Most national regulators are, at present, not sufficiently attuned to the needs of



the regional market.<sup>4</sup> In ECOWAS, for example, the national regulators constitute ERERA, a consultative committee of the regional regulatory authority, with collaboration in the licensing field.

### Technical constraints

The slow progress in developing a common regulatory regime for the power trade is partly attributed to the technical skills gap among the power pools. The electricity industry is very complex in terms of both market arrangements and technical needs. This becomes even more complex when the market involves many countries. The industry demands both semi- and highly advanced technical skills, as well as good managerial and legal skills. The challenge in some power pools is the lack of skilled permanent technical staff. For example, CAPP depends on staff seconded by national utilities who are often recalled by these institutions. In the Comité maghrébin de l'électricité it was found that the Secretary General is the only technical staff member coordinating the work of the various technical commissions (Infrastructure Consortium for Africa, 2011, p. 36). This weakens the capacity of the power pools to perform their functions effectively.

## 6. Legal and policy challenges

Various countries in a single power pool have different legal and policy regimes for electricity trading, which present legal complexities for harmonization. In many African countries the national electricity act or code is the principal instrument that defines the legal and regulatory framework. Following a series of reforms implemented in Africa's power sector in the 1990s, various countries amended their electricity laws, introducing a number of important regulatory changes. Many countries, including Eritrea, Ghana, Kenya, Namibia, Senegal, South Africa, Uganda and Zambia, replaced regulation by a Minister of Energy with an independent regulatory body (United Nations Industrial Development Organization, 2006). However, in countries such as Kenya the Minister of Energy retained approval powers with respect to decisions such as the licensing of independent power producers and tariff-set-

4 "Legal and institutional framework for electricity trading in SADC", Southern Africa Today (2011).

ting. Moreover, commercial laws on the import and export of electricity among countries also vary in terms of their requirements. The United Republic of Tanzania requires a decree from the Government, a licence suffices in Uganda, while, in Rwanda, the law is not specific.<sup>5</sup> On the other hand, some countries, such as Kenya, South Africa and Uganda, still apply a single-buyer policy regime that grants power purchasing rights and imports only to national public utilities. Power pools have made little progress in addressing these differences. However, the Southern African Power Pool has made some progress in harmonizing the technical-standards, although there are still major disparities in national regulatory regimes.

In terms of policy priorities, the variance in national policies on cross-border energy trade is a contributing hindrance to harmonization. For some countries, regional integration in energy is not a major national policy priority. Energy policies tend to be more inward-looking, targeting the development of national power systems. In the Eastern Africa Power Pool only the energy policies of the Democratic Republic of the Congo and Uganda make provision for integration and cross-border power export, while Ethiopia and the Sudan focus on becoming more self-sufficient through the development of indigenous resources.<sup>6</sup> Reconciling regional policies or interests with national interests remains a challenge, even in the Southern African Power Pool, which is a relatively advanced power pool in the region.<sup>4</sup> Explicit national policy commitments on intercountry power trade underpin the implementation of regional projects in this respect. The lack of region-oriented policies derails efforts to implement programmes such as harmonization.

The recurring challenge of overlapping membership among regional economic communities is also mirrored in the power pools. Some countries

5 Mercados Energy Markets International, Nord Pool Consulting and CEEST, "Consultancy to develop an institutional regulatory and cooperative framework model for the Nile Basin power trade", pp.v-19.

6 Mercados Energy Markets International, Nord Pool Consulting and CEEST, "Barriers to power trade and how to solve them", pp. v-15.

are participating members of both the Eastern Africa and Southern African Power Pools, in addition to the power trade projects of the Nile Basin initiative. According to ECA, overlapping membership is counterproductive because it affects the ability of regional economic communities to pursue coherent and effective integration (Economic Commission for Africa, 2010). It also results in the duplication of efforts, mostly in cases in which countries have other available alternatives to meet their national energy demands.

However, in the Democratic Republic of the Congo, where the national power system is split in parts, belonging to several power pools has been advantageous and has come naturally. When Southern African Power Pool was formed in 1995, the Katanga province of the Democratic Republic of the Congo was already connected to the Copperbelt province of Zambia. Also, the isolated power system to the east of the Democratic Republic of the Congo was already connected to Burundi when the Eastern Africa Power Pool was formed in 2005. The national power utility of the Democratic Republic of the Congo accordingly participates in both Power Pools.

### Low levels of regional power trade

The low volume of electricity trade within Africa's power pools, coupled with an underdeveloped power market, is a disincentive to policy and regulatory harmonization. In the Eastern Africa Power Pool, power trade was at 0.2 per cent and at 6.2 per cent in the Comité maghrébin de l'électricité in 2009, while, in the Southern African Power Pool, it was considerably higher, at 7.5 per cent in 2010.<sup>7</sup> By contrast, the Nord Pool trades some 70 per cent of total electricity consumed in the Nordic region.<sup>8</sup> Africa's low volume of trade is attributed primarily to its significantly low generational capacity and an unreliable power supply (Kapika and Eberhard, 2013). In the Eastern Africa Power Pool, until 2008, Ethiopia had no interconnection with any other country and did not import or export electricity,

although the power pool was created in 2005. Although a number of interconnections were developed, the actual level of power exchange remains far below what is required and the market continues to be dominated by State utilities, with limited private sector participation. Within the Comité maghrébin de l'électricité, regional power trade between Algeria-Morocco and Algeria-Tunisia on average was only 5 to 16 per cent of interconnection capacities (Infrastructure Consortium for Africa, 2011). Member countries trade more with utilities outside the power pool. For example, Morocco's utility, the Office national de l'électricité, and Algeria's Société nationale de l'électricité et du gaz signed two contracts relating to the exchange and transit of power to Spain through the Moroccan transmission grid. There are also plans to integrate the Algerian, Moroccan and Tunisian electricity markets into the internal European Union electricity market project as a follow-up to the protocol agreement signed by the three Maghreb countries and the European Union in 2003. In the Eastern Africa Power Pool, Egypt has significant power trade with Jordan and Libya, while the United Republic of Tanzania imports power from Zambia. The low level of electricity trade in the power pools is a disincentive to harmonization.

## 7. Financial resource constraints

Harmonizing national policies and regulations is a rigorous process that requires significant financial resources. Contributions from member countries and member utilities are not sufficient to cover the recurrent and development budgets. At present, the Central Africa Power Pool depends on utility contributions, which are not always paid on time. To address this challenge, power pools chose to adopt a combination of funding mechanisms, such as the specific vehicle project or independent power producers/public-private partnerships, in order to kick-start the generation and interconnection projects. This is already being considered in the Southern African Power Pool for the ZIZABONA interconnection project (Zimbabwe-Zambia-Botswana-Namibia, part of the Programme for Infrastructure Development in Africa programme called the North-South Power Transmission Corridor). However, there remains a

<sup>7</sup> The West Africa Power Pool electricity trade was at 6.9 per cent in 2010. (Infrastructure Consortium for Africa, "Regional power pools report" (2011).)

<sup>8</sup> Nordic Energy Regulators, "The Nordic financial electricity market", Report 8/2010 (2010) p. 11.

lack of a regulatory framework for such funding mechanisms, especially public-private partnerships, in most countries.

Owing to the complexities of the cross-border power trade, there are real obstacles that stand in the way of harmonizing policy and regulatory regimes. Institutional constraints and policy and regulatory differences are some of the major barriers to harmonization, while the lack of sustained political support is the overriding factor. Beyond these obstacles, Africa's power pools still face capacity challenges that have derailed harmoni-

zation efforts. The challenge for policy-makers is to move from a market driven by national policies to a market driven by a common regional framework consisting of coordinated regional planning, regional market structures and rules, a regional regulatory framework, and strengthened regional institutions with a clear mandate. However, there is a need to be cognizant of what a harmonized regulatory framework alone cannot achieve. Physical infrastructure, the mobilization of adequate financial resources and technical capacity-building need to be prioritized.

## VI. Conclusions and recommendations

African countries are faced with a power supply deficit that has a negative impact on their efforts to achieve transformation and development. Although a number of reasons have been advanced for the power deficits, the most compelling ones are inadequate financing, poor planning and inadequate maintenance of existing facilities. It should be noted that, even if financing is a key impediment to increased generation capacity, the level of the deficit could have been reduced significantly if adequate planning and maintenance had been applied to existing capacity. The limited participation of the private sector and the low capacity of public institutions to address issues of generation and maintenance are key negative contributing factors. For many years “regional” programmes and regional planning have not been integrated adequately throughout Africa, given that national level priorities often supersede agreed regional-level master plans.

The situation is, however, changing. Current trends in investments and regional frameworks reveal a positive outlook for African infrastructure, in particular for those sections of the power sector in which the development of power pools is already under way. The rapid growth of energy demand, accompanied by a growing middle class on the continent, has pushed individual countries and regional economic communities to act strategically by taking regional planning and integration more seriously. A number of players joined and supported the African Union Commission NEPAD agency to develop the continental and consensual Programme for Infrastructure Development in Africa, mainly the African Development Bank and ECA. The Programme provides an outlook for the development of African infrastructure during the period 2012-2040.

The Programme for Infrastructure Development in Africa complements African countries’ vision of creating a fully functional, integrated and competitive power pool, even though this will require substantial effort and may take time to be realized. As the case study shows, the electricity

trade presently taking place under the auspices of the Eastern Africa Power Pool relates to the prepool bilateral power exchanges that existed between some of the member countries from the mid-1950s onwards. The region needs significant investment in the new generation and transmission grid infrastructure. The identification and involvement of diverse sources of financing, including the private sector, through, for example, public-private partnerships and infrastructure bonds, is critical. Countries should be encouraged to develop independent power producer projects to reduce the huge gap in generation and transmission. The associated power purchase agreement should, however, be carefully negotiated in order not to jeopardize the objective of creating a liquid and competitive electricity market. In this regard wages and conditions of employment for the energy sector will have to be handled carefully.

Central to all efforts is the need for real political will and commitment to regional solutions regarding the supply of electricity, and to promoting competition in electricity markets in the long term for the power pools to succeed. The Eastern Africa Power Pool, like other power pools, also needs to operationalize robust institutional and administrative frameworks for power trading to take place, as well as arrangements for systems operations and a system for equitably setting the tariffs for use of the transmission infrastructure, together with agreed principles and procedures for dispute resolution and consumer protection.

In addressing the challenges and opportunities, actionable recommendations for enhancing regulatory harmonization include the following:

- **Updating the status of progress on regulation in all power pools**

Along the lines of making a compelling case for building and strengthening regulatory frameworks for power pools and for the harmonization of regulatory regimes, there is a need for a comprehensive analysis of all power pools using

up-to-date data and information in order to distinguish which regulatory system is the best for their particular context. Given that the power pools are at different stages of development, this information can also help to highlight advances in some of them, from which others can draw useful lessons.

- **Clarifying roles and functions in terms of harmonization**

The regulatory system involves a range of stakeholders in energy regulation, including utilities, national regulators and consumers, from the sub-regional to the regional levels. It is important to differentiate between the players and the referee, specifying who is best placed to harmonize the regulations.

- **Promoting energy reforms inclusive of harmonization, starting at the national level**

A favourable legal and regulatory framework for private participation, which would include legally empowering power pools to act on behalf of regional economic communities and Governments, in particular on power deals, can help to improve generation profitability and capacity in Africa. A private sector entity seeking to invest in a regional project would have to deal with one entity instead of with various ones in many countries. Regional governments and the operators of national grid systems must define a common legal and regulatory framework to facilitate the attainment of regional objectives. This initially involves consensus-building activities consisting of the preparation, negotiation and adoption of two key frameworks permitting utilities to enter into contracts, while also providing guarantees resulting from power interconnection contracts. Agreements signed among the participating national power utilities must define the ownership of assets and other key rights such as the development of future substations, while also establishing and enforcing rules of practice that cover technical planning, operations and the commercial aspects of power system integration.

- **Deepening regional power trade markets**

As has been shown in this study, the advantages of cross-border power trade are immense. Priority should therefore be given to reaching out for trading opportunities. Support in the form of political will could be given to existing efforts by power pools, such as the West Africa and Central Africa Power Pools, which are trying to integrate and operationalize the regional market. This is in addition to investing in the hardware and software necessary, which will support trade in, and exchange of electricity.

- **Building cross-border interconnection facilities**

To be operational, power pools require cross-border interconnectivity. The integration of national power grids demands cross interconnection facilities through which national power utilities can exchange energy. Pool interconnection facilities comprise not only a transmission line, but also supportive platforms, such as switch gears and control equipment. Power pools must also acquire and deploy other hardware and software systems, such as metering, data collection and the real-time processing of information, to ensure that individual national power grids are able to function using a common operational and commercial platform. Building cross-border interconnection facilitates the harmonization and smooth delivery of the requisite energy throughout space.

- **Leveraging opportunity presented through a diversified energy mix**

Power pools can provide an opportunity to include alternative energy sources. Kenya's Vision 2030 reflects this approach for sustainable development and inclusive growth through rural electrification. Such opportunities can contribute to increased power generation capacity by blending hydropower and nuclear, geothermal, solar and thermal energy sources.

- **Operationalizing independent regional regulators**

As the regional market grows, and in accordance with ongoing work by the African Union through its action plan for a harmonized regulatory framework for the electricity market in Africa,

consideration should be given to an independent regulator with a regional mandate. The independent regional regulator would, in conjunction with power pools, initiate regional planning standards for regional projects with a means of determining which beneficiary utilities will have to support implementation costs.

The regulator has to supervise and monitor various factors pertaining to the operation of power pools, including, but not limited to, compliance with electricity codes and technical standards and controlling the use of transmission lines, while also regulating the price of transmission lines and facilitating the entry of independent power producers and other private actors, thus promoting increased competition in the pool.

This regulator would also ensure that tariff methodologies reflect costs, taking into account transportation and distribution costs. Member countries therefore need to amend their electricity legislation to empower their regulators, enabling them to make decisions that are binding on the power pools. A regional approach to regulation brings with it the requisite certainty about the enforcement of standards, further improving the investment climate for private investors.

- **Strengthening power pools in their efforts to achieve regulatory harmonization**

Power pools need continuous strengthening through training and capacity-building of personnel. This is to reinforce and also acquire critical skills in the following: interconnected power system planning and operations, competitive market operations and the structuring and negotiation of power deals with the private sector, (e.g., power purchase agreements), in addition to general power utility performance management.

- **Advancing and expanding financing mechanisms**

There is a need to address the challenge of the transmission of donor funds from Governments to autonomous sub-regional entities, such as power pools. Whereas power pools have often drawn up the power generation master plans, their member

countries have commonly received the financing for projects.

Technical support in designing bankable projects for infrastructure development in the energy sector is also important, as is support for power pools in generating their own income from the market. This can be facilitated through setting up specialized units in power pools or regional economic communities with experts who can design bankable projects enabling access to available funds.

Financing through grants, loans and other vehicles is mandatory to make regulatory bodies operational. Some countries and regional economic communities have already begun to consider infrastructure bonds. In addition, African countries can utilize central bank reserves for infrastructure development. There is also an emerging idea of using pension funds and infrastructure bonds. The political will of member countries is needed to enhance guarantees for the financing of power pools, such as those provided by the Power Africa initiative.

- **Strengthening partnerships, including bilateral and multilateral agencies**

The multiple roles of these agencies cannot be overemphasized. They provide not only catalytic funding for the power projects to take off, but also technical support in the formation of these power pools. For example, the World Bank and the African Development Bank have been supporting a number of African Governments in funding some of the power projects being undertaken in their countries. Continuing engagement with these bodies is needed to mobilize project funding and provide neutral technical and advisory support, as well as independent counsel capable of fostering common understanding and encouraging consensus among the partner States.

- **Tapping into opportunities for harmonization offered by existing mechanisms such as the Continental Free Trade Area**

The harmonization of legal and operational frameworks for infrastructure development, in particular in the energy sector, can occur along-

side ongoing continent-wide efforts for regional integration, including the Continental Free Trade Area. Although this is not precondition for the establishment of regional power pools, the harmonization of national trade frameworks encourages private investment participation in the power sector, given that it ensures a high degree of certainty and predictability about transmission line access, revenue flow and the resolution of any disputes that may arise. For example, an interconnection code provides a framework for the implementation of satisfactory operational security and reliability, while also encouraging the integrated planning of generation capacity and transmission planning. Ongoing harmonization is therefore also an entry point for power pools.

- **Aligning ongoing efforts with the Programme for Infrastructure Development in Africa**

The energy vision of the Programme for Infrastructure Development in Africa is aimed at connecting the continent's power pools to enable a large increase in interregional energy trade. The implementation of the Programme's priority action plan until 2020 is expected to boost energy trade within and between power pools. Such an

approach will have a positive impact on the following: the cost of generation, due to economies of scale (the implementation of big projects serving many countries); the energy mix (countries with dominant hydro potential supplying those with dominant thermal (gas and coal) potential); and increased access to modern energy services, which, in turn, will trigger increased access to clean water and improved health care. Having new initiatives aligned with existing mechanisms will also enhance the opportunities for monitoring and evaluating progress, identifying gaps, and including actionable recommendations for change in future planning.

- **Linking good governance with regulatory harmonization**

The quality of regulation is a reflection of the state of economic and political governance in a given country. It is therefore essential to link regulation with good governance. Countries with a good governance record tend to build more effective regulatory systems that are transparent and accountable. Effecting regional-level regulation should therefore go hand in hand with enhancing and improving the general governance situation at the national level.

## References

- African Development Bank (2013). An integrated approach to infrastructure provision in Africa. Economic Research Papers No. 64. Tunis.
- \_\_\_\_\_ (2000). Linking Africa through regional infrastructure. Economic Research Papers No. 64. Abidjan.
- African Union and European Union Technical Assistance Facility for the Sustainable Energy for All Initiative. Strategy for the development of a harmonized regulatory framework for the electricity market in Africa.
- Amundsen E. S., and Bergman L (2006). Why has the Nordic electricity market worked so well? Utilities Policy, vol. 14, No. 4.
- Baldwin, Robert, Martin Cave and Martin Lodge (2012). Understanding Regulation: Theory, Strategy, and Practice. Oxford University Press.
- Banerjee, Sudeshna, Heather Skilling, Vivien Foster, Cecilia Briceño-Garmendia, Elvira Morella, and Tarik Chfadi (2008). Ebbing water, surging deficits: urban water supply in sub-Saharan Africa. Background Paper 12, Africa Infrastructure Sector Diagnostic. Washington, D.C.: World Bank.
- Banerjee, Sudeshna, Quentin Wodon, Amadou Diallo, Taras Pushak, Hellal Uddin, Clarence Tsimpo, and Vivien Foster (2008). Access, affordability, and alternatives: modern infrastructure services in sub-Saharan Africa. Background Paper 2, Africa Infrastructure Country Diagnostics. Washington, D.C.: World Bank.
- Barnes, Douglas F. (1988). Electric Power for Rural Growth: How Electricity Affects Rural Life in Developing Countries. Boulder: Westview Press.
- Brodman, Janice (1982). Rural electrification and the commercial sector in Indonesia. Discussion Paper D-73L. Washington, D.C.: Resources for the Future.
- Brown, Ashley C. (2001). Handbook for Evaluating Infrastructure Regulatory Systems. Washington, D.C.: World Bank.
- Castellano, A. et al. (2015). Brighter Africa - The Growth Potential of the Sub-Saharan Electricity Sector. McKinsey & Company.
- Commission for Africa (2005). Our Common Interest: Report of the Commission for Africa. London.
- Department of Economic and Social Affairs (2004). Sustainable Energy Consumption in Africa. Available from [www.un.org/esa/sustdev/marrakech/EnergyConsumption.pdf](http://www.un.org/esa/sustdev/marrakech/EnergyConsumption.pdf).
- Eastern Africa Power Pool (2016). Organization profile 2016. Addis Ababa.
- \_\_\_\_\_ (2016). Strategic plan executive summary 2016–2026. Addis Ababa.
- \_\_\_\_\_ (2016). Interconnection code compliance programme. 3 February 2016. Addis Ababa.
- \_\_\_\_\_ (2014). EAPP regional power system master plan 2014. Volume I: Main Report. Ea Energy Analyses.
- \_\_\_\_\_ (2005). Inter-utility memorandum of understanding.
- Eastern Africa Power Pool and East African Community (2011). Interconnection code. SNC Lavalin International and Parsons Brickerhoff.
- \_\_\_\_\_ (2011). Regional power system master plan and grid code study. Final Interconnection Code Report, Module 2G. SNC Lavalin International and Parsons Brickerhoff.
- Eberhard, Anton, Orvika Rosnes, Maria Shkaratan, Haakon Vennemo. (2011). Africa's Power Infrastructure Investment, Integration, Efficiency. Vivien Foster and Cecilia Briceño-Garmendia (series eds.) Washington, D.C.: World Bank.
- Economic Commission for Africa (2016). Greening Africa's Industrialization: Economic Report on Africa. Addis Ababa.
- \_\_\_\_\_ (2015). The Economic Report on Africa: Industrializing through Trade. Addis Ababa.
- \_\_\_\_\_ (2012). Compendium of best practices in utility regulation: towards energy policy harmonization. Addis Ababa.
- \_\_\_\_\_ (2010). Assessing Regional Integration in Africa IV- Enhancing Intra-African Trade. Addis Ababa.
- \_\_\_\_\_ (2005). The challenges of operationaliz-



- ing power pools in Africa. Addis Ababa. Available from [https://sustainabledevelopment.un.org/content/documents/3214interconnection\\_powerpools.pdf](https://sustainabledevelopment.un.org/content/documents/3214interconnection_powerpools.pdf).
- \_\_\_\_\_ (2003). Assessment of power pooling arrangements in Africa. Addis Ababa.
- Economic Commission for Africa and United Nations Development Programme (2005). African Governance Report I. Addis Ababa.
- Energy Sector Management Assistance Programme (2003). Energy and poverty: how can modern energy services contribute to poverty reduction? Proceedings of a multi-sector workshop, Addis Ababa. 23-25 October 2002. Washington, D.C., USA: Joint UNDP/World Bank Energy Sector Management Assistance Programme.
- Foley, Gerald (1990). Electricity for Rural People. London: Panos Institute.
- Foster, Vivien, and Cecilia Briceño-Garmendia (2010). Africa's infrastructure: a time for transformation. Africa Infrastructure Sector Diagnostic, Washington, D.C.: World Bank.
- Infrastructure Consortium for Africa (2011). Regional power status in African power pools. African Development Bank, Tunis.
- International Renewable Energy Agency (2014). Estimating the renewable energy potential in Africa. Available from [www.irena.org/DocumentDownloads/Publications/IRENA\\_Africa\\_Resource\\_Potential\\_Aug2014.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_Africa_Resource_Potential_Aug2014.pdf).
- Jimenez, Antonio, and Ken Olson (1998). Renewable energy for rural health clinics. Boulder, CO: National Renewable Energy Laboratory. Available from [www.nrel.gov/docs/legostif/fy98/25233.pdf](http://www.nrel.gov/docs/legostif/fy98/25233.pdf).
- Kambanda, Callixte (2013). Power trade in Africa and the role of power pools. Available from [www.afdb.org/en/blogs/integrating-africa/post/power-trade-in-africa-and-the-role-of-power-pools-12101/](http://www.afdb.org/en/blogs/integrating-africa/post/power-trade-in-africa-and-the-role-of-power-pools-12101/).
- Kapika, Joseph, and Anton A. Eberhard (2013). Power-sector reform and regulation in Africa: lessons from Kenya, Tanzania, Uganda, Zambia, Namibia and Ghana. Cape Town, South Africa: Human Sciences Research Council.
- Karekezi, Stephen, and Kimani, J. (2002). Status of power sector reform in Africa: impact on the poor. African Energy Policy Research Network.
- Kennedy, David (2003). Power sector regulatory reform in transition economies: progress and lessons learned. Working Paper No. 78. European Bank for Reconstruction and Development.
- Kojima, Masami, Xin Zhou, Jace Jeusun Han, Joeri de Wit, Robert Bacon, Chris Trimble (2016). Who Uses Electricity in Sub-Saharan Africa? Findings from household surveys. Policy Research Working Paper No. 7789. Washington, D.C.: World Bank. Available from <https://openknowledge.worldbank.org/handle/10986/25029>.
- Kojima, Masami, Robert Bacon, Chris Trimble (2014). Political economy of power sector subsidies: a review with reference to sub-Saharan Africa. Washington, D.C.: World Bank Group. Available from <https://openknowledge.worldbank.org/handle/10986/19986>.
- KPMG (2015). Power in Africa. Sector Report.
- Ku, Anne (1997). Power pools. Available from <http://www.analyticalq.com/energy/powerpools/default.htm>.
- MERCADOS Energy Markets International, Nord Pool Consulting and CEEEST (2007). Barriers to power trade and how to solve them. Institutional regulatory and cooperative framework model for the Nile Basin Power Trade.
- Mosad, Elmissiry (2013). Hydropower in Africa: continental perspective as in PIDA. Available from [www.engerati.com/sites/engerati/files/15h45%20Elmissiry%20Tues%20Hydro.pdf](http://www.engerati.com/sites/engerati/files/15h45%20Elmissiry%20Tues%20Hydro.pdf).
- Nordic Energy Regulators (2010). The Nordic financial electricity market. Report 8/2010. Available from [www.nordicenergyregulators.org/wp-content/uploads/2013/02/Nordic\\_financial\\_market\\_NordREG\\_Report\\_8\\_2010.pdf](http://www.nordicenergyregulators.org/wp-content/uploads/2013/02/Nordic_financial_market_NordREG_Report_8_2010.pdf).
- Plummer, Janelle, and Piers Cross (2007). Tackling corruption in the water and sanitation sector in Africa: starting the dialogue. In *The Many Faces of Corruption: Tracking Vulnerabilities at the Sector Level*, J. Edgardo Campos and Sanjay Pradhan (eds.). Washington, D.C.: World Bank.
- Programme for Infrastructure Development in Africa [(2012). Transforming Africa through modern infrastructure. African Union Commission, New Partnership for Africa's Development and the African Development Bank.
- \_\_\_\_\_ (2012). Energy vision. Available from [www.](http://www.)

- afdb.org/en/topics-and-sectors/initiatives-partnerships/programme-for-infrastructure-development-in-africa-pida/.
- Reiche, Kilian, Bernard Tenenbaum and Clemencia Torres de Mastle (2006). Electrification and regulation: principles and model law. Paper No. 18, Washington, D.C.: World Bank.
- Reinikka, Ritva, and Jakob Svensson (1999). Confronting competition: firms' investment response and constraints in Uganda. In *Assessing an African Success: Farms, Firms, and Government in Uganda's Recovery*, P. Collier and R. Reinikka (eds.). Washington, D.C.: World Bank.
- Republic of Kenya (2016). Sustainable energy for all (SE4All). Kenya Investment Prospectus.
- Smith, Warrick (2000). Paper presented at Conference on Infrastructure for Development: Private Solutions and the Poor, London, United Kingdom of Great Britain and Northern Ireland, 31 May –2 June 2000.
- \_\_\_\_\_ (1997). Utility regulators: the independence debate. Public Policy for the Private Sector, Note No. 127. Washington, D.C.: World Bank.
- Southern African Research and Documentation Centre (2010). Expanding energy generation capacity in SADC: challenges and opportunities for power sector infrastructure development. Energy policy brief No.1.
- Teplitz-Sembitzky, W. (1990). Regulation, deregulation, or reregulation: what is needed in the LDCs power sector? Industry and Energy Department Working Paper. Energy Series Paper No. 30. Washington, D.C.: World Bank.
- Trimble, Chris, and Masami Kojima (2016). Making power affordable for Africa and viable for its utilities. Policy Research Working Paper; Washington, DC.: World Bank.
- Trimble, Chris, Masami Kojima, Ines Perez Arroyo and Farah Mohammadzadeh (2016). Financial viability of electricity sectors in sub-Saharan Africa: quasi-fiscal deficits and hidden costs. Policy Research Working Paper. Washington, D.C.: World Bank.
- United Nations Industrial Development Organization (2006). Reform of the power sector in Africa, Module 4. Sustainable Energy Regulation and Policy-making Training Manual.
- Venkataraman, Krishnaswami (1990). Rural electrification in the Asian and Pacific region. In *Power Systems in Asia and the Pacific, with Emphasis on Rural Electrification*. Economic and Social Commission for Asia and the Pacific, New York: United Nations.
- World Bank (2011). Regional power integration: structural and regulatory challenges. Washington, D.C. Available from <https://openknowledge.worldbank.org/handle/10986/2766>.
- \_\_\_\_\_ (2008). Building regional power pools: a toolkit. Washington, D.C.
- \_\_\_\_\_ (1993). The World Bank's role in the electric power sector: policies for effective institutional, regulatory, and financial reform. Washington, D.C. Available from <http://documents.worldbank.org/curated/en/477961468782140142/The-World-Banks-role-in-the-electric-power-sector-policies-for-effective-institutional-regulatory-and-financial-reform>.

## Annex 1 :

### Power generation data in the power pools

Power pool	Country	Installed capacity(MWh)	Generation (GWh)
Central Africa Power Pool	Angola	1 768	4 153
	Burundi	51	207
	Cameroon	980	4 256
	Congo	237	898
	Gabon	374	1 638
	Equatorial Guinea	86	524
	Central African Republic	37	126
	Democratic Republic of the Congo	2 437	7 383
	Sao Tome and Principe	31	27
	Chad	72	182
Comité maghrébin de l'électricité	Algeria	11 325	43 005
	Libya	6 273	30 426
	Mauritania	134	476
	Morocco	6 135	20 267
	Tunisia	3 480	14 962
Eastern Africa Power Pool	Burundi	36.5	93.6
	Djibouti	123	325.6
	Democratic Republic of the Congo	103	239.8
	Egypt	22 118	128 798
	Ethiopia	836	3 819
	Kenya	1 680	6 436
	Rwanda	79	212.9
	Sudan	1 083	5 506
	United Republic of Tanzania	1 500	4 143
	Uganda	850	2 069
South Sudan	24		

Power pool	Country	Installed capacity(MWh)	Generation (GWh)
Southern African Power Pool	Angola	1 793	4900
	Botswana	352	445
	Democratic Republic of the Congo	2 442	7641
	Lesotho	72	486
	Malawi	287	1 543
	Mozambique	2 308	341
	Namibia	393	1 305
	South Africa	44 170	232 812
	Swaziland	70	288
	Tanzania	1 380	4 371
	Zambia	1 870	10 156
Zimbabwe	2 045	6 951	
West Africa Power Pool	Nigeria	8 425	25 045
	Benin/Togo	337	379
	Ghana	2 186	10 166
	C te d'Ivoire	1 391	5 888
	Burkina Faso	241	565
	Niger	91	268
	Mali	295	627
	Senegal	629	2 246
	Guinea	181	615
	Gambia	67	250
	Guinea-Bissau	5.6	-
	Sierra Leone	79.2	-
	Liberia	12.6	-

Source: Infrastructure Consortium for Africa, "Regional power status in African power pools report" (2011). Available from [www.sapp.co.zw/docs/R9%20-%20SAPP%20Statistics%20-%202013.pdf](http://www.sapp.co.zw/docs/R9%20-%20SAPP%20Statistics%20-%202013.pdf).

## Annex 2

### Transmission projects in the power pools

Power pool	Interconnection	Voltage (kV)	Capacity	Length (km)	Commissioning date/Year of operation/Status
West Africa Power Pool	Benin-Nigeria	330			2007
	Burkina Faso	225			2009
	Ghana (within)	330			2017
	Burkina Faso-Ghana	225			2015
	Benin-Ghana-Togo	330			2015
	Kaleta-Guinea Sambangalu-Senegal	225		1 677	2013/14
	Benin-Burkina Faso-Ghana	225			2018
	Cote d'Ivoire-Ghana	330		296	2016
	Guinea-Mali	225			2017
	Benin-Burkina Faso-Niger-Nigeria	330			2018
	Benin-Nigeria-Togo	330			
	Gambia-Guinea-Guinea-Bissau-Senegal	225			
	Ghana (within)	161			2014
Cote d'Ivoire-Guinea-Liberia-Sierra Leone	225			2017	
Central Africa Power Pool	Angola-Democratic Republic of the Congo	400	900	192	
	Congo-Gabon	400	600	482.1	
	Equatorial Guinea-Gabon	400	600	271.4	
	Cameroon-Equatorial Guinea	400	600	95.4	
	Cameroon-Chad	220	125	205.8	

Power pool	Interconnection	Voltage (kV)	Capacity	Length (km)	Commissioning date/Year of operation/Status
Comité maghrébin de l'électricité	Algeria-Morocco	225	235	49	In operation
		225	235	67	
		400	2 400	230	
	Algeria	90	74	35.5	In operation
		90	63	60	
		150	145	65	
		225	217	60	
		400	961	160	
	Libya	225	434	220	Second test conducted
		225	217	160	
		400	961	330	2015
	Eastern Africa Power Pool	Burundi-Eastern Democratic Republic of the Congo	220	49	78
Eastern Democratic Republic of the Congo-Rwanda		220	300	46	2015
Eastern Democratic Republic of the Congo-Southern Democratic Republic of the Congo-		220	500	841	2025
Southern Democratic-Republic of the Congo Western Democratic Republic of the Congo		400	1 000	1 700	2025
Egypt-Sudan		500	1 000	775	
Egypt-Sudan		600	2 000	1 665	
Ethiopia-Kenya		500	2 000	1 068	2017
Kenya-United Republic of Tanzania		400	1 300	508	2018
Burundi-Rwanda		220	300	131	
Ethiopia-South Sudan		220	300	300	
South Sudan-Uganda		400	1 000	200	
Ethiopia-Sudan		500	1 200	550	
Burundi-United Republic of Tanzania		220	27	161	2018
Kenya-Uganda		400/220	600	254	
Rwanda-Uganda		220	600	172	
Uganda-United Republic of Tanzania	220	400	271		

Power pool	Interconnection	Voltage (kV)	Capacity	Length (km)	Commissioning date/Year of operation/Status
Southern African Power Pool	Botswana, Namibia, Zambia, Zimbabwe,		650		2013
	Central Transmission corridor, Zimbabwe		650		2013
	Kafue-Livingstone, Zambia		600		2014
	Kenya, United Republic of Tanzania, Zambia		400		2014
	Mozambique, United Republic of Tanzania		600		2017
	Democratic Republic of the Congo, Zambia		600		2014

**Source:** Infrastructure Consortium for Africa, "Regional power status in African power pools report" (2011); West Africa Power Pool; Eastern Africa Power Pool (2014), "Regional power system master plan", vol. I: main report.

## Annex 3

### Tariff prices in the various power pools

Power pool	Country	Tariffa									
		Social tariff (E=100 KWh/month)	Single phase domestic usage (E= 200 KWh/month)		Three-phase domestic usage (E=600 KWh/month)		Three-phase commercial usage (E=1800 KWh/month)		Mid-industry and motive power (E=2500 KWh/month)		Medium voltage (E=35000 KWh/month)
		1 KW	2 KWh	4 KWh	6 KWh	10 KWh	12 KWh	15 KWh	20 KWh	25 KWh	250 KWh
Eastern Africa Power Pool	Burundi	3.7	3.82	3.82	5.84	5.84	11.8	11.8	11.8	11.8	17.4
	Rwanda	14	14	14	14	14	14	14	14	14	14
	Sudan	3.04	9.88	9.88	9.88	9.88	12.3	12.3	12.3	12.3	4.97
	Kenya	6.06	7.19	7.19	8.15	8.15	8.48	8.48	8.45	8.45	7.25
	Ethiopia	4.3	5.1	5.1	6.3	6.3	7.7	7.7	6.4	6.4	4.5
	Uganda	23.7	24.8	24.8	25.5	25.5	24.3	24.3	25.5	26.3	12.8
	Egypt	1.34	1.56	1.56	2.5	2.5	8.02	8.02	8.33	8.33	3.2
Central Africa Power Pool	Dem-ocratic Republic of the Congo	2.65	3.9	3.90	8.70	8.70	11.00	11.00	15.00	15.00	9.80
	Gabon	7.13	11.52	15.10	15.90	16.64	17.23	17.58	14.76	15.80	16.17
	Congo	9.94	6.72	6.72	6.72	6.72	6.40	6.40	5.64	5.64	7.60
	Chad	11.07	25.60	25.60	25.60	25.60	26.75	26.75	23.26	23.26	19.33
	Central African Republic	16.90	16.94	16.30	16.94	16.51	16.80	16.66	14.27	14.13	11.91
	Cameroon	11.55	11.55	11.55	12.73	12.73	14.94	15.70	14.09	15.00	13.17
Southern African Power Pool	Angola	2.08	4.48	4.48	4.48	4.48	5.88	5.88	5.5	5.5	2.93
	Zambia	1.13	2.04	2.04	2.18	2.18	4.13	4.13	4.52	4.92	4.72
	South Africa	4.62	4.62	4.62	4.12	4.12	3.64	3.64	3.38	3.55	2.81
	Malawi	4.17	3.78	3.78	3.53	3.53	6.57	6.57	12.44	14.53	9.87
	Mozam-bique	4.04	10.25	10.25	11.34	11.34	14.75	14.75	9.28	10.13	8.08
	Madagas-car	9.06	22.93	23.38	22.28	22.28	22.12	22.34	22.23	22.5	22.55
	Zimbabwe	2.07	1.46	1.46	1.01	1.01	1.11	1.11	1.04	1.04	1.45
	Namibia	12.15	12.15	13.75	12.15	18.85	8.79	10.47	10.13	12.15	9.19



Power pool	Country	Tariffa									
		Social tariff (E=100 KWh/month)	Single phase domestic usage (E= 200 KWh/month)		Three-phase domestic usage (E=600 KWh/month)		Three-phase commercial usage (E=1800 KWh/month)		Mid-industry and motive power (E=2500 KWh/month)		Medium voltage (E=35000 KWh/month)
West Africa Power Pool	côte d'Ivoire	6.51	18.8	20.6	16.51	17.74	18.74	19.1	18.89	19.33	16.37
	Togo	13.5	13.55	14	15.55	15.85	17.91	18.36	18.4	18.95	14.92
	Burkina Faso	20.1	23.41	26.93	25.48	27.23	24.71	25.3	24.95	24.95	24.62
	Mali	15.96	19.79	19.79	29.57	29.57	30.57	30.57	23.19	23.19	19.37
	Niger	11.23	11.23	11.23	11.23	11.23	13.4	13.54	13.52	13.68	8.27
	Senegal	17.58	17.74	20.47	17.74	19.56	23.52	24.91	24.63	25.31	20.09
	Nigeria	17.58	3.12	3.12	3.04	3.04	6.45	6.45	6.44	6.44	7.95
	Benin	14.4	14.93	14.93	16.34	16.34	16	16	16	16	15.15
	Ghana	8.07	7.8	7.8	10.32	10.32	14.61	14.61	13.22	13.22	14.06
	Gambia	12.57	15.03	15.03	16.68	16.68	24.17	24.17	24.17	24.17	27.33
	Liberia	34	34	34	34	34	34	34	34	34	34
Guinea	8.7	8.7	8.7	8.7	8.7	12.4	12.4	12.4	12.4	12.4	

Measured in United States cents per KWh.

Source: Infrastructure Consortium for Africa, "Regional power status in African power pools report" (2011).

## Annex 4

### Organizational structure of the Eastern Africa Power Pool, including roles and responsibilities

Organs and bodies	Roles and responsibilities
<p>The Council of Ministers consists of ministers responsible for electricity in the region</p>	<ul style="list-style-type: none"> <li>• Sign and amend the intergovernmental memorandum of understanding relating to the Power Pool</li> <li>• Approve the common electrical energy policy</li> <li>• Approve the regional power development master plan</li> <li>• Provide strategic guidance on and oversight to the steering committee</li> <li>• Approve the members of the independent regulatory board of the Power Pool</li> <li>• Approve admission of new members</li> <li>• Impose sanctions on defaulting members</li> <li>• Approve the appointment of the Executive Secretary</li> </ul>
<p>The steering committee consists of the chief executive officers of the Power Pool and active members</p>	<ul style="list-style-type: none"> <li>• Define the common electrical energy policy</li> <li>• Define and ensure the implementation of schemes relating to the policy, especially in terms of tariffs, planning and standardization policies</li> <li>• Approve the plans, programmes and reports issued by the various technical sub-committees</li> <li>• Work out, using Power Pool technical structures, standard rules and procedures in the framework of enforcing the operational agreement relating to the Power Pool</li> <li>• Propose to the Council of Ministers responsible for electricity options to develop the power systems in the region</li> <li>• Submit quarterly progress and operational reports to the Council of Ministers</li> <li>• Recommend appointment of the Executive Secretary to the Council of Ministers</li> <li>• Approve the budgets</li> <li>• Approve the training programme of staff involved in Power Pool operations</li> <li>• Set up ad hoc subcommittees, as needed</li> <li>• Harmonize and approve the rates of access networks</li> <li>• Enact the rules governing the members participating in the power exchange within the Power Pool</li> <li>• Recommend admission of new members to the Council of Ministers</li> </ul>
<p>The independent regulatory board consists of nominees of national regulatory boards in member countries</p>	<ul style="list-style-type: none"> <li>• Enforce standards, procedures and specifications as set out by the steering committee</li> <li>• Organize power markets in the Power Pool</li> <li>• Follow up the application of the rules governing members participating in the power exchanges within the Power Pool</li> <li>• Harmonize the accounting and billing procedures of power exchanges</li> <li>• Settle any disputes that may arise between members and which are related to exchanges and transactions within the Power Pool</li> </ul>
<p>The permanent secretariat is led by an Executive Secretary recommended by the steering committee, as defined in the bylaws and as approved by the Council of Ministers</p>	<ul style="list-style-type: none"> <li>• Manage and update a database of regional power systems</li> <li>• Provide secretarial services to the Council of Ministers, the steering committee and the technical sub-committees</li> <li>• Seek ways and means of mobilizing funds for common interest projects in accordance with guidelines of the steering committee</li> <li>• Follow up the implementation of power interconnection projects</li> <li>• Ensure the coordination of the work of the technical sub-committees</li> <li>• Ensure liaison between Power Pool organs, regional economic communities and international organizations involved in the development of the power sector</li> <li>• Submit to the steering committee draft plans and programmes of action and related budgets</li> <li>• Foster cooperative relations between the Power Pool and African and international financing institutions</li> <li>• Keep records of the minutes of Power Pool organs</li> <li>• Manage the permanent office of the Power Pool</li> <li>• Follow up the implementation of decisions of other organs of the Power Pool</li> <li>• Prepare training programmes for staff involved in the Power Pool</li> <li>• Process applications for membership</li> <li>• Prepare and submit financial statement to the steering committee on a regular basis</li> </ul>

Organs and bodies	Roles and responsibilities
The technical subcommittee in charge of specific issues, including planning, operations and environment. Should it be necessary, the steering committee may set up other subcommittees to deal with specific matters	<ul style="list-style-type: none"> <li>Deal with specific issues relating to the operation and development of the Power Pool</li> <li>Subcommittee on planning will be the organ responsible for the coordination of master plans and the development of programmes of member utilities</li> <li>Subcommittee on operation will be responsible for the definition of the operating and maintenance rules of power plants and networks involved in the Power Pool. Other specific tasks will be defined in the operation agreement</li> <li>Subcommittee on environment will be responsible for the environmental impact assessment and mitigation measures on the electrical installations within the Power Pool</li> </ul>
Coordination Centre	<ul style="list-style-type: none"> <li>Under the guidance of the subcommittee on operation, a coordination centre will be established. The centre will handle, on a real-time basis, the collection of technical and commercial information necessary for the operation of the interconnected regional power system and exchanges of power between Power Pool members. An operation agreement to be signed by members will define the duties and modalities for operating the coordination centre in both the short and long term.</li> </ul>

## Annex 5

### Evaluating the Eastern Africa Power Pool

The table below provides qualitative information on the regulatory system of the Eastern Africa Power Pool. The information included in the table was collected through interviews with experts at the Power Pool and through a review of relevant documents that were made available. It provides a snapshot of the three dimensions of regulatory governance, regulatory substance, and regulatory impact, highlighting potential areas for improvement and strengthening.

#### Model questions for evaluating regulatory systems

##### *Evaluating the Eastern Africa Power Pool Regulatory governance: the “how” of regulation*

Question	Response
<b>Clarity on roles and functions</b>	
A.1 Does the Eastern Africa Power Pool exist as a separate legal and independent entity? YES or No	YES. The Eastern Africa Power Pool is a regional organization established for the integration of the power system networks of the countries in the Eastern Africa region, providing the services necessary for the coordinated development and operation of the interconnected system and power trade, including regulatory services, among members
If NO, why not? If YES, explain	The current 11 member countries exercise their membership through their representatives in the various organs of the Power Pool
What has been done so far?	The organizational structure of the Power Pool to date comprises the following five main organs: the Council of Ministers, the steering committee, the independent regulatory board, the general secretariat and the organizational committees. No single entity influences outcomes, although the Council of Ministers is the highest decision-making body
A.2 Which requisite powers does the Power Pool have?	These are set out in the governance documents, including the intergovernmental memorandum of understanding and the inter-utility memorandum of understanding, which outline the objectives and structure of the Power Pool, the obligations of the parties and the roles and responsibilities of the Power Pool organs. The memorandums of understanding also provide definitions of the principles governing cooperation among members, and the Power Pool’s relationship with other organizations, including principles for the resolution of differences concerning the provisions of the memorandums of understanding

Question	Response
<b>Clarity on roles and functions</b>	
Does the Power Pool have licensing authority? YES or NO	No
If NO, why not? If YES, explain	The Power Pool does not license power providers. However, in the future it will license the trading of power in the region, and players in the market will need the Power Pool's approval to be in the pool
A.3 Can the Power Pool approve power-purchase agreements? YES or NO	No
If NO, why not? If YES, explain	Power purchasing agreements are made on a bilateral level by members However, the Power Pool is supposed to be informed of daily schedules
A.4 Can the Power Pool enforce the quality and reliability of standards? YES or NO	YES
If NO, why not? If YES, explain	Enforcing the quality and reliability of standards is a key objective of the Power Pool
What has been done to date?	Members not in compliance are not allowed to benefit from the pool
A.5 Does the Power Pool have a Board? YES or NO Which document includes this information?	YES; the Council of Ministers. The information on it is included in the intergovernmental and the inter-utility memorandums of understanding
How are members of the Power Pool appointed to the Board?	By virtue of their position as ministers responsible for electricity in their countries, to the Council of Ministers, which is the highest policy-making organ
Are there term limits for Board members? YES or NO. How long is the term limit?	YES; for as long a Board member is a Minister responsible for electricity in his/her member country. However, the Chair of the Board rotates annually in the Council of Ministers and biennially in the case of the steering committee
Are there clear grounds for the dismissal of Board members before the end of their term limits? YES or NO. Which grounds?	Board members retain their position for as long as they are ministers responsible for electricity in their member country. The Council of Ministers can impose sanctions on defaulting members of the Power Pool
A.6 What is the relationship between the Power Pool, regional policymakers, national ministries, national regulatory authorities, electrification funds and subnational political entities?	The organizational structure of the Power Pool defines roles and responsibilities and relationships with relevant organizations and entities (see annex IV)
<b>Decision-making and financial independence</b>	
A.7 Does an institutional and legal framework exist for decision-making processes/procedures? YES or No	YES
If NO, why not? If YES, explain	The legal framework is provided by the intergovernmental and the inter-utility memorandums of understanding.
A.8 Does the Power Pool have a formal structure through which the public can engage with it on positions and concerns including on licensing and tariff-related matters? YES or NO?	Not yet
A.9 To what extent does the Power Pool publish its decisions in a timely and regular manner? 1=very low extent to 5 =very high extent	A high extent
A.10 Does the Power Pool prepare annual accounts? YES or NO?	YES
If NO, why not? If YES, explain	Two annual accounts are prepared, including the general account listing members' contributions and the project accounts.

Question	Response
<b>Clarity on roles and functions</b>	
If NO, what has been done to date?	Reporting is done on an annual basis.
To whom are the accounts submitted?	The audit report is submitted to the steering committee and the Council of Ministers
A.11 To what extent is the Power Pool financially independent? 1=very low extent to 5 =very high extent	A low extent
What has been done to date?	The Power Pool depends on contributions from member countries for recurrent expenses and on technical assistance for projects
What are the key remaining gaps?	For example, the implementation of the interconnection code compliance programme is carried out with funds from the United States Agency for International Development. More similar modalities are encouraged
What should be the priorities for future action?	Strengthen financial support to the Power Pool in its key role of facilitating the electricity trade and help to intensify its activities
A.12 Can the Power Pool afford and hire high-calibre staff? YES or NO?	NO.
If NO, why not? If YES, explain	The salary structure approved by the Council of Ministers is not yet fully implemented. Once this has been done, through financial contributions, it will be possible to hire high-calibre staff
What should be the priorities for future action?	The Power Pool needs to be supported by other development partners by providing capable technical staff who understand the electricity market in the region
A.13 Does the Power Pool have full authority to determine remuneration levels? YES or NO?	YES
If NO, why not? If YES, explain	The Power Pool salary scale is approved by the steering committee and the Council of Ministers. Salaries are based on the salary scale of the African Union Commission
If NO, what has been done to date?	Currently, there is a human resources and governance committee, which approved new human resources rules in April 2015
What should be the priorities for future action?	Implement the human resources rules
A.14 Is the annual performance of the Power Pool evaluated? YES or NO?	YES.
Who evaluates the performance of the Power Pool?	It is evaluated by the steering committee and the Council of Ministers
What should be the priorities for future action?	The above bodies operate like any other Board with decision-making authority
A.15 Does the Power Pool have a mechanism to deal with grievances and disputes? YES or NO?	YES
If NO, why not? If YES, explain	Existing instruments include the inter-governmental memorandum of understanding, which sets out the rules and guidelines to which member countries are already signatory
If No, what has been done to date?	The independent regulatory board has a mechanism for handling serious disputes
A.16 To what extent is the Power Pool credible in the eyes of potential investors and legitimate in the eyes of consumers? For potential investors: 1=very low extent to 5 =very high extent For consumers: 1=very low extent to 5 =very high extent	High extent, by providing information to various clients, including ministers, chief executive officers and investors. Consumers need to be better educated about the work of the Power Pool

## Regulatory substance: the “what” of regulation

Question	Response
<b>Content of regulation</b>	
B.1 To what extent does the Power Pool have clarity on and responsibility for planning and procurement? 1=very low extent to 5 =very high extent	High extent
What has been done to date?	The inter-governmental memorandum of understanding includes mandates on monitoring and reporting on the implementation of physical infrastructure to the steering committee. The Power Pool is mandated to monitor interconnectivity projects during their development and implementation through the regional master plan, which provides national planners and utilities with a regional perspective The Power Pool can assist member countries in identifying experts to assist in projects, including the development of physical infrastructure The Power Pool procures services, including consultants to draw up a study of the regional master plan
B.2 To what extent does the Power Pool engage in negotiations for power purchase agreements? 1=very low extent to 5 =very high extent	Low extent
What has been done to date?	The Power Pool offers technical capacity by preparing member countries for negotiations through the development of model memorandums of understanding and organizing expert and training meetings to help to facilitate bilateral negotiations between member countries The Power Pool develops guidelines for generation pricing and the cost of generation, with the goal of the equitably sharing benefits among the member countries
What are the key/remaining gaps?	The establishment of a coordination centre which is under the subcommittee on operation, will enable the Power Pool to monitor and even negotiate agreements
What should be the priorities for future action?	Establish the coordination centre
B.3 To what extent does the Power Pool have publicly available documents and information that explain tariff methodology, laying out the key drivers of cost in simple terms? 1=very low extent to 5 =very high extent	Moderate extent. The Power Pool develops generation pricing methodology and shares it with the steering committee. Although the Power Pool undertakes this responsibility it is not enough, given that pricing methodology is a confidential undertaking of member countries, which they use for negotiations Various guidelines on standardization have also been developed
What are the key/remaining gaps?	There is a need for sustained capacity in this area
B.4 To what extent do the staff of the Power Pool feel sure of the details in the tariff methodology? 1=very low extent to 5 =very high extent	Low extent
What has been done to date?	Tariff methodology is specific to the context of each member country. .
What are the key/remaining gaps?	Resources and capacity-building are required for deep technical content in order to prepare guidelines, to implement them and to understand the various contexts of member countries

Question	Response
<b>Content of regulation</b>	
B.5 Does the Power Pool develop and publish technical standards? YES or NO?	High extent
If NO, why not? If YES, explain	The interconnection code compliance programme and the Power Pool grid codes. The Interconnection Code is the document that consists of provisions for the coordinated planning and operation of the interconnected network. It defines the technical standards for system operation and capacity planning, including the training and certification requirements of members' operations staff, as well as administrative provisions that govern the implementation and revision of the code. The interconnection code has been adopted by the Common Market for Eastern and Southern Africa as the reference regional grid code
What are the key/remaining gaps?	There is a need to expand the Power Pool through improved expertise, technical capacity and financial resources
B.6 To what extent does the Power Pool engage in pro-poor regulation, such as subsidization and rural electrification, to promote affordability? 1=very low extent to 5 =very high extent	High extent, in accordance with the objectives and mandates of the Power Pool
What are the key/remaining gaps?	Given that the mandate is broad, there is a need to strengthen the institutional capacity of the Power Pool and to support the implementation of pro-poor regulation through technical assistance and finance
B.7 To what extent does the Power Pool take environmental considerations into account in decision-making? 1=very low extent to 5 =very high extent	High extent, as stipulated in the guidelines of the interconnection code
What are the key/remaining gaps?	Support through implementation

## Regulatory impact

Question	Response
C.1 To what extent has the Power Pool contributed to enhancing the quality and reliability of electricity supplies? 1=very low extent to 5 =very high extent	<p>If the interconnection code compliance programme is successfully implemented, reliability will be enhanced to a large extent. The interconnection code was developed in 2012. It sets out the technical rules necessary for the Power Pool to ensure that the transmission grid is operated in a safe, reliable, secure and efficient manner. It also includes a set of standards and measures to clearly specify what was required of member countries/utilities and what evidence was needed to determine whether an entity is in compliance with each of the requirements set out in the code</p> <p>To further enhance understanding of the interconnection code, its standard requirements and measures and to assist member countries in complying with the code on a timely basis, the Power Pool and the independent regulatory board, with support from the Power Africa plan to implement an interconnection code compliance programme</p> <p>It is anticipated that the implementation of the interconnection code will begin during the first quarter of 2016 and extend for a three-year period through 2018. The Power Pool and independent regulatory board will develop the plan for a phased implementation of the interconnection code on the basis of the plan to initially adopt those interconnection code standard requirements that will address the highest risks to the regional transmission system</p>
What has been done to date?	The interconnection code compliance programme has been developed
What are the key/remaining gaps?	The implementation of the interconnection code compliance programme
What should be the priorities for future action?	East African countries should undertake self-assessments on power generation/transmitters/distribution to identify gaps between the current state and the requirements of the code. A mitigation plan should be developed to address the gaps. The Power Pool, with support from Power Africa, should assist countries in complying with the interconnection code. Compliance focuses only on operational issues (stage 1), given that full compliance with the interconnection code is not obligatory through the various stages
C.2 To what extent has the Power Pool led to increased investments in the sector?	The Power Pool can be used by countries to justify their investment needs, given that any power surplus/extra capacity could be traded through demand from other Power Pool member countries
C.3 To what extent has the Power Pool reduced power supply costs in the region?	The Power Pool reduces the cost of bulk power in the region, which is reflected in tariffs for the end user
C.4 Has the Power Pool led to increased access to power among its member countries?	The Power Pool, by facilitating the exchange of power, makes it easier for the region to invest in power generation, enabling countries to expand grid opportunities to rural areas. Doing so enable countries that are part of the interconnected system to increase access rates



