



GENERAL ASSEMBLY
ASSEMBLÉE GÉNÉRALE
ASSEMBLEIA GERAL
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Creating African Futures in an Era of Global Transformations:

Créer l'Afrique de demain dans un contexte de transformations mondialisées :

Criar Futuros Africanos numa Era de Transformações Globais:

بعث أفريقيا الغد في سياق التحولات المعولمة :

Regional Integration and Pathways to African Futures: The Case of East African Power Pool



CODESRIA

08 - 12 June / Juin 2015

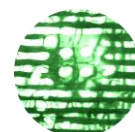
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Acronym

AfDB	:	African Development Bank
AUC	:	African Union Commission
AU	:	African Union
CODESRIA	:	Council for the Development of Social Science Research in Africa
COMESA	:	Common Market for Eastern and Southern Africa
EU	:	European Union
FDA	:	French Development Agency
MM	:	Millimeter
NEPAD	:	New Partnership for African Development
NPP	:	No Place of Publication
NP	:	No Publisher
NY	:	No Year
UNECA	:	United Nations Economic Commission for Africa
WB	:	World Bank



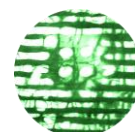


Abstract

The Eastern Africa region is endowed with vast water potentials for power generation that can supply the whole continent. However, the falling water distribution in form and location is uneven as well as untapped. Electrification is the primary step to development in its all forms and water is the most available and the cheapest resource. The people of the region predominantly depend on traditional energy sources that are unhealthy and environmentally unfriendly. Due to lack of reliable power supply different economic sectors in the region perform poorly and investment is feeble. Thus, to avert the situation seven utility ministers of the regions assembled in Addis Ababa in 2005 and established the Eastern Africa Power Pool (EAPP).

In 2006 the Heads of States and Governments of COMESA approved the establishing documents and adopted the EAPP as its special institution. The mission of the EAPP, thus, is to facilitate power resources development in economically and environmentally sustainable manner, ensure efficient provision of adequate, and secure power with least cost to the citizens of the region through fully integrated and interconnected power transmission grids. Therefore, power pooling through regional electric market integration system enhances supply reliability, political security and would serve as propeller of development to fight backwardness and poverty in the era of increasingly integrating and globalizing world.

Key words: electrification, environmentally unfriendly, traditional, Eastern African Power Pool, COMESA, affordable, propeller of development, integration system, backwardness and poverty.



1. Introduction

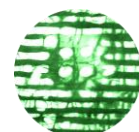
The idea of Pan-African integration was conceived in Diaspora as a movement with a common objective to struggle for social justice, political equality and freedom from economic exploitation and racial discrimination. It was “belief in some form of unity or of common purpose among the peoples of Africa and the African Diaspora” (www.gwp.org, accessed 4, June 2014). Five consecutive Pan-African conferences were held in abroad of which the fifth was historic one in which the leadership was passed from the hands of African Diasporas to African Pan-Africanists and brought home. In 1958 the First All-African People’s Conference of the then Independent African States was organized by Kwame Nkrumah in Ghana. In 1963 the then independent states of African Heads of States and Governments assembled in Addis Ababa and signed the first Pan-African Charter that had established the Organization of African Unity and “the dream of Pan-Africanism is destined to come true” (Senghor, 1965). The OAU has served the continent for about 38 years and “has enabled leaders to consult as well as act together” (Patterson, et al. (1970). The OAU functioned under interwoven network of challenges of internal, regional and international natures; however, judged by many as a ‘toothless talking shop and the club of leaders’ and withered away with the launching of the AU.

The AU was established in 2001 in Addis Ababa and was launched in 2002 in South Africa to replace the OAU. One of its major objectives as stipulated in Article 3(c) of its Constitutive Act is to “Accelerate the political and socio-economic integration of the continent.” The AU had come up with 16 areas of integration of which strengthening power pool and interconnection through transmission grids is one amongst others.

Thus, to address the issue this paper is structured into different sub-topics. Introduction including its sub-sub topics briefly treated the concept of Pan-African integration, the background, methodology, the scope and significance of the paper. The second sub-topic dealt with the hydropower potentials of the EAPP region with special emphasis on three countries. The third sub-topic assessed the necessity of power pool development. The fourth sub-topic analyzed the establishment of Eastern Africa Power Pool and the role it is playing in integrating the regions. Fifth sub-topic showed the nexus between hydropower development and climate variability. The sixth sub-topic scrutinized the challenges and prospects of the Pool and the conclusion briefly summarized the study and advocates for strong move of the region in the road of integration comparing it to a story of man-tail of a Tiger. Lastly, materials used in the study are alphabetically referenced in three categories.

1.1. Background

The Eastern African region is geographically diverse. There are countries endowed with abundant waters for hydropower development and countries that are water scarce. The



Democratic Republic of Congo (DRC) located in equatorial rainforest gets the highest precipitation throughout. Its Congo River alone can generate enough power for whole Africa if fully nurtured. Ethiopia, Uganda, Rwanda and North Sudan have also substantial amount of water to harness for hydropower to satisfy domestic needs as well as for export. Kenya is water scarce however; larger portion of its energy is hydro. Burundi has limited water resource. Nevertheless there are seven mini hydroelectric plants with combined installed capacity of 30.6 MW. Egypt and Libya are arid countries. Egypt is downstream riparian of the Nile River and depends on it. Libya depends on piped water from the Great Man-Made River.

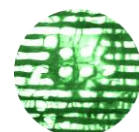
In the countries of the region there is rapid development of population, urbanization, industrialization and agricultural expansion that escalated power demand. Thus, governments of the region are endeavoring to harness their water resources as it is available, cheap and environmentally friendly to satisfy domestic demands. There are some Pool countries that can generate excess power for export with optimum price that also require the development of robust transmission grids. Therefore, the existence of institution of cooperation is of great necessity to promote production, distribution and consumption in integrated manner in order to benefit the region more. It is in this light that the countries of the region had established a regional power pool with shared objectives. The existence a pool has multidimensional benefits of political, economic and social natures that this paper has analyzed.

1.2. Methodology

This succinct study methodologically anchored on qualitative approach. The qualitative data needed for the paper were basically gathered from secondary sources. Books and professional journals related to the study that are available in the library of Addis Ababa University and in the personal collection of the author are gathered and critically grinded. Besides, the head office of the EAPP in Addis Ababa was visited. Again Internet sources were browsed and the existing data are downloaded and reviewed. All data gathered from various sources were triangulated, critically analyzed and argumentatively crushed to produce this final paper.

1.3. Scope

There are four power pools established in Africa. The scope of this paper is limited to the study of hydropower generation, development of interconnected transmission grids of the EAPP member countries only. The other alternative power sources such as wind, geothermal, solar, natural gas and oil are not within the ambit of this paper. The scope is limited to hydropower because of its availability; reduced cost of production, cleanness, and sensitivity since it abrogates national sovereignties.



1.4. Significance

Harnessing shared resources for hydropower generation unilaterally and exporting virtual water through power pooling system in a bilateral arrangement falls within the realm of hydropolitics that is a complex network of environmental, economic, political and security interdependencies between riparian states and non-state actors.

Therefore, studying such contemporary, dynamic and complex issues where different regional and international actors act and interact; glaringly justify the multidimensional significance of this succinct study to the EAPP, CODESRIA, individual researchers, students of conflict and cooperation, hydropolitics and academic exchange fora.

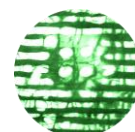
2. The hydropower resource potential of the region

The eastern, central and north Africa (East Africa) is vested with immense hydropower potential that can electrify the entire continent at current peak demand of 2,500 MW. However, there are few countries of the region that are water scarce. Hydropower is the pillar of the region's electricity supply (<http://www.afribiz.info>, accessed in July 24, 2014). It is reliable, one of the least expensive generation sources and clean. It is a power generated from energy of flowing water. The EAPP region is endowed with abundant flowing waters and in this part of the paper only three countries with huge hydropower potentials are succinctly reviewed. And these are: Democratic Republic Congo (DRC), Ethiopia, and Uganda.

The DRC stands first with huge potential for hydropower generation amongst the pool countries. It has 51 rivers with estimated hydropower potential of 100 GW that turns the DRC stand the third in the world next to China and Russia. Only 2.5 percent of the available potential is nurtured. DRC's 90 percent energy source is hydro.

The Congo River (former Zaire River) is the biggest of all rivers of the DRC. It is the deepest (220 meters) and the 9th longest (4,700 km) in the world, second in water volume to Amazon River and empties into the Atlantic Ocean; that is estimated 50,000 m³ per second. The river has many rapids and falls very close to its mouth that gives it a unique feature which is in most rivers to upstream. These features created conducive environment to produce energy without damming or diversion weir construction with least cost of estimated US\$ 0.03 per kilowatt hour. The hydropower potential of the Congo River is 13 percent of the entire potential of Africa. If fully developed it alone could provide enough power to sub-Saharan Africa.

Despite the abundant endowment one in ten Congolese has access to electricity (<http://www.worldbank.org>, acceded July 13, 2014). Thus, the government has dedicated itself to raise power supply to address the ever increasing demand through building of cascades of power projects. Currently there are about 40 hydropower plants over the Congo River of which cascades of dams over the Inga Falls in the southwest of the capital are the major ones. Inga Fall



has vast untapped hydropower potential of more than 45, 000 MW. Inga I and II with 14 turbines were completed and commissioned in 1972 and 1982 with capacities of 351 MW and 1,424 MW respectively.

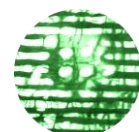
Inga III is the third cascade and its construction is scheduled to begin in 2016. The Grand Inga is the fourth cascade, however, the biggest of all. It will have 52 turbines with the capacity to produce 39,500 MW. This is a third of the total electricity currently produced in Africa. The project requires a new transmission line to integrate EAPP members of COMESA. The Grand Inga project is believed by donors and dam industries as the “magic bullet to electrify the entire African continent and export energy as far as southern Europe and Middle East” (<http://www.internationalrivers.org>, accessed 13, July 2014).

Ethiopia stands second to DRC in hydropower potential. Its annual surface runoff is 122 billion cubic meters (BCM) that create 12 major river basins. Only three percent of the available runoff is maintained in the country while ninety-seven percent of the surface water flows out of the country (Yacob, 2007); making the inland remaining water to be 54.4 bcm of surface runoff (Worku et al., 2010). Of this 94 percent is utilized by agriculture, 6 percent for domestic and municipal and 0.4 percent is for industries (Ibid.).

In recent years Ethiopia’s total electricity production including diesel was only 5 percent (Ibid.). About 95 percent of energy sources come from traditional energy sources such as wood, dung, grain residue, etc. Ethiopia’s per capita production of electricity in 1999 was 26 KWh, that was the lowest by regional standards in comparison to Uganda (40 KWh), Sudan (50 KWh) and Kenya (150 KWh) (Ibid.).

Ethiopia’s existing hydropower potential is estimated differently. Worku, et al. in Worku & Helmut K. (eds.) (2010) estimate at 650, 000 GWh per year. However, State Minister of the Ministry of Water and Energy at a workshop held at Jimma University in his key note address stated that Ethiopia has generation capacity of 45, 000 MW (Proceeding, 2010). He further noted that only 2,000 MW or 0.04 percent of the available potential is exploited. But Worku, et al. in Worku & Helmut (eds.) (2010) contest that “only about 1% of the feasible potential had been tapped by 2002”. They further contend that from the existing water potentials “less than 5% of Ethiopia’s abundant water resources are utilized in the country” (Ibid.). Against this reality the incumbent government has planned to increase the supply between 8,000-10,000 MW in five years time of the growth and transformation plan (GTP) period (Proceeding, 2010).

Presently the government is aggressively giving a hit on head to develop hydropower generation schemes over its major rivers located in different regions of the country. The water sector policy of the government in this regard states that it will “give high priority [to] hydropower resource development” (MOWR, 1999). It also promises to “pay close attention to environmental issues during development of energy projects” and “provide the private sector with the necessary support and incentive to participate in the development of the country’s energy resources” (Ibid.). Thus, since 1960 eight hydropower projects were completed that generate 663.6 MW in



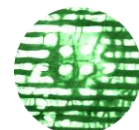
late 2006 (Worku, et al., 2010). Besides, the Tekeze Dam (300 MW), Gibe I (184 MW), Gibe II (420 MW) are completed and have become operational. Furthermore, the Renaissance dam (6,000 MW), Baro I&II (500 MW), Mandaya Dam (2000 MW), Karadobi Dam (1,600 MW), Genji Dam (200 MW) and Gibe III (1,870 MW) are some of the hydropower infrastructures under swift development and when all these are finished the country's power supply will triple and Ethiopia can export power to the pool members as well as to non-pool members within the continent and beyond.

Ethiopia's hydropower potential with 75 percent dependable surface water availability is located in three major basins: the Blue Nile, the Baro-Akobo and the Omo-Turkana. The Blue Nile Basin has a technical potential of 78, 820 GWh/yr and its dependable surface water is 51.48 bcm and has 132 potential hydropower sites. The Baro-Akobo Basin has a technical potential of 18,880 GWh/yr and its dependable surface water is 8.51 bcm. The Omo-Turkana Basin has a technical potential of 36, 560 GWh/yr and its dependable surface runoff is 17.9 bcm and has detail studied 23 potential hydropower sites. Of Ethiopia's national hydropower potential the Omo-Turkana Basin's share is 5,153 MW (Worku, et al., 2010; Associates & R. Woodroof, 1996).

The Omo-Turkana Basin is shared between Ethiopia and Kenya. It is in this basin that five cascades of dams were planned for construction. Gibe III is the third cascade under completion and is located at the middle reach of the Basin. Kenya and Ethiopia in 2006 have signed a bilateral memorandum of understanding (MOU) to trade a firm hydropower of 400 MW from the output of Gibe III (Zelalem, 2013), while several other sources account 500 MW. The same year both countries additionally signed a memorandum of understanding to construct a power interconnection system line construction agreement. Thus, a transmission line with a capacity to carry 2,000 MW is under construction for 1068 kms to interconnect Ethiopia and Kenya that will be finished in 2018 with budget obtained from AfDB (\$338m), WB (\$684m) and FDA (\$118m). Ethiopia, Djibouti, and North Sudan had also power trade agreement of 200 MW respectively. Transmission lines of 220 kV had been constructed and presently Ethiopia is exporting power to both countries.

Uganda is another EAPP country with substantial resource potential for hydropower production. Of its total area of 44,000 km² an estimated 1/5 is covered with international waters (<http://countrystudies.us>, accessed July 24, 2014). Its total hydropower capacity is 3, 000 MW and less than ten percent of it has been harnessed. About 97 percent of the populations do not have access to power and about 2 percent of the rural dwellers have access to light (Ibid.). The government has come up with a policy to nurture the existing hydropower potential and raise the supply from the present level of 3 percent to 61 percent by 2017 (Ibid.).

There are several hydro projects underway and are found at different levels of developments in Uganda. Some of the huge hydropower projects are: Murchison Falls (600 MW), Rippon falls (200 MW), Bujagali falls (250 MW), Karuma falls (600 MW), Ayago fall (600 MW, Isimba falls (180MW) to cite. Besides, Uganda has numerous medium sized hydropower projects over rivers



such as Nalubaale Dam (180 MW), Kiira Dam (200 MW), Owen falls (180 MW) and Bujagali Dam (250 MW). Furthermore, Uganda is undertaking steps to strengthen and expand grids to facilitate power export to Rwanda and Kenya in accordance to the principles of the Pool (<http://www.mbendi.com>, accessed 24 July 2014).

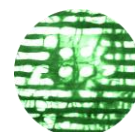
Hydropower trading had existed among the EAPP countries for about half a century. In 1958 a transnational transmission line with a capacity of 132 kV linking Uganda's Owen Falls hydropower station to Nairobi was installed. However, after the establishment of the EAPP and preparation of the regional master plan; projects were promoted to interconnect Ethiopia with Kenya, Tanzania with Kenya, Ethiopia with Djibouti, and Sudan with Egypt. Some of the projects were completed and others are under way while some others are at plan level. Member countries are dedicated to harness their water resources and share the benefits with others through interconnected lines.

Rwanda and Uganda already are connected with 30 kV and there is also plan to link the two countries by a 132/110 kV transmission line. The governments of Kenya and Tanzania have already commissioned a feasibility study for a 250 km transmission line to interconnect Nairobi to Arusha with 220 kV (Niyimbona, 2005). In a related development Tanzania and Zambia also have planned to carry out a feasibility study for the construction of 330 kV transmission line from Mbeya in Tanzania to Pensulo in Zambia for 670 km distance. Nonetheless, almost all of the projects are bilateral interconnections (<http://addisfortune.net>, accessed 24 July 2014).

3. Power pool :a pathway to regional integration

The east, central and north Africa (East Africa) region has vast hydropower potential for production of dependable electricity with least cost. The Africa's water tower country such as DRC is found in this region. Though resourceful, about 20 percent of the regions existing potential is developed and access to electricity ranges from 5 percent to 20 percent against Egypt's 99 percent. There are few transmission lines existing within the region and those available are weak and outdated that require huge investment to upgrade.

In many of the regions capitals there are daily power blackouts due to unreliable supply and countries try to cope by rationing. Because of power supply shortage different economic sectors suffer huge losses monthly and annually. Absence of integration and lack of capacity to tap their huge water resources for generation of reliable power has turned the region energy poor. Therefore, prior planning to harness the hydropower potentials of the region to satisfy the domestic demand as well as trading power through integrated system has multifarious advantages to the governments of the region.



Power pooling is a framework for centralizing energy resources and promoting power exchanges between utilities in a given geographic area based on an integrated master plan and pre-established rules. The overall benefits of a power pooling to its members are to:

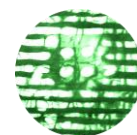
- ✓ secure reliable power supply through regional market;
- ✓ promote mutual assistance in case of failure in their respective power system;
- ✓ provide social, economic and environmental benefits since hydro is clean;
- ✓ reduce capital and operating costs through improved generation, transmission expansion and coordination among power utilities;
- ✓ optimize generation of power with large units;
- ✓ improve power system reliability with reserve sharing;
- ✓ improve investment climate avoiding power shortage risks;
- ✓ build trust, gradually clean grudges, minimize idiosyncrasy of hatred and strengthen cooperative relationships.

The existence of reliable and secure electricity is detrimental for region's countries to attain real development and export the excess power to other neighbors to obtain foreign revenue. Presently some of the major hydro-rich governments of the region in recent years are undertaking major hit on head by developing their renewable energy sources. This in turn requires sustainable power transmission line building of power system interconnection to establish bilateral trade agreements within and beyond the region. The rationale of shared transmission line is of multipurpose benefits. Sharing of operational reserves and installed transmission lines enable the pool members avoid additional investment in power generation infrastructure. Power pooling helps countries save operating costs and achieve secured supply as well as develop mutuality on one another that is the motto of AU, AUC, COMESA and other African institutions of integration.

Power generation requires high capacity to produce sufficient quantity of supply and reliable transport system to bring it to its end users. Robust transmission interconnection will boost access to electricity for the population in sustainable manner, raise savings in operating costs, reduce levels of required reserve capacity in the interconnected grids, improve national energy security including mutual support during time of emergence and reduce environmental impacts.

Access to reliable energy is pathway to economic and social development and electrification is crucial in ensuring citizens rights to basic services and is a step toward improving infrastructure and long-term economic development. No country has attained civilization without electrification and effectively and efficiently nurturing water.

Power poverty is a major hurdle to the region's governments. Lack of access to dependable supply turned the citizens of the region to be deprived of their fundamental human rights to



services such as healthcare, economic development, communication and education. Hence, it is the prior agenda of the region's governments to nurture the available water resources to avail reliable energy to their peoples that is closely intertwined with the peace and security of their existence against skyrocketing cost of imported oil that is malignant to their economies. In 2010 the African countries imported USD 18 billion worth of oil that was more than the annual foreign aid it got. Besides, the African governments subsidize USD 50 billion each year on oil that is devastating to their national economy. The oil rich countries are shifting to exploit their hydro energy resources to satisfy their domestic needs of energy supply because it is cheap and produce oil for export because it fetches lucratively high price.

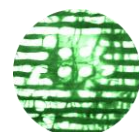
The regions countries all do not possess hydropower resources equally. Some have excess hydropower while others are rich in other power resources. Development of hydropower resources and building of cross-border transmission lines helps mixing of other power sources with the main hydro-grid that has immense benefits. All member countries are weak to finance mega projects and lack technical strength to construct long distance running transmission lines if they don't pool their sovereignties and cooperate to hit poverty on head. This can be facilitated when there is an institution of integration established with clearly defined visions, objectives, and legal mandates bestowed upon to play a fostering role in pooling together the region's countries. Pooling will benefit the members in reduction of:

- operation costs due to economic power exchange;
- investment costs in additional generating capacity due to least-cost development of energy resources from a regional as opposed to a national perspective; and
- sharing reserve requirements as a proportion of peak load.

The above benefits thereby will improve reliability and security of energy supply. Improvement of supply reliability and security of electricity can guarantee different economic and social service sectors to expand as well as invite more investments. Therefore, for the region's governments harnessing their available water resources and exporting power through integrated system is a Pan-African call of the moment to conquer backwardness as well as negotiate on their differences to create peace with themselves and others.

4. The Eastern Africa Power Pool

The concept of Pan-African power pooling is recent phenomena to the countries of the region though bilateral trading had existed for long. Developing energy projects and integrating their power system through regional planning is a priority agenda for members of the community to create secured supply for their peoples and for holistic developments. It was in light of this lofty and visionary understanding that the Eastern Africa Power Pool was conceived in water, born in water and is growing in water being guided by the hydro light of its own.

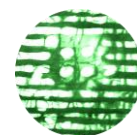


The Eastern Africa Power Pool (EAPP) was established 24 February 2005 with the signing of an Inter-Governmental Memorandum of Understanding (IG-MOU) by Energy Ministers of seven countries, viz.: Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda and then Sudan. On the same day, the Inter-utility Memorandum of Understanding (IU-MOU) was signed by the Chief Executive Officers (CEOs)/ Managing Directors (MDs) of Power Utilities countries that were signatories to the IG-MOU. In 2006 the 11th Summit of Heads of States and Governments of the Common Market for Eastern and Southern Africa (COMESA) held in Djibouti approved the establishing documents of the Pool and adopted the EAPP as its specialized institution to foster power system interconnectivity within the region. Thus, the IG-MOU, IU-MOU and the adoption by the Heads of States and Government laid a legal framework for the EAPP. Later on Tanzania, Libya and Uganda have joined the EAPP in 2010, 2011 and 2012 respectively.

Thus, the mission of the EAPP is to create more vibrant power market providing an efficient and reliable electricity supply through a fully integrated and interconnected regional system at a very low cost (<http://allafrica.com>, accessed July 24, 2014). When the East African countries are fully integrated they will save 33 billion USD annually (EU, 2007). Power pooling has multidimensional advantages to the communities of the region. Oduor, J. (2012) the former Executive General of the EAPP, hence, enumerates the following major objectives of the Pool:

- “Secure power supply for the EAPP member countries;
- Optimize energy resources availability in the EAPP Region by working out EAPP Regional investment schemes in Generation, Transmission and Distribution taking into account the socio-economic and environmental aspects;
- Coordinate and cooperate in the planning, development and operation of the power systems and minimize costs;
- Increase power supply in the EAPP Region in order to increase access rate of the population to electricity;
- Reduce electricity cost in the EAPP Region by using power systems interconnection and increasing power exchanges between countries;
- Play its role for coordination between various initiatives taken in the fields of power production, transmission as well as exchanges between countries;
- Create in the framework of NEPAD, a conducive environment for investment in order to facilitate financing of the integration projects in the fields of power generation and transmission in the EAPP Region;
- Facilitate the development of a competitive electricity market in the EAPP Region based on cooperation among the countries, transparency and respect for the environment.”

The EAPP is structured into political organ and bodies: Conference, Steering Committee, Permanent Secretariat, Independent Regulatory Body and Coordination Center. The Conference



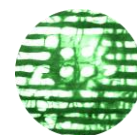
is the highest body of the Pool and is represented by utilities Ministers. It is the ruling authority in charge of electricity affairs of the members. It handles major policy issues and admission of new members. The Steering Committee consists of the Chief Executives of the Pool utilities of presently active members and oversees the activities of the Permanent Secretariat. The Permanent Secretariat (PS) is the administrative body of the pool mandated to facilitate bilateral and multilateral day to day affairs of the Pool. It is led by Executive Secretary who is recommended by the Steering Committee according to the bylaws of the pool and adopted by the Conference. The Pool's head quarter is in Addis Ababa. The PS has involved in the execution of various studies and capacity building activities with the view to lay the basis for optimal regional power system development as well as in creating an enabling environment for efficient power trade within the Pool.

The Independent Regulatory Board consists of nominees of national regulatory boards in the countries of the members. It is responsible for making standards, procedures, specifications, settle disputes, and organize power markets within the EAPP. It shares the same building with the Permanent Secretariat. The Technical Sub-Committees are in charge of specific issues such as, planning, operations and environment. The Coordination Center under the guidance of the sub-committee on operation is responsible to handle, on a real time basis, collection of technical and commercial information necessary for the operation of the regional interconnected power system and exchanges of power between members.

The existing organizational structure is commented and a new structure was proposed by the technical assistance project financed by EC to enable the implementation of an efficient market operation which defines different organs and regional institutions. The proposal is in the offing and awaits for consideration and approval by the Conference of Ministers.

The creation of EAPP is an important step to foster member countries harness their resource potentials and pool their electricity outputs within the broader framework of continental integration and by that enable members share regional resource benefits through win-win hydro-power diplomacy. All members of the pool have no equal resource potential neither to satisfy domestic demand nor export to others within or without the pool. DRC, Ethiopia and Uganda, etc have substantial potential to export hydropower to member countries while others are supposed to import cheap hydropower (Hamad, 2010). Therefore, nurturing of the available hydropower potential and cross-boundary trade has mutual benefit to countries in the region through coordinated efforts of EAPP.

The EAPP is sponsored by different regional institutions of integration such as NEPAD, AU, AUC, COMESA, AfDB, etc. Besides, there are many external partners of intergovernmental,

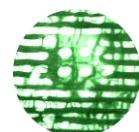


governmental and non-governmental types that financially and technically support the pool achieve its end goal of taking power to the end user as well as through power pooling and virtual water trading within and without the region. Thence, the EAPP has implemented four projects: (1) fostered technical assistance and capacity building, (2) developed master plan and grid-code, (3) fostered technical assistance for operationalisation of EAPP, and (4) facilitation of powering progress of East Africa.

The EAPP vies for regional power interconnection and has conducted several conferences up to now where issues of serious and common interests were discussed and resolutions were passed. Its 9th extraordinary conference of utilities ministers was held in Addis Ababa in 2014. At the conference development partners of the Pool; viz., AfDB, USAID, EU, Norwegian and Swedish government representatives were participated. The conference approved the selection of a new Executive Secretary of the Permanent Secretariat and deliberated on the budget of the Pool as well as the construction of the transmission line interconnecting Ethiopia with Sudan and Egypt. However, at the Conference different conflicting opinions were emerged. The Egyptian delegate expressed his view “over how to utilize the water resources of the region” and hinted that “their country might not want to import power from Ethiopia” (<http://allafrica.com>, accessed July 24, 2014.).

The Ethiopian delegate argued against the Egyptian delegate saying that this was “an excuse not to be part of the project” (<http://addisfortune.net>, acced July 24, 2014). He added that “Once the dams are finished, the Middle East and South African Power Pool are the available market” (Ibid.). The North Sudan CEO commented that “Egypt, whose main source of power is fossil fuel, will benefit from the import of cheaper and cleaner power from Ethiopia” (Ibid.). The Norwegian Government representative also expressed his thought of “win-win situation for everyone involved” (Ibid.). And in a similar manner the Egyptian Ambassador expressed his will that the hydropolitical differences between the two countries might be resolved through similar win-win mechanism. This paper also underlines that cooperation is sine quo non for the riparians of the region because “the benefits of cooperation outweigh the costs, the process and outcome is politically and socially acceptable” (Grey & Claudin, 2005).

The EAPP is a voluntary association established on mutual consent to trade energy between the members. As observed at the extraordinary conference; the EAPP served as another platform to discuss hydropolitical differences between the members of the region. The Pool’s great endeavor to integrate the region through power trade is a pathway to regional and continental integration but the road is not as smooth as one ideally thinks. The newly selected Executive Secretary in this regard has expressed that his immediate duty is to fast track the ongoing bilateral interconnection projects, urge members to put aside politics and target on technical issues to achieve the lofty objectives of the EAPP (Ibid.).



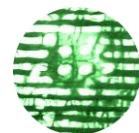
5. The climate vulnerability and the EAPP

Climate change is one of the dynamic processes impacting water resources in East Africa. There had been always “nexus of water resources and climate change in Africa” (UNECA, 2011). Climate-hydropower nexus is unavoidable but mitigatable to minimize the probable negative impacts. Climate variability causes significant impacts on the availability of waters for all forms life and their needs. Availability of water is a prior condition for the development of infrastructures to produce power to satisfy human needs. Turton (NY) further notes that “water and associated ecosystems” are “key components of sustainable development.”

Climatic change is one of the causes of water scarcity. Africa is endowed with abundant water resources. However, major African rivers are reducing in their volume and even some of the African rivers are steadily drying due to climate changes. Antano Fernandes was the first European to reach the Omo River in South Ethiopia in 1613. He recorded that the Omo River had “more water than the Nile” (Fernandes in Tellez, 2010). But today the Omo River stands the third in water volume and on steady reduction. This is due to high deforestation in the upstream of the basin that also resulted in the drying of some of the westward tributaries of the Omo River that led to the growth of woody vegetations along the banks (Butzer, 1971). Tefera (2007) has also accounted that “the country’s [Ethiopia’s] forests were estimated to cover 40 % of the country’s surface in the 1940s, but they now cover less than 3%”. Haack (1996) also has observed that the reduction of rainfall in the upstream is caused by climatic changes.

The increased frequency of extreme events such as flooding and severe droughts causing the drying up of lakes, rivers, and ponds are the consequence of climatic changes. Many lakes in Africa have dried because of climatic factors. Lake Manyara in Tanzania and Lake Haramaya in Ethiopia have dried because of climate. Water storing infrastructures can capture water if at all there is water to be captured for scarce period or generate power. Therefore, the primary concern of the Pool should be realizing the water dam-climatic variability inter-linkage. It is known that the pool members are many times attacked by cyclical droughts due to climate variability. Hence, the Pool as it fosters for the harnessing of the resource potential of its members and export of power; it has to make aware and work for the coordinated stance of planning a mechanism of mitigating climate and integrated management.

The African Water Vision 2005 believes that the EAC is endowed with substantial water resources and advocates for a doubling of the current hydropower supply by 25 percent. (UNECA and others, 2001). Though this is a pretty good idea it is farsightedness to underline on the necessity of pursuing an integrated water resource management (IWRM) to effectively and sustainably nurture the water resources of the region under the changing climatic environment. Our knowledge and power to forecast exactly the future climate variability is not precise. Thus, it



is important to know the trade-offs and synergies between human interest to nurture nature and natural ecosystem. Most of the time this nexus is neglected by policy makers, dam designers and other developmentalists like an ‘*eagerly ox sending its tongue to pick a green grass grown top-down of a cliff, itself standing at the marginal edge of the cliff*’ as the Ethiopian say goes.

The development of huge water storage facilities is advised to produce power and guarantee water availability for period of scarcity. However, mega storages are vulnerable to climate variability. Due to climate changes rainfall decreases and dam reservoirs may fail to impound any water in time and space either to avail the supply or produce power. Dams are useful if and only if when all negative impacts it can induce on nature as well as socially are ahead of its undertaking scientifically studied and mechanisms of mitigation measures are clearly known.

Dams and high voltage transmission lines can alienate the local people from their farm lands, destroy their livelihoods and induce involuntary resettlements. Swain (2004) in this relation notes that “Construction and operation of large dams and their reservoirs have led to many significant social, human and environmental impacts.” Worku et al. (2010) further noted that “hydropower production will have to consider not only downstream effects, periodic drought, and climate change, but also the rivers’ high silt loads, landslides and earthquakes in addition to the resettlement of population displaced by the reservoirs and possible negative hydrological, ecological, health and socio-economic impacts within the vicinity of reservoirs and downstream.”

Gibe I built in Ethiopia in the upper portion of the Omo-Turkana basin was planned for 50 years life time but because of high silt load it will fill in 25 years (Ibid: 85). Ethiopia likes to make hydropower a major national export with lower price but climate and ecological degradation may cause a challenge to generate far less power than the planned (<http://www.internationalrivers.org>, accessed April, 11, 2014). Therefore, if natural cases are not correctly handled and addressed through robust mitigation measures, socially if the local people are not integrated into the project through active participation and made to be the beneficiaries and enjoy changed life by far better than in the past then the sustainability of water-power infrastructures and long distance air highway transmission lines are susceptible to all kinds of human and natural calamities.

5. Challenges and opportunities for the EAPP

The EAPP is nine years old institution in a forward move to facilitate hydropower resources development, transmission lines pooling and transboundary power trading in the region. But from what has been achieved what yet has not been achieved are many and the roadmap for the awaiting duties are challengingly bumping. The basic challenge of the pool is



politics. Sadoff and Grey in Swain (2004) contest that politics will govern whether the result is cooperation or conflict. If there is a political will of all members; pooling of power through integration cannot be hindrance.

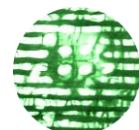
Politics is the right to decide who gets “what, why, when, where and how”. How much political authority is vested to the EAPP by its makers? This is a fundamental question that is intertwined with state sovereignty. The EAPP is voluntarily established association with minus sovereignty. Sovereignty as many argue is indivisible and states like not to split part of it to any. It is due to this fact that all regional and international intergovernmental organizations are feeble in their function. How much do the members of the pool politically trust and are confident of each other? This is detrimentally important for the robustness or footlessness of the institutions and this was observed during the 9th Conference recently.

Political instability and its spillover effect between some of the Pool members is a great common challenge to sustainability of power supply. The existence of different radical groups, opposition movements, terrorism, etc. are sources of vulnerability to the security of hydropower stations and transmission lines. Some of the members had long stayed historical grudges because of territorial claims, politicization ethnicity or the emergence of xenophobia and transboundary natural resources that could be covert causes of conflicts and lack of confidence among the Pool members. Furthermore, dual membership to different pools, unwanted competition over scarce resources and envy might negatively impact the cohesion of the pool when one stands at present and looks through the long tunnel twilight of the future.

Private investment involvement in power production sector in Africa in general and in particular in EAPP region is very weak. In the whole Africa in 11 countries there are 23 independent power producers involved from medium to large power production process (EU, 2007). There are various reasons for the dwarfing of the involvement and this is an important issue that requires the attention of the EAPP to work strongly in fostering member countries to create enabling policy conditions to attract private investors.

All pool members are not equally endowed with physical water resources. The DRC is the ‘water tower’ while others do not possess equal amount. Those with abundant resources will benefit by exporting excess power to deficit neighbors that is equated to equitable distribution of benefits. Though rich in physical abundance in hydropower resources the water available countries lack technical and economic capabilities to develop their energy sources or upgrade their outdated power facilities to increase their generation capacity since it is costly. Looking for foreign funds is tiresome; and knotted with political conditionalities of traditional ‘donors’ in particular when the basin is shared.

The major rivers of the EAPP countries are transboundary and create complex riparian relationships. Dinar (2002) notes that “International river basins create a complex network of environmental, economic, political and security interconnectedness between its riparian states.” The unilateral development of transboundary rivers in the absence of an agreed cross-border



water regime is tagged with controversies and as to the existing experience riparians are reluctant to establish a legal regime that relatively limits state sovereignty with consent. Thus, harnessing of shared water for power production and trading of power is hydropolitics. Hydropolitics is a systematic study of who gets what, why, when, where and how from the shared resources. Therefore, one riparian always is anxious of what another riparian is doing with the shared water and what and how much it benefits from the unilateral development. Therefore, the pooling of power from the shared waters for the benefit of the pool members is knitted with riparian rights to water and other multifarious issues of environmental, climatic, economic, legal and institutional interdependenc-ies between the pool countries making the missions of the Pool even more intricate.

Challenges and opportunities always coexist. The East Africa region has no shortage of water resources to harness for the production of electricity and pool through interconnected lines and thereby boost regional power trade that is a primary opportunity endowed by nature to the region. The financial, technical and other challenges confronting the opportunities can be overcome through strengthening of the institution since once it had come into existence. Institutionalization of dispersed hydro political consciousness into one center is important steps to yoke the members share cooperative vision, move forward and steadily negotiate on their differences. Nonetheless, the pool cannot be panacea for all the ills of the members but is an important intergovernmental forum for the utilities ministers to negotiate on their respective national interests as well as the COMESA Heads of States and Governments.

The pool countries are aware of the financial and technical constraints they have to nurture the available water resources. Any pool countries with immense hydropower potentials are vigilantly dedicated to mobilize domestic resources of fund raising such as usage of infrastructure bonds, voluntary contributions, central bank reserves and pension funds for development of infrastructures. A good case in point is the “Grand Ethiopian Renaissance Dam Bond.” There is no other pathway for EAPP countries other than continuing in the direction they are now moving. Once you *catch the tail of a tiger you can never release*. If you release the consequence is unconcealed.

7. Conclusion

The Eastern Africa region face immense challenges of ensuring security of energy supply, nurturing economic growth and meeting environmental obligation such as reducing carbon emission. Hydropower potential availability is the golden opportunity to address the prevailing challenges to the countries of the Pool. It is the cheapest and environmentally friendly means to power the region’s industry and boost gross domestic production, to electrify rural areas and improve quality of life, and reliably supply the increasing demand for energy. Besides, the export of hydropower to resource deficit neighbors with the cheap price through interconnected



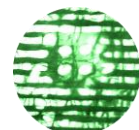
transmission system has multi-purpose benefits of which integrating the region as a pathway to continental integration is Pan-Africanism of this century.

The EAPP is an institution of lofty objective to integrate the region through hydro-development with cheap cost, export of virtual hydropower through integrated transboundary grids and avail reliable supply to the peoples of the region with least price. The EAPP promotes mutuality of members on one another and cooperation that will steadily lead to trust building, more and more integration of the region as well the continent through ambassadorship of water. Water is peaceful substance and the EAPP's struggle to integrate the region requires the political vigilance, tolerance, transparency and cooperation of all its members as response to globalization. Otherwise, what Kwame Nkrumah had long before said that "Africa must unite, or disintegrate individually" is true to the present either to unite or fall apart and individually become a prey in an increasingly interdependent and integrating world.

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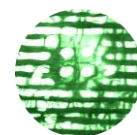




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