ADDIS ABABA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES

DEPARTMENT OF POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

PROSPECTS OF ENERGY LED INTEGRATION IN THE HORN OF AFRICA: OPPORTUNITIES AND CHALLENGES

By

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July, 2021

Addis Ababa, Ethiopia

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A THESIS SUBMITTED TO THE DEPARTMENT OF POLITICAL SCIENCE AND INTERNATIONAL RELATIONS OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENTS OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF ARTS IN INTERNATIONAL RELATIONS AND DIPLOMACY

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ADDIS ABABA UNIVERSITY

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DECLARATION

I, the undersigned, declare that this thesis is my own original work and has not been presented for a degree in any university and that sources of materials used for the study have been duly acknowledged.

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Acknowledgments

I am deeply thankful to numerous persons and institutions for their support in bringing my thesis to its completion. I would like to extend my heartfelt gratitude for all the participants of this study. I am greatly indebted to my advisor Dr. Yonas Ashine for his frank and constructive comments throughout the study. I also greatly appreciate his keen interest in the topic of this study.

I am very much thankful to Dr. Fana Geberesnebet, senior lecturer at IPSS (Institute of Peace and Security Studies). His personal encouragement and good friendship greatly boosted my moral throughout conducting this study.

My sincere appreciation also goes to my families who support me financially. Also many thanks to my friends Elias, Ermias, Rediat, and Tariku for their constructive comments, peer reviews, and discussions.

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List of Acronyms

AAU	Addis Ababa University
AfDB	African Development Bank
ASEAN	Association of Southeast Asian Nations
AU	African Union
GERD	Grand Ethiopian Renaissance Dam
COMESA	Common Market for Eastern and Southern Africa
EAPP	Eastern Africa Power Pool
ECA	Economic Commission for Africa
ECCAS	Economic Community of Central African States
ECSC	European Coal and Steel Community
ECOWAS	Economic Community of Western Africa Countries
EdD	Electricité de Djibouti
EEP	Ethiopian Electric Power
EEPCo	Ethiopia Electric Power Corporation
EIA	United States Energy Information Administration
EU	European Union
FTA	Free Trade Area
GAO	United States Government Accountability Office
GERD	Great Ethiopian Renaissance Dam
GWh	Giga Watt hours
HoA	Horn of Africa

HoAI	Horn of Africa Initiative
IGAD	Intergovernmental authority on Development
IEA	International Energy Agency
IPSS	Institute of Peace and Security Studies
IRENA	International Renewable Energy Agency
KETRACO	Kenya Electricity Transmission Company
kV	kilovolt
LAPSSET	Lamu Port-South Sudan-Ethiopia-Transport
MoFA	Ministry of Foreign Affairs
MoWIE	Ministry of Water, Irrigation, and Energy
MW	Mega Watts
NEC	National Electricity Corporation of the Sudan
NEPAD	New Partnership for Africa's Development
PEAC	Power Pool of Central Africa
PPA	Power Purchase Agreements
PTA	Preferential Trade Area
SAPP	Southern African Power Pool
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USAID	United States Agency for International Development
U.S.	United States
USD	United States Dollar
WAPP	Western Africa Power Pool
WB	World Bank

Abstract

Among different areas of regional economic cooperation, energy led cooperation has been shown in different parts of the world. Since recently, it has been also noticed in different parts of Africa including the Horn of Africa region (hereafter HoA). Energy cooperation in the HoA has been seen as a good move to promote relations between countries in the region and the regional economic integration in various forms. This study has three separate but interrelated objectives. Firstly, it highlights the energy resource potential of the HoA region and rationales for the regional energy cooperation initiatives. Secondly, assess the prospects of energy led integartion in the HoA by examining the current status of energy led cooperation schemes in the region and opportunities surrounding it. Thirdly, the paper discusses the key challenges of energy led integration in the HoA. The study uses both primary and secondary data. To substantiate the analysis, theories such as Institutional Liberalism, Functionalism, Neo-Functionalism, and Political Realism were utilized. In addition to theories, the study employed the political economy approach in order to examine the political economic factors at various levels that frustrate energy led cooperation as well as future integartion in the region. As a final point, the study tends to conclude that energy cooperation schemes in the HoA are increasing from time to time and have a good prospect for further regional energy integration. Thus, the existing energy led cooperation in the region is incrementally and functionally becoming more in line with theories liberalism, functionalism and neo-functionalism. However, it also asserts, for example, that political instability of the region, lack of trust among countries, geopolitics of the HoA region and hydro politics of the Eastern Nile basin inform political realism is also important to explain the politics of integration/disintegration in the region. Moreover, shortage of generation capacity and weak energy infrastructures, political economic dynamics at national, regional, and international level are key barriers to the existing regional energy integration process.

Key words: Energy, Horn of Africa, Cooperation, Integration, Interconnection

Chapter One

1. Introduction

1.1. Background of the study

Although regional integration had a long history, it has become much more popular after the end of the Cold War. Regional integration today is a very common phenomenon practically all over the world. It remains the principal strategy that will enable governments around the world to accelerate their economies, expand markets, widen the region's economic space, and reap the benefits of economies of scale for production and trade, thereby maximizing the welfare of their nations (Economic Commission for Africa (ECA), 2010: xix). Regional integration increases competition in global trade and improves access to foreign technology, investment, and ideas (ECA, 2010: 1). As a result, countries all over the world are increasingly focusing on regional integration as a strategy for achieving sustainable socio-political and economic development (ECA, 2010: xix; Samson & Halidu, 2014: 102).

Among different areas of regional cooperation, energy led cooperation has been shown in different parts of the world. Energy cooperation has long existed in North America where energy markets across the United States, Canada, and Mexico are extensively integrated (United States Government Accountability Office (GAO), 2018: 3). There is increasing energy cooperation in Latin America which has abundant hydro and hydrocarbon resources, with some countries in surplus and others in deficit (David & Martin, 2012: 53). Because access to energy remains a pressing challenge in most countries in the South and Southwest Asia, countries in the region are increasingly in collaborative effort towards building power and gas infrastructure (UN, 2013: 10).

Although Africa has a great potential of various energy resources, it has minimal share of the total world's energy integration (International Energy Agency (IEA), 2019). The continent is rich in exploitable energy resources to meet its needs. However, most of these resources remain unexploited, despite various initiatives and investments (ECA, 2010: 323). Nonetheless, energy cooperation has been also noticed in different parts of Africa. It is more focused on hydroelectric cooperation except – in North Africa--in which gas already meets around half of the region's

energy needs (IEA, 2019). The Southern African Power Pool (SAPP) was the first power pool created in Africa in 1995, and is currently the most advanced regional power pool in Africa. The creation of the SAPP was soon followed by establishment of the Western Africa Power Pool (WAPP) in 1999 (Medinilla *et al*., 2019:5). The Eastern Africa Power Pool (EAPP) was established in 2005 by seven Horn and Eastern African countries: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda and Sudan. The EAPP was further adopted by Heads of State and Government at the 11th Summit of the Common Market for Eastern and Southern Africa (COMESA) in Djibouti in November 2006 as a specialized institution for electrical power for Eastern Africa (Medinilla *et al*., 2019:5).

The HoA region is among the African regions with the most energy production potential both from non-renewable (oil and gas) and renewable sources (hydroelectric power; solar and wind energy). Thus energy cooperation in the HoA has a good promise to promote regional economic integration in various forms. Medhane (2004) noted that energy led integration in the HoA acts as a stimulus to other areas of cooperation such as infrastructure and port linkages. Ethiopia is specially endowed with a great hydropower potential. Being at the heart of the region with huge potential of hydropower, it has a good opportunity to accelerate regional relations and cooperation among states of the region (Endalcachew, 2014: 281). According to the World Bank Group (2018: 4), in the coming years, Ethiopia could become a regional energy superpower, which would also provide additional revenues to the sector. Given its massive clean energy reserves, Ethiopia can become a cornerstone of the regional power market in the HoA and of the Eastern Africa Power Pool (EAPP). And this will be most critical in the future relations between Ethiopia and its neighbors.

There have been recent energy led cooperation efforts in the HoA region. For instance, Ethiopia's electric power system is interconnected with Sudan and Djibouti, and the one with Kenya is currently under its finalization stage. There are also additional and proposed power system interconnection projects among countries in the Horn. Other than electric power interconnection, natural gas transmission line, road, railway, and port projects are underway in the region, which is expected to boost existing level of regional energy cooperation. Hence, the overall concern of this research paper is to examine the prospects of energy led integration in the Horn of Africa through paying particular attention to the opportunities and challenges.

1.2. Statement of the problem

The HoA is one of the most unstable and insecure areas in the world (Medhane, 2004; Leenco, 2004; Healy, 2011). The name HoA itself is mostly associated with disease, famine, poverty, border dispute, and civil war. The other gloomy aspect of the HoA is the magnitude of environmental degradation, which has been linked to long years of instability in the region (Yonas, 2012: 1). These manifestations of the region are attributable to different factors and are mostly political and economic. For instance, according to Medhane (2004), the nature of the state is at the heart of the conflicts in the region. Another manifestation and hindrance for further regional cooperation is the small and fragmented nature of the region's economy (Jannah, 2012: 65). Countries in the Horn still face similar challenges in poverty reduction, climate change, population growth and food security, and they will find it hard to address these because of lack of trust and lack of regional integration around oil, water and hydropower (Verhoeven, 2011: 1).

In the contemporary world energy plays key role for a country's economic and social development. Thus, the Horn of Africa would benefit greatly from this aspect of functional cooperation - energy - that would contribute to tackle its multifaceted problems and bring sustainable regional development. Energy cooperation is especially important for regions like HoA which is on high rate of population growth and suffers from huge deficits in the supply and distribution of energy (Verhoeven, 2011: 5). Energy can also help the Horn countries to avoid conflicts and build good relationships among them. It can also serve as a stimulus to other areas of cooperation such as infrastructure and port linkages (Medhane, 2004). By expecting these political and economic benefits, the HoA countries are already witnessed energy led cooperation efforts.

If HoA's political economic crisis could be minimized via energy, it would be worth exploring the status and dynamics of regional energy cooperation in the region. Only few literature attempts to explain the energy resources potential of the Horn of Africa region and its importance for the regional economic integration (Medhane, 2004; Verhoeven, 2011, Endalcachew, 2014). Medhane (2004) in his famous book "From conflict to cooperation: Towards Energy Led Integration in the Horn of Africa", says that energy led integration has seen as a good promise to promote relations between countries and economic integration in various forms. Verhoeven (2011), in his article "Black Gold for Blue Gold? Sudan's Oil, Ethiopia's

Water and Regional Integration", argued that regional integration in the HoA can be best built through energy, for instance, on the synergies between Sudan's oil and Ethiopia's water. Endalcachew (2014) also raised similar argument and examines the role of Ethiopia's hydro dam constructions in boosting regional relations. As of the expectations of these literatures, the most recent years have witnessed energy led cooperation efforts in the HoA region.

However, there is a time gap in the above literatures. Moreover, no comprehensive study has yet conducted in examining the achievements made so far by energy cooperation among the Horn countries. This study seeks to build in these earlier contributions by assessing the progress made so far by energy cooperation in the Horn of Africa region and future prospects of the regional energy integration. It also tries to examine opportunities for and challenges to energy led integration in the Horn.

1.3. Central argument

The central argument of this study is that, with the existing achievements of energy cooperation among countries in the HoA and surrounding opportunities, energy led integration in the region has a good promise.

1.4. Objectives of the study

The overall objective of this study is to document the political economic dynamic of energy cooperation in the region and prospects therein.

Based on the aforementioned, the specific objectives include:

- Shedding light on the of energy resources potential of the HoA region;
- Exploring the necessitating factors of energy led cooperation in the region;
- Assessing the current status of energy led cooperation in the region and how much this will play a role for further regional energy integration;
- Examining the opportunities surrounding energy led integration in the HoA and key challenges towards it.

1.5. Research questions

Based on the research problem and the aforementioned general and specific objectives, the study examined and analyzed the following specific research questions:-

- What are the main factors necessitating energy-led cooperation in the HoA?
- What are the main features, status, and dynamics of energy-led cooperation in the region?
- What are the major opportunities of energy led integration in the HoA and challenges thereof?

1.6. Research Methodology, Methods and Instruments of Data Collection

The study has employed the following research methodology and methods of data collection.

1.6.1. Methodology

Research methodology is the general research strategy that outlines the way in which a research project is to be undertaken and, among other things, identifies the methods and approaches to be used in it (Igwenagu, 2016: 5). This simply means a guide to research and how it will be conducted. Methodologically, this study has employed qualitative research approaches. As Goundar (2012) put it, qualitative research is concerned with qualitative phenomena involving quality. It is non-numerical, descriptive, applies reasoning and uses words. Its aim is to get the meaning, feeling and describe the situation. Hollis (1994) also argued that the qualitative approach seeks to understand phenomena. In qualitative research it is important to investigate questions involving the intentions and purposes of people, the 'Why?' 'How?' and 'What kind?' are important, when looking at social science phenomena (Cropley, 2019: 36). Moreover, qualitative research attempts to interpret phenomena in terms of the meanings people bring to them. In other words, qualitative research is basically interpretive in that it involves analyzing non-numerical data and finally making interpretation or drawing conclusions about its meaning (Creswell, 2014).

Therefore, prospects of energy led integration in the HoA can be clearly understood through examining relevant documents and conducting in-depth interviews with key informants. The research objectives, research questions, and means of data collection also fall under the framework of qualitative methodology. Accordingly, the study employs qualitative research supported by explanatory and political economy approaches. Explanatory research approach is conducted for a problem which was not researched well before, generates operational definitions and provides a better-researched model. It is actually a type of research design which focuses on explaining the aspects of the study in a detailed manner (China Scholarship Council, 2018). With

many difficulties facing, energy led cooperation in the HoA is an undergoing process and it is not well researched before. Thus, an explanatory research approach is best suitable to examine the level of energy interconnection in the region, and explain the opportunities and challenges thereof. Moreover, the study employs a political economy approach to analyze the links of various economic and political factors and to reveal the underlying interests, incentives and institutions that will enable or frustrate energy led integration in the HoA.

1.6.2. Methods and Instruments of Data Collection

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes (Kabir, 2016: 202). Qualitative data are mostly non-numerical and usually descriptive in nature. This means the data collected are in the form of words and sentences. Qualitative methods of data collection, thus, include literature review, focus groups, group discussions and interviews (Kabir, 2016: 203).

The researcher utilized both primary and secondary sources to gather the necessary data on the study at hand. Secondary sources such as books, journals, articles, reports, official documents, newspapers, magazines and internet sources have been consulted. In order to strengthen aspects of data provided by these writings, this study also used primary sources of data through in-depth interviews.

1.6.2.1. Interviews

Key informant in-depth interview has been used as a key instrument of data collection in this study. Fontana and Frey (2000) described in-depth interviews as one of the most powerful tools for gaining an understanding of human beings and exploring topics in depth. Thus, the researcher employs semi-structured in depth interview techniques. It is because semi-structured interviews consist of several key questions help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail manner (Gill *et al*., 2008: 292). . As Jackson*et al* (2007: 25) noted, semi-structured interviewing is preferred to allow for more flexibility and responsiveness to emerging themes for both the interviewer and respondent.

Therefore, this study employs this in-depth interview to gather necessary information from pertinent authorities and individuals. To this end, the researcher had conducted 10 (ten) in-depth

interviews with key informants from Ministry of Water, Irrigation and Energy (MoWIE), Ethiopian Electric Power (EEP), Eastern Africa Power Pool (EAPP), Ministry of Foreign Affairs (MoFA) and with scholars at Addis Ababa University (AAU) and Institute of Peace and Security Studies (IPSS).

1.6.2.2. Sampling technique

To gain access to key informants, the researcher has used mainly two sampling procedures--purposive and snowballing. The purposive sampling technique is the deliberate choice of a participant due to the qualities the participant possesses (Etikan*et al*., 2016: 2). The researcher prefers purposive sampling technique since it enables to identify participants who have closer connection and knowledge of the subject to be studied.

Snowballing sampling is a method of gathering information to access specific groups of people. What is very special in snowballing sampling is that, after gaining access to the preliminary samples, the samples begin to introduce other people to take part in the research (Naderifar*et al*., 2017: 1). That is why the researcher chooses again this sampling technique. Using these sampling techniques, the researcher managed to consult key informants from different organizations mentioned above.

1.6.2.3. Data Analysis and Interpretation

As discussed earlier the study has employed a qualitative research approaches which usually is a non-numerical nature. Thus, the data collected through key-informant interviews, and document analyses are largely qualitative. Because of this, the study employed a qualitative content analysis method. Content analysis is used to evaluate patterns within and across multiple pieces of content or sources of data, and it helps to build patterns, categories, and themes from the 'bottom-up,' by organizing the data into increasingly more abstract units of information (Creswell, 2007: 38). In this study, Content analysis is mainly used to analyze relevant secondary sources such as books, journal articles, reports and official documents, and responses from interviewees of key informants. Moreover, the researcher has used a triangulation data analysis method in order to enhance the credibility of a research study. Triangulation refers to the practice of using multiple methods or data sources in qualitative research to develop a comprehensive understanding of phenomena and to enhance its credibility (Patton, 1999). Data

triangulation using above mentioned secondary and primary methods of data collection in this study may result in a broader understanding of the study and enhance its credibility.

1.7. Scope

Since the major aim of this study is to give deep analysis of the case with giving high emphasis to the current situation, it is believed to best accomplish this objective by geographical delimiting the study to the Horn of Africa region. Therefore, the scope of the study is to deal with prospects energy led integration in the Horn of Africa .The study is also limited in examining the economic and political cooperation achieved so far among the Horn countries through energy, and discussing the challenges and opportunities for further energy led integration.

1.8. Significance of the study

The study aims to make a useful contribution towards enhancing energy led integration in the HoA by assessing and analyzing the key challenges that face the integration process. The study will also have a significant value to anyone who is interested in analyzing and appraising the current status of energy led cooperation in the Horn of Africa. Given the timeliness of study, it will help to fill the existing knowledge gap in regards to the study area. Moreover, the findings of the research could be used by policy makers for the purpose of policy re-orientation.

1.9. Limitations of the Study

In conducting this study, the researcher has faced some difficulties. The first constraint for the study is lack of willingness from some pertinent bodies and individuals to deliver relevant documents and information, which are very important to the research. The COVID 19 pandemic and inability to gather information everywhere was the other key challenge for the researcher. The study also challenged by lack of time and finance.

1.10. Organization of the study

The research paper is organized in five chapters. This first chapter consists of the background of the study, statement of the problem, central argument, research objectives, research questions, research methodology and methods of data collection, significance, scope, limitation, and the organization of the paper. Chapter two is a highlight of relevant reviews of related literature and theoretical framework on major themes of the study. The third chapter discusses the energy resources potential of the HoA region and rationales for regional energy cooperation. The fourth chapter discusses prospects of energy led integration in the HoA. In doing so, the chapter

examines the current level of energy led cooperation in the Horn of Africa and how it will play a positive role for further regional energy integration, major challenges facing and opportunities surrounding. The fifth chapter forwards conclusion and at the end, the study has references and annexes as well.

Chapter Two

2. Literature Review: Conceptual and Theoretical Framework

2.1. Conceptual Notes

This section mainly has two components. The first two subsections try to conceptualize briefly 'energy' and the 'Horn of Africa region', which are the basic pillars of this study. In doing so, the subsections define and operationalize what the term energy and Horn of Africa means with reference to the focus of the study area. Secondly, subsections discuss the general concepts of regional integration and other related issues. To this end, concepts of regional integration and the rationales for regional integration schemes are consecutively reviewed followed by levels of regional integration.

2.1.1. Defining Energy, Renewable and Non Renewable

Literature on energy related matters is abundant, and covers scientific and technical aspects. However, for the majority of people having no scientific or technical degree it is still hard to find a suitable introduction to the basics (Mehling, 2017: 1).

Energy is a concept introduced in physics. Therefore, many texts give neat packaged definitions of energy such as: 'energy is the capacity to do work' (Sefton, 2015: 3). Taken literally, definitions like this are not best suitable to the understanding of energy these days. This definition is the original historic meaning, however nowadays incomplete as it misses "the ability to supply heat and power" (Mehling, 2017: 2). In this research, energy mainly represents renewable and non-renewable energy sources that are used to generate power.

Renewable energy can be defined as energy used without reducing its availability in the future (IRENA, 2018). Renewable energy sources include wind, solar, geothermal, hydro-power and energy from biomass/wastes. In contrast, non-renewable energy is energy sources that are finite and run out through time or will not be replenished easily. They cannot be easily replaced on human timescales, and we are exploiting them faster than they are being made (IRENA, 2018). Non- renewable energy sources mainly include fossil fuels, oil, natural gas, and coal.

2.1.2. 'Horn of Africa' region

To define the Horn geographically, it usually understood to comprise Djibouti, Somalia, Ethiopia, Eritrea, and the Sudan, which constitute the horn-shaped landmass which extends from the Red Sea and the Gulf of Eden outwards the Indian Ocean (Breouk, 2011; Medhane, 2004).However, there is no common geographical definition of HoA. For instance, according to the World Bank (2020), five countries constitute the HoA: Djibouti, Eritrea, Ethiopia, Kenya and Somalia. Some broader delineation says 'Greater Horn' region stretches over an area of 5.2 million km2 that comprises the countries of Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda (IGAD, 2016: 5; Gaas, 2019: 11). For the purpose of this study, however, the HoA include all countries in the region that shares border with Ethiopia such as Eritrea, Sudan, South Sudan, Kenya, Somalia, Djibouti, and Ethiopia itself.

Next to conceptualizing 'energy' and the 'Horn of Africa', it is also important to operationalize what is 'energy led cooperation' and 'energy led integration' mean in this study. Energy led cooperation, in this paper, encompasses existing bilateral electric power system interconnections, natural gas transmission lines, and other existing and planned energy interconnection schemes and infrastructural projects like electric power system interconnection, energy transport and port constructions between countries and across the mentioned Horn of Africa region. Whereas, energy led integration is meant to explain mainly the prospects of further extensive energy system integration of countries in the region. Therefore, the study has examined existing energy cooperation, the prospects of energy led integration in the HoA region, and the challenges and opportunities therein.

2.1.3. Conceptualizing Regional Integration

Regional integration can be defined in various ways by different scholars in the field of international relations. The school of thoughts in the field indicate that no common consensus with regard to a definition of regional integration. Some focus on the process of forming a regional body, others emphasize the stage of integration (Cornett, 1999: 4). However, most of the definitions tried to address the economic and political components of regional integration. Traditionally, regional integration takes place between relatively similar countries regarding economic development or political traditions and institutional frameworks (Cornett, 1999: 4).Regional integration is the process whereby political actors in several distinct national settings are persuaded to shift their loyalties, expectation and political activities to a new center whose

institutions possess or demand jurisdiction over the pre-existing national states (Haas, 1958: 16 cited in Laursen, 2008: 4).

According to Jonne Brücher (2016), regional integration can ultimately best be described as a spatial trade-off between a local and a global solution and, consequently, as an approach that merges aspects of liberalization and protectionism. Regional integration is nothing but just another layer between the two extremes, the local level (or even the individual) and the global level (or humankind). In between these two extremes, there is a diversity of partially overlapping units, ranging from social categories such as different definitions of family, ethnicity and nation to organizational units such as different forms of firms and organizations and to administrative, governmental units such as sectors, provinces, states and regions (Brücher, 2016: 13).

John Ravenhil (2016: 1) stated that regional integration is a broader concept that encompasses economic, cultural, security and political character. Thus, it is essentially a label for interstate interactions within a given geographical space in various aspects. According to this definition, regional integration takes many forms, addresses multiple objectives, and ultimately all forms of regional integration arguably have a political underpinning.

Some people use regional cooperation and regional integration interchangeably in their literature, for instance, Andreas Cornett (1999) and Jonne Brücher (2016). However, there is a distinction between the two. According to Philippe Schmitter (2007), one can distinguish between regional cooperation and regional integration and lay the foundation for analyzing their distinctive dynamics, as well as their eventual interconnections. Many trans-regional organizations are engaged in regional cooperation; only a few of them manage to contribute to regional integration. The former seems to be a precursor to the latter, i.e. a specific region seem to find it necessary to engage first in cooperation in order to build up mutual trust among elites and sufficient interdependencies among broader publics before plunging into the much more risky (and potentially rewarding) business of integration (Schmitter, 2007: 8). There is also a general view that regional cooperation is somewhat easy to achieve, temporary, and also easy to quite while regional integration is binding, permanent and difficult to leave. Therefore, we can say that regional cooperation is a predecessor of regional integration. This study also views the existing regional energy cooperation initiatives in the HoA as a predecessor of energy led integration and regional economic integration in various forms.

2.1.4. Rationales and Benefits of Regional Integration

It is undoubted that there are varieties of necessitating factors for regional integration schemes. The motivations for regional integration were mostly economic and political. Among economic motivations, regional economic integration allows the free movement of goods, services, people and capital between countries in a given region. Regional integration, thus, has been taken as considerable potential for driving more robust and equitable economic growth as well as promoting poverty and unemployment reduction (Kayizzi et al,. 2014: 1). Establishing a regional integration framework is essential to constructing a broader economic and good governance agenda, which in turn provides the basic precondition for enabling economic growth (Clapham, 2001: 64 cited in Draper, 2010: 13).

The political motivation for building regional integration is centered primarily on security considerations. The reference point is principally European, specifically the origins of the European Community centered on managing Franco-German relations in order to avoid a rerun of the first and second World Wars (Draper, 2010: 11). Therefore, economic interdependence was thought to be the most effective means to promote the political cooperation that was highly desired in the region after World War II. That means economic means would be used to achieve a political goal (McKay *et al*., 2004: 36).

As of the expectation and the rationale, there are benefits of regional integration. Using positioning theory in regional integration studies, Slocum and Langenhove (2004: 239) come up with common benefits of contemporary regional integration. These include the following:

- Integration will bring increased economic prosperity to the region.
- Integration will ensure peace (e.g. prevent violent war) in a region.
- Integration will enable a region to become a global actor (to better compete with other powerful countries and regions).
- Integration will provide a new common identity for a region.
- Increased regional integration will provide more democracy (the principle of subsidiary).

2.1.5. Levels of Regional Integration

Regional integration schemes are stepwise that could be manifested through different levels ranging from the simplest (Free Trade Area (FTA) to the most complex (Political Union) (Jennifer, 2004: 4). These ranks are sequential – Economic Union is not established without first

passing through a Customs Union. In addition, the step between a Free Trade Area and a Customs Union is not comparable to the step between a Customs Union and an Economic Union (Jennifer, 2004: 4). According to McDonald (2005, 25-26), the commonly cited levels of regional integration are:-

A. **Free Trade Area (FTA)** – this occurs when nations jointly remove all trade restrictions amongst them, while retaining their freedom to pursue individual policies**.** FTAs are coded as the first level of regional integration.

B. **Customs Unions** – This represents an upgrade of free trade area but member countries must undertake joint external trade relations with non-member states i.e. common external tariffs on goods from non-member states. This is the second level of regional integration.

C. **Common Markets** – This occurs when customs unions upgrade their relationship further to allow free movement of factors of production i.e. the so called '4 Freedoms' between them e.g. the European Union. Common markets require a much greater degree of political and economic cooperation than the two previously discussed arrangements. This type of regional integration is coded as level three.

D. **Complete Economic/Financial Union** – This involves a situation when countries that formed a common market completely unify and harmonize their monetary and fiscal policies. An Economic union reflects a higher and increasingly complex level of regional cooperation.

E. **Complete Political Union** – occurs when two or more member states unite to form a sovereign nation under one federal or centralized institutional structure e.g. the unification of the East and West Germanys.

Table 1: Schematic Representation of Regional Integration Scheme

Scheme	Free intra trade scheme	Common trade policy	Free factor mobility	Common monetary & fiscal policy	One government
Free Trade Area	Yes	No	No	No	No
Customs Union	Yes	Yes	No	No	No
Common Market	Yes	Yes	Yes	No	No
Economic Union	Yes	Yes	Yes	Yes	No
Political Union	Yes	Yes	Yes	Yes	Yes

Source: Ali M. El-Agara, Regional Integration: Experience, Theory and Measurement (1999)

2.2. Theoretical Framework

It is believed that regional integration theory started with a broad comparative regional and organizational scope in the 1950s and 1960s, and it has since focused on European integration and the European Union (Jarvis, 1994: 18; Schimmelfennig, 2018: 1). However, there are numerous theories analyzing integration processes in Europe and the world. Given its multifaceted nature, it is not surprising that regional integration is analyzed in a diverse set of theoretical and analytical frameworks. This subsection, therefore, discusses regional integration theories with an attempt to link with the topic under study. Theories are discussed so as to show how they could be useful in explaining the existing level of energy cooperation and prospects of energy led integration in the Horn of Africa (and also the challenges and opportunities therein).

2.2.1. Liberalism

Liberalism has an optimistic view towards the possibility of creating harmonious relations among the states. Institutional liberalism/liberal internationalism, one variant of liberalism, starts from the assumption that international anarchy and its adverse effects can be overcome by the establishment of international organizations and international law. Liberal institutionalism

hinged on the basic assumption that institutions are important because of their impact on political outcomes, and for them institutions intervenes between preferences of actors and policy outcomes (McDonald, 2005: 144). Within the context of European integration, for instance, it is reflected in the belief that the adoption of a European constitution would itself constitute the key step for transforming the European Community into a true federal state (Gehring, 1996: 227).

Approaches of this assume that an appropriately designed institution is capable of steering the decisions of the units and, consequently, of taming their otherwise self-interested and occasionally conflict-raising behavior. Hence, the establishment of international and regional institutions itself may be conceived of as an important step for the progressive development of international relations (Gehring, 1996: 227-228). We can argue thus that institutional liberalists are in favor of regional integration. Based on this theory, one may assert that HoA countries can establish harmonious relations among themselves, engage in energy led cooperation, can facilitate their efforts via Eastern Africa Power Pool (EAPP) and other institutional frameworks, and this energy cooperation i in gradual historical process will have paramount importance to boost regional energy integration and regional integration based on mutual benefits.

2.2.2. Realism

In contrary, for realists, cooperation among states and regionalism remains a difficult phenomenon to explicate. This school basically emerged from western political thought, viewing the state as the single most important actor in the international system with predetermined national interests, which often quantifies costs and benefits involved in different policy alternatives to achieve desired goals (McDonald, 2005: 135). This theory conceives the states as basically distrustful of each other and there is continuous struggle for power and dominance that will leave no room for trust and cooperation (Donnelly, 2005). Realists also advocate the existence of international anarchy - the absence international government which dictates the behavior of states. Thus states take the behavior of their co-actors into account in their decision making.

Therefore, different variants of realism warn against following the idealistic recommendations of liberal institutionalism and regional integration (Gehring, 1996: 228), rather advocate states to be strong by military and economy in order to pursue their national interests. In line with the realist assumption, one can conclude that it will be difficult to establish genuine energy

cooperation among the horn countries, because there will be no mutual trust between countries in the region and most of the time states will act unilaterally to maximize their own national interests. According the realists assumption, the geo political dynamics of the HoA region and hydro politics of the Eastern Nile basin will also impede the regional integration process in the global anarchical and politically realistic world.

According to Gehring (1996), the above two approaches constitute the extremes on a continuum. While one of them believes in the relevance of regional integration and recommends their establishment, the other discourages participating and relying on it. The middle ground between these extremes is occupied by theories which are less optimistic than liberal institutionalism but also less pessimistic than political realism (Gehring, 1996: 228). These middle ground regional integration theories are discussed below.

2.2.3. Functionalism

There can be no doubt that functionalism and its later refinement, i.e. early neo-functionalism, set out to occupy middle ground between liberalism and realism (Mitrany, 1966; Hass, 1970 cited in Gehring, 1996: 228).

> *Functionalism theory rejected both the power-orientation of realism and the "grand designs" of traditional institutionalism. Instead, it advocated a strategy of institutionally supported incrementalism. They drew attention to the distinction between power issues ("high politics") and welfare issues ("low politics") and argued that the latter, in contrast to the former, bore the potential for the collective pursuit of common interests. Over time, progress in "low politics" would produce fundamental political consequences*.(Gehring, 1996: 229)

Functionalists primarily focus on common interests and needs shared by states. The functionalist assumptions also emphasized a practical approach to problem solving insisting that this could be achieved by prioritizing functional areas of common interests, and proper administration of things was expected to produce more appropriate results than political governance (McDonald, 2005: 137-138). Thus, functionalists view regional integration as a technical and nonpolitical nature, and implicitly believe that the process of integration could be operating without a concentration of sanctioning power (McDonald, 2005: 138).

> *Simply stated, functionalism is based on the assumption that the growing complexity of governmental systems leads greatly the essentially functional, non-political tasks confronting government. They argued that in identifying and jointly acting upon 'human needs' which are not politically sensitive, governments begin to integrate their activities at the functional-technical level in specific sectors of their economies. In consequence, governments tended to 'weave an ever spreading web of international institutional relationships on the basis of meeting such needs. Integration would, then, be a product of the technical 'functional interdependence' of modern nation states.*(Jarvis, 1994: 20)

Therefore, based on the assumption of functionalism, energy cooperation in the HoA could be based on various technical and functional areas of energy interconnection projects, and this technical and nonpolitical cooperation will lead to further energy led integration and socio-economic interdependence among countries in the region. Thus, one can argue that practical and technical energy cooperation among the Horn countries will enhance regional cooperation and integration among states of the region by providing welfare and economic benefits.

2.2.4. Neo-Functionalism

What makes neo-functionalism different from functionalism is that this theory is based on the assumption that the forces moving regional integration forward are endogenous and self-reinforcing (Obydenkova, 2006: 8). The neo functionalist approach assumes that regional integration is achieved through gradual and incremental cooperation between actors, while concluding that cooperation in economic and social fields may eventually spill over into the political fields (McDonald, 2005: 137).

Neo-functionalism is mostly associated with the political and economic goals, as well as the integration strategies, of the European Coal and Steel Community. Jean Monnet, one of the chief architects of European unity, believed that in achieving integration in one sector of common policy amongst sovereign states, this would eventually lead to a 'spillover' into other policy areas (Dunn, 2012). This would then lead to integration in these policy areas and in turn, other broad economic and political sectors. Thus, the current European Union is a best example to substantiate the neo-functionalists argument of regional integration.

Terms such as ‘spillover’ ‘incremental integration’ and ‘ramification’ are important in neo-functionalist explanations of regional integration (Hass, 1958, 1968 cited in Yonas, 2012: 3). Especially, ‘spillover’ is important because it appeared to carry much of the explanatory weight in the neo functionalism account of how integration deepens moves from sector to sector and becomes politicized (Warleigh and Rosamond. 2006). According to spillover effect, concluding that cooperation in one economic field may eventually spill over into other economic and social fields, and eventually adapts to broader regional integration. ‘Spillover’ amounts to a (positive) feedback mechanism stressing the possibility of self-supporting social processes that start modestly, gain dynamics and may over time produce dramatic outcomes (Mitrany, 1966; Hass, 1970 cited in Gehring, 1996: 229)

What is special here is that neo functionalists mostly place major emphasis on the role of non-state actors and external actors (i.e., regional and international organizations from multiword) in a given regional cooperation of functional issues (Yonas, 2012: 2). From this point of view, for example, we can say that the neo functionalist assumption promotes the role of development partners and donors such as Power Africa (USAID)[1], AfDB, EU, and WB in providing the dynamic for further cooperation in the Horn’s regional energy integration.

In general, neo-functionalist theories focus on the progressive development of integration and emphasize the role of "spillover" effects. Therefore, according to this assumption, existing energy cooperation will lead to energy trading among states of the region which will enhance further integration the energy sector. This integration then will have spillover effect in the infrastructural connection and other broad economic sectors.

The theories discussed above seem feasible in explaining historical trajectories, current energy cooperation efforts in the HoA, and prospects for regional energy led integration and economic integration in various forms. The central issue is, however, not labeling whether one of the theories is right and the other is wrong. Rather the core question is to understand which theory sufficiently explains the energy led integration processes and dynamics in the region. Therefore, the theories will be revisited later in discussing the findings of the research paper.

[1] Power Africa is a U.S. Government Led partnership coordinated by the U.S. Agency for International Development (USAID). It has an aim of bringing cleaner, more efficient electricity to sub-Saharan Africa. For more see https://www.usaid.gov/powerafrica/partners

2.2.5. The Political Economy Approach

Other than the above theoretical perspectives, this study also employs the political economy approach. In simple terms, 'political economy' is issues of politics and economics considered together (Lee & Usman, 2018: 4). Similarly, existing energy cooperation achievements and prospects of energy led integration in the HoA is both economic and political in nature. While energy led integration is one aspect of economic integration among states, it needs genuine political commitment.

There are several ways to explain political economy, with common elements but no standard formulation is available in the literature of the field. According to Lee & Usman (2018), key elements of political economy include how actors interact to pursue specific interests given their different ideas, means of influence, and use of institutions in a given context. These key elements are also very important in the study of regional energy integration process in the HoA. This means within the regional energy cooperation scheme states interact to acquire specific interests using their means of influence, ideas, and institutions. The researcher chooses this approach because it is open to analyze how and why actors and factors interact in the Horn's energy cooperation achievements and in further regional energy integration process.. Moreover, it helped the study to critically assess the domestic, regional, and international political economy dynamics that frustrate energy cooperation in the HoA.

2.3. Literature Review

This section deals with review of related literature to trace key issues and develop themes relevant to the specific problems under study. First, it starts with briefly looking at the literatures of global experience of energy led cooperation in due consideration of the recent status. Second, it has reviewed literature related to regional energy cooperation efforts in Africa. Lastly, literature on energy led cooperation initiatives in the East and Horn of Africa are briefly discussed.

2.3.1. Energy Led Cooperation and Regional Integration

Regional integration today is a very common phenomenon practically all over the world. It remains the principal strategy that will enable governments around the world to accelerate their economies and expand markets (Economic Commission for Africa (ECA), 2010: xix). Regional integration also increases competition in global trade and improves access to foreign technology,

investment, and ideas (ECA, 2010: 1). As a result, countries all over the world are increasingly focusing on regional integration as a strategy for achieving sustainable socio-political and economic development (ECA, 2010: xix; Samson & Halidu, 2014: 102).

To achieve regional integration, countries most of the time initially create cooperation over specific issues. Energy led cooperation is regarded as one way of attaining regional integration among countries or a region. There are different literatures around the world that propose energy led cooperation as way of attaining regional economic integartion. Energy led cooperation was mostly seen as the political and economic goals, as well as the integration strategies, of the European Coal and Steel Community. Pioneers of the European Coal and Steal Community believed that in achieving integration in one sector of common policy amongst sovereign states, this would eventually lead into economic integartion areas (Dunn, 2012). Similarly, Carrizo and Velut (2018) address the issue of energy transitions and regional integration in South America. The core point, for the authors is that regional integration in South America is merely seen as a means to ensure the existing functioning by limited exchanges, rather than as a genuine transition instrument- energy transition. Thus, they look at energy transition as a key and necessary instrument in the South America regional economic integration (Carrizo & Velut, 2018). Anna Fünfgeld (2019) also addresses effort towards regional integration within the Association of Southeast Asian Nations (ASEAN) region, which is also believed to be achieved through enhanced cooperation in the energy sector. The author appreciates the most recent effort of the ASEAN towards enhancing cooperation in the energy and infrastructure sector that builds on earlier transnational energy projects and pushes for the realization of transnational infrastructures, including an ASEAN gas pipeline network and a regional power grid, and these is expected to boost the regional economic integartion in various aspects (Fünfgeld (2019). African countries are also increasingly involving in energy led cooperation and establishing regional power pools to facilitate electrical power trade in their respective sub-regions and regional economic integartion in various aspects. When we come to the Eastern and Horn of Africa region, similar arguments and assumptions are growing in the literatures. Medhane (2004) asserts that energy led integration could be an opportunity to minimize conflict and enhance cooperation in the Horn of Africa. Diverse energy routes could also reinforce economic interdependence and help to dampen the potential for conflict in the region. Energy-led integration can also help as a stimulus to other areas of cooperation such as infrastructure and

port linkages (Medhane, 2004). Similarly, Endalcachew (2014) mainly argues for the importance of Ethiopia's hydro dam construction in enhancing cooperation in the Horn of Africa region.

This above group of literatures tends to argue in favor of energy led cooperation and further integration. These groups of literatures argue that energy cooperation and connecting into power pools can play pivotal role in promoting peaceful and cooperative regional relations through accelerating economic integration and expanding infrastructural facilities. These Literatures even stresses the importance of energy led cooperation for regions like Southeast Asia, Latin America, and Eastern Africa in which energy transition is best possible and necessary.

However, some other literatures like Priyanka Kher (2012) and Medinilla *et al* (2019), on the other hand, are skeptical of energy led cooperation and its anticipated benefits. Priyanka Kher (2012) mainly examines political economic factors that have been impediments to regional energy cooperation and economic integration in the South Asia region. Similarly, Medinilla *et al* (2019) explore and assess the weaknesses of regional power pools in Africa through political economy analysis, and their political economy analysis is based on evolving interests of member states and state-business relations around energy (Medinilla *et al* (2019). So this group of literatures more focuses on the challenges and factors that impede regional energy transitions. For these literatures, energy cooperation is not only an economic phenomenon but it has also a political implication. Therefore, they gave high emphasize that energy led cooperation requires trust and a strong alignment of interests between the region's member states.

Nonetheless, energy led cooperation has been witnessed in different parts of the world. Thus the subsequent sections briefly assess the literatures and experiences of energy led cooperation around the world.

2.3.2. Global Experience of Energy Led Cooperation

There are many literatures on the experience of energy led cooperation in different parts of the world. According to Chanakira (2011), regional cooperation in energy sector is increasingly becoming a common phenomenon in every part of the world. Currently, regional cooperation in the energy sector is recognized as central to the attainment of energy security (Chanakira, 2011: 64 cited in Getahun, 2015). Integrating regional energy systems often provides diversification of energy source – a key component in energy security (World Energy Council, 2005: 9). Regional

energy integrations can also enlarge national energy markets beyond borders that could help to decrease variable supply and demand issues and stimulate capacity investment (Maupin, 2013:1).

However, regional energy market strategies vary across countries and regions in the world; some countries rely on bilateral interconnections, while others operate on the basis of a broader regional level of energy trading (Getahun, 2015). As a result, regional energy cooperation is at different levels among different regions of the world.

Energy led cooperation in Europe was a long existing phenomenon. Not only this, energy cooperation was the first step in the process of European integration. The creation of European Coal and Steel Community (ECSC) in 1951, which is basically energy-based initiative, marks a milestone in European cooperation as it represents the first supranational treaty organization in history: National governments decided to delegate domestic decision-making authority in the coal and steel sectors to a new supranational organization, thereby renouncing portions of their national sovereignty (Rittberger & Glockner, 2012: 1).

Integration of EU-wide energy markets and networks is considered by the European Commission to be one of the best means by which the objectives of the common energy policy can be achieved. It has been working towards this goal for the last decade, attempting to build the legislative framework to complete this internal energy market (Palle, 2013:1). For many years, the EU has sought also to encourage the development of energy networks. It has progressively attempted in 1995, 2007, and more recently 2009 to finance, at the European level, the development of trans-European energy networks. Measures taken to encourage the liberalization and opening up of the electricity and gas markets in 1996 and 1998, adding the integration of markets to the integration of physical infrastructure networks, have been further steps toward this integration (Palle, 2013: 3).

Energy led cooperation in North America is also a long-existing phenomenon. Integration of the energy systems of Canada, Mexico, and the United States historically occurred by gradual, ad hoc, and regional adjustments implemented by an array of regional, public, and private stakeholders, reflecting the complex and fragmented jurisdictions in all countries (U.S Quadrennial Energy Review, 2017). Currently, energy trading like oil, natural gas, electricity across US, Canada, and Mexico is well advanced. In 2015 alone, energy exports from Canada to

the United States totaled USD 53 billion, almost all of the total Canadian energy exports. Canadian oil accounts for 43 percent of total US crude oil imports (GAO, 2018). Canadian natural gas furthermore accounts for 97 percent of US natural gas imports. The United States also exported USD 14 billion in energy products to Canada in 2016 (Krupnick*et al*., 2017: 8). This volume of trade requires a compatible energy transportation network through the development of pipelines and rail access. It is expected that energy trade between Canada and the United States will continue to grow in coming years (Krupnick*et al*., 2017: 8).

According to the United States Government Accountability Office (2018),

> *Energy markets across the United States, Canada, and Mexico are extensively integrated. For example, Canada and Mexico, respectively, the largest and fourth largest foreign suppliers of crude oil to the United States—together supply almost half of total US petroleum imports. A growing trade in natural gas produced in the United States is also increasingly important to the energy relationship among the three countries. Moreover, trade in the other energy commodities, such as electricity, natural gas liquids, and coal, is comparatively small yet important to some US regions. In 2017, the value of the energy trade between the United States and its North American neighbors exceeded USD 125 billion, with almost USD 83 billion in U.S. energy imports and almost USD 43 billion in exports.* (GAO, 2018: 3)

Extensive cross-border infrastructure is used to transport oil, refined petroleum products, and natural gas between the United States and both Canada and Mexico in which, Pipelines are the primary means of transporting crude oil from Canada to the United States; at present, six pipeline systems link the petroleum-producing regions in western Canada to US markets (GAO, 2018: 3-4). Marine vessels, rails and truck are also used to transport petroleum products. Not only these, Cross-border electrical infrastructure is also significant between the United States and Canada but is limited between the United States and Mexico. There are 30 major US–Canadian transmission connections, while synchronized US–Mexican connections exist only at the border between Mexico and the state of California (GAO, 2018: 4). As we can see from the above figures, the achievements made so far by energy led integration among the North American countries are significant. According to Vidangos*et al* (2016: 8), a potential turning point for North American energy integration and for its associated results is that the highest levels of

government in the United States, Canada, and Mexico has been a sustained interest in the benefits of enhancing North American energy integration.

Regional energy cooperation in Latin America has long been a goal of governments, international development agencies and many businesses. The region is an energy-rich region and has abundant hydrocarbon resources, with some countries in surplus and others in deficit (Singh, 2009; David & Martin, 2012: 53). Consequently, institutions are established to achieve the desired goal. According to Carrizo &Velut (2018: 181), there are a set of political and technical energy integration institutions in Latin America created in the 20th century. None of which has been suppressed, although some share common objectives. Some of these bodies are political; some are devoted to technical topics, like tariffs or infrastructures that affect energy markets. All of them are concerned with energy but only two are dealing exclusively with energy: Latin American energy organization and Commission of Regional Electrical Integration (Carrizo &Velut, 2018: 181). The official objective of these arrangements, particularly, is to achieve energy integration in Latin America Region.

To achieve the desired goal, governments and multilateral organisms also launched an Action Plan for the Integration of Regional Infrastructure in South America (2000), which includes the objective of developing "efficient regional energy interconnections, in a regulatory context promoting competence and free trade."(Carrizo &Velut (2018: 183). However, optimal solutions are not prioritized for network design, neither on a national scale, nor on a regional one. Investments do not address social issues, local development or reliability improvement. Instead, South American network expansion is designed mainly to increase energy supply to mines, industry and metropolitan areas (Carrizo &Velut, 2018: 184). The South Gas Pipeline Network which covers seven countries and due to its vast geographic sweep could also substantially reduce the political risk of energy integration in Latin America (World Energy Council, 2008).

Within the Association of Southeast Asian Nations (ASEAN), energy led cooperation is perceived as a major prerequisite for economic growth and development and therefore countries in the region are increasingly focusing on energy cooperation. As Fünfgeld (2019) noted, in Southeast Asia energy demand is projected to increase significantly in the decades to come. Just like general infrastructure development, ensuring energy supply in the region is therefore important to accommodate future electricity and transportation-related needs. Moreover,

electrification is essential for improving living conditions in a region where energy consumption is distributed highly unequally, and many people still lack access to electricity or rely on biomass for cooking (Fünfgeld, 2019: 317). Regional cooperation in the energy sector is perceived as a means to tackle these kinds of challenges. It includes not only the harmonization of regulations but also the improvement of cross-border energy infrastructures. Thus similar to other regional organizations like the European Union, ASEAN seeks to enhance cooperation in the energy sector (Fünfgeld, 2019: 318).

And also for similar reasons there is an increasing multilateral effort among countries of South and Southwest Asia to establish a common energy market. Because access to energy remains a pressing challenge in most countries in the South and Southwest Asia, countries in the region are increasingly in collaborative effort towards building power and gas infrastructure (UN, 2013: 10), that in turn, help the broader regional energy led integration process. Power grid interconnection among the Northeast Asia countries has been also raised as an alternative energy solution for many years (Otsuki*et al*., 2015: 311).

In South Asia too, there is an increasing collaborative effort among countries in the region to establish institutional arrangements for energy led cooperation. To facilitate energy cooperation in South Asia, there are three established institutional mechanisms dealing with the sector in all or some of the South Asian countries. They are: (i) South Asia Association for Regional Cooperation, (ii) South Asia Sub regional Economic Cooperation, and (iii) Bangladesh-India-Myanmar-Sri Lanka-Thailand–Economic Co-operation (Wijayatunga& Fernando, 2013:1).

2.3.3. Energy Led Cooperation in Africa

There are also many literatures on energy led cooperation initiatives of Africa. According to a report of the World Energy Council (2005), the diversity of energy potential across regions of the continent necessitates regional energy cooperation in Africa. Oil and gas reserves are concentrated in North and West Africa, hydroelectric potential in Central and Eastern Africa and coal in Southern Africa. These all demonstrate energy diversification and market availability is the ultimate driving force of energy cooperation and integration in Africa (World Energy Council, 2005: 10). Although there is strong evidence that Africa is beginning to reap the benefits of regionally integrated energy development (World Energy Council, 2005: 10), there is still a long way to go, when we compare it with the European and North American experience.

Nonetheless, cross-border energy cooperation in Africa is not new. African countries have signed bilateral power trading arrangements as far back as the 1950s and 1960s. This includes bilateral power agreements between Zaire (now the Democratic Republic of Congo) and Zambia in the late 1950s; between Zambia and Zimbabwe in the 1960s and between Nigeria and Niger around the same time, with Nigeria becoming the main source of energy supply to Niamey (Vanheukelom et al., 2016; Karaki, 2017 cited in Medinilla, 2019: 3). Other early examples include agreements for Ghana to export energy from the Akosombo dam on the Volta river to Togo (1972) and Benin (1973), Mozambique selling hydropower from its Cahora Bassa dam to Zimbabwe and South Africa (1975); and Senegal, Mali, and Mauritania cooperating around hydropower produced from the Senegal river basin as part of the Organization pour la Mise en Valeur du Senegal (Medinilla *et al*., 2019: 3).

However, the African ambition to go beyond these bi- and trilateral approaches came in the 1990s, largely driven by the apparent successes of US and European experiences in power pooling and energy sector integartion. This is why since the mid 1990sliberalization of national grids and energy sector were put in place in many African countries, and African Regional Economic Communities and their members in Southern, Eastern, West, Central and North Africa started rolling out regional power pools (Medinilla *et al*., 2019: 4).

Continually, AU and New Partnership for Africa's Development (NEPAD) are working in partnership with national, regional, continental and global organizations to promote a comprehensive program of regional integration in the energy sector. To this end, they are working in cooperation with continental organizations like African Energy Commission; Forum of Energy Ministers of Africa; the Union of the Producers, and Transporters and Distributors of Electric Power in Africa (Igbinovia and Tlusty, 2014:6 cited in Getahun, 2015). NEPAD plays a key role in facilitating the formation and expansion of interconnected systems and power pools in Africa.

The Southern African Power Pool (SAPP) was the first power pool created in Africa in 1995, and is currently the most advanced regional power pool in Africa (Medinilla *et al*., 2019: 4).

It is events that influenced the SAPP. For example, in 1992, a severe drought hit Southern Africa, which severely impacted Southern Africa Development Community's (SADC)

hydropower producers such as Zambia, Malawi and Zimbabwe. The resulting power shortages signaled the need for energy cooperation between hydro-rich countries in the North and thermal-rich South Africa in the South, at that time an electricity surplus country due to its coal reserves (Medinilla et al., 2019: 4). The drive to create a regional pool was therefore driven by a convergence of interests between South Africa on one side, which sought to generate additional income from its energy surplus, and importing countries on the other, which looked to ensure a supply of reliable and affordable electricity to their citizens and industries when hydropower capacity was constrained (Medinilla et al., 2019: 4).

SAPP has aimed to facilitate the development of a competitive electricity market in the Southern African region and to act as 'the right arm of the SADC Infrastructures and Services Division' with regards to any energy-related project at the regional level (Maupin, 2013: 2-3). The SADC Energy Protocol, also signed in 1996, intends to promote the development of national energy policies under a regional policy umbrella for the member states' common benefit, in providing a balanced and equitable development of energy resources throughout regional energy resources pooling. Thereafter, all utilities participating in SAPP were given equal rights and obligations, and agreed to act in solidarity without taking advantage of one another (Maupin, 2013: 2-3). SAPP has made significant progress in enhancing power trade by developing a regional electricity market. Another important factor in the energy cooperation of southern Africa is the recent introduction of renewable energy sources in the SADC regional strategy and in several member states' national policies and future energy mix (Maupin, 2013: 3).

The Creation of the SAPP was soon followed by the establishment of the Western Africa Power Pool (WAPP) in 1999. First launched as an integral component of the Economic Community of West Africa Countries (ECOWAS), the WAPP was later transformed into an independent ECOWAS agency covering 14 of the 15 members of the Regional Economic Community (Medinilla *et al*., 2019: 5). The WAPP could build on the experience of the SAPP just four years earlier, and benefited from significant technical assistance from the United States Agency for International Development (USAID) (Karaki, 2017: 6). While the ambition of regional energy cooperation already featured in the 1975 ECOWAS Treaty, the ECOWAS Energy Policy (1982 and 1993), and conception of West African Gas Pipeline in 1982, the WAPP is widely regarded as a replica of the SAPP (Medinilla *et al*., 2019: 5).

The ultimate goal of WAPP was to promote the development of infrastructure for power generation and transmission and to create a real regional power market. In essence, the WAPP creates a platform for bilateral or tripartite agreements on interconnection, power generation, transmission and distribution among member state (World Bank, 2007). While Ghana was one of the key drivers towards regional energy trade, member states with energy deficit and/or with a small market such as Togo, Benin and the Sahelian countries were also very much interested in this regional program, and producers like Nigeria, Côte d'Ivoire, and Ghana could also benefit from improved security of supply and economic exchange of short-term power (Karaki, 2017: 6).During 2011, the WAPP continued efforts to update the ECOWAS Master Plan for Production and Distribution, and after several validation meetings, the Master Plan was adopted in November 2011. The ECOWAS Regional Electricity Regulatory Authority also effectively entered its operational phase for the establishment of a regional electricity market in January 2011 (AU, 2013: 68).

In April 2003 Economic Community of Central African States (ECCAS) has established the Power Pool of Central Africa (PEAC), which became an ECCAS specialized agency by decision 021/ ECCAS /2004(AU, 2013: 68). PEAC is responsible for implementing and coordinating regional energy policy, expanding the community infrastructure and managing the exchange activities of electric power on all ECCAS member countries. The PEAC is also mandated to establish a regulatory framework for harmonization, technical and marketing to promote investment and trade in electricity in the region (AU, 2013: 68).

2.3.4. Energy Led Cooperation in the Eastern and Horn of Africa

Although scarce, there are growing literatures describing the energy resources potential of the Eastern and Horn of Africa and its importance for regional integartion in many aspects. According to Medhane (2004), energy led integartion in the HoA has been seen as a good promise to promote relations between states and economic integartion in various forms. For Medhane, energy can also serve as a stimulus to other areas of cooperation such as infrastructure and port linkages. Similarly, Verhoeven (2011), in his article "Black Gold for Blue Gold? Sudan's Oil, Ethiopia's Water and Regional Integration", argued that regional integration in the HoA can be best built through energy, for instance, on the synergies between Sudan's oil and Ethiopia's water. Endalcachew (2014: 284) argued power system interconnection can play

positive role in promoting relations between countries in the Horn, for instance, the realization of hydropower potential of Ethiopia through its underway projects is significant for both Ethiopia and neighboring East and Horn African countries. Endalcachew (2014) also raised similar argument and examines the role of Ethiopia's hydro dam constructions in boosting regional relations.

As the projections of literatures, the most recent time has witnessed energy led cooperation initiatives in the Eastern and HoA. Bilateral power system interconnections are established between countries, and there are also undergoing energy interconnection projects in the HoA region. Moreover, countries in the Eastern and HoA have established regional power pool—Eastern Africa Power Pool (EAPP)—to promote regional power trade and interconnection. The EAPP was established in 2005 by seven eastern African countries: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda and Sudan. The Eleventh Summit of the COMESA Authority of Heads of State and Government held in Djibouti City, in 2006 adopted the EAPP as a COMESA specialized institution and as a vehicle for the enhancement of energy interconnectivity in the region and the rest of Africa. The COMESA Council of Ministers in its meeting held in 2010 further decided that the EAPP to be incorporated as a Specialized Agency under Article 182 of the Treaty (AU, 2013: 65). As such, COMESA is not significantly involved in the implementation of the EAPP agenda. Instead, COMESA's main role is to provide a level of oversight and 'political cover' and to provide the EAPP with more political clout and financing opportunities from donor agencies (Medinilla *et al*., 2019: 5).

According to EAPP (2016), the main objectives of the EAPP include:

- power supply security for the countries of the region;
- optimization of the use of energy resources available in the region by working out regional investment schemes in power generation, transmission and distribution taking into account the socio-economic and environmental aspects;
- enhancement of power supply in the region to increase the access rate of the population to electricity;
- reduction of electricity costs in the region by using power systems interconnection and by increasing power exchanges between countries;
- negotiation of cooperation agreements in the power sector;

The power pool also aims at the creation of a good environment for investments and facilitation, in the long-term, the development of an electricity market (AU, 2013: 65-66). To this end, relevant studies and capacity building activities have been conducted. Under the technical assistance and capacity building to the EAPP some activities were completed which included, but not limited, to the following: the strategic road map to 2025, the regional market design. Moreover, an Independent Regulatory Body was also established. Model bilateral electricity trading agreements and the interconnection code and power transmission standards were also developed. A Regional Market Operations Centre has been established and yet to be operational (AU, 2013: 66).

Several interconnections are underway in the EAPP. A 500KV High Voltage Direct Current line between Ethiopia and Kenya is set to go online in mid-2019, which will enable a 400MW power purchase agreement between the two countries (Medinilla *et al*., 2019: 12). A further interconnection between Kenya and Tanzania is planned, which would enable it to purchase electricity from Ethiopia through a "wheeling agreement" with Kenya for transporting power over the Kenyan grid into Tanzania (Power Africa, 2018 cited in Medinilla *et al*., 2019: 12).

Although it is largely power system interconnection in its kind, energy led cooperation in the Eastern and HoA has also achieved some sort of success. Ethiopia is the champion in this area of regional energy interconnection. Ethiopia is initially exporting electricity to Djibouti and Sudan (up to 100 MW/each) (Endalcachew, 2014). There is a plan to increase power exports to Djibouti due to a growing demand in the region. In 2018 Ethiopia and Sudan are also negotiated a bilateral agreement for the installation of the second power interconnection line, which will enable Ethiopia to export 1,000MW of electric energy to Sudan (Addis Fortune, 2018). Ethiopia also expects power export to Kenya very soon. The Ethiopia-Kenya electric power interconnection line installation and converter station infrastructure construction have already been finalized on the side of Ethiopia. After the completion the GERD, Ethiopia also sets to extend its power export towards South Sudan, Somaliland, and other Eastern Africa countries (AU, 2013, 62; Ethiopian Herald, 2020). Other than electric power interconnection, in February 2019 Ethiopia and Djibouti signed a memorandum of understanding for the construction of natural gas pipeline from the Hilala and Calub gas fields in Ethiopia's Somali region, to a new port east of Djibouti City in Djibouti (Xinhua, 2019), which also expected to boost the energy

cooperation of the region. Therefore, the current status and dynamics of energy cooperation in the HoA, and its prospect for regional energy led integartion needs to be discussed further.

As we can draw lessons from the above literature (Global, African, Eastern African experience of energy cooperation), the trend and historical evolution of energy cooperation had been increasing from time to time across different regions of the world. Energy cooperation has been a long-exiting trend in Europe, North America and some parts of Latin America and Asia. The global trend of regional energy cooperation and its historical evidence supports, for example, the liberal internationalism and functionalism/neo-functionalism assumptions of regional integration, despite some challenges which political realism may substantiate.

The momentum of energy led cooperation in Africa is also on the rise, largely driven by the success of the European, North America, Latin American, and Asian experience. What is different in the African context is that some regions are advanced in the regional energy cooperation and the others are not. The Southern and Western Africa has established relatively strong energy cooperation arrangements and institutions compared with the Horn and Eastern Africa. For instance, in Western Africa, the ECOWAS Regional Electricity Regulatory Authority has effectively entered its operational phase for the establishment of a regional electricity market in January 2011 (AU, 2013: 68). ECOWAS as a regional economic community had managed to design institutions as an important step for enhancing regional energy integration among Western Africa countries. This is very in line with the assumptions of liberal institutionalism that appropriately designed institution is capable of steering the decisions of the units and, consequently, enhancing regional cooperation. What about the Horn of Africa region? What are the institutional arrangements? What are the driving factors for regional energy cooperation? What are major achievements made so far by energy led cooperation? And what are the prospects for further energy led integartion?

Therefore, in order to fill the gap that there is scarcity of literature on recent status and prospect of energy led integartion in the HoA and also to answer the above questions, conducting this study is believed to have a significant importance.

Chapter Three

3. Energy Resource Potential of the HoA Region and Rationales for Regional Energy Cooperation

3.1. Horn of Africa's Energy Resource Potential

The HoA region is among the African regions with the most energy production potential both from nonrenewable (oil & gas) and renewable sources (hydro, geothermal, wind, solar etc.). The energy resource potential varies from country to country. While some countries in the Horn are endowed with huge amounts of non-renewable energy resources, others are endowed with renewable energy production capacity. The study views at these as they will have a positive impact in the regional energy cooperation efforts. This subsection, therefore, briefly highlights the energy resources potential of the Horn region.

3.1.1. Oil and Natural Gas

The HoA region especially Sudan and South Sudan is endowed with a significant amount of natural crude oil. Most of Sudan's and South Sudan's proved reserves of crude oil is located in the Muglad and Melut basins, which lies into both countries (Shankleman, 2011: 3). According to United States Energy Information Administration (EIA), Sudan and South Sudan have 5 billion barrels of proved crude oil reserves as of January 1, 2013.Approximately 3.5 billion barrels are in South Sudan and 1.5 billion barrels are in Sudan. Oil is transported through two main pipelines that stretch from the landlocked South to Port Sudan (EIA, 2013; EIA, 2014).

Oil has been a dominant factor in the economics and domestic and international politics of north and south since it was first discovered in the late 1970s (Shankleman, 2011: 3). Oil plays a major role in the economy of both Sudans. Oil represented over half of government revenue and 90 percent of export earnings for North Sudan (EIA, 2013). Oil is the lifeline of the South Sudan economy now and over the medium term. It accounted for about half of the country's GDP, and most of the country's exports (about 97 %) and government's revenue (about 98 %) (Cust and Harding, 2013: 1).

Table 2: Crude Oil Production of Sudan and South Sudan (2012-2019)

Country	Crude oil production in thousand barrels per day (bbl/d)							
	2012	2013	2014	2015	2016	2017	2018	2019
Sudan	92,000	133,000	113,000	108,000	104,000	102,000	67,000	69,000
S.Sudan	22,000	115,000	147,000	152,000	152,000	150,000	155,000	157,000
Total	114,000	248,000	260,000	260,000	256,000	252,000	222,000	226,000

Source: *U.S. Energy Information Administration, 2019*

The Above table illustrates actual crude oil production capacity of Sudan and South Sudan which are the biggest producers of oil in the HoA region. If appropriately explored, the oil production capacity of the two countries is much beyond the above figure. Therefore, the two countries can sell their surplus natural crude oil to their neighbors in the HoA.

Countries in the HoA Africa especially Sudan and Ethiopia are also well endowed with natural gas. According to the US Energy Information Agency (2019), Sudan has proved reserves of 3 trillion cubic feet of natural gas. However, development has been very limited. Natural gas associated with oil fields is mostly flared or re-injected. Ethiopia is the other country in the region with a huge natural gas potential. The country has a natural gas reserve estimated at 112 billion cubic meters. The natural gas deposit is in the Eastern part of the county (MoWIE, 2012:9). In contrast to Sudan, Ethiopia has already started exploiting its natural gas resource and is planning to export it via Djibouti port. For instance, in February 2019 Ethiopia and Djibouti signed a memorandum of understanding for the construction of a natural gas pipeline from the Hilala and Calub gas fields in Ethiopia's Somali region, to a new port east of Djibouti City in Djibouti (Xinhua, 2019).

3.1.2. Hydro

The HoA region is also endowed with a significant amount of hydro capability. However, the Hydro potential is concentrated in Ethiopia and Sudan; with Eritrea, Djibouti, Somalia and South Sudan having a deficit both in potential and installed capacity. The Horn's potential and energy surplus is set to increase with Ethiopia's prospects of becoming a major hydropower producer in the near future (Medinilla et al., 2019: 8).

Table 3: Yearly Hydro Capability in the HoA by Country

Country	MW	Hydro generation (Ave. Giga watt hours)
Ethiopia	16,204	76,986
Sudan	4,678	26,393
Kenya	1,300	6,135
Total	**22,182**	**109,514**

Source: *EAPP, Regional Power System Final Report, 2011*

As illustrated in the above table, EAPP assesses the annual hydro capability of the HoA region by country using the historical data of 35 years (1972 – 2006). Three of the Horn countries alone have a yearly hydro capability of producing 22,182 MW. We can, thus, understand that the region has endowed with much hydro production capability. Other countries in the HoA which does not have significant hydro generation capability (i.e. South Sudan, Eritrea, Djibouti, and Somalia) may engage in power system interconnection with Ethiopia and Kenya. Currently, the Ethiopian power system is already interconnected with Djibouti and the Ethiopia-Eritrea, Ethiopia-Somalia, Ethiopia- Somaliland, and Kenya-Somalia power system interconnection is under study with the support of the Horn of Africa Initiative (Horn of Africa Initiative, 2020)

Table 4: Identified actual energy and demand by country

Country	Actual energy in 2018 (MW)	Energy demand in 2018 (MW)
Ethiopia	4,256	3,000
Kenya	4,520	6,290
Sudan	1,575	3,100

Source: *Musau.M.P, Analysis of the East Africa Power Pool, 2018*

The above table shows that Ethiopia has surplus hydro power by the year 2017 when compared with Kenya and Sudan. It seems why Ethiopia has started exporting electricity to Sudan and is planning to export power to Kenya very soon. The Ethiopia-Kenya power system interconnection is at its finalization stage, which is the longest in East and Central Africa (African Energy Portal, 2019).

Ethiopia, well positioned at the core of the Horn, is blessed with a great hydro generation potential which is estimated technically exploitable potential of more than 45,000 MW and economically exploitable potential of 21,000 MW (MoWIE, 2012: 10). However, to-date only little of this hydropower resource has been exploited due to less financial sources and other considerable factors (Khan and Singh, 2017: 121). Still Ethiopia is on the verge of hydropower development revolution. Thus, in the coming decades Ethiopia is expected to play key role in the regional energy integration process if continued in aggressively developing its untapped hydro potential.[2]

In line with the country's energy policy, the government of Ethiopia intends to develop this indigenous resource for domestic consumption and export. Already, the available generation capacity, mostly based on hydropower, has reached 4,256 MW and other large-scale hydropower projects (with capacity exceeding 6,000 MW) are now under construction (World Bank, 2018: 2). The government of Ethiopia is interested in affecting power system interconnection with its neighboring countries as part of its export strategy and for mutual benefit (EEPCo& KETRACO, 2012: 4). To this end, there are many hydro dams in Ethiopia commissioned, under construction, and planned as future candidates. Ongoing and future expansion of generation capacity will continue to rely exclusively on hydro and other renewable (World Bank, 2018: 2).

Table 5: Existing Hydro Power Plants in Ethiopia

No	Name of a Plant	Capacity (MW)	Year Commissioned
1	Koka	43.2	1960/61
2	Awash II	32.0	1966/67
3	Awash III	32.0	1971/72
4	Fincha	134	1973 & 2001
5	Melka Wakena	153	1988 &2014
6	Tis Abay I	12	1964 & 2000
7	Tis Abay II	72	2001
8	Neshe	97	2013
9	Gilgel Gibe I	184	2003/2004
10	Tekeze	300	2009/10
11	Gilgel Gibe II	420	2009/10
12	Tana Beles	460	2009/10
13	Fincha Amertinesh	97	2011/12

[2] Andarege Gizaw, senior EEP energy official, Addis Ababa, April 22, 2021 and
Teame G/tsadik, a former senior EEPCo energy official, Addis Ababa, May 4, 2021

14	Gibe III	1,870	2016
	Total	**3,906.2**	

Source: *MoWIE, 2019 & USAID, System Integration Study (GMSP-SIS) Power Africa (2019)*

Table 6: Hydro Power Plants under Construction

No	Name of a plant	Capacity (MW)	Expected Year of Completion
1	GERD	6,450	2022
2	Genale Dawa III	254	2019
3	Koyesha	2,100	---
	Total	**8804**	

Source: *MoWIE, 2019 & USAID, System Integration Study (GMSP-SIS) Power Africa (2019)*

As we can see from the above tables, Ethiopia has been highly investing in hydro power plant development since recent times in order to meet its increasing energy demand and for its interest in power system interconnection with its neighbors and beyond. Moreover, there are planned hydro power plants and expansion candidates estimated capacity around 9,590 MW (MoWIE, 2019; USAID, 2019). It seems that this is why the Ethiopian Electric Power Corporation's 2012 plan aims to boost hydro generating capacity to 37,000 MW by 2037. When completed, the Grand Ethiopian Renaissance Dam (6450MW) alone, will have the largest installed capacity of any hydropower plant in Africa and is expected to generate significant amounts of energy for export to the Eastern and Horn of Africa countries(Wyatt et al., 2015). Initially Ethiopia is begun exporting power to Djibouti and Sudan and the one with Kenya set be finalized very soon.

Given its massive clean energy reserves that can be developed cost competitively, Ethiopia aims at becoming a cornerstone of the regional power market of the Eastern Africa Power Pool (EAPP). The EAPP and its southern sister pool, the Southern African Power Pool (SAPP), bring together the members of the Common Market for Eastern and Southern Africa (COMESA) around the vision of optimizing the use of clean energy resources available in the region to benefit the region's society with a reduced cost of electricity production and an increased rate of access (MoWIE, 2019: 7).

Table 7: Future Hydro Supply and Demand of Ethiopia

Country	Existing 2012 MW	Future by 2030 MW	Total 2030 MW	Demand 2030 MW	Surplus 2030 MW
Ethiopia	**2,179**	**13,617**	**15,796**	**8,464**	**7,332**

Source*: EAPP, Regional Power System Final Report, 2011*

This table shows that Ethiopia will continue be the main net exporter of hydro in the region, mainly due to its future surplus hydro capability, which is estimated to be 7,332 MW.

3.1.3. Other Renewable

Geothermal potential in the Eastern Africa Rift is expected to be 20,000 MW (International Geothermal Association (IGA), 2018). In the HoA region, Ethiopia and Kenya are well endowed with high temperature geothermal resources that are largely untapped. Kenya is the first African country to develop commercial Geothermal Energy Utilization. Exploration for geothermal resources in Kenya began in 1950's (Mangi, 2017: 3).

By now Kenya is one of two countries (including Ethiopia) that produce geothermal energy in Africa. In 2013, geothermal accounted for 21% of Kenya's total electricity net generation. Kenya's Great Rift Valley is believed to contain significant amounts of unexploited geothermal resource potential (EIA, 2016). Currently, Kenya is number seven on the world geothermal energy producers with a total of 657 MW. This power is generated by Olkaria I (45 MW), Olkaria I unit IV&V (140 MW), Olkaria II (105 MW), Olkaria III (139.3 MW), Olkaria IV (140 MW), Wellhead generators (83.3 MW), Oserian (2 MW) and Eburru wellhead (2.5 MW) (Mangi, 2017: 1). Not only these, geothermal resource development has a great future with the Kenyan government focusing on having 2,500 MW from geothermal by the year 2025.

Like Kenya, Ethiopia has most geothermal energy resource potential estimated about 7,000 MW (MoWIE, 2012: 9). Ethiopia started a long-term geothermal exploration undertaking in 1969. Over the years a good inventory of the possible resource areas has been built up and a number of the more important sites have been explored in the Ethiopian Rift Valley (Omenda & Meseret, 2010: 4). From Geothermal power plants in Ethiopia, additional generating capacities were provided by the 5 MW Aluto Langano I and 75 MW by Aluto Langano II geothermal plants (Wyatt et al., 2015).

In addition to existing geothermal power plants, there are a number of other planned projects in Ethiopia which is expected to boost the country's energy production in the coming ten years.

The HoA region (Ethiopia, Kenya, Somalia, Djibouti and Eritrea) has also endowed with most energy production potential from wind and solar. Ethiopia has huge wind energy potential estimated at about 1,035 Giga watts. Committed wind generation plants in the country include the 30 MW Ashegoda I, 51 MW Adama I, and 90 MW Ashegoda II. With respect to solar energy, Ethiopia also has immense potential for solar radiation, though it varies from season to season (MoWIE, 2012: 9). Moreover, the Ethiopian energy system is expected to see large changes in the coming years, due to the demand growth and the implementation of generation and transmission projects, as well as support for exports to the rest of EAPP (USAID, 2019: 8).

As I briefly highlighted above, the HoA region has endowed with many energy production potential both from renewable and non-renewable. What is special here is that some countries in the region have much production capability on non-renewable energy resources like oil and natural gas, some others have enormous potential on renewable energy resources like hydro and geothermal, and the whole HoA region has potential on solar and Wind. For instance Sudan and South Sudan has much natural crude oil production capability; Ethiopia has a production capability of renewable energy resource like hydro; and Kenya has geothermal energy production capability. Therefore, these all no doubt will play its own positive role in the Horn's regional energy cooperation which helps for comparative advantage and energy diversification.

The other positive aspect for the regional energy cooperation is that some countries in the region (i.e. Ethiopia) have a great prospect to be a producer of surplus energy and others (i.e. Kenya, Sudan, South Sudan, and Djibouti, Eritrea, Somalia) have shortages in their national energy demands. This is also expected to play a good role in the regional energy led cooperation initiatives.

3.2. Rationales for Energy Led Cooperation in the HoA

Why should countries in the Horn engage in energy interconnection? This question is among the key research questions this study tries to answer briefly. In addition to the above diversified energy resources potential of the Horn region that in its way could positively promote energy

cooperation, there are a lot of rationales for countries in the Horn to engage in regional energy cooperation:

3.2.1. The need for improved energy generation capacity and transmission infrastructure

Despite the region's endowment of renewable and nonrenewable energy resources, the HoA suffers from deficits in the supply and distribution of energy. Perhaps the region is among the lowest electrification rates in the world (EIA, 2019). Access to energy represents one of Horn's greatest obstacles to social and economic development. Few indicators are sufficient to draw a picture of a region where the energy sector is dramatically underdeveloped, at a time when growing populations and prospects of economic growth would require more energy (Hafner et al., 2018: 1).

While there is a need for improved energy generation capacity and transmission infrastructure within Horn countries, greater cross-border trade in electric power and other energy options is a potentially cost-effective way of connecting excess capacity in one country to the other (Medinilla et al., 2019: 40). This is why energy cooperation was mainly established in the Eastern and Horn of Africa. Additionally, below are key reasons why countries in the Horn may engage in regional energy cooperation and its ramification for the broader energy led integration and regional economic integartion in various aspects.

3.2.2.. Geographical and Infrastructural Interdependence

States in the Horn are, in one way or another, geographically interdependent and that necessitates regional economic integartion in general and energy cooperation in particular[3]. While others have access to the sea outlet, countries like Ethiopia and South Sudan are landlocked. If Ethiopia wants to export its natural gas to the outside world, there is a need to use Eritrea, Djibouti or other countries in the Horn who have export infrastructure, and in turn Ethiopia may offer energy in exchange for port usage.[4] The fact that some countries are landlocked has been a motivating factor for states in the Horn to develop certain terms of cooperation or integration in the energy sector[5]. For instance, Ethiopia has been working on its plan to export natural gas via Djibouti port. In February 2019 Ethiopia and Djibouti signed a memorandum of understanding for the

[3] Asfaw Setta, senior MoFA expert on trans-boundary resources affairs, Addis Ababa, May 31, 2021
[4] Gesela Belete, senior MoFA official on neighboring countries and IGAD affairs, Addis Ababa, June 2, 2021
[5] *Ibid*

construction of a natural gas pipeline from the Hilala and Calub gas fields in Ethiopia to a new port in Djibouti (Xinhua, 2019).

Here the case of the South Sudan is very interesting. South Sudan gained independence from Sudan in July 2011. Most of the oil production capacity is now in South Sudan, but the country is landlocked and remains dependent on Sudan because the pipeline, refining and export infrastructure is in the North of the country. Thus, it was a must for South Sudan to use Sudan's export pipelines and port (EIA, 2014).

Sudan and South Sudan's oil sectors are still closely linked. South Sudan remains dependent on Sudan to transport its oil through Sudan's pipelines to the Bashayer port along the Red Sea. Sudan also relies on the fees it charges South Sudan for using its pipelines and facilities to help fill Sudan's financing gap because of the loss of oil export revenue (EIA, 2014). We can argue here that the geographical interdependence in turn creates mutual benefit and interdependence among the two Sudans' because of energy. It seems both countries will remain co-dependent in terms of the oil industry.

Geographical and Infrastructural Interdependence of Horn countries is beyond rationale for energy cooperation rather it has also its own ramification for further energy led integartion among countries in the Horn and economic integartion in other technical and functional areas. This argument goes with theories of functionalism and neo-functionalism which I discussed earlier in chapter two. Energy cooperation among the Horn countries can enhance infrastructural interconnection like road, railway, pipeline, grid, and export infrastructure. For example, Ethiopia and its neighbors can be interconnected through energy infrastructures such as power grid, natural gas pipeline, road and port; Sudan and South Sudan through oil pipeline and refinery; and Kenya and South Sudan through oil pipeline and port. These are what functionalist label as "supported incrementalism" and neo functionalist advocate of "spillover effect". Functionalist and neo-functionalist theories focus on the progressive development of integration and therefore emphasize the role of "spillover" effects (Gehring, 1996: 229). In line with neo-functionalism view, HoA countries thus by prioritizing areas of common interests may engage in energy cooperation through functional-technical level and the process will led to broader energy led integartion and economic interdependence among each other.

3.2.3. Comparative Advantage

Ethiopia has massive clean energy reserves and has comparative advantage as a cost-competitive generator of hydropower in the HoA region.[6] Neighboring power markets, on their part, experience much higher costs of generation and stand to benefit greatly from access to Ethiopia's low-cost clean power supply (MoWIE, 2019: 6). In 2009, the Union of African Electricity Producers, Distributors and Conveyors reported that the average tariff of electricity in Ethiopia was $0.053/ Kwh, making it the cheapest in the region when compared to $0.097/Kwh in Sudan and $0.12/Kwh in Kenya (Mulugeta, 2016: 84). Currently the tariff of electricity in Ethiopia is approximately US$0.07/kW which is still competitive in the region (MoWIE, 2019:7). Countries in the Horn thus have also comparative advantage of importing affordable and clean hydropower from Ethiopia than engaging in power production which is very much capital intensive.[7]

South Sudan has the lowest per capita electricity consumption in Africa, and only 1% of South Sudan's population is connected to the electricity grid, while more than 96% of the population uses firewood and charcoal for household heating and cooking (EIA, 2019). It has about 20 MW of total installed capacity fueled by oil. The largest source of power is the 12-MW Warsila plant in Juba. As a result, load shedding[8], or forced blackouts, are a regular part of South Sudan's power system (AfDB, 2013; EIA, 2019). To complement this deficit, for instance, South Sudan may engage in energy trade with Ethiopia in exchange of oil for hydro. According to Verhoeven (2011: 10), the HoA would benefit from an energy deal involving hydro and oil that would contribute to sustainable regional development. It might also lead to wider reductions in tensions in the region. For Verhoeven, an energy deal exchanging Sudanese oil for Ethiopian electricity should be a key driving factor for energy cooperation in the region.

Recently, Ethiopia is a leading figure in the production of electric power in the region. Countries in the region may greatly benefit from Ethiopia's non-renewable energy sources like hydro (Dawit, 2010: 7). Moreover, there is the general view that hydroelectricity is the renewable energy source par excellence, non-exhaustible, non-polluting, easy to store and run, and more

[6] Yiheyes Eshetu, MoWIE energy official, Addis Ababa, April 8, 2021
[7] Andarege Gizaw, senior EEP energy official, Addis Ababa, April 22, 2021
[8] Load shedding means the deliberate shutdown of electric power in a part or parts of a power-distribution system, generally to prevent the failure of the entire system when the demand strains the capacity of the system.

economically attractive than other options.[9] Therefore, one driving factor in the Horn's energy cooperation initiative is the principle of 'comparative advantage'.

3.2.4. Energy Diversification and Energy Security

Not only in the HoA but all over the world, the main rationale behind regional energy interconnection is for the sake of diversification of energy sources which is recognized as central to the attainment of energy security. In line with this argument, EAPP (2015:10) noticed that, to achieve energy security and reliability, a complementary power generation mix is usually recommended. Therefore, energy trade among countries and integrating regional energy systems often provides diversification of energy sources. Of course, this argument highly works for the Horn's regional energy integration initiative.

As I discussed earlier, some countries in the Horn have a potential on non-renewable energy resources and some other have enormous potential on renewable energy resources. For instance Sudan and South Sudan has much natural crude oil production capability; Ethiopia has a production capability of renewable energy sources such as hydro; and Kenya has geothermal energy production capability. Therefore, they can exchange each other and cooperate in broader aspect to diversify their energy resources.[10]

Hybrid energy systems with alternating complementary power plants (like hydro, solar, wind power and biomass generators) will be a further significant option rather than dependent on one energy system, which in turn help countries in the Horn to diversify their energy systems.[11] This is also expected to play key role in the Horn's prospect of energy led integration.

3.2.5. Economic, Social and Political Reasons

Economic reasons such as economic and financial costs and benefits may drive energy cooperation in the HoA. For example, according the United Nations (2006), grid interconnections may offer economic benefits. Examples of direct economic benefits to the electricity generation systems of one or all of the interconnected nations are direct costs avoided by the use of the interconnection—including costs for purchase and production of fuels used in electricity generation, capital costs of generation facilities, and operating costs of generating

[9] Yiheyes Eshetu, MoWIE energy official, Addis Ababa, April 8, 2021
[10] Teame G/tsadik, a former senior EEPCo energy official, Addis Ababa, May 4, 2021
[11] Daniel Mulatu, senior EAPP energy official, Addis Ababa, April 13, 2021

facilities. Another direct economic and financial benefit of an interconnection to a country is income from power sales, with payments for power made in hard currencies of particular import to many developing economies(UN, 2006: iii).

To this respect, Ethiopia's revenues from power exports to its neighbors can contribute to the financial sustainability of the sector and provide relief to the country's balance of payments.[12] Another practical example is that power system interconnection between Ethiopia and Sudan had been derived by the expected economic benefits of the interconnection for the two countries. The government of Sudan will save money which could be used for other development activities by importing low cost and environmentally friendly energy from Ethiopia. Similarly, the government of Ethiopia will receive hard currency from export of firm hydro energy to Sudan.[13]

Another manifestation of economic benefits is oil trade between Ethiopia and Sudan during 1990's and 2000's.Though statistics are hard to obtain and rather unreliable, Ethiopia is understood to import a significant amount of fuel supply from Sudan during the 1990's and 2000's (Verhoeven, 2013: 10). This was also derived by economic reasons. Under a government-to-government deal Sudan sells oil at below global market prices, making Ethiopia that time dependent on its neighbors' stability to keep petrol flowing. In August 2010 Ethiopian Petroleum Enterprise announced that a Sudanese state-owned oil company, Sudapet, was to become Ethiopia's only benzene supplier. The fuel-trucking business was estimated to be worth $1.2–2bn annually (Verhoeven, 2013: 11).

Energy cooperation in the Horn also driven by expected social benefits. It has an aim of strengthening people to people relations across countries in the Horn.[14] Additional Social benefits, for example, in Ethiopia-Sudan power system interconnections are the possibility of rural electrification for border towns of Shehedi and Metema in Ethiopia and Gallabat and Doka in Sudan (EEPCo& NEC, 2009: 32). The exiting border electricity trade between Ethiopia and Kenya in the border of towns of Moyale which lies in the two countries[15] is also expected to enhance the social interaction of peoples of the two countries living at the border cities.

[12] Esubalew Tenaw, senior EEP energy official, Addis Ababa, May 18, 2021
[13] *Ibid*
[14] Gesela Belete, senior MoFA official on neighboring countries and IGAD affairs, Addis Ababa, June 2, 2021
[15] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021

In addition to economic and social reasons, political reasons drive the regional energy cooperation. In the energy cooperation, countries in the Horn expect political benefits such as increased experience and political comfort with international cooperation and more reasons to avoid conflict with neighbors (UN, 2006: 45). For example if two countries in the region are highly integrated in their energy systems, they most probably goes to look peaceful solutions than resort to force incase misunderstanding and conflict arose between themselves.[16] This is because the conflict between them will accurately disrupt the energy supply system and most probably the buyer state is the one who will suffer most[17]. In line with this argument, EEP senior energy official noted that:

> *Energy cooperation in the Horn can help to avoid conflict and enhance economic integration in many forms. Energy system interconnection--especially electric grid interconnection creates conducive environment for regional cooperation. For instance, if there is power export and import among countries in the region, they are less likely to go to war with each other which may significantly disrupt the existing power interconnection. This is because electric power is becoming a basic need. Thus political benefits are among the driving factors for the regional energy cooperation efforts.*[18]

Countries in the Horn also see energy cooperation as an initial stage and have an aim of attaining energy led integartion and cooperation in other broader economic, social, and political issues. Like the Neo-functionalists assumption that regional integration process deriving from economic self-interest via incrementalist process spill over into other areas of cooperation (Jarvis, 1994: 23), cooperating in energy sector, integrating energy systems, and other broad economic aspects, countries in the Horn may aspire to bring economic development and regional political stability in the meantime.

As we can understand from the above Horn's energy resources potential and rationales for the regional energy cooperation, it seems nature and geographical interdependence dictates the region to be suitable for regional integration and liberal internationalism/institutionalism.

[16] Gesela Belete, senior MoFA official on neighboring countries and IGAD affairs, Addis Ababa, June 2, 2021
[17] Teame G/tsadik, a former senior EEPCo energy official, Addis Ababa, May 4, 2021 and
Gesela Belete, senior MoFA official on neighboring countries and IGAD affairs, Addis Ababa, June 2, 2021
[18] Andarege Gizaw, senior EEP energy official, Addis Ababa, April 22, 2021

However, the pace of energy led cooperation the HoA is not as of the above push factors and rationales. Rather at the same time, the challenge of competition and lack of trust among countries in the region as well as regional geopolitics and hydro politics are constraining the above natural, geographical, economic, social, and political reasons of energy cooperation in the HoA. The researcher will revisit these issues in detail in the later stage of the study.

Chapter Four

4. Prospects of Energy Led Integration in the HoA: Opportunities and Challenges

4.1. Energy Led Cooperation Schemes in the HoA and its Current Status

Before assessing the prospects of energy led integartion in the HoA, it is very important to examine the existing status of energy cooperation in the region. Thus the objective of this sub section is mainly to examine the current status of energy led integration in the HoA region. It, therefore, highlights the existing energy cooperation schemes. The subsection also addresses other undergoing energy interconnection projects in the region that are expected to transform the existing energy cooperation efforts in the Horn into broader regional energy integartion.

Countries in the HoA region have in the past adopted inward looking policies aimed at planning and developing their power systems in an isolated manner with a view to satisfying only their national demand growth (EAPP, 2015: 9). Therefore, energy cooperation in this region is a recent phenomenon and it is mostly power system interconnection in its kind. Power Purchase Agreements were started in mid-2000s and power trade was functional in early the 2010s. Moreover, the existing energy cooperation schemes mostly centered in Ethiopia. Unlike other countries in the region, Ethiopia's main potential source of energy is hydro-electric power, which makes costs cheaper than elsewhere in the region.[19] Motivated by this potential, Ethiopia is seeking to develop a market for its energy exports and the neighboring countries are, in turn, looking for cheaper energy sources. This convergence of interests has led Djibouti, Kenya and Sudan to enter into power purchase agreements with Ethiopia. As part of these agreements, power-grid connectivity projects have been launched and the Ethiopian grid system is now connected with Djibouti and Sudan, the one with Kenya being under construction (Mulugeta, 2016: 81).

4.1.1. Ethiopia-Djibouti Power System Interconnection

The Ethiopia-Djibouti power system interconnection was the pioneer in the Horn of Africa in terms of regional power cooperation. The Ethiopia-Djibouti interconnection project was meant to establish power trade between Ethiopia and Djibouti and to improve electricity access at an

[19] Yiheyes Eshetu, senior MoWIE energy official, Addis Ababa, April 8, 2021

affordable price. The Power Purchase Agreement (PPA) initially was signed in April 2006 and was amended in March 2011 between Ethiopian Electric Power Corporation (EEPCo) and Electricité de Djibouti (EdD) (African Development Fund, 2011). The whole PPA was amended in order to update its timeliness and tariff changes.

A first power system interconnection between Ethiopia and Djibouti was completed and operational in May 2011, which has been supplying about 80 percent of total power demand in Djibouti (WB, 2020: 9). Since then, Ethiopia and Djibouti are tied by a first double circuit 230 kV Double Circuit electric transmission line.

The starting point of the first interconnection line is the Dire-Dawa III substation, which also serves adjacent towns located in the Eastern part of Ethiopia. As it is an industrial area, power demand is increasing, and when all expected future demand (dominated by industrial facilities, irrigation and the Ethiopia-Djibouti railway) materializes, the existing Koka – Dire Dawa III 230 kV single circuit and Koka Hurso 230 kilovolt (kV) double circuit transmission lines would no longer suffice to evacuate power, thus calling for additional High Voltage transmission line capacity (EdD& EEP, 2017: 11). At the same time, power demand in Djibouti is growing and new sources of supply would need to be secured by 2025 (WB, 2020: 9). This necessitates the need for second Djibouti-Ethiopia Power System interconnection project.

The second Djibouti-Ethiopia power system interconnection project is a construction of a new double circuit 230 kV transmission line from Galafi (Ethiopia) to Nagad (Djibouti) of 190 km. Each circuit would have a rated power of 200 MVA. Therefore, to increase the reliability of power supply to Djibouti, the Ethiopian Electric Power (EEP) and Electricité de Djibouti (EdD) plan to increase the interconnection capacity by constructing:

- A new 230 kV double circuit transmission line from Semera to Nagad;
- An extension of the existing Semera Substation (Ethiopia);
- An extension of the existing 230/63/20kV substation at Nagad (Djibouti);
- A new 230 kV single circuit Transmission Line from Kombolcha II substation to Semera substation (EEP, 2021: 1)

In line with this, EEP and Electricite' de Djibouti (EdD) has planned to construct Kombolcha-Mile-Semera 230kV Power Transmission line and Semera/Ethiopia/Nagad/Djibouti/230Kv Power Transmission Project to fulfill the demand of electricity. The Ethiopian Electric Power (EEP) has planned to supply high voltage power to Semera Substation to feed the Semerato Djibouti 230 kV transmission line. In view of this, new 230 kV transmission line from Kombolcha II substation to Mille and Semera substation will be constructed. Moreover, new substation will be constructed at Mile. In addition, the existing substation at Semera City will be upgraded (EEP, 2021: 2).

Therefore, after the completion of the second power system interconnection project, capacity for power trade would increase between Ethiopia and Djibouti from the current 80MW (strained to 95MW) to 220MW (equaling almost to a three-fold increase in power trade) with improved adequacy and reliability of supply, reserve capacity management, and operational efficiency (World Bank, 2020: 10).

Thus this bilateral power system interconnection between Ethiopia and Djibouti goes in line with the argument of liberal institutionalism/internationalism and functionalism that there is a high possibility of cooperation between states over common interests and needs shared by them. Likewise, both countries agreed on some terms of bilateral cooperation and established power system interconnection among them.

4.1.2. Ethiopia-Sudan Power System Interconnection

The Ethiopia-Sudan power system interconnection was the second in the Horn of Africa in terms of regional power cooperation next to the Ethiopia-Djibouti power system interconnection. It was aimed at further strengthening economic relations between the two countries by the construction of 230 kV transmission line between their electrical power systems (EEPCo& NEC, 2009: 1). The Power Purchase Agreement (PPA) had been concluded in August 2009 on the basis of the previously "Construction Agreement" signed by Ethiopian Electric Power Corporation (EEPCo) and National Electricity Corporation of the Sudan (NEC) in July 2008 (EEPCo& NEC, 2009: 5). In the Power Purchase Agreement, EEPCo and NEC have agreed on all the terms and conditions for:

a. The sale of firm power of 100 MW and associated energy by EEPCo and the purchase of the same by NEC;

b. The sale of annually scheduled energy by EEPCo and the purchase of the same by NEC;

c. The sale of monthly scheduled energy during the rainy season in Ethiopia by EEPCo and the purchase of the same by NEC;

d. Sharing of capacity reserve of the Parties' systems during Emergency Conditions;

e. The reliability of EEPCo system to deliver all forms of agreed energy shall not be less than 95%, and the reliability of NEC system to receive the same shall not be less than 95% (EEPCo& NEC, 2009: 5-6).

The first power system interconnection between Ethiopia and Sudan had been completed and inaugurated in 2013. The Ethiopia-Sudan Power Systems Interconnection runs for 321Km, connecting Gonder, Shehedi, and Metema in Ethiopia with Gedaref State in Eastern Sudan. Constructed with 35 million dollars, it has a transmission capacity of 100MW of electric power (Addis Fortune, 2018). Since then, the two countries remained connected by a first double circuit 230 kV electric transmission line.

The current maximum energy export to Sudan does not exceed 100 MW despite the growing potential of Ethiopia and demand in Sudan (Ethiopian Herald, 2020). Therefore, in addition to existing power interconnection, a 500 kV double circuit line interconnector are planned between the two countries (Wyatt, et al., 2015). In 2018 Ethiopia and Sudan negotiated a bilateral agreement for the installation of the second power interconnection line, which will enable Ethiopia to export 1000MW of electric power to Sudan. The proposed interconnection line extends from the Grand Ethiopian Renaissance Dam (GERD), currently under construction, to Khartoum, Sudan passing through Rabak, a city in South-Eastern Sudan. The feasibility study of the project was conducted by Centro Elettrotecnico Sperimentale Italiano with 2.5 million Euros contributed by the two countries (Addis Fortune, 2018; Ethiopian Herald, 2020).

Here also the bilateral power system interconnection between Ethiopia and Sudan strengthens the argument of liberal institutionalism/internationalism and functionalism that cooperation between

states is much more possible over common interests and needs shared by them. However, it is expected that the recent Ethiopia-Sudan border dispute and the hydro politics of Eastern Nile basin will challenge this initial energy cooperation, which amounts to the assumptions of the realist thinking.

4.1.3. Ethiopia - Kenya Border Electricity Trade

Currently, there is no connected power system between Ethiopia and Kenya. However, there is power trade in the border of towns of Moyale which lies in the two countries. Kenyan border towns around Moyale have electricity access from Ethiopian system in same price (equal tariff) as of Ethiopian towns and nationals around Moyale.[20] Ethiopia's annual whole sale energy (GWh) to Kenyan border towns are 0.17, 1.11, 1.04, 1.44, and 1.87 in the year 2011/12, 2012/13, 2013/14, 2014/15, and 2015/16 respectively (Khan and Singh, 2017: 133). Ethiopia and Kenya inaugurated a new border post in the Kenyan town Moyale to bolster trade in December 2020 (africannews, 2020), which may also enhance the existing border power trade.

4.1.4. Ethiopia –Kenya Power System Interconnection Project

Another power system interconnection project in the HoA is between Ethiopia and Kenya. Ethiopia – Kenya Power Systems Interconnection Project was conceived by governments of the two countries as a precursor to future energy trade between the two countries and in the region as part of the Eastern Africa Power Pool (EEPCo& KETRACO, 2012: 1). On May 7, 2006 Ethiopia and Kenya signed a memorandum of understanding that underscored the need to recognize the comparative advantage of Ethiopia over Kenya in terms of hydropower generation, and technically cooperate in power generation, transmission, rural electrification and customer services (AfDB, 2011: 2). Following the memorandum of understanding, the two countries have reached an agreement to implement a power interconnection project between the two systems (AfDB, 2011: 2).

The power system transmission line is a major part of the proposed power systems interconnection project and it is almost nearing completion to link the two countries for regional electricity. The project involves establishing power transmission facilities (power transmission line and substations) between Ethiopia and Kenya to export up to 2000 MW of electricity

[20] Yiheyes Eshetu, senior MoWIE energy official, Addis Ababa, April 8, 2021 and
Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021

(EEPCo& KETRACO, 2012: 11). The finally-adopted transmission line is approximately 1045 km long (433 km in Ethiopia and 612 km in Kenya), which is the longest in East and Central Africa (African Energy Portal, 2019).

This line will allow hydropower imports to Kenya from Ethiopia in line with a State-to-State agreement entered in January 2012. In the agreement, Kenya will buy 400 MW of hydropower from Ethiopia at a fixed tariff of seven US cents per unit for domestic use. It's part of the Kenyan government's quest to ensure energy security at any given time. Therefore, the 500kV direct current bi-pole transmission line will interconnect the electricity network of Ethiopia, at the Wolayta/Sodo substation, with the Kenya network, at the Suswa switchyard (African Energy Portal, 2019). The construction of the power transmission line has already been completed in August 2019, and the highway is only awaiting finalization of the construction of a substation (Fortune, 2019). It is expected to be finalized and commissioned by June 2021.[21]

Image 1: <u>Ethiopia- Kenya Power Transmission Line</u>

Source: Addis Fortune Magazine, 2019

When completed the Ethiopia-Kenya power system is expected to change the regional power trade beyond the Horn of Africa. The project's development objective is to promote power trade

[21] Andarege Gizaw, senior EEP energy official, Addis Ababa, April 22, 2021

and regional integration, contribute to the East African countries' social and economic development, and reduce poverty in those countries.[22] The project aims at improving the supply of electricity in Kenya and other EAPP countries in the long run by exporting power from Ethiopia (Africa Development Fund, 2012:3).The Ethiopia-Kenya power system interconnection project is also a regional venture that has the potential of developing into a vital part of electricity power exchange in Africa.[23] The proposed high voltage transmission line linking Ethiopia to Kenya will form a major part of the interconnection and will serve to close a major gap on the high voltage grid within the Eastern Africa Power Pool (EAPP) countries, because it will ultimately serve as one of the links between Northern and Southern Africa regions (EEPCo& KETRACO, 2012: 3).

Here also the bilateral power system interconnection between Ethiopia and Kenya strengthens the argument of liberal institutionalism/internationalism and functionalism that cooperation between states is much more possible over common interests and needs shared by them. However, it is expected that the recent competition for regional hegemony between Kenya and Ethiopia in the Horn region, and political economic dynamics at national, regional and international levels will challenge this initial energy led integration, which amounts to the assumptions of the realist thinking.

4.1.5. Ethiopia-Djibouti Natural Gas Pipeline Construction Project

Other than the above existing power system interconnections and projects, there are other energy cooperation initiatives in the HoA. This subsection clearly assesses Ethiopia- Djibouti natural gas pipeline project in the region which are expected to enhance the regional energy led integration process.

Ethiopia has believed to have extensive gas deposits in its Eastern part. However, being landlocked it is unable to extract and export the resource for the long period of time. In February 2019 Ethiopia and Djibouti signed a memorandum of understanding for the construction of natural gas pipeline from the Hilala and Calub gas fields in Ethiopia's Somali region, to a new port east of Djibouti City in Djibouti(Xinhua, 2019), which will help Ethiopia to export natural gas through the Port of Djibouti.

[22] *Ibid*
[23] *Ibid*

This comes over a year after China's POLY-GCL Petroleum Group Holdings, an energy firm, signed a Memorandum of Understanding with the Djibouti government to invest US$4bn in natural gas infrastructure. This latest agreement paves the way for construction of a 767-km pipeline (most of which will be in Ethiopian territory) to begin in 2019 (The Economist, 2019). Construction was slated to begin in 2018 but has been delayed by negotiations over concession agreements. The project, financed by POLY-GCL, is expected to be completed by 2022. The pipeline constitutes the first phase of the project, which will be followed by construction and operation of a liquefied natural gas plant and a gas export terminal located at Damerjog, Djibouti. The natural gas pipeline is expected to transport 12bn cubic meters of natural gas a year. The liquefaction plant has a target annual capacity of 10 million tones of liquefied natural gas (The Economist, 2019). Currently the natural gas pipeline project is under construction and when completed it is expected to enhance the existing regional energy cooperation and mutual benefits of the two countries.

Image 2:- **Ethiopia-Djibouti natural gas pipeline under construction**

Source: The Reporter, 2019

As discussed above, the current status energy led cooperation in the HoA are largely power system interconnection between Ethiopia and its neighbors, and natural gas transmission pipeline between Ethiopia and Djibouti. Thus energy led integartion in the HoA is in its initial stage of cooperation, but at the same it is also on the rise. The existing achievements such as power purchase agreements, power system interconnections, and natural gas transmission line project substantiate the theoretical assumptions of liberalism and functionalism/neo functionalism that cooperation among states is possible over common needs shared by them.

4.2. Opportunities Surrounding Energy Led Integration in the HoA

Other than existing achievements, energy led integration in the HoA is surrounded by the following opportunities:-

4.2.1. Great Ethiopian Renaissance Dam (GERD)

Since recently, Ethiopia has developed a power sector and started production on a massive scale. It is one of the rising power production zones in the Horn and Eastern Africa and is currently constructing Grand Ethiopian Renaissance Dam (GERD) - an upstream dam and hydro plants along the Nile River. The first filling of the dam was done last year in July 2020 and the second round is set to be held in the coming Ethiopian rainy season. The completion of GERD will bring a significant importance in the Horn's regional energy integration efforts .With an energy potential of 6450 MW, the GERD would be one of the largest producers of electricity derived from hydro on the continent (Maupin, 2016: 11). There is no doubt that it will be a game changer in the region and will alleviate the problem of generation capacity that hampered the existing regional energy cooperation. GERD's completions will double Ethiopia's power generation capacity and its energy export potential. After the completion of GERD, Ethiopia sets to extend its power export towards South Sudan, Somaliland, and other Eastern Africa countries (AU, 2013, 62; Ethiopian Herald, 2020).

According to a senior energy official in EEP, the completion of GERD will be the turning point for further regional energy integration. First of all, it will assure in practice that the dam does not harm downstream countries and, in turn, it will lead to increased mutual trust among countries in the eastern Nile basin. Secondly, the mutual confidence will help to foster further regional energy integration in the HoA and also in the Nile river basin.

4.2.2. Eastern Africa Power Pool (EAPP)

EAPP was established in 2005 with the signing of an Intergovernmental Memorandum of Understanding by seven Eastern Africa countries, namely: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda and Sudan. In further development, EAPP was adopted as a specialized institution to foster power system interconnectivity by the heads of states of the COMESA region (Medinilla, 2019: 5). Among the goals of EAPP are the optimum development of energy resources in the region, integrating regional investment in power generation and transmission, and reducing electricity production cost in the region by using power system interconnection and increasing power exchange between countries (EAPP, 2016).

To lay the necessary foundation for substantial power exchange among the various power utilities in the region and ultimately to create a regional power market, relevant studies and capacity building activities have been conducted. Under the technical assistance and capacity building to the EAPP some activities were completed which included, but not limited, to the following: the strategic road map to 2025, regional master plan and grid code study, strategic plan (2016 – 2026), and the regional market design (AU, 2013: 66; EAPP, 2016). Moreover, an Independent Regulatory Body was also established. Model bilateral electricity trading agreements and the interconnection code and power transmission standards were also developed. A Regional Market Operations Centre has been established and yet to be operational (AU, 2013: 66).

Thus, EAPP will help countries in HoA region to integrate their power systems with the broader market and promote energy led integartion and regional energy security. EAPP also will facilitate development of the electricity market in the region, and bilateral power export agreements will be institutional and regional. When the EAPP regional market is operational soon, countries in the Horn will be benefited as of other member countries. They can sell and purchase power through the regional power pool that playing key facilitating role.

4.2.3. Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) Project

The Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) Corridor Program is a regional flagship project intended to provide transport and logistics infrastructure aimed at creating seamless connectivity between the Horn Countries of Kenya, Ethiopia and South Sudan. The project is part of the larger land bridge that will connect the East African coast from Lamu Port

to the West coast of Africa at Douala Port (LAPSSET Corridor Development Authority, 2016:1). The LAPSSET Corridor is intended to operate as an economic corridor with the objective of providing multiple Eastern African nations access to a large scale economic trade system thereby promoting socio-economic development in the region. The LAPSSET program consists of several subsidiary projects ("project components") in Kenya, and in the region (LAPSSET Corridor Development Authority, 2016:1). However, for the sake of the study area, I would like only to assess energy related projects of LAPSSET as follows:-

- **Lamu Port:** In early 2012, the countries of South Sudan, Ethiopia and Kenya held a ceremony in Lamu, Kenya. The ceremony was the ground breaking ceremony for the proposed new port, complete with a new oil refinery to take care of South Sudan's oil, which is currently pumped via the Greater Nile Oil Pipeline to Port Sudan (South Sudan Oil Almanac, 2016: 38). This project is expected to help South Sudan and Ethiopia have access to a port as both countries are landlocked. The construction of Lamu port was begin in July 2014 and is currently undergoing. To facilitate this, several preliminary and support infrastructure such as the Port headquarters, Port Police Station, Electric Power Connection to the National Grid and Water Reticulation Network were undertaken and are complete, and construction of the Port Management Housing Scheme is also ongoing (LAPSSET Corridor Development Authority, 2016:4). The first Berth of Lamu port is operational and received its first ship on May20, 2021(Anadolu Agency, 2021).

- **Crude Oil Pipeline from Lamu to Isiolo, Isiolo to Nakodok and Nakodok to Juba (South Sudan):** in January 2012, it was announced that South Sudan had agreed a deal with Kenya to build an oil pipeline, potentially reducing its dependence on its northern neighbor Sudan (South Sudan Oil Almanac, 2016: 38).

- **Product Oil Pipeline from Lamu to Isiolo, Isiolo to Moyale (Kenya) and Moyale to Addis Ababa (Ethiopia):** The Product oil pipeline is one of the 7 key infrastructure projects planned under the LAPSSET corridor projects list. The project runs from Lamu – Isiolo – Moyale – Addis Ababa (Ethiopia), a distance of approximately 790 Km (LAPSSET Corridor Development Authority, 2016:9). The construction product oil pipeline will supply Ethiopia with product oil from Lamu port to Addis Ababa. The bilateral agreement lays the foundation to build a product Pipeline connecting to Ethiopia

which to-date does not have a product pipeline. Considering that Kenya and Ethiopia are connected through road infrastructure. Lamu port is strategic to Ethiopia's larger southern market as Djibouti Port is suitable for Northern Part of Ethiopia (LAPSSET Corridor Development Authority, 2016: 19).

The LAPSSET Corridor mainly consists of two elements; the 500 meter wide Infrastructure Corridor where the road, railway, pipelines, power transmission and other projects will be carried and the Economic Corridor of 50 km on either sides of the infrastructure corridor where industrial investments will be situated (LAPSSET Corridor Development Authority, 2016:2). To this respect, cities are expected to develop along the project corridors and industries will expand in the meantime. These all will necessitate the need for electricity and other energy facilities which will reinforce energy cooperation along the project corridor and the three countries. The project will also increase power interconnection through various energy initiatives like clean energy to improve reliability in electric power supply to support faster rate of industrialization[24].

4.2.4. The Horn of Africa Initiative (HoAI)

The governments of the Horn of Africa region have prioritized the development of regional corridors to enhance economic diversification and trade competitiveness, as one of the key pillars of intervention (World Bank, 2020: 4). The Horn of Africa Initiative (HoAI) was launched in October 2019 by the Ministers of Finance of Djibouti, Ethiopia, Eritrea, Kenya and Somalia with the support of three Development Partners: the African Development Bank, the European Union and the World Bank. The initiative calls for investments of about USD 15 billion over the next decade, by supporting the development of economic corridors (transport, energy and digital) and trade, promotion of value-added regional value chains, thus improving human capital and increasing resilience in the region (World Bank, 2020: 4). The initiative has an ambition to interconnect countries in the Horn by infrastructures like road, port, and energy.[25]

Power integration through regional energy interconnections and power trade between the countries of the Horn is among the key aims and priorities of the HoA Initiative. Below are power projects prioritized by the initiative:-

[24] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[25] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021

- **Ethiopia - Somalia Power System Interconnection: -** The proposed Ethiopia – Somalia Power Interconnection requires feasibility study for at least two lines, North and Central (Berbera and Mogadishu), includes Environmental Social Impact Assessment, Resettlement Action Plan, Tender Document preparation (Horn of Africa Initiative, 2019). However, special focus is given to Mogadishu-Ethiopia transmission line feasibility study. The proposed line is High voltage 230kV transmission overhead line connecting substations of Gode/Dolo Odo (Ethiopia) and Mogadishu (Somalia). The project cost is estimated at about 250 million dollars and has a length of 430 km (Horn of Africa Initiative, 2020).

- **Ethiopia–Eritrea Power System Interconnection**: - With recent favorable political changes, there is renewed interest in power system interconnection between Ethiopia and Eritrea (MoWIE, 2019: 7). The proposed Ethiopia-Eritrea Power Interconnection includes feasibility study for Technical, Economic and Financial Analysis, Environmental Social Impact Assessment, Resettlement Action Plan, and Tender Document Preparation. The World Bank has received an official request from the government of Ethiopia (Horn of Africa Initiative, 2019). The project cost is estimated at about 200 million dollars. The proposed power interconnection line is a 230kV transmission overhead line connecting substations of Adwa/Adigrat/Dalol (Ethiopia) and Asmara (Eritrea) with transfer capacity of 100MW. The estimated project length is 150 km (Ethiopia: 40km and Eritrea: 110km) (Horn of Africa Initiative, 2020).

- **Ethiopia - Somaliland Power Interconnector: -** A feasibility study has been conducted by Ethiopian Electric Power (EEP) in 2015, but an updated and extended feasibility study is mandatory (Horn of Africa Initiative, 2019). The proposed line is a 230kV transmission overhead line connecting the substations of Dire Dawa/Harar IV/Jigjiga II (Ethiopia) to Hargeisa and Berbera (Somaliland). The project cost is estimated at about 200 million dollars and has a length of 320 km (Horn of Africa Initiative, 2020).

- **Kenya - Somalia Interconnection: -** The proposed Kenya-Somalia power Interconnection project is a high voltage 220kV transmission overhead line connecting Loiyangalani-Marsabit-Wajir-Kismayo-Mogadishu. The project has a possibility to connect Kenyan power system to western Somalia regions. Feasibility studies in Kenyan

side are completed and ready for implementation and there is a need for feasibility study in the Somalia side (Horn of Africa Initiative, 2019).

The criteria developed to select these power projects are convergence of interests of the countries, special attention to Somalia and Eritrea, contribution to regional integration and transformation, and availability of funds (Horn of Africa Initiative, 2019). As discussed above, the HoA Initiative provides USD 1.84 billion for the Horn's energy interconnection and power trade between the countries in prioritizing energy projects (HoA Initiative, 2019). The initiative will help to alleviate lack of finance in the regional energy interconnection efforts that I mentioned above, and will also enhance the existing status of regional energy cooperation among countries in the Horn into further energy led integartion. The power projects are also expected to promote peace and stability in the region through scalability and "spillover effect" to other areas of cooperation.

The above achievements of bilateral power system interconnection, natural gas transmission line under construction, port, road and other energy infrastructure interconnections of the LAPSSET project, and planned power system interconnections under the Horn of Africa Initiative shows us that the moment of energy cooperation in the HoA is on the rise. And these positive progresses and opportunities of energy cooperation in the region are indicators for further energy and economic integartion in various forms in the HoA.

When we look at the above achievements of energy cooperation and future prospects, the momentum of energy led integration in HoA is on the rise as of the trend and historical evolution of energy led cooperation in the world. The trend of energy led cooperation in the world had been a gradual process increasing from time to time. The same is true with respect to the Horn's energy led cooperation, and it has started between two countries as electric power system interconnection and has gradually increasing to different aspects of energy led cooperation schemes. These gradual energy cooperation trends and experiences support the liberal internationalism/institutionalism, functionalism and neo functionalism assumptions of regional integration.

4.3. Examining Challenges of Energy Led Integration in the Horn of Africa

Despite the positive achievements and opportunities discussed above, the pace of energy led integration in the HoA is not as promised. It was believed that the Horn of Africa countries would benefit greatly in cooperating their national energy systems that would contribute to sustainable regional development. Energy was also perceived as critical in the future relations between countries that will lead to wider reductions of tensions in the region, and acts as a stimulus to other areas of cooperation such as infrastructure and port linkages (Medhane, 2004; Verhoeven, 2011: 10). However, so far the regional energy integration process did not bring the intended outcome. Although the region has witnessed some positive progress of energy cooperation in the past few years, there is no significant economic and political interdependence achieved among states of the Horn by the ongoing energy led integration process. Rather with growing energy demand, the countries of the region face a number of same old energy challenges; shortage in generation capacity, poor energy infrastructure, and mutual mistrust and border conflict between countries of the region just to mention a few. This subsection thus critically assesses key challenges that threaten the current energy cooperation efforts and prospects of energy led integration in the HoA.

4.3.1. Political Instability of the Region

Throughout history, the HoA region is among politically unstable and insecure areas in the world. Civil war based on ethnic and clan divisions is a common phenomenon elsewhere in the region. Border dispute and subsequent war was also common among countries in the Horn. Ethiopia-Eritrea, Ethiopia-Somalia, and Sudan-South Sudan conflicts are witnesses for this manifestation. Some countries in the region still do not a have strong statehood structure and are politically unstable. Undoubtedly, these had significantly affected the Horn's regional economic integration in general and energy cooperation efforts in particular. During interview session, one long-time MoWIE energy official made the point clearly,

> *The long existed political instability and mutual distrust among states in the Horn is one key challenge posed on the energy led integration efforts already started in 2000's. The political instability of the region tackles the regional energy integration efforts not to run as expected. What if Somalia was politically stable in the last 20 years? What if Ethiopia and Eritrea was been good neighbors in the last 20 years than enemies? Countries would have been interconnected with*

> *Ethiopia's electric power grid as the case of Ethiopia-Djibouti and Ethiopia-Sudan power system interconnection….. The current energy led integration status would have been more than what it is today.*[26]

Still today there is no significant change in the region's insecurity in various aspects. Most importantly, political instability and civil war remain be the region's peculiar characteristic feature. Recently, there is domestic political instability and uncertainty in Ethiopia and Sudan.[27] Moreover, there is also border dispute between Ethiopia and Sudan, which no doubt negatively affect the existing regional energy cooperation and will affect prospects of energy led integartion.[28] This specific challenge supports the arguments of realism/neo-realism that regional integration among states is difficult to promote in global anarchic system and in the absence of global government system.

4.3.2. Lack of Mutual Trust and the issue of Energy Security

Trust and cooperation cannot be dissociating from such energy led cooperation schemes elsewhere. Especially for regions like HoA, historical enmity and antagonism is common between countries, mutual trust is very vital to bring the intended outcome. Unfortunately, there is no mutual trust between countries in the Horn in the existing regional energy cooperation. As an informant put it, if there is lack of mutual trust among states, there will be no willingness to go to the regional energy cooperation in good faith, and that will hamper the regional energy integration ambitions.[29] Moreover, this will result in preference for bilateral over regional agreements in the energy deal (Medinilla *et al*., 2019).

Among my key informants, a senior energy official of MoWIE and a former senior energy official of EPPCo, try to associate mutual distrust of states in the regional energy integration process with energy security. They noted that:-

> *There is no full cooperation and trust which is very important in regional energy integration. As a result, a given country in the horn does not want to be fully dependent on another country's energy system, even though there may be cheap*

[26] Yiheyes Eshetu, senior MoWIE energy official, Addis Ababa, April 8, 2021
[27] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[28] Asfaw Setta, senior MoFA expert on trans-boundary resources affairs, Addis Ababa, May 31, 2021
[29] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021

> *and reliable energy access. For example, Sudan does not want to be highly dependent on Ethiopian power system. They fear that if war breaks out with Ethiopia, they will face acute power shortage and complete shutdown. This factor greatly hampers regional energy cooperation, because they are afraid of integrating their power/energy systems completely.*[30]

Thus, mutual distrust and lack of full cooperation in the Horn are one key challenge that face the existing power cooperation as well as prospects of energy led integration. Countries in the region are not also good enough in cooperating in power generation and transmission investment. Rather they have adopted inward looking policies aimed at planning and developing their own power systems in an isolated manner with a view to satisfying their national energy demand growth (EAPP, 2015: 9). As a senior EAPP energy official noted, countries,

> *……in the region do not communicate and co-operate each other in power generation and transmission investment rather they work hard just to enhance their own national energy capability. Moreover, to achieve this goal they act unilaterally. Each country in the region works hard to be self-reliant at any cost than fully integrating their national energy systems to the regional one*.[31]

Countries in the Horn focused on all alternative sources of power available in respective national territories to be self-reliant in energy at any cost including by undertaking feasible and infeasible energy projects.[32] These unilateral actions of countries in the region emanate from lack of mutual trust. In doing so, countries undertake their own feasible and infeasible power projects for the mere reason of not to be dependent on other country's power system.[33] This specific challenge of energy led integration is also supports the arguments of realism that regional integration among states is difficult to promote because states lack trust among each other and also lacks genuine political will and commitment to share a portion of their sovereignty.

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[30] Yiheyes Eshetu, senior MoWIE energy official, Addis Ababa, April 8, 2021 and Teame G/tsadik, a former senior EEPCo energy official, Addis Ababa, May 4, 2021

[31] Daniel Mulatu, senior EAPP energy official, Addis Ababa, April 13, 2021 and Esubalew Tenaw, senior EEP energy official, Addis Ababa, May 18, 2021

[32] Esubalew Tenaw, senior EEP energy official, Addis Ababa, May 18, 2021

[33] *Ibid*

4.3.3. Shortage of Generation Capacity and Weak Energy Infrastructure

Shortage of generation capacity is a common challenge of the Horn's regional energy cooperation and seems will affect the prospects of energy led integration in the region. The region had been challenged by power capacity shortages, though there is good progress in recent times[34]. Moreover, most of the current energy cooperation schemes in the HoA are power system interconnections that largely depend only on hydro. In the perspective of climate change impacts such as seasonal variations and prolonged droughts, dependency on hydropower develops unreliable power system and shortage of generation capacity in connected regional power systems (Khan and Singh, 2017: 129). Although new generating capacity is due to come on line, the tradeoffs between domestic coverage and feeding a regional market will not go away, with rising domestic energy demand likely to continue (Medinilla *et al*., 2019).

In Ethiopia which is regarded as power house of the region and expected to play key role in the regional energy integration process, there had been shortage in electric power generation capacity. The government of Ethiopia was expected to sell at least 4,000 MW of power to regional partners in the next decade (Verhoeven, 2011: 6). However, that was just only short of expectation mainly due to shortage in generation capacity. It is only after the completion of the delayed Gibe III hydro power plant in 2016 that Ethiopia seriously looks forward in exporting electricity to neighbors.[35]

Moreover, there is no adequate energy infrastructure such as transmission and distribution system both at national and regional level to transmit generated power[36]. Countries in the region like Ethiopia give high attention only to construction mega energy projects and there is no major investment in transmission and distribution infrastructure[37]. Mega hydro projects will not reach their objectives if member state power utilities in the region do not invest in transmission capacities and maintenance (Medinilla *et al*., 2019). As a result, transmission infrastructure in the region struggles to meet the demand of those connected to the grid with load shedding[38] is a

[34] Andarege Gizaw, senior EPP energy official, Addis Ababa, April 22, 2021
[35] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[36] Esubalew Tenaw, senior EEP energy official, Addis Ababa, May 18, 2021
[37] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[38] Load shedding means the deliberate shutdown of electric power in a part or parts of a power-distribution system, generally to prevent the failure of the entire system when the demand strains the capacity of the system.

common occurrence.[39] These factors combined creates difficulty for a given energy exporter country in the region to provide a firm power and associated energy as defined in the power purchase agreements.[40]

As a result, the volume of existing power trade between Ethiopia and its neighbors is not significant[41]. Especially Ethiopia's border energy trade with Kenya is in its infant stage. Ethiopia's energy export to Djibouti and Sudan are not also significant when we compare it with stipulated in the power purchase agreements and projections. Looking at, for example, the Djibouti case Ethiopia has planned to export 1275.4 and 1031.4 GWh energy annually in the year 2015 and 2016 respectively.[42] However, only 379.15 and 271.53 GWh was exported actually in the mentioned fiscal year respectively.[43] Not only the volume of power exchange is insignificant but also exporting parties have frequently been unsuccessful in their commitments to deliver the power in accordance with their contractual obligations because of the deficits in their systems and weak energy infrastructures (EAPP, 2015: 9). In line with this argument, one senior EEP energy official admitted,

> *Ethiopia has entered contractual agreement with Djibouti and Sudan to deliver an estimated firm power of 80MW and 100MW on annual basis respectively. However, most of the time Ethiopia fails to fulfills this commitment due to power shortage and excessive system losses that arises from transmission and distribution networks.*[44]

Thus we can argue that in addition to shortage of generation capacity, weak energy infrastructure is a common challenge of the Horn's regional energy integration efforts.

4.3.4. Political Economic Factors

In discussing this particular challenge of energy cooperation and prospects of regional energy integration in the HoA, this study tries to assess the political economic dynamics at domestic, regional, and international level that frustrate the existing energy led integration efforts.

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[39] Andarege Gizaw, senior EPP energy official, Addis Ababa, April 22, 2021
[40] *Ibid*
[41] Yiheyes Eshetu, senior MoWIE energy official, Addis Ababa, April 8, 2021
[42] EEP (2015), Djibouti annual energy export projection
[43] Khan & Singh (2017), The Current and Future States of Ethiopia's Energy Sector and Potential for Green Energy
[44] Andarege Gizaw, senior EPP energy official, Addis Ababa, April 22, 2021

The domestic political economic factors in most Horn countries had significantly hampered the existing energy cooperation. In Ethiopia, mostly seen as a power supplier of a region, there had been internal political instability and a huge financial constraint in its power sector from 2016 to 2018. If not, for example, Koyesha Hydropower Plant would be completed and delivered by 2021[45]. Koyesha (2,160MW), the fourth hydro dam in the Gibe cascade, began construction with the completion of Gilgel Gibe III, but has been delayed by the shortage of finance and prioritization of the GERD.[46] The financial constraint was both in hard currency (i.e., payments to such mega hydro projects are in hard currency) and deficit in national budgets. Therefore, mega hydropower projects such as Gibe III and Koyesha were not completed in their framed time schedule, which affect the expected generation capacity of Ethiopia and the Horn region.

Leaving this aside, what if Ethiopia was managed to complete its mega hydro projects on time? One senior EEP energy official replied,

> *.....if Ethiopia was completed its hydro power plants in due date, I think there was no potential power importer in the Horn region to buy that big amount of power from Ethiopia at that time.....An economy of countries in the region has been stagnated for a long period of time.....*[47]

There had been lack of economic development in most of Horn countries such as Eritrea, Djibouti, Somalia, and Sudan and South Sudan.[48] For instance, Sudanese economy has stagnated since 2011 after the session of South Sudan. South Sudan was officially recognized as an independent nation state following a referendum held in January 2011, which led to Sudan losing 75% of its oil reserves to South Sudan (EIA, 2018). The oil revenue had dramatically decreased. Moreover, there was war between the two Sudanese over border disputes. Since then, the Sudan and South Sudan economy has been struggling to recover. There was also an economic stagnation in Eritrea and Djibouti.[49] So we can assert that domestic financial constraint and economic stagnation in the Horn impedes countries not to actively engage in importing energy, which is mostly pushed by domestic economic growth and energy demand.

[45] Esubalew Tenaw, senior EEP energy official, Addis Ababa, May 18, 2021
[46] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[47] *Ibid*
[48] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[49] *Ibid*

The second political economic dynamic is regional. Control, competition and co-operation cannot be dissociated from such regional energy cooperation schemes. In this case, the regional political dynamics is usually associated with political interests of member states that appear to pursue different interests through their participation in the regional energy integration (Verhaeghe and Woolfrey, 2017: 10).

Ethiopia, with its massive hydro potential, is often regarded as having strong interest in exporting its future electric power surpluses to its neighbors and beyond (Verhaeghe and Woolfrey, 2017: 10). It dominates the regional power trade and uses the EAPP as an instrument and a means to pursue the country's broader national strategic interests and to further assert its dominance in the Horn and Eastern Africa region (Woolfrey, 2016). Central to Ethiopia's position is the Grand Ethiopian Renaissance Dam (GERD) currently under construction, which is expected to cause dramatic shifts in regional power relations.[50] According to Woolfrey (2016), this is part of the country's long-term strategy in the region, but also aims to tie the region to Ethiopia through energy trade, and, by fostering interdependence on Ethiopia's terms, to shift the regional balance of power away from other countries (i.e. Egypt, Kenya, and Sudan) in the region. In support of this argument, one senior EAPP energy official clearly noted,

> *…Played key role in the establishment of the EAPP and playing active role in the current energy led integration in the HoA, hydro-rich Ethiopia seeks to become a significant energy exporter and strong political figure in the region*[51].

According to Medinilla *et al* (2019), in order to gain control over the transmission and prices of power traded in the Horn and Eastern Africa, Ethiopia convinced the EAPP to build a new regional head office and regional market operations and Control Centre in Addis Ababa. It thus blocked attempts to decentralize EAPP institutions to other countries in the Horn and Eastern Africa. While Ethiopia helped develop the EAPP and largely dominates its agenda, the country again mainly engages in bilateral energy trade agreements (with e.g. Djibouti, Sudan, Kenya, and Tanzania) (Medinilla *et al*., 2019).

[50] Asfaw Setta, senior MoFA expert on trans-boundary resources affairs, Addis Ababa, May 31, 2021
[51] Daniel Mulatu, senior EAPP energy official, Addis Ababa, April 13, 2021

This regional political dynamic undoubtedly will have its own negative impact on existing energy cooperation as well prospects of energy led integration in the HoA. Ethiopia's influence over the regional energy cooperation is not without challenges. Rather countries may be suspicious of it and will not opt for further regional energy integration. Because of this it is not clear exactly how committed the region's states are willing in practice to closer energy system integration and power pooling (Verhaeghe and Woolfrey, 2017: 10). The situation may also push Horn countries (i.e., like Sudan and Kenya) look for alternatives that could better foster their national interests.

The international political economy dynamics mainly goes with technology advancement and flexibility of solar energy price in the global market. Since 2015/16, there had been an incredible reduction in the cost of solar technology. In 2009, for example, solar PV module per watt was around $0.52, which has dropped to $0.27 in 2015 (Khan and Singh, 2017: 129). In mid-2000s and the early 2010s, solar energy was unaffordable, and also there was no skilled man power and technology to accommodate it for developing regions like the Horn.[52] Thus, power pooling and electric power interconnection was a fashion in the region. Most of the electric power purchase agreements between countries were made during that period. Nonetheless, the affordability of solar energy in the global market and easy access of the technology significantly affects, for example, electric power interconnection in the region. Currently, countries in the Horn opts the affordable and cheap off-grid renewable energy solutions[53] than relatively high costly electric grid interconnection with other country's power system.[54]

The African continent and especially countries in East Africa has seen rapid developments in off-grid renewable energy over the past five years They have emerged as leaders in the deployment

[52] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021

[53] Off-grid renewable energy solutions are different from traditional grid energy systems like diesel and hydroelectricity. According to International Renewable Energy Agency (IRENA, 2018: 3), Off-grid renewable energy alternatives have emerged as a mainstream solution to expand access to modern energy services in a timely and environmentally sustainable manner. Over the past five years, the deployment of stand-alone and mini grid systems has witnessed tremendous progress as technology costs have plummeted, innovation in deployment and financing models has picked up, and a more diverse set of stakeholders, including local entrepreneurs, the international private sector and financing institutions, have become engaged in the sector. Besides providing energy for lighting and cooking, off-grid solutions are being deployed to support the delivery of public services (e.g., education, water and primary health care), the development of livelihoods by powering productive end-uses (e.g., agriculture) and other commercial and industrial needs.

[54] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021)

of stand-alone solar solutions for providing electricity access for lighting as well as for other services such as radio, television and productive uses (e.g., pumping) (IRENA, 2018: 3). Global investments in the off-grid solar sector reached USD 284 million in 2017, with East Africa accounting for over half (57%) of all investments (International Finance Corporation (IFC), 2018).

As clearly shown in the above statistical figure, interests in off-grid renewable energy systems are on the rise. Solar lights have driven this rapid growth in the Horn and eastern Africa. As an Informant put it, solar became very cheap since the last five or six years due to Chinese strong involvement in the sector[55]. Kenya is among the Horn countries that turn significantly using the new solar energy technology to diversify its power demand. For example, if solar panel was not affordable and cheap since 2015/16, Kenya might be integrated with the Ethiopian power system rapidly. So this also disrupts the regional energy cooperation and will continue impacting it[56]. Not only this, especially electric grid interconnection in the HoA is endangered by continued affordability and price reduction of solar energy technology.[57]

4.3.5. Hydro Politics of the Eastern Nile Basin and Competition in EAPP

For centuries, Egypt, Sudan and Ethiopia have fought over the Blue Nile Basin through shifting alliances and against the backdrop of global politics and local resource realities (Verhoeven, 2011: 4). Thus hydro politics was a long existing phenomenon in the Nile River resource, but it has heightened following Ethiopia's decision to construct a mega hydro dam over its Blue Nile River (Abay River). Since then there had been raised contested disputes and concerns by downstream riparian states such as Sudan and Egypt. According to Maupin (2016:6), Ethiopia's approach in constructing the GERD raises challenges mainly for downstream riparian states' hydro hegemony[58] in the Nile Basin.

Egypt is seen to block Ethiopia's hydro power generation strategies regarding the Nile (Medinilla *et al*., 2019), and also other water resources in Ethiopia.[59] It is because Egypt wants to

[55] Fana G/senebet (Dr.), senior IPSS lecturer, AAU, Addis Ababa, April 21, 2021
[56] *Ibid*
[57] Esubalew Tenaw, senior EEP energy expert, Addis Ababa, May 18, 2021
[58] The concept of hydro-hegemony has been developed to define situations in which one country establishes dominance in these strategic resources (Zeitoun and Warner, 2006). Hydro hegemony also suggests that conflict and co-operation coexist in trans-border water resource management.
[59] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021)

challenge Ethiopia's influence over the HoA and EAPP in terms of power generation and export. Egypt's perception is clear that if Ethiopia emerged strong regional power, its long standing hydro hegemony over the Nile River resource and its political influence in the North Eastern Africa region will be challenged.[60] Egypt had always an interest in protecting its downstream position on the Nile from any upstream hydropower development or ensuring that the development of hydropower resources in the Nile Basin is limited (Medinilla *et al*., 2019; Verhaeghe and Woolfrey, 2017: 10). For example, it resigned from the EAPP in 2016 due to its opposition to the construction of GERD.

The dispute over the GERD and hydro politics of the eastern Nile basin and competition in EAPP will have its own negative impact on the prospects of energy led integartion in the HoA. As a senior AAU lecturer in hydro politics noted,

> *The recent dispute over GERD and the Nile river resources tells us that unilateralism prevails than cooperation…..if unilateralism prevail, cooperation among states will decrease and conflict will arise. Conflict is destructive to all parties in, and even to the environment and the river water resources….thus no doubt it will impede the regional energy integration efforts in the Horn and Northeastern Africa.*[61]

GEDR in not only a national project only rather it is also a regional project. The Dam is expected to benefit neighboring countries in power generation and transmission.[62] However, there have been recent unsuccessful negotiations over GERD's filling and operation among Eastern Nile basin countries such as Ethiopia, Sudan, and Egypt. The diplomatic dispute remained unresolved and posed threats for the regional energy integration in the HoA and EAPP in particular and the stability of the North Eastern Africa region.[63] Since recent time, Sudan has similar stance with Egypt with respect to the dam, which is expected to benefit the regional energy integration in maximizing generation capacity of the Eastern and Horn of Africa region.[64] For instance, in 2018 Ethiopia and Sudan negotiated a bilateral agreement for the installation of the second power

[60] Asfaw Setta, senior MoFA expert on trans-boundary resources affairs, Addis Ababa, May 31, 2021
[61] Demeke Achiso (Dr.), senior PSIR lecturer on hydro politics, AAU, Addis Ababa, June 3, 2021
[62] Esubalew Tenaw, senior EEP energy expert, Addis Ababa, May 18, 2021
[63] Asfaw Setta, senior MoFA expert on trans-boundary resources affairs, Addis Ababa, May 31, 2021
[64] *Ibid*

interconnection line, which will enable Ethiopia to export 1000 MW of electric power to Sudan.[65] The proposed interconnection line extends from the Grand Ethiopian Renaissance Dam (GERD) to Khartoum, Sudan. Thus among other things the disagreement over GERD will negatively affects the planned Ethiopia- Sudan power systems interconnection.[66] This specific challenge of energy led integration in the Horn is also goes in line with the arguments of realism that genuine regional integration among states is difficult to promote because states do not trust each other and aspire only to maximize their national interests at the expense of others.

4.3.6. Delay in Energy Infrastructure Projects and Lack of Finance

Delay in energy infrastructure projects is among the key challenges in Horn's energy led integration. For instance, the Ethiopia-Djibouti first power system interconnection project was completed in April 2011 and commissioning was finalized in May 2011 as opposed to June 2010 planned at re-appraisal. The project activities were completed with a ten (10) months delay. Poor performance of transmission and substation contractors contributed to implementation delays (African Development Fund, 2011). The Ethiopia-Kenya power system interconnection was also delayed and the progress is not going as expected.[67] The power grid construction in Kenyan part is much delayed compared with the Ethiopian side. After testing, the transmission line was expected to be ready for power transmission by April 2020 (Fortune, 2019). However, it is not completed and functional yet.

The reasons for delays in projects are mostly financial constraints. Electric grid and other energy infrastructures like transmission lines and distribution systems (i.e., substations and transformers) are very much capital intensive and cannot be constructed easily by a given country in the Horn.[68] This problem is inherent with respect to hydro power generations. During interview session, one former long-term EEPCO energy official and now private energy consultant noted,

> *Mostly hydro power is generated from rivers that might be miles away from the central grid of a given country that will necessitate the construction of billion dollar transmission lines and distribution systems. For Example, GERD was*

[65] Esubalew Tenaw, senior EEP energy expert, Addis Ababa, May 18, 2021
[66] *Ibid*
[67] Andarege Gizaw, senior EEP energy official, Addis Ababa, April 22, 2021
[68] Teame G/tsadik, a former senior EEPCo energy official, Addis Ababa, May 4, 2021

found some 650 km away from the Ethiopian capital, Addis Ababa. Therefore, constructing transmission lines from GERD to Addis Ababa is mandatory which is very much capital intensive. Moreover, there is a need for constructing distribution systems like sub-stations and transformers[69]*….*

So this kind of billion dollar energy infrastructures cannot be constructed by Ethiopia's domestic financial sources. The same is true for the regional energy integration infrastructures. Energy infrastructures must exist between countries. However, countries in the region have no financial capacity to invest such amount of money in transmission and distribution systems unless they have access to donors and loans.[70] Donors' such as EU, WB, AfDB, and Power Africa plays their own positive role in the energy led integration initiatives in the region mainly in technical and financial support of power system interconnection projects. Hence, that was not enough. The above all are the key challenges facing the current energy cooperation and prospects of led integration process in the HoA.

As briefly discussed in the above section, promoting energy led integration in HoA is not without challenges. The biggest obstacles to the full regional energy integration in HoA are political instability in the region, lack of trust between countries, geopolitics of the region and its subsequent competition, and insufficient power generation capacity and lack of transmission facilities. The region needs significant investment in new generation and transmission energy infrastructures. Moreover, the political economic dynamics at national, regional, and international level are also affecting in its way the current energy led cooperation efforts. These challenges, especially the political instability of the region, hydro political and geopolitical competition, and lack of mutual trust between countries, go in line with the realistic assumptions of regional integration. For realists, cooperation among states over a specific functional area and broader regionalism is a difficult phenomenon to promote. Similar to their stance, these all are among the key factors that challenged energy cooperation in the HoA.

Given the region's geopolitical importance and nearness to the Red Sea, the HoA has become the major site of competition for regional and global superpowers. For instance, Djibouti alone hosts a number of military bases of global super powers. Thus competition rather than cooperation

[69] *Ibid*
[70] Yiheyes Eshetu, senior MOWIE energy official, Addis Ababa, April 8, 2021

among these powers has become a common phenomenon to maximize their spheres of influence and interests in the HoA and the Red Sea. In this case, regional and global actors are negatively impacting (**constraining**) the Horn's regional economic integration in general and energy led cooperation in particular. Moreover, there is a contesting dispute over the use of the Nile river resource among countries in the Eastern Nile Basin.[71] The disputes remain unresolved and the near future remained uncertain. Therefore, the geopolitical dynamics of the HoA region and hydro politics of the Eastern Nile basin has been impeding the existing regional energy cooperation efforts and are also expected to challenges the prospects for further regional energy led integration efforts. These points also amounts to the realist assumptions of regional integration that actual political and military power and states' unilateral maximization of national interests are the key challenge in forging genuine regional integration.

[71] Demeke Achiso (Dr.), senior PSIR lecturer on hydro politics, AAU, Addis Ababa, June 3, 2021

Chapter Five

5. Conclusion and Summary

Access to clean energy is becoming a critical issue and pressing challenge in the world. This is most relevant to developing regions like HoA. Despite the region's endowment of many renewable and nonrenewable energy resources, the HoA suffers from deficits in the supply and distribution of energy. Perhaps the region is among the lowest electrification rates in the world (EIA, 2019). Access to energy represents one of Horn's greatest obstacles to social and economic development. Few indicators are sufficient to draw a picture of a region where the energy sector is dramatically underdeveloped, at a time when unprecedented growing populations and prospects of economic growth would require more energy (Hafner et al., 2018: 1).

It is clear that the energy deficit in a given country or region adversely affects economic growth and productivity. Thus with energy systems integrated across the national economies of all countries in the region, tackles energy deficit in one country, this would further encourage economic growth, help for energy diversification, and build mutual trust and interdependence between countries in the region. It will also help to create more robust regional power grids with the potential of lowering capital investment requirements across the region and enhance energy trade and cooperation. Due to these similar economic and political rationales, the historical trend of energy led cooperation was evolutionary and had been increasing from time to time across different regions of the world. In the HoA region, too, since recent time there has been gradual and incremental energy led cooperation efforts. Especially, the most recent years have witnessed efforts to integrate power systems via power pools in the region. Ethiopia, found in the heart of the region with the most hydro power generation capacity, plays a key role in the regional energy cooperation. The Ethiopia-Djibouti and Ethiopia-Sudan power system interconnection through a 100MW capacity line were operational in 2011 and 2013 respectively. Agreements were made about additional power exports to these countries. There is also border electricity trade between Ethiopia and Kenya at the border towns around Moyale. Moreover, Ethiopia-Kenya power system interconnection is set to be operational very soon, and there are proposed power system interconnection projects with Somalia, Eritrea, and Somaliland (Horn of Africa Initiative, 2019). Other than electric power interconnection in the Horn, there are other energy infrastructural

interconnection projects underway across countries like natural gas pipeline, road, railway, and port that will have its own ramification on the Horn's regional energy integration efforts.

Therefore, the momentum of energy cooperation in the region is on the rise and seems to be there is a prospect for further regional energy led integration. This study views the existing energy led cooperation efforts and prospects in the region from the functionalist/neo-functionalist and liberalist assumptions of regional integration discussed in chapter two. While functionalists focus on common interests and needs shared by states, neo-functionalism promotes gradual and incremental cooperation between actors to manage collective problems in a given region. Terms such as 'spill over', 'incremental integration' and 'ramification' are important terms for neo-functionalist assumptions (Hass, 1958, 1968 cited in Yonas, 2012: 3). As I briefly discussed in the above paragraph, countries in the Horn practically manage to engage in energy cooperation (i.e., functional area) and have achieved some sort of success. They (countries) even tend to look at energy cooperation as an initial stage and have an aim of cooperation in other broader economic, social, and political issues. Medhane (2004) noted that energy led cooperation in the HoA acts as a stimulus to other areas of cooperation such as infrastructure and port linkages. Of course, regional energy interconnection in the Horn has existing achievements and future prospects that strengthen the assumptions of functionalists/neo-functionalists and Medhane. The Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) corridor program is a regional project aiming to create connectivity between Kenya, Ethiopia, and South Sudan on functional areas of cooperation such as road, railway, port, and energy. The Horn of Africa Initiative (HoAI) also prioritized functional areas of cooperation among countries in the Horn on similar areas of transport and energy in order to enhance economic development and regional economic integration. Therefore, these functional areas of cooperation are expected to bring further energy led integration and broader regional economic integration outcomes like the neo functionalists' and Medhane's assumptions that regional integration process deriving from economic self-interest via incremental processes acts as a stimulus to other social and economic sectors.

Neo functionalists also places major emphasis on the positive role of non-state actors and external actors (i.e., regional and international organizations from the multiword) in a given regional cooperation of functional issues. As of their assumptions, regional and international

actors and donors such as AfDB, Power Africa[72], EU, and WB are positively impacting (**enabling)** the existing energy led cooperation by supporting the development of energy infrastructure interconnection projects in various forms (i.e., technically and financially).[73] For instance, these development partners and donors provide USD 1.84 billion to enhance the Horn's energy infrastructures and power trade between countries in the region (HoA Initiative, 2019). Power Africa is also supporting the development of electricity generation projects in the HoA both technically and financially.[74] It seems the roles and investments of these development partners will continue since there are many undergoing and planned energy interconnection projects in the HoA.

The existing achievements of energy led cooperation in the HoA such as bilateral electric system interconnections, natural gas transmission lines, and other energy infrastructural projects between countries also validate the assumptions of liberal institutionalism/internationalism that cooperation between states is much more possible over common interests and needs shared by them. Institutional arrangements can also play their own key role in promoting these areas of cooperation. Perhaps EAPP will help countries in the HoA region to integrate their power systems and facilitate regional power grid integration.[75] EAPP's role in facilitating regional power interconnections in the HoA also supports the theoretical assumptions of liberal institutionalism. Institutional liberalism assumes that an appropriately designed institution is capable of steering the decisions of the units and, consequently, of taming their otherwise self-interested and occasionally conflict-raising behavior of states (Gehring, 1996: 227-228). In line with this, EAPP as a regional energy pool is expected to play a positive role in transforming the bilateral nature of existing energy cooperation in the Horn and Eastern Africa to more designed, market oriented, and institutional power system integration.

Other the existing achievements, energy led integration in the HoA is also surrounded by opportunities such as the completion of GERD, EAPP, LAPSSET, and the Horn of Africa

[72] Power Africa is a U.S. Government Led partnership coordinated by the U.S. Agency for International Development (USAID). It has an aim of bringing cleaner, more efficient electricity to sub-Saharan Africa. For more see https://www.usaid.gov/powerafrica/partners

[73] Andarege Gizaw, senior EEP energy official, Addis Ababa, April 22, 2021
Teame G/tsadik, a former senior EEPCo energy official, Addis Ababa, May 4, 2021

[74] Gosaye Mengiste, senior MoWIE energy advisor to the minister, Addis Ababa, April 9, 2021

[75] Daniel Mulatu, senior EAPP energy official, Addis Ababa, April 13, 2021

Initiative. These opportunities are also expected to play positive role toward the achievement of further energy led integartion in the region. However, at the same time political instability of the HoA region, lack of trust among countries as well as regional geopolitics and hydro politics are **constraining** energy cooperation and future prospects of energy led integartion in the HoA. Therefore, the prospects of Horn's regional economic integration in general and energy led integration in particular depend on the upcoming scenarios[76]. If states in the region alter their self-behavior, believe in discussion and come up with common trust and understanding, when the region is politically stable, and respective politicians truly understand the benefits of energy interconnections, the regional energy integration effort will flourish beyond what it is now. The existing energy led cooperation efforts in the HoA could also be transformed to further energy led integartion by having genuine and credible regional organization that may help the region to maximize the benefits from ''enabler'' actors and minimize the ''constraining'' actors' role, at the same time creating good conditions for looming energy-led integration.

[76] *Ibid*

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Appendix 1: Interview guidelines

To Ministry of Water, Irrigation and Energy (MoWIE)

- What is the role of Ethiopia's and the region's hydro and other energy resource potentials for energy led integration in the HoA?
- Do you believe that strong energy institution and capacity is build enough in Ethiopia in particular and in the HoA Africa in general to enhance regional energy integration?
- What is the role of external actors like (Egypt, IGAD, AfDB, EU, Power Africa and WB) and how they IMPACT the Horn of Africa's energy led integration?
- What do you think are the main challenges that the Horn of Africa region faces in achieving energy led integration?
- How do you look at the future prospects of the regional energy led integration process?

To Ethiopian Electric Power (EEP)

- What is the role of Ethiopia's hydro and other energy resource potentials for energy led integration in the HoA?
- How do you see the current level of energy cooperation in the Horn of Africa? What is the volume of power exchange b/n Ethiopia and its neighbors? Can we say it significant enough?
- Does Ethiopia frequently meet its obligation to deliver the power in accordance with its contractual obligations to power importing countries like Djibouti and Sudan?
- Do you believe that there is adequate generation capacity and energy infrastructure in the Horn's regional energy integration?
- What do you think are the main challenges that the Horn of Africa region faces in achieving energy led integration?
- How do you look at the future prospects of the regional energy led integration process?

To Eastern Africa Power pool (EAPP)

- What is the role of Horn's hydro and other energy resource potentials for energy led integration in the Horn and Eastern Africa?

- Do you believe that strong energy institution and capacity is build enough to enhance energy led integration in the Horn of Africa?

- What will be the role of EAPP in transforming the exiting energy led integration efforts in the HoA?

- What do you think are the main challenges that the Horn and Eastern Africa region faces in achieving energy led integration?

- How do you look at the future prospects of the regional energy led integration process?

To Ministry of Foreign Affairs (MoFA)

- What is the role of Ethiopia in the Horn's regional energy led integration?
- Countries in the Horn opts regional energy integration to enhance their economic cooperation, increase trust among them and avoid conflicts. In this case, what are positive achievements so far? Can we say the regional energy integration has met its goals?
- How disagreements over GERD between Ethiopia, Sudan, and Egypt, and recent Ethiopia-Sudan border conflict affect regional energy integration in the HoA?
- What are other diplomatic and political challenges that face the regional energy integration?

To scholars in AAU and IPSS

- What do you think are the rationales for energy led integration in the HoA? What is the role of Ethiopia in the regional energy integration process?
- What do you think are the major achievements so far?
- How disputes over the Grand Ethiopian Renaissance Dam (GERD) between Ethiopia, Sudan, and Egypt will affect regional energy integration in the Horn of Africa?
- How recent border disputes between Ethiopia and Sudan can affect energy led integration in the Horn of Africa?
- What are the major political economic factors impede regional energy led integration in the Horn?
- What do you think are the future prospects?

Appendix 2: Summary of Key Informants/ Interviews cited

No	Name	Position	Organization	Date	Remark
1.	Mr.Yiheyes Eshetu (KI 1)	Senior Energy Official/Director	MoWIE	8 April, 2021	
2.	Mr.Gosaye Mengiste (KI 2)	Senior Energy Official /Energy Advisor to the Minister	MoWIE	9 April 2021	
3.	Mr. Daniel Mulatu (KI 3)	Senior Energy Official/Power System Planning Head	EAPP	13 April, 2021	
4.	Dr.Fana G/senebet (KI 4)	Senior lecturer	IPSS	21 April, 2021	
5.	Mr. Andarege Gizaw (KI 5)	Senior Energy Official/Energy Advisor to the CEO	EEP	22 April, 2021	
6.	Mr. Teame G/tsadik (KI 6)	Former EEPCo Energy official/Manager	Now private consultant in the energy sector	4 May, 2021	
7.	Mr.Esubalew Tenaw (KI 7)	Senior Energy official/Director	EEP	18 May, 2021	
8.	Mr. Asfaw Setta (KI 8)	Senior expert on trans-boundary resources affairs	MoFA	31 May, 2021	
9.	Mr. Gesela Belete (KI 9)	Senior Official/Neighboring countries and IGAD Affairs	MoFA	2 June, 2021	
10.	Dr. Demeke Achiso (KI 10)	Senior lecturer	AAU	3 June, 2021	