Sustainability in Kenya's Energy and Development: An alien concept?

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SUSTAINABILITY IN KENYA'S ENERGY AND DEVELOPMENT: AN ALIEN CONCEPT?

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DEDICATION

I dedicate this dissertation to my father, the late Abdallah Hassan, who ignited the fire that drives my education and professional endeavours; and to those in Africa and elsewhere whose development struggles I identify with

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List of Acronyms

BoP – Bottom of the Pyramid (or Base of the Pyramid)
DIIS – Danish Institute for International Studies
GDP – Gross Domestic Product
GNP – Gross National Product
GoK – the Government of Kenya
ICT – Information and Communication Technology
IRENA – International Renewable Energy Agency
KEREA – The Kenya Renewable Energy Association
KIPPRA – Kenya Institute for Public Policy Research and Analysis
KNBS – Kenya National Bureau of Statistics
KW – Kilowatt
MW – Megawatt
NGO – Non-governmental Organization
PV – Photo-voltaic
REC – Rural Electricity Cooperative
SD – Sustainable Development
SDGs – Sustainable Development Goals
SE – Sustainable Energy
SHS – Solar Home System
SME – Small and Medium Enterprises
UNDP – United Nations Development Program
UNDESA – United Nations Division for Economic and Social Affairs
UNEP – United Nations Environment Program
UN ESCAP – United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC – United Nations Framework for Climate Change Convention
WISDOM – Woodfuel Integrated Supply/Demand Overview Mapping

Acknowledgments

The research work presented in this dissertation is the culmination of a long journey. Given my determination to make the research relevant both academically and practically, the time I have taken has been longer than average. It has been a journey that has taken me to many countries, cultures and organizational settings. However, above all, I have met and come to know many people. Some have been easy to work with, while others have presented challenges that have enriched my abilities to face the difficult side of life. A large number have supported the research work, while others have been invaluable in getting the work done. At times, the journey appeared endless, and a number of those who have supported me provided encouragement and inspiration to continue. Having been out of the academic world for a long period, making a return was a difficult decision. Taking the journey was even more challenging, and it is the encouragement that has kept me going. I got the initial inspiration to start the journey from Aalborg University in Denmark, particularly from Professor Poul Osterberg, and Professor Frede Hvelplund. At UNEP-DTU Centre in Denmark, I was strongly motivated by Gordon Mackenzie and John Christensen who stand out among my many supporters at the centre. Others at the centre who deserve special recognition are Todd Ngara, Ivan Nygaard and Karen Olsen. While at the centre, I visited many countries in Africa and Europe. In these countries, I met people who contributed in a number of ways to my work. The contributors that I single out for special mention are Lara Bertarelli from Italy (based in France), Lawrence Agbemabiese from Ghana (currently based in the USA), Stephen Karekezi of AFREPREN (Kenya), David Karanja of Sustainable Energy Strategies (Kenya), Emmanuel Michael of UNIDO (Tanzania), Eva Paul of KfW (Rwanda) and Kumbulawo Lungu of the Ministry of Energy and Mines in Malawi. Then, there are those who facilitated the end of the journey who deserve special recognition. The two who stand out most, and who guided and promoted my work are Professor Hans Bressers and Professor Joy Clancy of the University of Twente, the Netherlands. The other person who has promoted my work is Wilkister Moturi of Egerton University, Kenya. Others who supported me at the University of Twente are Associate Professor Maarten Arentsen, Nthabiseng Mohlakoana, Annemiek van Breugel and Barbera van Dalm-Grobbe. Finally, I wish to acknowledge the partial funding support that I received from the National Commission for Science Technology and Innovation (Kenya) and the University of Twente's invaluable facilitation that included tuition fee waiver and provision of all the facilities at the university that I needed for my PhD work.

“Electrification is not an implacable force moving through history, but a social process that varies from one time period to another and from one culture to another”

Quote from David Nye (Nye, 1990), an American academic writer

“Japanese people cut their energy use by 25 percent immediately after Fukushima. They showed there was huge opportunity there. And instead, the government simply wants to get those plants up and running again”

Quote from David Suzuki (Suzuki, nd), a Canadian Scientist

“To measure a country's wealth by its gross national product is to measure things, not satisfactions”

Quote from a 1973 speech by Julius K. Nyerere, Tanzania's first president, cited in McLean (2012)

1. Chapter One: Overall Introduction

1.1. Background and inspiration

The speed and scale of the advancement of technologies and technological systems (hereafter referred to collectively as tech-systems) are spectacular. On the one hand, these tech-systems comprise non-living physical components, and on the other hand social¹ (specifically human-oriented) components. In general, and in conformity with the functioning of a system², they work in conjunction for specific purposes (see, for example, Svensson and Ingerman, 2009; Carlsson and Stankiewicz, 1994; Hughes, 1983). The cited literature further observes that the physical components largely dominate general perceptions, and that the social components are, in many people's minds, insignificant. Nevertheless, some progress has been made in bringing out the human aspect of tech-systems. An illustration of this

¹The term 'social' is used here and in the rest of the dissertation in the sense of a characteristic of people as individuals or groups of individuals, and the relationships between or among individuals and groups. More specifically, the concept of social is as elaborated in Section 1.3.1. In the dissertation the term 'social components' is used interchangeably with the terms: social aspects, social elements, social dimensions etc. The meaning is the same and the various phrases in use throughout the dissertation are intended to make the text more readable.

²In general, a system is taken to be a set of interconnected parts that work together for specific purposes (see, for example, Macmillan Dictionary).

progress is presented in Figure 1.1 that depicts the possibilities of socializing with a robot. The picture in the illustration is a “social robot”; meaning that the robot is one that engages in social actions such as serving a drink.

Fig 1.1: Socializing with a technological system (robot)
Source: Aldebaran (2015)

Robots are also being designed with increasing levels of social sophistication, such as sensing emotions and taking part in conversations (Aldebaran, 2015). Nonetheless, although social features³are progressively being built into tech-systems, it seems there is still a minimal level of attention being given to these features. This problem is clearly not new as the quote from David Nye (1990) above indicates. In his analytical works, Nye found it necessary to remind tech-systems developers and related actors that electricity is more than a technical (physically deterministic) utility. Electricity is taken by Nye, and in this dissertation, to be an example of a tech-system. According to Nye electricity is a sociological system, affecting and being affected by the societies which it serves or could be expected to serve. In a similar line of thinking, it is not enough to merely measure (and aim for growth of) “things” mentioned in the quote from Nyerere above. The “things” in this quote are in this dissertation equated with tech-systems in their physical sense. From this perspective, Nyerere contests

³ Social features in this sense include, for example, the expression of emotions and engaging in conversation as depicted in Fig. 1.1

measuring a country's progress through determination of physical or physically-oriented parameters, Instead, Nyerere asserts that the progress should primarily be assessed on the basis of achievement of sociological goals, alluded to in the quote by the reference to achieving satisfaction.

Evidently, the reminders from David Nye and Nyerere are as relevant today as they were in the past. Based on the quote from David Suzuki above, energy, which encompasses electricity, is not being given adequate sociological attention In the quote, Suzuki sees the Japanese government as an energy policymaker with the primary duty of addressing societal concerns about nuclear safety. Nevertheless, the government appears to show inadequate concern for safety and wants to go back to the same nuclear tech-system that caused the Fukushima disaster. However, according to Suzuki, all classes of Japanese energy users have shown their willingness to participate in finding an alternative to nuclear energy by cutting their use of energy. This can be considered a social response to the search for the safe provision of energy. Here, what the government and the energy consumers have used are examples of instrumental rationality and communicative action respectively, as explained in Section 1.3.3 below.

Another example of under-emphasis of social factors could be drawn from the case of leapfrogging in a development context. By definition, e.g. from the Oxford Dictionary of English, leapfrogging means moving directly to an advanced position, skipping intermediate steps. From this sense of the word, developing countries have an opportunity for learning from developed countries, and skip difficult or teething development stages that the latter countries had to go through. What is normally envisaged in the development trends literature (see e.g. Steinmueller, 2001; and Murphy, 2001) is technology or economic leapfrogging. Often, as Sauter and Watson (2008), and Galagher (2006) indicate, leapfrogging is taken to mean skipping the use of polluting and economically inefficient technologies that were common during the industrial revolution; and instead adopting today's (modern) technologies. What is rarely mentioned is that apart from technological leapfrogging, there is an opportunity for developing countries to do social leapfrogging. The social aspect draws from the fact that during the industrial revolution, there were many workers and the working class in general who faced harsh socio-economic conditions (see Birchall, 2003; and Foster, 1974). The affected group suffered social ills principally on account of low wages and neglect of their welfare; and many of them descended into destitution.

Against this background, and using the lenses of Critical Social Theory (or simply Critical Theory) and other socially oriented theories, this dissertation interrogates the apparent underrating of the social component of development. Given the normative nature of the understanding of what is social and what development means generally and in a sustainability context, key concepts relating to these terms are provided in Section 1.3.1. In particular, this research focuses on the seemingly low appreciation and under-emphasis given to the social element of energy for sustainable development, with Kenya selected as the unit of analysis. Sustainable development as a whole is of great significance for developing countries, including Kenya. In this respect, the theoretical position taken is that sustainable development needs to balance the economic, social and environmental components if it is to be truly equitable; a view argued by, for example, Kuhonta et al. (2013), Jabareen (2008), Hammond (2006), Hjorth and Bagheri (2005) and Roseland (2000). As such, the social component needs as much attention as the economic and environmental components.

The research draws inspiration from the fact that in Kenya it has been shown that there is good potential for enhancing the social dimension of sustainable development. Specifically, the potential has been clearly demonstrated in the case of the use of ICT (Information and Communication Technology), which has allowed for innovations that have contributed to improving livelihood conditions of underprivileged Kenyans, who constitute the bulk of the Kenyan population. For example, Mutongwa *et al* (2014), Vaughan *et al* (2013), and Kirui *et al* (2012) have studied and reported many instances where ICT has facilitated development advancement of a large socially disadvantaged section of the population in Kenya. The study focuses on the particular case of the relatively new system of money transfers and inexpensive banking through mobile phones (referred to below as mobile money system), an innovation pioneered by Kenyans and international partners.

By the accounts of the indicated authors, due to the mobile money system Kenyans of lowly means have singularly benefitted through easing of the burden of moving, receiving, and keeping money—especially in cash. Prior to introduction of the system, money transfers largely entailed physical movements of people carrying money around and keeping it under unsafe conditions, all of which involved the risk and occurrence of theft and robbery. At best, money transfers companies were used at great cost, especially by the many Kenyans living abroad .who send money to their relatives in Kenya.

The widespread physical movements of money required many Kenyans to spend much of their very limited earnings on transportation. Banking services were unavailable to most Kenyans, and transaction costs were prohibitive. With the mobile money system, it has become possible and indeed a very common practice for richer kin, working in urban centres within the country and overseas, to send remittances to poorer relatives residing in far-off rural areas. Equally important, the mobile money system has given rise to large numbers of small-scale traders involved in the money business, and significant employment opportunities have been created all over the country. Some details of the evolution of the system and the differences that it has made for socially deprived Kenyans are presented in Appendix 8.1.1 (vignette, parts 1 and 2).

Existence and success of the socially useful ICT innovation is an indicator that, given the right motivation, the latent capacity for social innovations in Kenya can be put to work. Comparing the case of energy with the case of ICT, it is clear that energy technologies for advancing the social element of sustainable development in Kenya can be engineered and enhanced. The opportunity for such innovation could be seized by tapping into local (national) research and innovation potential, development capacity of all pertinent stakeholders, and national policy and international development support.

1.2 The Focus Country – Kenya

Among sub-Saharan African countries, Kenya stands out, from a geopolitical standpoint, as a relatively fast growing and strategically located country. Bloomberg (2015) has recently noted that Kenya's economy is growing at an annual rate of 4% to 5%, placing it among the 20 fastest growing economies in the world. Similarly, the World Bank (2016) has noted the international attractiveness of Kenya as an investment destination, as reflected in a sixfold increase in foreign investment flows into the country, from 140 million US\$ per annum (MUS\$ p.a.) in 2011 to 944 MUS\$ p.a. in 2014. The country, which is home to the author of this study, lies on the East African coast. From this location, the country has from ancient times served as a coming together point for explorers, traders and missionaries from all over the world. In both early and modern times, the country has attracted considerable foreign attention from explorers, traders, colonizers, prospectors, researchers and others with an interest in the country.

Kenya has been and continues to be attractive for foreigners mainly due to the country's advantages. The advantages include abundance of natural resources, its strategic location

for colonialists and for traders from both east and west. The country's good economic standing within the Eastern and Central African sub-region also makes it possible for the country to serve as a base for foreigners interested in the wider sub-region. The national population is made up of diverse African ethnic groups. However, settlers from Europe, Asia and other continents form small but highly influential groups. This mix and the socioeconomic factors have created a society of well-educated and wealthy individuals who govern the country. At the same time, KNBS and the Society for International Development (SID) [2013] have documented that a substantial proportion (over 55%) of the population remain very poor and mostly confined to under-developed rural areas.

Furthermore, different sources, (e.g. the KNBS, 2010; World Bank, 2014; and Population Reference Bureau, 2011) estimate that the total Kenya population was about 40 million in 2009 and 45.6 million in 2014. The same sources indicate that about 70% of the population is rural. As illustrated in Fig. 1.2 the highest concentration of the population is in the arable Southern half of the country, while the generally arid North is sparsely populated. It is noteworthy that according to the World Bank (2014a), Forbes (2014), and KNBS (2014), Kenya was up to 2014 classified internationally as a low income country. This meant that the GNP per capita for Kenya was less than US\$ 1045 per annum (World Bank, 2015b). However, economic recalculations (rebasing⁴) were done for Kenya and other African countries, and Kenya was repositioned to a lower middle income category, starting from 2014. This meant that Kenya's GNP per capita level was re-estimated and found to be between US\$ 1046 and US\$ 4125 per annum (ibid). Again, according to World Bank (2014a), Forbes (2014), and KNBS (2014), the GNP per capita levels before and after rebasing were US\$ 994 and US\$ 1246 respectively, reflecting a change of +25%. Nevertheless, in practical terms Kenyans did not experience any change in their day-to-day lives.

⁴Rebasing is a standard national financial accounting procedure to update the size of an economy to reflect prevailing national economic performance (UNDP, 2014)

Fig 1.2: Kenya Population Densities [Cities and major towns in red)
Source: Lynch (2015)

The country's development planning is guided by a national blueprint known as Vision 2030 (GoK, 2007). Based on the vision, Kenya is projected to attain industrial country status by 2030; and the current government is investing heavily towards attainment of the vision. For example, based on indications by Maina (2014), one of the major projects that is expected to catalyze industrialization substantially is the construction of a Standard Gauge Railway (modern standard of 1.435 metres width). The project which is ongoing is expected to be complete within four years (2013-2017). Its estimated cost is US\$ 3.8 billion and entails construction of 610 km. It is remarkable that this project, which is at mega-scale by Kenyan standards, is taking place after 100 years since any significant railway project was undertaken in Kenya. In fact, the only major railway project that has ever been carried out in

the country is the existing Mombasa-Kisumu line, with a length close to 1000 km, that was completed in 1904 (Gunston, 2004).

Among the government policies that are being aligned with Vision 2030 is the national energy policy entitled National Energy and Petroleum Policy (GoK, 2015). The energy policy is in the final stage of drafting and its finalization is awaiting enactment of the associated legislation (the Energy Bill 2015). The policy places a heavy emphasis on the provision of sufficient energy to spur industrial growth, and especially on making electricity supply cost-competitive. There are also some less-emphasized provisions in the policy for providing energy for sustainable development. These provisions include greater use of renewable energy resources for electricity generation, increasing access to electricity (especially through rural electrification) and wider consultations with stakeholders in the policymaking process. In the proposed energy policy, there is little recognition of the critical role of biomass energy in sustainable development. Instead, in the policy biomass energy is primarily seen from the standpoint of energy that has adverse effects on the environment and health, and hence requiring curtailment⁵.

For appreciation of the role that the energy has on the lives of most Kenyans, it is pertinent to examine energy use data for the country. In this regard, various sources including KIPPRA (2010) and Government of Kenya [GoK (2004) and GoK (2015)] give data on contributions from the principal sources of energy to total energy consumption nationally. Although the data differs slightly amongst the sources, generally the contributions trend is as follows: Biomass energy (mostly for households)—69%, petroleum oil (mostly for transportation) 22%, and electricity (mostly for industrial and commercial uses) 9%. It is worth noting that the 69% contribution from biomass fuels is a conservative estimate, and some sources (e.g. Saidi *et al*, 2012) point out that usage of the fuels is increasing, and the contribution to total energy usage has attained a level as high as 77%. The dominance of biomass energy (mostly from wood and charcoal fuels) is striking; and for purposes of this dissertation study it is significant to note that this type of energy almost solely provides for cooking needs of the bulk of the Kenyan population (rural and urban poor). As can be noted from looking at the maps on Fig 1.3 and Fig. 1.2, use of biomass energy is widespread in the inhabited areas of the country.

⁵ The negative effects of biomass largely arise from the inefficient technologies that are currently employed in its combustion. Modern biomass technologies are available for using biomass as an energy source, which do not exhibit these negative effects.

In contrast to endeavours for development of biomass energy, the Government of Kenya has strong measures for developing electrical power capacity. Already, there is a major electricity infrastructure especially for supplying Kenyan urban centres (see Fig. 1.4). From Government of Kenya information (GoK, 2013) and Kenneth *et al* (2014) this infrastructure is expected to grow exponentially according to current plans. The plans aim at increasing national supply capacity by 5500 MW within the period 2013-2017, from the existing (year 2013) 1660 MW level. The plans being implemented will in a small way catalyze sustainable development, especially through renewable (environment-friendly) energy provision.

However, the proposed plans will be detrimental to sustainable development on account of the use of fossil-fuel (non-renewable and environment-degrading) energy provision. Data provided by the Government of Kenya (GoK, 2013) and KEREAA (2014), show that renewable

energy sources in the plans are expected to provide a total of 2276 MW (1646 MW geothermal and 630 MW wind). Conversely, fossil-fuel sources in the plans are expected to provide a total of 3220 MW (1920MW coal, 250 MW oil, and 1050 MW natural gas). Kenya is also expected to become an oil producer within the next ten years, and it can be expected that diesel and petrol (fossil-fuel) driven electricity generation will be further facilitated.

1.3 Guiding Questions and Theories

1.3.1 Key Development Concepts and social framing

Various parts of the world are at different stages of developmental growth, and generally there are countries that are considered to be developed and those that are taken to be developing. This brings into question what it means to be developed and developing. Some indications can be gleaned from studies by development analysts including Jinadu (2015), Arnfred (2014), Stockemer and Sundstrom (2014), Bellu (2011), Dirlik (2007), Nafziger (2006), Szirmai (2005), Charlton and Andras (2003) and Gilman (2003). The extensive nature of the cited literature is a manifestation of the protracted debate as to what constitutes development. In view of the breadth of this topic, no attempt is made here to elaborate on the various meanings attached to the concept. Rather, in this dissertation, the literature sources provide an understanding of development and of the developing status of the countries studied. Specifically, the concepts of modernization, westernization and the North-South divide are used as determinants and extensions of the development narrative.

Gilman (2003), Tipps (1973), and Shils (1960) trace the history of the notion of development as it is widely perceived today, from the end of World War II in 1945, through the Cold War era and end of colonialism. The authors indicate that the notion emanated from the West—comprising Western Europe and, North America, Australia, and New Zealand. The West was the centre of capitalism, from where the Cold War was mostly waged against the Communist world—comprising the Soviet Union, China, and other communist-leaning countries. The authors further indicate that the Cold War consisted partly of winning over non-Western and non-Communist countries without using military means, and promoting non-communist development approaches. The West, led especially by Americans from the United States, decided to try to ideologically and economically win over the so called non-aligned countries and prevent them aligning with the Communists.

Particularly included in the strategy were newly independent former colonies. Overall, the West considered it necessary to carry out modernization of the under-developed countries—measures of modernity being based on standards of the West, which was taken as already modernized and developed by the 20th Century. To achieve development developing countries needed to follow the same path as Western countries, that is, industrialisation. From this beginning, development has grown to encompass tackling of developmental challenges that include:

- 1) Extensive poverty and malnutrition,
- 2) Large share of agriculture in economic output and employment,
- 3) A rapid population growth,
- 4) Large forces of unutilized labour,
- 5) Political instability and corruption,
- 6) Low levels of technological capacity and industrialization
- 7) Lack of democratic institutions and practices, and
- 8) Weak or highly inadequate civil liberties and rights (Szirmai, 2005, and Nafziger, 2006).

In this dissertation, development in general is understood in the sense of overcoming the listed challenges.

The concept of development arising from aforementioned history could be used in framing a distinction between developed and developing countries. The framing could however be a general guide only because the boundary for demarcating what is developed and what not is an imprecise one. Although there is no precise demarcation, geographically the boundary falls roughly along the Brandt Line that was proposed by the Brandt Commission in the late-1970s. Drawing from Solarz (2014), and Lees (2011), the commission was internationally mandated and chaired by Willy Brandt, the then Chancellor of West Germany. The commission deliberated on the division between the generally rich and industrialized (developed) countries, and the generally poor and under-developed (developing) countries. Geographically, the developed countries were generally within the northern hemisphere, with the exceptions of Australia and New Zealand. Conversely, the developing countries were generally in the southern hemisphere.

The notion of the Global North (the North) embracing developed countries, and the Global South (the South) comprising the developing countries emanated from the work of the Brandt commission. However, as argued by (Szirmai, 2005, and Nafziger, 2006), developing countries or nations of the South have come to be known more for the aforesaid challenges than for their geographical locations. Conversely, developed countries or nations of the North are those that have overcome the challenges, and generally include the West and some

industrialized East Asian countries (Japan, South Korea, Taiwan and Singapore). Nonetheless, there are development countries that are considered to be borderline cases, especially China and other fast industrializing countries like India, Brazil and South Africa. Although economically these countries are as advanced as most developed countries, they still suffer some of the development challenges facing the South, and therefore are generally included as part of the South. In this study all the countries of the South are considered to be developing.

While on the subject of development conceptions, it is important to bear in mind that development is about progress that enhances the wellbeing of humans, both individually and collectively. The progress is therefore about human social advancement which has been studied by, among others, Murphy (2012), Baines and Morgan (2004), Kabeer (2004), Mkandawire (2001), Bebbington (1999), McNally (1993) Escobar (1992), and Sen (1989). The studies generally identify social advancement or social development as life enhancement; and particularly Bebbington (1999) and Sen (1989) see it as improvement of human capability for enhancing their own lives. This dissertation study adopts this concept of social advancement, and further borrowing from the studies conceptualizes the advancement as a fulfilment of a set of social considerations. These considerations require exhaustive accomplishment for the advancement to be complete.

The key social considerations comprise of the following:

- 1) Satisfaction of basic human needs including nutrition, health, education, shelter, comfort, and emotional support;
- 2) Building and maintaining social capital, that is a network of relations with other people where trust and bonds can generate benefits for all;
- 3) Establishing and continuously improving a just system that ensures fairness for each and all members of a society; particularly in safeguarding individual and collective rights, and in equitable distribution of opportunities
- 4) Fostering equity where there is no discrimination on the basis of social category such as gender, race, ethnicity, religion or similar grouping; and
- 5) Empowerment of vulnerable and disadvantaged individuals and groups so that they can ably build their livelihoods and participate in societal affairs that affect their lives

In this dissertation, references to social considerations are made from the standpoint of sustainable development. This type of development relating to societal progress is of great importance in the sense that it has a vision of optimal progress for the present as well as the near and distant future. This is the conception generated by the Brundtland commission (WCED, 1987), leading to the definition of sustainable development as: *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs*. Later work aimed at a more scientific meaning of the concept has been done while retaining the essence of the Brundtland definition.

A large number of studies on understanding sustainable development have been done by analysts including UN ESCAP (2015), Kuhonta *et al* (2013), Jabareen (2008), Hammond (2006), Hjorth and Bagheri (2005), Roseland (2000), and Bossel (1997). In essence, what has been sought is making the concept more amenable to a systems approach and operationalization. Thus, a view of sustainable development as development with balanced economic, social and environmental dimensions has emerged; and this is the understanding that has been adopted in this dissertation study. Furthermore, Atkinson *et al* (2007) and Murphy (2012) have in addition to the aforementioned sustainable development analysts shown that conceptualization of sustainability has been undergoing transformation similar to that of sustainable development. Sustainability amelioration has come to be associated with balanced economic, social, and environmental dimensions of development; unlike in the earlier conceptualization where sustainability was principally linked with the environmental dimension. Indeed, Atkinson *et al* (2007) and Murphy (2012) have concluded that in the new conceptualization sustainability and sustainable development can be used interchangeably; and this understanding informs this dissertation research.

Balancing the three dimensions, or pillars, of sustainable development is taken to mean giving the dimensions equal priority insofar as this possible, and avoiding giving too much or too little attention to any of the dimensions. From this perspective, the concern arises that the social pillar is quite often neglected and usually receives the least attention (Carrera and Mack, 2010; Cuthill, 2010; Lehtonen, 2004). Neglect of the social element is of special significance to this study, as its focus is on energy for sustainable development from a social perspective. Given this background of concerns over social aspects in sustainable development, our study focuses on social aspects of energy in Kenya, and explores strategies for deploying biomass energy and electrical energy from a social perspective. These two forms of energy are selected because of the high level of importance attached to electrical energy relative to biomass energy. From observations by, for example, the World

Bank (2011), it is clear that the economic value attached to electricity is placed way above the social value obtainable from biomass energy. The perceptual differentiation in the importance attached to the two forms of energy is considered in this dissertation, with a view to emphasizing the importance of the seemingly undervalued biomass energy.

In this dissertation, it is acknowledged that from a sustainable development perspective, the degree of attention given to the economic dimension is on a qualitative basis high in comparison with the environmental dimension. The imbalance is documented by a large body of literature including Heijden (2014), Dryzek (2013), Davison (2001), Haynes (1999), and Hajer (1996). The literature further points out that there has been a growing awareness and action towards addressing environmental concerns. This is especially in respect of economically and socially damaging climate change impacts, brought about by Greenhouse Gases emitted in the process of economic production. Davison (2001) for example, points out that some early measures were taken by businesses to contain emissions from industrial production. The measures included internalization (identification and minimization) of negative environmental externalities. The internalization involved such actions as using production inputs that result into lower levels of emissions. Cleaning of pollutants from industrial processes was also done before releasing of the pollutants into the atmosphere. As Sankar (2001), DeNyse (2000), and Rose *et al.*(1994) have documented, internalization actions were taken in response to legal or regulatory requirements; or to take advantage of economic incentives that were made available by governments or markets.

DeNyse, 2000 further notes that initially there was resistance to the regulatory measures for enforcement of internalization, especially by the most significant polluters like industries. However, gradually the resistance was overcome, as awareness of benefits of the internalization actions grew. It became clear to the polluters that they could simultaneously improve their commercial productivity while taking action towards reducing environmental impacts from their production activities. Based on integrated resource planning and least-cost approaches, the internalization efforts were turned into what was called a triple-bottom-line strategy. The strategy made it possible to have increased profits, care for the environment, and minimization of impacts on society. As part of the strategy, businesses adopted productivity and efficiency improvement measures as well as use of resources that are more environment-friendly. Minimization of resources use resulted in cutting costs and lessening pressure on natural resources. The process of optimization of the use of resources, and employment of resources that were environmentally benign, basically constituted what was known as ecological modernization (Dryzek, 2013; and Hajer, 1996).

Although the subject of the environmental dimension relative to the economic one is of interest in this study, it is too broad to be covered in the limited scope of the study. Therefore, there is only minimum recourse to the subject in the dissertation content. It is also clearly noted that sustainable development is being propagated, especially in the UN system, in parallel with pursuit of climate change mitigation and adaptation—as part of general environmental degradation minimization endeavours. For instance, it is well recognized that there is ongoing work on sustainable development indicators being done by the UN Commission on Sustainable Development (see e.g. UNDESA, 2016). Sustainable Development Goals have also been developed and are in the process of implementation as successors of the Millennium Development Goals (International Council for Science, 2015). At the same time, there are strong measures being taken to contain climate change impacts worldwide, especially within the context of the United Nations Framework Convention on Climate Change (UNFCCC, 2015). Nonetheless, while the efforts on both sustainable development and climate cannot be underrated, it is deemed in this dissertation study that a scientific approach to sustainable development conceptualization and operationalization is needed to ensure that all key aspects of human and nature's interests are systematically, objectively and equitably addressed. The efforts to enhance sustainable development and address climate change concerns could be integrated within a framework of balanced economic, social, and environmental pursuits, with mutual benefits for society and nature.

1.3.2 Sustainable Development and Energy in North and South Contexts

The generally low importance attached to social aspects of sustainable development in countries of the North is evident in the literature (see e.g. Murphy, 2012; Cuthill, 2010; Beg et al., 2002; Jacobs, 1999; Kappel, 1994). This observation, and others that follow in connection with countries of the North, views China as a special case of a Southern nation with Northern characteristics. For example, China analysts including Awan (2015) and Chan (2015) see China as a paradoxical developing country providing development aid to poorer developing countries while having a large poor population of its own that craves attention. The analysts also comment that the country has a very rapid economic expansion with attendant environmental degradation and climate impacts that exceed those in many developed countries. Environmental problems should therefore be of as much concern in China as they are in developed economies. However, the analysts indicate that China does not give such issues the attention they deserve, as the country considers itself to be a developing one and further that the environmental problems are the responsibility of developed countries. In view

of this ambivalence, China is, in this dissertation, excluded when discussing general characteristics of both the South and the North.

Kappel (1994), through a quote from an African researcher, observes that Northern countries have given a secondary status to social development (simply referred to by Kappel as development):

We are surely of one mind that the sustainability standard can equally apply to development as well as to environmental questions. Here in Europe, the environmental facet is stressed, but in Africa it is development.....

Suliman Mohamed (an African researcher) cited in Kappel (1994, p. 289)

Although these observations suggest that social concerns might not be of primary interest in the North, Michaelowa and Michaelowa (2005), Beg et al. (2002) and Jacobs (1999) note that destructive environmental effects, such as climate change impacts, are viewed with much more concern in the North than in the South. In particular, the concern arises from the heavy environmental degradation taking place worldwide. This is generally seen as being due to the large emissions of greenhouse gases, primarily from industrial activities in the North and, at least until recently, minimally from the South. Climate change repercussions are becoming increasingly evident, and could reverse development gains made in the North as well as in the South. As a result, there is a great deal of effort being made in the North to contain threats related to the consequences of environmental degradation. Among these efforts, are sensitization and investment activities undertaken by Northern countries in Southern economies.

Significantly, environmental care activities in developing countries have been, and continue to be, incorporated in bilateral and multilateral development assistance programs and projects from the North. This is as documented in a wide section of literature, including Bruggink (2012); Lewis (2003) and Conroy and Litvinoff (1988). The literature further observes that at the bilateral level, countries of western and northern Europe have been leading in provision of assistance; while at the multilateral level organizations like the World Bank have played important roles in aid supporting environmental care.

It is notable that environmental support provided for developing countries has been a significant part of international development assistance. For example, by the accounts of, studies including Chachage (2000); Marcussen and Speirs (1998); and James and

Nwomonoh (1994), environmental care and protection institutions and plans were initiated in African countries by international aid agencies. This was in an effort to propagate environmental practices in developing countries, as happened in the case of Zanzibar (Chachage, 2000), and Burkina Faso (Marcussen and Speirs, 1998). Establishment of environmental protection measures was also made a condition for receipt of aid for many developing nations. Overall, in the development aid process, the narrative that was passed on to the developing countries was that sustainable development could be achieved mostly by care for the environment. Although poverty alleviation or social enhancement was included as a target in aid programs, it was relegated far behind environmental care.

The political economy of international aid has had a significant impact on Southern worldviews of the environmental dimension of sustainable development. Development aid has, in general, often been used to push Northern political agendas in the South (see, e.g., Lewis, 2003; Théârien and Lloyd, 2000; James, 1999). Linner and Selin (2002) and Susskind et al. (2002) further note that opposing interests between environmental concerns in the North and development concerns in the South have, at least for the last fifty years, caused North-South political tensions. These tensions were especially evident during the 1992 Earth Summit in Rio de Janeiro. In furtherance of Northern interests, aid development agencies, that receive most of their support from the North, have in many cases operated as 'gangs of virtue' and 'cartels of good intentions' (Arnfield, 2014; Easterly, 2002). That is to say, agencies will at times act simultaneously on behalf of selfish interests while apparently engaging in acts of benevolence. For example, agencies may promote trade in products from donor aid countries in countries benefitting from aid. Here, Arnfred (2014, p. 86) asserts that aid is used to propagate donor countries' values, power and prestige; and includes the following quotation as testament:

"Development aid plays a political role both for the donors and the recipients; development aid is a symbolic act. Evidently this is also the case in Sweden. Development is part of Swedish foreign policy and gives Sweden a presence and a power in international relations which we would otherwise lack"

Carl Tham --- a vocal Swedish politician and SIDA director who made this statement in a public speech in 1987

Furthermore, Hoben (1998) makes the point that foreign and national actors are at the core of international aid planning and execution. The foreign actors include donor country or aid agency policy makers and experts, and NGOs (supported by donors). On the other hand,

national actors are principally government policy makers and planners, consultants, and some local NGOs. According to the author (Hoben, 1998), it is especially noteworthy that the national actors often learn and adopt the practices of the foreign actors, in an effort to attract and maintain aid flows. It could therefore be expected that the national actors acquire worldviews aligned with those of the foreign actors. Therefore, the national and foreign actors are bound to be concurrent on attaching high values to environmental care relative to social amelioration. Considered together, the foreign and national actors who predominantly drive development aid tend to act as a cartel-like coalition—hereafter the North-centered coalition. This is a view that is strongly held by, for example, Molle (2008), Marcussen and Speirs (1998) and Hoben, 1998; and upheld in this study.

An example of the manner in which North-centred coalitions propagate their development worldviews in the South is provided by Molle (2008). According to Molle, the Tennessee Valley Authority (TVA) model of sustainable water supply was widely promoted by USA authorities in the South. Additionally, Molle indicates that similar models have been spread in the South by other developed countries through bilateral and multilateral agencies including Sida, GTZ, USAID, AusAID, UN agencies, and the World Bank.

Despite the fact that the TVA model might not have been sustainable in the contexts of many countries in the South, it was vigorously pursued as a water supply solution for the countries. Examples of countries that espoused the model include India, Mexico, Iran, Colombia, Egypt, Mozambique, Sri Lanka, Tanzania, and Turkey (Molle, 2006). Notably, Molle (2008) cites Ekbladh (2002) who indicated that the model was used as part of Cold War campaigns by the USA, to modernize developing countries following Western styles of modernity. Therefore, developing world leaders including policy makers, planners, and development experts eagerly adopted the TVA model as a sign of attainment of modernity. The leaders were also keen on uptake of the model to ensure funding that was made available for the model adoption package flowed generously.

For the North-centred coalition, environmental concerns are much more important in matters of development, than social deprivation concerns. Even more importantly, production and markets (economic concerns), which define development in Northern (capitalistic or neo-liberal) economies, are given a high level of priority. To the coalition, environmental and economic pursuits are key determinants for sustainable development. Thus, the coalition furthers an economic-environmental discourse of sustainability, in exclusion of a socially-leaning discourse of sustainability. It is noteworthy that many literature sources (e.g.

Agbemabiese, 2009; Sovacool, 2009; Chachage, 2000; James, 1999 and Hoben, 1998) argue against the economic-environment discourse. The literature contends that the discourse, as subscribed to by bi- and multilateral development agencies, supports development approaches that are linear, expert-driven, top-down, supply-side, mega-scale and centralized. Furthermore, the sources associate the discourse with subjugation of participatory, rural-based, and culturally-leaning types of development solutions that have great significance for sustainable development in developing countries.

Although criticisms of the economic-environment discourse abound, it is acknowledged that within the development (donor) aid sphere, the discourse is continuously undergoing transformation in response to the criticisms. Michaelowa and Michaelowa (2005), Bruggink (2012), and Naylor (2011) have documented that changes have been made to improve donor aid policies so that humanitarianism remains at the core of international aid. From the literature sources, it is clear that environmental pursuits in international aid projects and programs have shifted focus from general environmental protection and conservation strategies. Instead, the environmental focus is increasingly becoming largely climate change mitigation, and to a smaller extent climate change adaptation. It is generally argued that the climate change abatement strategies in international aid efforts are for minimizing climate change risks for Southern populations. These populations are seen as high vulnerability groups in the face of expected climate related extreme events; and climate change abatement assistance could reduce the vulnerability. However, while climate change adaptation assistance is more in line with social protection and climate risk avoidance, climate change mitigation assistance has a higher preference in the North. This preference is apparently due to the abundance in the North of technologies for facilitating the mitigation, and possibility for exporting the technologies to the South with resultant commercial gains to the North.

Another notable trend in international aid provision is the move towards reducing aid and increasing trade with existing or potential aid recipients. As indicated by DIIS (2016) and Dichter (2003), building capacity in developing countries for improved trade is considered more effective for higher levels of growth of the countries, than growth levels achieved using aid. It is also believed that social uplifting, specifically poverty reduction in the South can be better achieved through boosting entrepreneurship among populations with low or no income (see e.g. Siwale, 2013; Blunt *et al*, 2011; Cammack, 2004; and Easterly, 2002). On the contrary, poverty reduction envisaged in the trade enhancement approach can do little to improve social development aspects like equity and similar non-economic aspects.

Furthermore, Blunt *et al* (2011) and Cammack (2004) contend that the entrepreneurship strategy is driven chiefly by neo-liberal considerations for expanding Northern global markets. Neoliberal policies are in some ways expected to encourage trade with mutual benefits for transnational corporations (TNCs) on one hand, and low income entrepreneurs who are customers of the TNCs on the other. The latter customers are according to *inter alia* Agnihotri (2013) people in developing economies at the bottom of the pyramid (BoP⁶) —based on an economic context. Evidently it is extremely difficult for the poverty-laden customers to trade and survive as entrepreneurs in international markets alongside TNCs. Therefore, the benefits of trade at the BoP are heavily slanted in favour of the TNCs, and poverty reduction that could be expected from the trade is largely unattainable.

While environmental and economic aspects of sustainability have been vocally addressed by the North-centred coalition, a socially-oriented, relatively latent and largely unheard coalition has been emerging. As reported by *inter alia* Groves and Hinton (2013), Davey (2009), Ford (2003), Dobson (2003), and James (1999), and Pulido (1996), the coalition is made up of economically and socially disadvantaged communities, and their civil society representatives. The coalition has increasingly been fighting for social justice in global economic and environmental interventions, mostly emanating from the North-centred coalition. The main bone of contention that drives the coalition's agitation is exclusion of the coalition's social interests in such interventions. For example, Rantala and Di Gregorio (2014) have studied the case of such a coalition in Tanzania. The study concludes that environmental projects in Tanzania need to internalize the interests of the weak and vulnerable whose power is beginning to be felt.

More closely related to this dissertation is the case of Kinangop Wind Power (KWP) in Kenya. The KWP case is one of the few wind power projects in Africa and the developing world generally where social opposition has been encountered. It has therefore attracted considerable publicity as widely reported in the mass media [e.g. Reuters (2016 and Wind Power Monthly (2016)]. This wind power project, which in a Kenyan and sub-Saharan African context is a very large investment, is in the process of closing down after heavy commitment

⁶ Bottom of the Pyramid' is a contested concept that was applied by Prahalad and Stuart (2002) to those living below a specified poverty line with the objective of stopping the poor being seen as victims, and instead seeing them as resilient and creative entrepreneurs as well as value-demanding consumers providing a large market for multinational companies. Based on World Bank figures, the BoP can be estimated as consisting of around three billion people living on less than US\$ 2.5 per day in 2005 (cited in <http://www.globalissues.org/article/26/poverty-facts-and-stats#src1>; accessed 22 March 2016).

of funds. The main reason for the closure is opposition largely coming from the farming community in the vicinity of the project site. The farmers formed a virtual coalition to stop the project after they felt aggrieved by the project developer's lack of adequate attention to issues of land acquisition and socio-cultural concerns. The developers are a consortium of international private and bilateral aid investors, with support from the Government of Kenya. The developers could be likened to a North-centred coalition in the sense used in this dissertation, and their interests are clearly in conflict with those of the community coalition in Kinangop.

It is apparent that equipped with the necessary voice, the emerging coalition of the socially disadvantaged could ideally be pursuing a socially-leaning discourse as a counter-force to the North-centered economic-environment coalition. The largest constituency of the coalition comprises the many stakeholders who are voiceless and marginalized in national development matters in Southern societies. Included in the coalition are civil society groups that avoid influences from donor aid hegemony; and others who subscribe to social advancement as a key ingredient of sustainability. The virtual South-centred coalition is anchored in the belief of development solutions that are people-centred, participatory, simple but not unsophisticated, affordable and can be mass produced, decentralized, context-specific and end-use oriented. A number of writers such as Karekezi (2012) and Sovacool (2009) consider that using solutions that adopt these criteria are important for the attainment of sustainable development. Nafziger (2006) and Rosser and Rosser (2004), and Lovins (2002), trace the origin of the philosophy behind such solutions to Mahatma Gandhi. From Gandhi the philosophy started as the notion of designing innovations according to the contexts within which the innovations would be used.

In their energy studies, the aforementioned analysts note that dominant sustainability discourses almost equally affect development on one hand, and energy that drives the development on the other. For instance, in the North, economic-environment prioritization applies to development; and to an almost similar extent it applies to energy providing input to the development. Energy with a social advancement focus is relegated to a peripheral position in the North. Similarly, this energy practice appears to be prevalent in the South. From analytical works including Kruckenberg (2015), Messner (1994), Bruggink (2012), it is noted that through the influences of international development agencies and related players, there is a skewed view of energy and sustainability among key players in development matters in the South. It would appear that environmental concerns strongly colour the view. The weak social view of sustainability is also generally seen from the poverty perspective of

the North-centred coalition. Moreover, the environment-economic narratives of the North seem to have been well embraced by national players in most planning processes. This has happened for development aided plans as well as in other publicly funded plans; and the general population seems to have accepted the narratives as a norm.

It is particularly important to recognize that with development aid funding enormous investments have been and are being made to build electricity infrastructures, fed by mega-scale renewable energy sources. Drawing from the report IRENA (2015), the scale of proposed renewable energy power infrastructure projects can be appreciated. The report notes that Eastern and Southern Africa (outside South Africa), where sub-Saharan African renewable energy projects dominate, there was close to 24,000 MW of renewable energy power generation planned for the period 2011-2016. The renewable energy sources that are expected to provide the generation are predominantly hydropower (mostly large-scale), with smaller contributions from geothermal, wind, solar, and biomass (large scale). The indicated generation is against approximately 4000 MW of non-renewable (mostly fossil-fuel based) power generation planned for 2011-2016 in the same two sub-regions—meaning that about 85% of power generation would be from renewable energy sources.

Battacharyya (2012), Brent and Rogers (2010), Hankins (2009), Barnes and Foley (2004) and Zomers (2001) indicate that renewable energy is especially preferred due to its potential to contain environmental and climate change impacts. In establishing large-scale renewable energy infrastructures, it is assumed that these will eventually benefit the majority of the population, who reside in rural areas, in that the benefits will trickle down to the lowest levels. Further, there is the assumption that, as a consequence of the trickle-down effects, there will be general social uplifting and sustainable development. Despite the commitment of large investments to electricity production and rural electrification, access to electricity for rural populations has generally remained very low. This is especially the case for sub-Saharan Africa, which this dissertation broadly examines, and where access to electricity stands at 26% overall and 17% in rural areas (International Energy Agency, 2015).stands at 26% overall and 17% in rural areas (International Energy Agency, 2015).

Considering electricity relative to biomass energy, a study by World Bank (2011) observes that biomass energy is used much more in sub-Saharan Africa than electricity. This is particularly for meeting basic energy needs such as for cooking; and notably about 81% of households in sub-Saharan Africa rely on biomass cooking fuels. The World Bank study indicates that there is a much greater demand for biomass energy than electricity in rural

areas where there are vast populations. Moreover, the study points that contrary to what could be expected, investments being made in biomass energy modernization and access are only a small fraction of investments in electricity access. For illustration of the point, the study draws attention to a World Bank investment amount of 36 million US\$ for biomass energy (mostly for cooking) in Africa as a whole during the period 2000 to 2008. Corresponding World Bank investment for the whole continent during the period was 1080 million US\$. This illustration is all the more significant from the standpoint that the World Bank is a leading financier of public energy investments in Africa. Also significant is the point that the relative under-prioritization of biomass energy in the context of sub-Saharan Africa is underscored in many energy studies, by e.g. Tessema *et al*, 2014; Saidi *et al*, 2012; and Matiru and Schaffler, 2011).

1.3.3 Theories and theoretical perspectives

The chosen study of energy and sustainability has a clear dichotomy of one coalition, the North-centred Coalition, pursuing an economic-environmental discourse of sustainability. On the other side of the dichotomy is an implicit coalition, the South-centred Coalition, whose main interest is a socially centred discourse of sustainability. In line with the thinking of Hajer (1996), this dissertation study contends that the coalitions have opposing storylines of sustainability. However, although the study could at the primary level be guided by the Discourse Analysis Theory, it is considered more fitting to use the Critical Theory as the overarching theory; with a focus on the Habermas strand of the theory known as the Theory of Communicative Action. In general, as Leckie *et al* (2010), Rush (2004), and Geuss (1981) have noted, Critical Theory seeks democratic practices, emancipation, and enlightenment. Application of the theory, therefore, makes much sense in the case of the two coalitions being studied—the North-centred one being seen as authoritarian and holding great power over the South-centred one. More specifically, from a Theory of Communicative Action perspective (see e.g. Bolton, 2005; Froomkin, 2003; Sanderson, 1999; and Habermas, 1984), the authoritarianism would be following an instrumental rationality—unquestionable, bureaucratic and top-down. From the same perspective, a Communicative Rationality could be established to facilitate dialogue and overcoming differences between the opposing coalitions.

At another level, theories that feature prominently are the Social Capital Theory, Social Cognitive Theory, Contextual Interaction Theory, and the theoretical perspective of Sustainable Development. Following Edelman *et al* (2004), it may be noted that key positive

aspects of social capital, according to the Social Capital Theory, are trust, bonds and solidarity. These virtues could be harnessed towards attaining a communicative rationality between the coalitions being studied. Conversely, negative elements of the capital including domination by the enlightened (elite capture) could be identified and countered so as to achieve communicative rationality. Equally significant to note is that, in the Social Capital Theory, social collective wellbeing and equity are paramount for in-group or societal wholesomeness and progress. These attributes form the main plank of the social element of sustainable development; as has been indicated in foregoing sections of this dissertation, and in line with the theoretical perspective of analysts including Carrera and Mack (2010), Cuthill (2010), and Lehtonen (2004). Again from what has been argued above and by the cited analysts, the element needs to be balanced proportionately with economic and environmental elements for sustainable development or sustainability to be attained.

Moreover, a good understanding of cognitive forces that are at play in different sustainability worldviews possessed by the coalitions being studied could be gained through the lenses of the Social Cognitive Theory (see e.g. Phipps *et al*, 2013). The theory postulates that a person or collective body of persons has perceptions, attitudes and behaviour determined by self (e.g. own experience), the environment (e.g. own society), and behaviour feedback (reaction to own behaviour). An understanding of, especially the environmental determinant, could assist in designing mechanisms for proper and uniform comprehension of sustainability among the coalitions under research. Importantly in this regard, it is noteworthy that the Social Cognitive Theory has linkages with the Contextual Interaction Theory (see e.g. Bressers, 2004). The latter theory could facilitate understanding and optimization of power relations, motivations, and cognitive inclinations of relevant actors in accomplishment of energy for sustainable development. For institution and actualization of an optimum level of the energy, it is important that the right policies and plans are designed and implemented aided by analysis with the theory.

1.3.4 Research questions

Based on the view of the Kenyan context that is presented in preceding sections, it appears that Kenya is one of the countries significantly influenced by the Northern discourse of sustainability. This premise is further underscored by the example of the evidence in the tender advertisement depicted in Fig 1.5. The evidence is in respect of one of the 47 Kenyan counties (geographical units forming a lower layer of government administration) established in 2013, which came into being after devolution (decentralization of state governance). The

counties are establishing their development policies, with a view to providing local (especially rural) populations with better opportunities for development growth. However, the counties are following in the same trend of policy making as the central government, borrowing heavily from foreign sources. From the evidence, it is clear that the energy policy that is being envisioned for the Kiambu County has environmental (climate change) impacts mitigation as a principal objective. There is no indication at all which, indeed if any, social objectives are being targeted. This is manifestly in tandem with the Northern discourse of sustainable development. Most tellingly, development assistance for policy formulation is being provided by the UK government through its DFID. It could therefore be surmised that the environmental or climate change slant in the policy to be designed is attributable to UK's sustainability viewpoint placing climate change or environmental concerns above other important concerns of sustainable development.

<p>Consultancy for the Development of Kiambu County Energy Policy and Sustainable Energy Action Plan</p> <p>[Available at http://tendersunlimited.com/i/ca13e6551a7459_658674592 on 19-0902015]</p> <p>Type : Tender (IFB) Category : General Services , Other General Services Ref No : By : KENYA ASSOCIATION OF MANUFACTURERS (KAM) Closing : Mon, Sep 28, 2015 12:00</p> <p style="text-align: center;">KENYA ASSOCIATION OF MANUFACTURERS</p> <p><i>Consultancy for the Development of Kiambu County Energy Policy and Sustainable Energy Action Plan to Encourage Investments in Clean Energy</i></p> <p>Kenya Association of Manufacturers (KAM) with support from DFID is working to strengthen business engagement in Clean Energy development under the 'Strengthening Business Society Engagement in Climate Change Mitigation' project (SBSECC). The goal of the project is to support low carbon development growth in Kenya. Energy is a major input of most commercial activities and studies have shown that the source of energy, distribution and efficiency of energy use are major considerations for climate change.</p> <p>The purpose of this assignment is to assist the Kiambu County Government to create an enabling regulatory environment at county level to encourage investments in clean energy and to ensure sustainability in energy generation and distribution. Efforts will focus specifically on developing an energy policy and action plan for sustainable energy for Kiambu County.</p>	<p>Required Qualifications</p> <ul style="list-style-type: none"> A. Demonstration of in-house capacity to undertake the exercise including at least three experts with extensive experience and specialized in the field of Economics, Engineering, and Legal fields; B. Qualification in environmental law, business/commercial law and/or relevant environmental qualification at postgraduate level will be an added advantage; C. Good knowledge of the Kenyan climate change and energy policy environment and at the global level; D. Extensive expertise, understanding and past experience in dealing with matters touching on environment and climate change in general; E. Experience working with the County Governments, legislative drafting and advocacy relating to an enabling business environment will be an added advantage. <p>Interested parties should submit two sealed copies each of the technical and financial proposals (including company profile, certificate of incorporation, PIN & VAT Certificate) to: AAM Resources, Purshotam House, Chiromo Lane (next to Diagnostics Centre), Westlands on or before 12:00p.m., September 28, 2015. Late submissions will not be opened.</p> <p>The Terms of Reference for this project can be accessed in the KAM website www.kam.co.ke under the opportunities section.</p>
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Fig.1.5: Example of Energy Policy Informed by Environmental Concerns
Source: Tendersunlimited (2015)
Note: The encircling of words is done by the dissertation study author

Against the backdrop of Kenya as a highly likely destination for Northern energy and sustainability worldviews, this dissertation enquiry focuses on Kenya as a case study. Also following from the background that has been provided, the following questions have been formulated. The sub-questions form the basis of sub-studies and resulting study papers that provide the empirical backbone of the whole enquiry.

MAIN QUESTION

How definitive is the understanding and actualization of social aspects of Kenya's energy for sustainable development?

SUB-QUESTIONS

- 1) How could building and using social capital, with social institutional innovations from external and internal sources enable successful accomplishment of Kenyan electrification for sustainable development?
- 2) What role do cognitive dynamics play in the social dimension of Kenyan energy for sustainable development, and are the dynamics externally influenced?
- 3) How valuable are small-scale technologies for enabling the social dimension of sustainable development in the Kenyan context, taking into account externally induced perceptions of the technologies?
- 4) How important is rural electrification for the social dimension of sustainable development in the Kenyan context, particularly in view of electricity reforms promoted by foreign actors?

1.4 Study Approach

The core essence of the dissertation study being undertaken, and the sub-studies at the core of the study, is a search for interpretations and meanings that people in the Kenyan context give to sustainability from an energy perspective. This is with a view to understanding behaviour towards the indicated sustainability and energy phenomena, and possible action towards better sustainability and energy practices. In view of the nature of the phenomena being studied, the study lends itself to a qualitative research paradigm within a social interpretive tradition [Hennink *et al* (2010), Ritchie and Lewis (2003), and Denzin and Lincoln (2000)]. Thus, the main research approach used in the study is a qualitative and interpretive. Equally importantly, the research done follows a case study methodology following Yin (2003) who argues that such methodology is needed where context matters for the phenomena being studied. Similarly, the methodology has been adopted on the ground that

'Why' and 'How' questions feature prominently in the study—again drawing from Yin's argument for use of the methodology where such questions are prominent.

Furthermore, the dissertation study utilizes existing theories in the quest for understanding interpretations, meanings and behaviour as mentioned. An applied research line of inquiry is therefore followed, which according to e.g., Nowotny (2003) is application-oriented and trans-disciplinary in nature. At the same time, following meta-theoretical analyses of e.g. Goldkuhl (2012), a philosophy of pragmatism is adopted. The analyses indicate that such a philosophy suits situations where the end goal of research is about practical application, and knowledge creation is not just for knowledge sake. With this in mind, the principal line of investigation is qualitative, with some instances of quantitative surveys. Inclusion of quantitative investigations alongside qualitative exploration is important in view of the multi-disciplinary nature of sustainability and energy. A multi-method approach has also been embraced to adequately cater for compound qualitative-quantitative aspects of the study.

The multi-method approach is used not only to accommodate action-orientation and multi-disciplinary diversity, but also to cater for different research procedures employed in research for triangulation purposes. As Meijer *et al* (2002) have noted, a multi-method approach is suitable for triangulation particularly for enhancing research validity. From this perspective, the dissertation study being carried out is designed for use of different methods of data collection and analysis—largely qualitative and to a small extent quantitative. Findings obtained from the various approaches are then juxtaposed with a view to determining corroboration and congruencies in line with Hammersley (2005). In case contradictions are noted, additional methods could be employed to arrive at a convergence of findings, following arguments by Brannen (2005). The latter arguments take into account the possibility of differences between the different findings. In this respect, the position taken in this dissertation study is that a resolution of such differences could be to get more findings that indicate which of the earlier findings are most plausible.

1.4.1 Data collection and analyses

The main methods that are employed for data collection and analyses differ among the sub-studies conducted. However, the overall study and all the sub-studies were largely based on primary data that was collected in Kenya, the focus country. Other field data was collected from Malawi, Rwanda, Tanzania and the Netherlands; and used for comparative purposes. A summary of information on data collected from the field for all countries is given in Appendix 8.1.2. Listed below are the methods that were used for data collection and analysis in respect of all the sub-studies and the general parts of the study:

- a Literature analysis and referencing are done using academic, grey, and public documents sources. The academic sources principally comprise of papers and articles from refereed journals, library books, and online material. The scholarly literature provides the key resource for theoretical inspiration and information. Together with grey literature and public documents, the academic literature also serves as a secondary means of evidence acquisition, particularly on worldwide studies and practices. On account of the wide use of literature sources for the dissertation research, further information on the literature survey that was done is given in Appendix 8.1.3
- b Interviews with key informants comprise the largest part of data collection instruments. For the interviews, semi-structured and unstructured types of questions are employed. The persons to be interviewed are to a large extent selected purposively and through semi-random sampling. As far as possible, the selection targets choice of respondents representing different classes of energy stakeholders nationally, from the lowest to highest societal levels. The respondents therefore range from, for example, little-informed villagers, to well-educated professional and political decision-makers. Balanced gender and age mixes are also ensured. In addition, location of respondents is selected purposively to cover rural or remote villages and towns, urban centres, and cities.
- c Focus group discussions are also widely employed as a means of acquiring data. The type of questions and selection of participants is similar to the case of personal interviews.

- d Surveys are used in a limited way to obtain quantitative data. Sampling is done semi-randomly to cover energy stakeholders from different societal classes and geographical locations.
- e Author knowledge and experience contributes in a significant way to evidence utilized in the overall study and sub-studies. The contribution singularly stems from the dissertation author's work and life experiences in Kenya. The country is the author's home where he has also worked in the energy sector for over thirty years. It is acknowledged that relying on a researcher's personal knowledge and experience can noticeably reduce value-neutrality in research work, as Patton (1999) and Lather (1986) have pointed out. However, the cited authors also recognize that qualitative research, which this dissertation is mostly about, is essentially value-laden. With this in mind, and to minimize issues of researcher bias, the dissertation research done has used author knowledge and experience principally for triangulation purposes. The main methods relied upon are literature and field based as indicated above.
- f Analyses of the data collected are generally done manually in the case of qualitative investigations. This type of analysis of qualitative data is possible on account of the prevalence of small but intensively investigated samples, and the researcher's intuitive capacity that has been built over his long career. The quantitative data that is collected is analyzed with the aid of SPSS (Statistical Package for Social Sciences) software. For the overall study and sub-studies, literature (text) analyses are broadly used.

1.4.2 Case focus

The central focus of the overall study is Kenya, and particularly the energy sector in the country. The selection was especially done because of the development potential and geo-political standing of the country and its energy sector as elaborated on in section 1.2 above. . As observed in the section, there is a great deal of activity taking place in the energy sector, and the country distinctly stands out among African and low income countries.

Other countries that have been studied to a limited extent, and for purposes of comparison, are Tanzania, Rwanda, and Malawi; where the author has travelled and worked extensively. These countries are important in the sense that they compare well with Kenya, and are

examples of sub-Saharan African countries and the South, within which groups Kenya belongs.

For evidence from countries of the North, the Netherlands has been empirically studied to a minor extent. The author's working experience in Denmark particularly, and Europe in general has also contributed to the overall study. Importantly, literature evidence and analyses relating to European countries have widely contributed to the overall study.

1.4.3 Sub-Studies and papers

There are four sub-studies presented as papers in the dissertation. The papers form chapters 2, 3, 4 and 5 that are described in section 1.5. Paper 1 (chapter 2) is designed to provide an answer to research sub-question 1, and the other papers accordingly aim at answering sub-questions 2, 3, and 4 respectively.

1.5 Dissertation Layout

Overall, the dissertation is divided into three parts: An introductory part (Chapter 1); a sub-studies or empirical investigations part (Chapters 2 to 5); and a concluding part (Chapter 6). The specific chapters are organized as follows:

- a. Chapter 1 provides the background for the dissertation; and the theoretical and methodological basis for the study as a whole. Further methodology is explained in the empirical papers.
- b. Chapter 2 presents a sub-study on the positive and negative aspects of social capital, through investigations about potential for electricity cooperatives in Kenya. The sub-study is expected to inform the main study on social strengths and weaknesses which could positively or negatively impact sustainability in the context of energy supply and use.
- c. Chapter 3 is about a sub-study that investigates social cognitive forces. This is especially in the way that the social aspect of sustainability is perceived and operationalised, with specific reference to sustainable energy policies and adoption. The main benefit of the sub-study for the main study is explanation of how the social

dimension of sustainability, in the arena of energy supply and use, is cognitively shaped and taken into account.

- d. Chapter 4 relates to a sub-study that investigates appreciation and the extent of application in Kenya of the potential of small-scale energy technologies in strengthening the social dimension of sustainability. This sub-study is expected to inform the main study about local (Kenyan) perceptions, and possible adoption, of energy technologies that could directly and positively impact the social element of sustainability.
- e. Chapter 5 is about a sub-study that investigates rural electrification in Kenya from the perspective of electricity sector reforms that could enhance the social element of sustainability. The sub-study is expected to contribute to the main study, with an explanation of how rural electrification is generally perceived and put into effect in Kenya, as a catalyst for the social aspect of sustainability.
- f. Finally, Chapter 6 sums up the findings from the sub-studies, discusses the findings, draws conclusions from the sub-studies, and provides an answer to the overall research question.

1.6 Chapter 1 References

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2. Chapter Two: Potential electricity cooperatives in Kenya: Could social capital be a barrier?

Note on Chapter 2: This chapter is based on a paper (Paper 1) which has the same title. The paper is authored by Said M. Abdallah (the main writer of the paper and author of this dissertation), Professor Hans Bressers, and Professor Joy S. Clancy, all based at the University of Twente, the Netherlands. The paper has been published by the Community Development Journal, Vol 50 No 2, May 2014, pp. 213–228, doi:10.1093/cdj/bsu029

2.1 Abstract

Providing development inputs like electrical energy is a formidable task in many parts of the developing world. The generally rural nature of developing countries makes it necessary to devise innovative ways of getting electricity to the non-urban majority. It is also imperative that adequate and productive electrical power is made available, for sustainable development to be achieved by rural communities and by extension the national economies. Therefore, institutional and other innovations are being continuously mooted to meet the challenges; and it is in this context that rural electricity cooperatives have been introduced to developing countries. The cooperatives are promoted largely because of their social strengthening characteristics. However, questions arise as to whether social capital upon which the cooperatives are based is a facilitator or an impediment to the cooperatives, and the sustainable development that is ultimately targeted. It is argued in this paper that rather overstretched virtues of social capital mask undesirable elements of the capital. Importantly, organizations like cooperatives that depend on it can fail because of the neglected dark aspects. Empirical evidence from Kenya is used to support the contention. It is concluded that electricity cooperatives could remain a far-fetched possibility, unless desirable and undesirable characteristics of social capital are carefully taken into account

2.2 Introduction

A significant challenge to development planners is the habitation pattern of populations in most impoverished economies that form the bulk of the developing world. In these economies, a large proportion of the population lives in rural areas, and often in scattered settlements over extensive land masses. For example, the World Resources Institute (WRI, 2007) estimates that in 2005 the rural population was about 65% of the total in rural parts of sub-Saharan African countries, where there is a concentration of poor developing countries. From this viewpoint, rural community development in the low income developing nations is a means for fundamentally advancing the nations; particularly because it positively impacts a critical mass of the countries' populations. It is acknowledged that generally in poor economies there is increasing rural-urban migration. However, from research by analysts like Potts (2012), the migration is nearly compensated by a rapid rural population growth. Lack of adequate urban opportunities is also slowing the migration. Consequently, rural population numbers remain high and development challenges for this population remain daunting.

The rural community development referred to here is from the perspective of social studies by, for example, Majee and Hoyt (2011), Gertler (2006), Gertler M. (2001), and Theodori (2005). These studies envision community development as a process that mobilizes resources and builds the capacity of local residents; the goal being to holistically attain social, economic and environmental progress. Importantly, from the works of, Drummond and Marsden (1999), Davidson (2001), and Atkinson *et al* (2007) this integrated progress with the three key dimensions is actually sustainable development. Rural community development would, as a consequence, lead to sustainable development for the countries where the communities are dominant. In this paper, sustainable development and sustainability are used interchangeably from this point of view.

Rural electrification is an important input for all the key elements of sustainable development, but especially for the social dimension, (see e.g. Silva and Nakata, 2009; Brent and Rogers, 2010). Based on this role of rural electrification, it has been recognized that innovative approaches are required to adequately serve impoverished populations in rural areas, and generally enhance rural community development. Innovativeness is imperative not only because technical challenges make it very expensive to provide electricity in the areas, but also due to the necessity for institutional setups that could reduce costs and maximize on socio-economic impacts of electrification. From a developing world perspective, one of the relatively new approaches to electrification is the supply and management of electric power

by rural cooperative organizations, simply referred to as rural electric cooperatives (RECs). The concept in this approach embraces the idea that rural people could organize themselves as social entrepreneurs. This is with a view to acquiring electricity either through local power generation by themselves or from a local supplier. They could then provide the power to their own members and others within and outside their areas.

World Bank (2008) and others have identified the utility led and managed model for rural electrification as the most dominant, and it often involves increasingly expensive extension of national power grids. This model is proving inadequate as the national power utilities are ill-equipped to continue expansion of power supplies to geographical sections that are difficult to reach. Moreover, due to utilities becoming increasingly commercialized, the utilities accord the highest priority to the lucrative urban markets; correspondingly relegating non-urban and remote areas (see e.g. Yadoo and Cruickshank, 2010). This is why the new approach to electrification could become very useful, especially because of the ownership aspect of the electricity supply. Since the users of power would also be the suppliers, they would tailor the electrification to meet their needs particularly in developmental pursuits. Equally, active participation by electricity beneficiaries engenders their commitment, and the beneficiaries would expectedly be willing to resolve challenges to provision of power supplies to themselves. Overall, therefore, it would become easier for the communities targeted in the participatory electricity schemes to achieve sustainable development.

Choice of the cooperative form of organization in the hands of electricity beneficiaries has many underlying reasons. The principal reason is that a cooperative is a social enterprise, which according to Valentinov (2004) derives its strength from social capital. Besides drawing from commercial capabilities, the enterprise largely depends on trust and other social capital attributes present in the beneficiaries as a social group. Overall, the definition of the cooperative as given by the International Labour Organization or ILO (see e.g. Birchall, 2003) captures the salient features of the organization as a social venture: *An autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically-controlled enterprise.* Furthermore, the cooperative is a formal organization guided by Cooperative Principles that are stipulated by the International Cooperative Alliance (ICA, 2005). It can therefore be argued that the dual commercial and social nature of a cooperative makes this form of organization ideal for advancing socio-economic development. Community groups similar to the ones considered in this paper would, as a result, gain significantly by using a cooperative approach.

However, from observations made in this paper, there is a debilitating aspect of the cooperative approach for community socio-economic development that is not sufficiently addressed. The aspect of cooperatives referred to is best understood by noting that the cooperative is built upon social interrelationships and trust. For the cooperative to survive and prosper, members of the organization need to have strong social bonds. Basically, what is needed here is social capital, which according to various sociological analysts (e.g. Leenders and Gabbay's, 1999) is a resource arising from the social relations and bonds. Arguments advanced in this paper will indicate that weaknesses of social capital are largely responsible for a significant deficiency in cooperatives. For example, the HIV/AIDS scourge in many African countries has created intra-community divisions of the infected and the healthy; and the divisions have weakened bonds among cooperative members. Despite failures of cooperatives arising from this bond-breaking, the resultant denting of social capital within the cooperatives has been largely unacknowledged. Cooperatives have therefore continued to deteriorate (see e.g. Birchall, 2006a).

Taking Kenya as a unit of analysis producer cooperatives in the country will be investigated empirically, and some evidence from similar African countries will be used for comparison. The producer type of cooperative is chosen because it is the same type that is usually used for rural electrification purposes. Furthermore, reasons why cooperatives in the country have generally suffered many setbacks will be examined; and contribution of social capital shortcomings to cooperative under-performance will be the main focus. Answers will be sought to the key question: Can the social capital weaknesses be remedied? The research in this paper is to a large extent based on empirical evidence from studies in Kenya (Abdallah, 2007), and subsequent ongoing work by the same author. Some of the ongoing work was done during a study in Eastern/Southern Africa (see <http://www.paceaa.org>), and from literature reviews.

An important motivation for carrying out the present research is the fact that there is generally very limited empirical research on cooperatives and other social enterprises in the Africa region. This is especially the case for research that could facilitate enhancement of energy and development sustainability. To ensure acquisition of information from people that matter most in the research, an ethnographic approach was used. Rural community members, and officers and leaders involved in development of cooperatives and electrification in Kenya were the main informants in the studies.

2.3 Social capital in cooperatives

Today's cooperatives had a formal beginning during the industrial revolution in the 19th century, when in 1844 Rochdale Pioneers created their cooperative enterprises in Britain. Birchall (1994) goes on to say that these British working class entrepreneurs were motivated by their near destitute conditions, when they were faced with unemployment and a high cost of living. They started cooperative businesses in competition with their oppressors – rich merchants and nobility. The design of the cooperatives was such that the businesses created made use of the social solidarity among the entrepreneurs and the poor generally. However, unlike purely social enterprises the cooperatives had to aim at commercial survival. This was due to the difficult trading conditions at the time, and therefore they made modest profit-making one of their targets. Overall, the entrepreneurs' circumstances shaped the character of the modern-day cooperatives.

An important achievement of the Rochdale pioneers was the formulation of a set of seven principles on the basis of which cooperatives operate up to now. The principles which were later adopted with slight modification by the International Cooperative Alliance (ICA) are according to ICA (2005): i) *Voluntary and open membership*; ii) *Democratic member control*; iii) *Member economic participation*; iv) *Autonomy and independence*; v) *Education, training and information*; vi) *Co-operation among co-operatives*; and vii) *Concern for community*. All the principles are important for undertaking rural electrification with a socio-economic development focus. Taking the first three, the relevance for the electrification is as follows: The principle of *voluntary and open membership* means anyone can join the cooperative irrespective of status, thus allowing even the poorest to join and represent their interests. The principle of *democratic member control* is the most critical, as it gives every member a right to vote on a 'one member one vote' basis and participate in the decision making of the cooperative. The principle of *member economic participation* means every member is entitled to contribute to the capital base of the cooperative according to her or his ability, and receive benefits from the cooperative like any other member.

The next four principles have relevance for electrification in following ways: *Autonomy and independence* mean that no interference or impositions are allowed in the cooperatives, and members are free to determine the course and direction of their organizations—this would discourage especially top-down governance on the cooperatives. *Education, training, and information* are critical for giving knowledge to members about their rights, obligations, sound structures and management of their organizations—this would enable the organizations to be

successfully structured and operated. *Co-operation among co-operatives* is required for sharing knowledge and resources for mutual benefit of linked organizations—benefits of bridging between and among the organizations can be achieved. Finally, the principle of *concern for community* makes cooperatives responsible for improving the social, economic, and environmental wellbeing internally within the cooperatives, as well as globally for entire communities to which the cooperatives belong—sustainable development would be possible internally and externally.

A close examination of the characteristics of cooperatives from the time of their first formation reveals that they are based on a social resource. Leenders and Gabby (1999) termed this resource as social capital. Specifically, these authors defined social capital as: *The set of resources, tangible and virtual, that accrue to a corporate player through the player's social relationships, facilitating the attainment of goals*. The definition is in agreement with others propounded by Bordieu (1979), Coleman (1988), and Putnam (1995); all of which underscore mutual trust, goodwill, and solidarity as key planks of social capital. Hong and Sporleder (nd) observe that the success of every organization depends to varying degrees on social capital, especially for economic performance. It could be argued that since social relationships are widespread in all societies, social capital should equally be in abundance, and unlimited benefits could be gained from it. What then limits the capital, and how does the limitation affect cooperatives? Sociology studies done by researchers including Platteau (2008), Elderman *et al* (2004), and Yanagihara (2001) provide indications that could serve as an answer to this question. In all the studies it is pointed out that social capital has both positive and negative sides, although the former side is normally given such prominence that the latter side is perceived as insignificant. It is also noted in the studies that the positive aspects are well known and celebrated, while the downside which can seriously undermine the capital is relatively unknown.

For a further understanding of social capital, it is important to note that there are two types of social capital, both of which are essential for high efficacy of the capital. Elderman *et al* (2004) and Woolcock and Narayan (2000) identify these types as bonding and bridging social capital respectively. Bonding generally implies what exists or is formed within organizations and communities (intra-group cohesion); while bridging connects bonding capital between or among social entities, creating inter-group cohesion. The former type of capital is usually the stronger one and is relatively plentiful. However, in groups where power relations allow domination of some members by others, bonding social capital is adversely affected by

subjugation of weaker members – so-called elite capture. This is a common factor in failure of cooperatives and similar organizations.

For better productivity inter-dependence among social groups is important, and bridging makes the inter-dependence possible. Groups could join together independently or create links through a facilitator. For example, government facilitation could be provided, and this is in many instances done for enhancement of community development. However, as indicated by Woolcock and Narayan (2000), bridging social capital is usually very difficult to achieve or create due to the closed nature of individual social groups. The difficulty is associated with the fact that bonding social capital tends to engender exclusivity, and allowing outsiders into a group needs great effort and time for trust and goodwill building. Inability to make bridges represents a significant negative aspect of social capital; and combined with elite capture, these negative characteristics present major drawbacks for organizations, especially those such as cooperatives relying heavily on social capital. Two examples that follow illustrate the point.

Narayan and Nyamwaya (1996) have reported that there was a survey of 200, 000 community groups in Kenya working on poverty reduction initiatives. Within each group there were modest achievements in the initiatives stemming from bonding social capital. Nevertheless, there was very little interaction among the groups, and therefore bridging social capital was generally absent. As a consequence, there was a low overall level of poverty reduction relative to what would have been achieved if the groups had worked together. The second example is about the HIV/AIDS pandemic as contained in two separate accounts by Bibby (2006), who focused mainly on Africa, and Wambua (2009), who focused on Kenya specifically. Both the writers indicate that the pandemic has greatly affected cooperatives in the developing world, more particularly women cooperative members in Africa. Due to stigma associated with the pandemic, sick members of the cooperatives are discriminated against such that the members are relegated to lower status in the memberships. Under these circumstances, bonds between sick and healthy individuals are severely strained; and social capital as a whole is compromised. According to Bibby (2006a), the international alliance of cooperatives (ICA) has been working towards bridging the gaps caused by the pandemic, and strengthening the loosened bonds. One of the strategies used by ICA to build the bridges is empowerment of the sick to increase productivity and regain acceptance by fellow members. Education of members has also been used as a strategy especially to reduce the level of stigma and discrimination associated with the pandemic.

2.4 Cooperatives for electrification and their global spread

Revisiting evolution of cooperatives, many modern day rural dwellers in developing economies find themselves in situations similar to those of Rochdale cooperators during the difficult times of the industrial revolution. Woolman (2003) also points out that previously in the early part of the 20th century, most non-urban residents of USA were in comparable conditions. As expected therefore the rural people find comfort in cooperatives, and popularity of cooperatives has grown substantially both in rural and urban areas. For example, ICA (2009) estimates that membership in cooperatives has grown to over 800 million worldwide and about half of the world's population is dependent on cooperatives for their livelihood. Hence, the perception built over the years of cooperatives as a tool for development of the underprivileged members of society led to the use of this type of organization in providing electricity to rural people unserved by mainstream power suppliers. The trend started in some currently developed countries like the USA which had impoverished rural areas over a century ago, and others like Denmark which were not impoverished but had an egalitarian kind of society. Subsequently, some models of the rural electricity cooperatives (RECs) from the developed world were replicated in developing economies, with the USA model being a leader in this respect. (Gullberg et al, 1999; and NRECA, 2002)

What made the USA model so strong that it became an export to developing countries? The answer lies primarily in well coordinated efforts from various players involved in the formation of RECs in this powerful economy. Besides the resources of cooperatives that were formed to establish electricity infrastructures, and collaboration among such cooperatives, there was a strong element of government support. To coordinate the latter support a Rural Electrification Administration (REA) was formed, with the responsibility of development of rural electrification. While REA played a major role in the development of RECs, organizational strengths brought about by adherence to cooperative principles played a critical part in the development of the RECs and electrification. Bonding and bridging social capital were also stimulated through member equity enhancement, and close collaboration among RECs and with REA.

As RECs grew, they became increasingly independent and gradually the relevance of REA reduced. The central coordination role of REA in matters of electrification was subsequently taken over by RECs' own body, NRECA (National Rural Electric Cooperatives Association), which was formed in 1942. According to NRECA (2007), among its responsibilities were and

continue to be representation of RECs in political and business affairs, formulation and enforcement of electrification standards, and provision of advisory services. International interests of the association are promoted by NRECA International Ltd, and it is through this international arm that export of the USA REC model is carried out.

The USA model of RECs was notably introduced in Bangladesh, Costa Rica and the Philippines. However, varying degrees of success were achieved in these countries. In the case of Bangladesh, various sources (e.g. Zomers, 2001) trace the history of the USA model of electrification in the country. As was done for USA, RECs were formed through support of a central body, known as the Bangladesh Rural Electrification Board (REB). Funding was secured by this body from American and other donor aid, and the country's government provided other forms of assistance. Essentially, therefore, the RECs were formed through a top-down process. Care was however taken to allow RECs as much autonomy as possible, and democracy was substantially practiced in the cooperatives. The net result was generally successful operations and performance, which made Bangladesh a leader in cooperatively organized electrification among developing countries.

Although in Costa Rica a slightly different model from the one in Bangladesh was implemented, success of RECs was comparable to the one in Bangladesh (see e.g. Barnes and Foley (2004)). What presented a stark contrast was the Philippines case, where failures of RECs continue up to now, in 2013. The same model as in Bangladesh was used, but the results differed considerably. As NRECA (2002) points out, it is significant that due to political interference and mismanagement that gradually beset the RECs performance gradually deteriorated. By 1980 most of the 120 RECs that were formed initially had collapsed. Recovery measures by the World Bank and other development agencies have been ongoing ever since. As recently as 2012, some RECs were barely surviving due to indebtedness and poor performance (see e.g. Anonuevo, 2012).

2.5 Adoption of RECs in Kenya

Electricity cooperatives in Africa are very limited in number and the USA model is especially difficult to find. The few cases that have been tried have not gone beyond the experimental stage or are still in infancy as documented by Nygaard (2009) and Gullberg *et al* (1999). In the case of Kenya, empirical evidence of RECs is not available as no such cooperatives exist in the country yet. However, analytically the possibility of using RECs in Kenya has been studied by Abdallah (2007). The Kenya study shows that cooperatives were introduced

mainly for agricultural production and were perceived as government impositions on rural dwellers, especially by farmers who suffered the consequences of mismanagement of cooperatives. This situation arose due to the top-down manner in which the cooperative form of organization was introduced and run by the government, with little done to employ cooperative principles and curtail negative aspects of social capital that brought about decline of the cooperatives. Government handling of the cooperatives had the unintended effect of dispiriting farmers, rather than motivating them to successfully use the organizations for increased socio-economic growth.

Initially, there was indeed positive gain from use of the Kenya cooperatives or societies as they are often called. However, subsequently, in a clear case of elite capture, there was collusion between some government officers and corrupt cooperative leaders for political gain and self-enrichment. As a result, farmers lost a considerable part of their earnings and many societies folded up. This was particularly true in the case of coffee, the second most important national crop; coffee cooperatives being a tool that was used by many leaders to ascend to political power. Another major challenge faced by cooperatives was the dependency nature that they had developed as a result of government paternalism. Because of this challenge which reflected lack of sufficient bonding social capital, the societies were unable to stand on their own after government hold on the societies was drastically reduced at the onset of the economic liberalization era. Many of the societies collapsed when state stewardship plummeted. This appears to be a case of failure arising from having more bridging than bonding social capital, the government having facilitated the bridging while bonding was eroded by lack of equity and capacity within the cooperatives.

Kenyan rural people who were interviewed clearly indicated that they would not wish to take part in electricity cooperatives due to their bad experiences with farmers' and other producer cooperatives. Additionally, the people were disillusioned by the way the government-run national programme for rural electrification has been carried out by the national power utility, where political patronage appears to be a major factor in getting access to electricity. Where possible, therefore, the rural communities preferred organizing provision of electricity supplies through semi-formal groups initiated by the communities. Here, semi-formality implies the groups are to a great extent formed and regulated by their own rules, and do not depend much on national and other regulations or laws—cooperative principles are for example unknown or considered by the groups. Flexibility, convenience, and minimal imposition of top-down or external authority are attributes that make the community groups popular. Due to this popularity, groups of loosely formed organizations referred to as self-

help associations have in some cases been pioneers in community based electrification. The associations include TunguKabiri in central Kenya and Mpeketoni in the coastal area (See e.g. Kirubiet *al* (2009)). Others noted in field studies by the author include Kathamba in Kirinyaga, within central Kenya.

The problem of governance in producer cooperatives is not restricted to Kenya; and is prevalent in many African countries that imported the cooperative concept through colonial administrations. For example, Bibby (2006b) points out to investigation of the performance of cooperatives in Tanzania. Results of the investigations concluded that the organizations suffered from a lack of financial capital, unwieldy structures, poor leadership, misappropriation, and theft. Issues with cooperatives in Malawi and Rwanda have also been reported, particularly in connection with political appropriation and interference. In the case of Malawi, Nkhoma (2011) observes that due to suspicion by political powers associating small cooperatives with political subterfuge, the cooperatives were not allowed to operate between 1964 and 1999. The operations were all taken over by a central government body. For Rwanda, MINICOM (nd) indicates that colonial powers in Rwanda introduced cooperatives with the aim of entrenching their rule, and enhancing production of commodities that would be used in their home countries. The same account further says that upon takeover of the country's governance by Rwandan people the government used cooperatives as a tool for promotion of its policies and plans.

Overall, the cooperative experiences in many African countries, especially from a commodities perspective, have been negative. Nonetheless, there are indications that the directions taken by these organizations can be turned around. Abdallah (2007) and Government of Kenya (2009) point to an increased awareness within the state establishment, that governmental authorities have been an obstacle to cooperative societies' prosperity. It is also recognized by the authorities that mismanagement and rent-seeking are widespread among the societies, especially due to ignorance of society members about their rights and privileges. Due to the awareness, strategies are being laid to gradually reduce government controls and grip on the enterprises. Simultaneously, there is increase in the role of the state as a facilitator and creator of an environment for growth. There is also an acceleration of acquisition of better management skills and education of society members. Most importantly, education of cooperative members has been accorded higher priority than was previously the case. An example of the importance attached to cooperative education is reflected by a recent introduction of a Cooperative University College in Kenya. In other African countries strategies like the ones in Kenya are being instituted; and development assistance agencies

are providing support for the efforts. APIP (Agricultural Productivity Investment Programme) in Malawi, and UGAMA in Rwanda, are examples of donor supported initiatives in the respective countries.

Farmers and other producers have also increasingly appreciated the value of cooperatives which have little or no government involvement. Through the cooperatives, they have been able to acquire affordable and subsidized inputs for their production, including financial and non-financial capital. Even more importantly, they acknowledge cooperatives as useful vehicles for accessing markets for their products and services. With this recognition, faith in cooperatives has been maintained despite setbacks of the past. For example, collapse of state managed cooperatives like the Kenya Cooperative Creameries (KCC) did not dissuade many dairy farmers from cooperatives. Fairly successful societies like the Githunguri Dairy Farmers' Cooperative were established when KCC ceased to exist; and continuing progress of this society has inspired many similar ones (see e.g. Morton and Miheso, 2000; and Florian, 2012). Another example relating to Malawi involves formation of farmers' clubs by small-scale producers when small-holder cooperatives were prohibited (Nkhoma, 2011). These clubs were substitutes for cooperative societies and later, when government prohibition was lifted, they were formalized into actual cooperatives. Remarkably, the clubs were not under government influence when they existed.

2.6 Reflection and way ahead

The ideals of the cooperative institution are, from the findings of this paper, well suited to electrification for sustainable development in areas of high socio-economic deprivation. This has been the case for pioneering countries like the USA and a number of developing countries that adopted the USA model of electricity cooperatives. It is apparent that the positive elements of social capital upon which the cooperative was built provided a good foundation for success. It is also manifest that the negative aspects of social capital were substantially diminished in the successful cooperatives. Still, it would appear that the negative elements were not well recognized and identified, even as they were indirectly addressed. Due to lack of a clear insight and systemization for addressing them, the dark elements badly affected those who adopted electric cooperatives without direct or indirect vision of their pitfalls.

Countries such as Bangladesh seem to have had the right vision, and their electricity cooperatives prospered; and conversely in countries such as the Philippines, failure was

experienced due to lack of a critical approach to the cooperatives. For Kenya, the cooperative institution especially in the producer category seems to have had a false start. A top-down manner, the low regard for cooperative principles, and inattention to social capital challenges characterized the dominant farmers' cooperatives. It is the failures that resulted from these characteristics that have made producer cooperatives unpopular, especially where the government is involved. From this perspective, it could be argued that in Kenya potential electricity cooperatives cannot be expected to function successfully.

However, it should be borne in mind that there is growing awareness by government and other cooperative stakeholders, about the historical weaknesses of Kenyan cooperatives generally. With this awareness and action for addressing the weaknesses, electricity cooperatives could potentially be implemented. The situation is therefore not beyond correction. Moreover, Kenyans have started formation and running of producer cooperatives with little or no government facilitation. They could therefore introduce their own electricity cooperatives as they have done for new government-independent farmers' cooperatives. In this regard, it may be noted that there is increasing catalyzation of such ventures by civil society and international development agencies. NGOs' and international support could therefore be obtained for the new cooperative ventures.

The studies done for this paper have been limited in scope and therefore they are not adequate for generalization of findings, especially in the context of the developing world. It is, as a result, the conclusion of this paper that social capital needs to be researched further. This is particularly as it relates to the negative characteristics of social capital, and their adverse impacts on cooperatives generally and electricity cooperatives in particular. Formation and running of electricity cooperatives in Kenya and similar developing countries could also be investigated, taking into account challenges of social capital. Design and implementation of electricity cooperatives in the target countries could be largely informed by such research.

Before further research is carried out, Kenyan and other pseudo-cooperatives that operate as informal or self-help groups should be encouraged to carry out electrification, as they have already started doing. The groups could build a strong bonding social capital and later, with the help of bridging social capital, be converted into full-fledged electricity cooperatives. Overall, what has been presented in the paper could serve as a pointer to an area of electrification for sustainable development that has not sufficiently caught the attention of energy sector stakeholders and researchers. The role of social capital in the institutional

dynamics of this electrification is of essence, and could be further underscored by other policy and academic investigations. Such investigations are therefore highly encouraged.

2.7 Chapter 2 References

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3. Chapter Three: Slow adoption of sustainable energy: What has the mind got to do with it?

Note on Chapter 3: This chapter is based on a paper (Paper 2) which has the same title. The paper is authored by Said M. Abdallah (the main writer of the paper and author of this dissertation), Professor Hans Bressers, and Professor Joy S. Clancy, all based at the University of Twente, the Netherlands. The paper is being considered for publication in the Sustainable Development Journal

3.1 Abstract

In current trends and fashions, it is the 'in thing' to be green and clean especially for the increasingly popular environment-friendly technologies. Certainly, this is the case for energy technology innovations that aim for low impacts on the environment. Often such innovations are alternatively labeled as 'sustainable' technologies. In many cases the latter label is associated with energy that enhances sustainable development or sustainability. However, from a scientific point of view, are greenness and cleanliness substitutes for being sustainable, and what cognitive factors are at play in perceptions of sustainable energy? These questions could be important for explaining the relatively slow adoption of sustainable energy and sustainable development. From this point of view, the research here develops a framework for understanding the cognitive determinants of the adoption. The framework could be applied particularly in exploring sustainable energy adoption from both North and South perspectives.

3.2 Introduction

As concern grows for challenges of climate change and other environmental impacts, interest in environment-friendly energy innovation is correspondingly increasing. Therefore, it has become common to talk about and engage in the pursuit of green energy –the latter labels being used to mean the same thing as environment-friendly. Further still, this type of energy is increasingly being seen and adopted as sustainable energy (SE); where the energy is envisioned from the perspective of sustainable development or sustainability– the two terms are used interchangeably in this paper and in many other contexts (see e.g. Atkinson *et al*, 2007). Importantly, it is noteworthy that the key characteristic of sustainable development is capacity for fostering balanced progress for economy, the environment (nature), and society (see e.g. Munasinghe, 2003). The same characteristic is associated with SE according to

definitions given in literature (see e.g. ICSU, 2007; Tester, 2005; and Davidson and Sokona, 2002) While there is a close association between SE and sustainable development, it is arguable whether or not SE is the same as clean or green energy; and in this paper interpretation of SE will be a key focus of research.

In generic terms, SE encompasses renewable energy (RE) and energy efficient (EE), where EE is envisioned as energy made available for use through raising efficiency (see e.g. Galarraga *et al*, 2011). From a technology point of view, RE technologies or RETs are known by the sources from which the energy is obtained, and the sources include solar PV, solar thermal, wind power, biomass (solid), bio-fuels (liquid), biogas, hydro-power, and geothermal. EE technologies include: energy-efficient lighting, motors and boilers; and improved biomass cook-stoves. Complementing the technologies are energy-efficient practices that range from small measures like switching off unnecessary lights, and cycling in lieu of driving; to high level steps such as EE targeted at strategic management and planning, and policy design and implementation.

Despite the proven positive attributes of SE innovations, uptake of SE by potential users has been very slow; and studies on the slow growth and barriers to the uptake have been widely undertaken by Parthan *et al* (2009), Reddy and Painuly (2004) and Christie (nd). Although there is general variance in the type and number of barriers, there is agreement on the existence of these barriers: Financial/economic, technical, market, awareness/behavioural, human capacity and institutional. Out of this list of impediments, the financial/economic barrier is in most of the studies ranked highest, while the awareness/behavioural one is placed almost at the bottom. Nonetheless, some studies by e.g. Christie (nd); Negro (2012), and Holm (2008) have shown recognize that the awareness/behavioural (cognitive) barrier can dominate all the others. The domination stems from the fact that decisions to adopt or decline use of any innovation or new idea is a cognitive (thought-related) function, and the course taken depends on how well informed or skewed the decision-making is.

In this paper, research is based on the premise that the cognitive barrier is a critical one. The authors argue that the barrier has the potential for negating all efforts towards promoting advancement of RE and EE (collectively referred to as sustainable energy or SE). Based on this premise, the paper theoretically explores the little understood cognitive dynamics underpinning the barrier. Drawing from cognitive and related theories, the normative and social-constructivist nature of the barrier is analyzed. Arguments are advanced using Kenyan and Dutch economies as case examples. Kenya is used as an example of a developing

country while the Netherlands is used as an example of a developed country. The cases are selected to illustrate wide divergences and some convergences of perceptions and understanding of SE as viewed respectively by developed or industrialized societies on one hand and developing societies on the other. From the theoretical insights and empirical observations that are considered, a conceptual framework is proposed to aid a deeper understanding of cognitive factors that constrain expected supply and use of SE. The questions that the paper seeks to answer are:

- 1) What cognitive factors are dominant in sustainable energy diffusion and adoption?
- 2) How do cognitive factors inter-relate and influence the diffusion and adoption?

Given the interpretive nature of the study upon which the paper is based, a qualitative approach has been taken. In addition, on account of the largely theoretical attributes of the study, much of the work draws from academic literature, and there is a minor recourse to gray literature. Some empirical data from personal interviews with key experts in Kenya and the Netherlands was also used. Further on the subject of the approach taken, the paper is laid out as follows: Section One gives an introduction; Section Two describes the general interpretations and perceptions of sustainable energy from the perspectives of sustainable development in developed and developing countries' contexts, with worldviews of sustainable energy illustrated in the specific cases of Kenya (developing country) and the Netherlands (developed country); Section Three gives the various cognitive and allied theories that could explain the interpretations and perceptions considered in Section Two, and the theoretical insights are then used to develop a proposed conceptual framework for deeper understanding of cognitive dynamics that shape sustainable energy worldviews and behaviours; Section Four summarizes and discusses the study carried out for the paper, and ends with a conclusion.

3.3 Differing Worldviews and Behaviours across the Globe

3.3.1 The General Picture

There are diverse meanings attached to sustainable energy or SE. Some meanings lay emphasis on the environment-friendly qualities of the energy, while others place most weight on the energy's potential for improving human life (social dimension). Yet others give almost equal weight to the environmental and social attributes; and in all cases the economic productivity advancement attribute of SE is given prominence (Galarraga *et al*, 2011; Colman, 2010; and Tester, 2005). The cited literature also points out that where SE is closely associated with environmental efficacy the energy is labelled as clean or green; and in a few instances, where human well-being is most important a brown label is used. It is therefore necessary to be clear about the meaning of SE under given circumstances; and for purposes of this paper a holistic meaning of SE is chosen –taking a balanced view of the economic, environmental and social attributes as done by ICSU (2007), Tester (2005) and Davidson (2002). In agreement with the cited literature works, the authors in this paper also take SE as the energy that drives sustainable development.

Sustainable development (SD) is a form of development that has been given a variety of meanings, and understanding of SE is derived from these meanings. Correspondingly, there is a large number of definitions of SD (and SE by extension), with considerable coverage of SD interpretations in the literature (see e.g. Dryzek (2011)). Still, there is wide concurrence with the definitions given by, for example, Atkinson (2007) and Munasinghe (2003); where SD is depicted as development with proportionate or balanced economic, social and environmental dimensions. Additionally, there is concurrence with, for example, Atkinson (2011), that SD can be equated to sustainability; and definitions of SE can be based on the balanced key characteristics of either SD or sustainability (Kemmler and Spreng (2006).

Prominence of SE in developed countries of the I North, came about after the oil shocks of the 1970s and following the 1992 UN Conference on Environment and Development (UNCED). Davison (2001) notes that the main motivation for taking up SE in the developed world was initially concern for lack of security of oil and other fossil fuels supplies. Then gradually, concern for environmental impacts of fossil fuels, principally climate change effects became a key motivator. From these beginnings, the concept of green or clean (sustainable) energy has become well established in the developed economies and the concept has generally been promoted by the North among countries of the South (developing

economies). From the same genesis, sustainability and SE in the North have broadly been viewed through environmental lenses, and this perspective has been projected in the South.

While sustainability –and by extension SE– is seen largely in the context of the environment in the developed world, a sizeable proportion of people in the developing world views the subject differently. As noted by, for example, Holm *et al* and Beg *et al* (2002), in developing countries sustainable development (SD) rather than sustainability (with a heavy slant towards environmental issues) is given priority. This prioritization takes SD as a key promoter of social or human well-being, on nearly equal footing with environmental care and economic prosperity. The Southern or developing world view also links SE to SD with a strong social strand (see e.g. Claudy, 2012)

Remarkably, as Pattenger (2007) and Davidson (2002) have observed, advocates of SD and SE from a social or poverty reduction angle see sustainability pursued in the developed North mainly as an environmental care (climate change abatement) endeavour. The advocates also largely attribute global environmental degradation and resultant climatic impacts to economic activities in the North. Therefore, they argue against drawing Southern countries too deeply into the fight against climate change. The following statements are very revealing in this regard:

‘When you talk to the Third World about environment, you are talking to the Third World about poverty, and unless you are prepared to deal with this poverty there will not be an environment to preserve’

Quote from James (1994), attributed to Robert Mugabe when he spoke at the 1987 UN General Assembly

‘I want to ask you something. You study a lot about the environment. And now we hear about this thing global warming, global warming. But we, black people, do not contribute to this problem, but we will be the first (one) to suffer from the impacts of climate change. You as environmentalists who (has) reached a high level of education and (has) given this climate change day at the international level, what have you done with the knowledge that you have accumulated from all (this) travels and speak in big countries like Germany and Holland to fight this problem, while it affects African countries the most?’

Quote from DeWitt S (2011), attributed to a Cameroonian country-side resident, who was a respondent in a personal interview with the author.

The skewed and context dependent understanding of SE is further compounded by personal or individual perceptions of this type of energy. As Straub (2009) and Rogers (2003) point out, personal perceptions provide strong incentives for adoption or non-adoption of this type of energy. Persuaded by a positive image of this energy, significant numbers of people have taken up or motivated others to adopt this energy. Equally, there are those people who are deterred from taking up this energy by such factors as perceived high costs, risk exaggeration, and insufficiency in meeting needs.

Another notable dimension of the cognitive aspect of SE is illustrated by the undervaluing of the importance of SE technologies as tools for improvement of women's lives, especially in the South. A sizeable body of literature including Clancy (2008), Epstein (2007), Karlsson and Rojas (2013), Clancy et al (2004), and Cecelski (2000) has analyzed the role of cognitive biases in internalization of general innovations and new ideas that could benefit women, especially in family settings. The innovations and new ideas particularly focus on SE technologies and their potential for labour saving, health amelioration, and general empowerment for women.

For example, Cecelski (2000) and Murphy (2000) cite improved biomass cook-stoves and solar cookers as SE technologies that could significantly improve women's lives in traditional societies. In the traditional societies constituting the bulk of developing countries, women are mainly involved in domestic chores. A major part of the women's time is taken by biomass gathering and cooking with traditional cook-stoves using wood, charcoal, or other biomass. Not only is their time wasted in the chores, they also suffer from smoke-related health problems, and they lack time for activities that could uplift their livelihoods. SE technologies could help the women overcome most of the challenges; and a question then arises why the technologies have not been taken up as would be expected.

To analysts like Bussey and Bandura (1999), Clancy *et al* (2004) and Epstein (2007), social-cognitive determinants giving rise to gender differentiation play a key role in non-adoption of SE technologies that could benefit women. With a specific focus on societies in the South, and to a lesser extent in the North, the social environments in which women grow assign men major decision-making and leading roles within and outside families. Therefore, decisions about whether or not to purchase a new type of asset would be a man's responsibility; and the man has to be convinced about the benefits of the asset for the purchase to be done. In the specific case of SE technologies, it is important to have a man's

decision about purchasing because the technologies are in most cases to be used for the first time. The man, in contrast to a woman would however have little inclination to acquire the technologies as he has a comparatively low appreciation of the benefits of the technologies. The end result would very likely be no purchase or no adoption of the technologies.

3.3.2 Cases of Kenya and the Netherlands.

The awareness level of SE in Kenya (a developing country) is high, and in particular the rate of adoption of small-scale solar PV is one of the highest in the developing world (Jacobsen and Kammen, 2007). However, compared to total potential for SE especially in rural areas where access to modern energy is very low, there is very limited supply and use of SE so far. Relative to traditional forms of energy (mainly from woody biomass) and fossil fuel energy (mainly kerosene for lighting and diesel for transport and water pumping), SE is generally considered expensive. This is especially the case for the majority of Kenyans, who chiefly reside in rural and peri-urban areas. There is also a very low level of understanding of the advantages of SE, most people having very limited knowledge about environmental and social benefits that could be gained from SE. There is also a general reluctance to abandon traditional energy and fossil fuel technologies which are well known and relatively available compared to SE technologies. Cost and risk perceptions are high for SE technologies compared to non-renewable technologies.

Although the general population is still faced with a high level of uncertainty about obtaining and using SE technologies, there is a growing interest in SE among the more enlightened Kenyans. There is a gradually increasing appreciation of the full benefits of SE in government (public sector), private sector, and civil society (including academic members). From this standpoint, the energy development initiatives that are being pursued, especially by the central government, are gradually giving prominence to renewable energy technologies. It is however clear that the main focus of the initiatives, is the economic dimension of sustainability. Energy technologies with a high social impact like biomass technologies are given low priority. Comparatively, energy technologies with a high economic impact like large-scale geothermal technologies for electricity generation are highly prioritized. Balanced economic, social, and environmental components of energy development in the country are therefore not being achieved, and SE growth remains very low.

To illustrate the SE challenge in Kenya, it is important to note that non-commercial energy with a predominance of traditional biomass energy for cooking, lighting and warmth has the highest level of consumption. Specifically, the Global Alliance for Clean Cook-stoves (GACC, 2012) and the Kenya Institute for Public Policy Research Analysis (KIPPRA, 2010) give the contribution of combustible renewable biomass (non-commercial energy) as 68%; which in some estimates is as high as 80% to 90%. Much lower but economically critical contributions come from commercial energy sources; comprising 29% from petroleum fuels, and 3% from electricity. The combustible biomass energy is used mostly by the dominant population, which resides in rural areas and poor sections of urban areas. To meet the needs of the population, a substantial amount of biomass is required, especially in the form of firewood and charcoal. There are therefore concerted efforts, especially by NGOs, to carry out afforestation and reforestation programs to increase the availability of the biomass, and to improve the efficiency of conversion of biomass into energy. These efforts have a high capacity for expanding availability of SE in the form of improved biomass energy, and energy that could ensure sustainable development of the majority of Kenyans. In addition, afforestation and reforestation could have the added advantage of reducing the effects of global warming and climate change, and consequently enhance sustainability.

Traditional ways of obtaining and using biomass for cooking and other household energy purposes is still prevalent as modernization of biomass energy has been a very slow process. Most of the Kenyan population (rural people and urban poor) is also unable to change to alternative modern fuels due to low affordability. The population has therefore continued facing challenges associated with a traditional biomass energy culture. The challenges include growing scarcity of biomass for household use, inefficient biomass to energy conversion inflating demand for biomass fuel, reduced time for productive activities due to time demands for biomass gathering, and indoor air pollution with attendant health consequences. Notably, these challenges are faced by women on whom household responsibilities are mainly placed. Therefore, acceleration of change from the traditional form of biomass energy to SE is needed for sustainable development, especially from a gender equity and cognitive perspective (see the next section of this paper). The potential for improved biomass energy sources in Kenya is well recognized; and measures for tapping into the potential are being undertaken by various actors.

One of the key measures that have been given a fair level of attention is small-scale manufacture and marketing of energy-efficient (improved) biomass cook-stove, simply referred to as clean or improved cook-stove. The stoves have been promoted in Kenya since

the 1980's. NGOs have been the main promoters of the stoves, and the national government has been providing some support. Nevertheless, a project rather than a programmatic approach for the promotion has been taken. A national framework for development of the stoves has also been missing, until recently when a Draft National Wood fuel Development Strategy and Action Plan was formulated (UNDP Kenya, 2013). As a consequence of inadequate support and promotion challenges, penetration of the stoves has been below expectation. In particular, the Global Alliance for Clean Cook-stoves (GACC, 2012) indicates that about 3 million cook-stoves have been made and sold in a period of approximately 30 years. In the same period only about 35% of the population requiring the stoves (approximately 38 million) has bought and used the stoves.

While support for growth of non-commercial types of SE technologies has been generally low, at the top end of the energy sector hierarchy, there has been great interest in SE aspects of commercial energy. In particular, large scale SE technologies for electricity production have been given growing attention. The latter technologies, including mainly hydro-power and geothermal varieties, are receiving growing attention ;chiefly because of their potential for reducing national electricity capacity deficits and meeting expected high power demands. The Government of Kenya (GoK) has focused on these technologies in its policies and strategies and there are major plans for deployment of the technologies (see e.g. GoK, 2014 and GoK, 2013). As a result, Kenya is hailed as a leader in renewable energy use among countries of sub-Saharan Africa. For instance, Gets and Mhlanga (2013) rate Kenya's efforts towards development of SE technologies as high in comparison to South Africa's. There have also been media accolades such as "Renewable energy generation is big business in Kenya" (Kahare, 2012 and Njihia 2014).

For the Netherlands, environmental concerns and sustainability have been a major preoccupation for over three decades. By accounts of Pattenger (2007) and Hajer (1996), the country has been one of the leading European countries and developed economies championing sustainability, particularly in combating climate change. The country has also been very instrumental in helping developing countries to pursue sustainability and SE. Dutch Ministry of Development (MoD, 1994) further indicates that as environmentalism gained momentum in the 1980's and 1990's, the Dutch incorporated poverty reduction within their environmental aid agenda for developing countries including Kenya. It is therefore evident that the Netherlands had, at least initially, made efforts to address social (poverty reduction) aspects of sustainable development. It is also apparent that sustainability with heavy emphasis on environmental concerns was propagated through international aid to developing

economies like Kenya, and increasingly the sustainability enhancement efforts are continuing through bilateral trade developments.

However, it is noteworthy that while Dutch bilateral relations with developing countries are still fostering an environment (green) agenda, back home the Dutch are no longer strong on energy sustainability initiatives. This fact is highlighted in literature and observed in surveys done for this paper. Evidently, government policies for transition to SE are receiving declining support, and implementation is lagging far behind SE initiatives in other European countries. From sources such as Verbong and Geels (2007), and Kern and Smith (2008), it appears that attraction to relatively cheap and abundant non-renewable energy sources like natural gas could be diminishing the level of attention previously given to SE. Moreover, Rooijen and Wees (2006), Verbong *et al* (2008), and Rabobank (2012) have done studies showing that between 1990 and 2001 the share of renewable energy in the overall Dutch energy consumption was very low, and grew from 0.6% to 1.3%. In 2005 the share was only 3%, compared to an average of 7% for the EU region. Subsequently, the contribution grew from 3% in 2008 to 4% in 2010.

For local communities and farmers in the Netherlands, government incentives (subsidies) for SE stimulated much interest, as indicated by Raven and Geels (2010). However, the interest in government supported SE programmes has been reducing as government support declined. Raven and Geels (2010) give the specific example of small-scale biogas as an SE technology that has been particularly affected. Between 1978 and 2002 the number of biogas units grew to 26 in 1983, and thereafter reduced steadily to zero in 2002. After 2002 some units (less than ten) have been recorded; but large-scale units started coming up. From personal communication, (Oppenoorth of SNV interviewed in May 2013 by Abdallah of University of Twente) it was noted that up to 120 large-scale units were built by 2013. Nevertheless, this number is insignificant compared to 5000 in Germany.

Overall, it has been observed that local communities and private companies are taking their own SE initiatives with the aid of the gradually diminishing government support. Solar power and wind power generation and energy efficiency improvement projects are being undertaken by these actors at an increasing rate. The growth in home based solar power generation or solar home systems (SHS) offering competitive investment returns has kept accelerating. The SHS investments have been stimulated by the so-called 'netting' rules that allow consumers to subtract the electricity they feed to the grid from their total bill. The SHS initiatives are however facing the challenge of cutbacks by the government, as demonstrated

by the fact that the present minister responsible for energy subsidies has already announced a reconsideration of the 'netting' rule.

3.4 From Theoretical Insights to a Conceptual Framework

Sustainable energy (SE), like sustainable development (SD), is normative in nature. Cognitive forces are therefore responsible for the way it is viewed and treated. From this standpoint, and in agreement with observations by Ratten and Ratten (2007) and Ratten (2010), one theory that is found very fitting for explaining perceptions and interpretations the energy is the Social Cognitive Theory (SCT) of Bandura (1986). The theory is built around three key attributes (elements) of human cognition as shown in Fig.3.1. The elements are: the personal, the behavioural, and the environmental.

The most basic element is the personal (self) characteristic which refers to what is attributable to personal feelings, observations, and experiences. In the case of SE, the personal element could be associated with, for example, the energy's ease of use, closeness to culturally known types of energy, and sufficiency for personal needs. Secondly, the behavioural element is closely related to the personal one, as behaviour of a person stems from that person's self cognition. Behaviour further contributes to modifying or shaping self cognition. In the case of SE, behaviour could be illustrated by little or no use. Thirdly, the environment element (physical and societal) has a direct influence on self-cognition and a person's behaviour. For example, what opinion leaders in a community or country say about

SE could have a profound effect on whether the energy is accepted or not at the personal level. Similarly; climatic conditions might be conducive or a deterrent to the use of a particular type of SE technology. Overall, each of the three elements has a reciprocal effect on the other elements. It is also evident that interplay between and amongst the elements contributes significantly to acceptability and adoption of new ideas and innovations like SE.

SCT contributes significantly towards explaining perceptions and beliefs, as Phipps (2012) and Straub (2009) have indicated. For instance, belief in being green (environmentally caring) could be motivated by sustainability promotion campaigns or societal influences. The belief could in turn help in building a positive attitude to SE. However, the positive attitude does not necessarily assure uptake or use of the energy by the people who acquire the attitude (Preez, 2005; Claudy, 2012; and O'Driscoll et al, 2013). This fact points to an aspect of cognition that falls outside the scope of SCT. Explanation of the attitude-behaviour gap could instead be explained by another theory, the cognitive dissonance theory (CDT), advanced by Festinger (1957) and Harmon-Jones and Harmon-Jones (2007). In CDT it is argued that personal or collective reasoning is in some instances faced with a dilemma: Adhering to one's stand on one hand, and on the other hand doing what is convenient or desired. To overcome the dilemma, there is usually a tendency to change the belief to suit the convenience.

For example, men may believe in gender equality and women's empowerment which could lead to uptake of SE technologies beneficial to women. On the other hand, studies have shown that due to social-cultural tendencies especially in highly traditional societies, men have decision-making powers over women, and the men often undervalue women's interests (Cecelski, 2000 and Clancy *et al*, 2004). Therefore, in spite of the gender equality beliefs or an apparent show of interest in the equality, there is a strong likelihood for men to reject SE technologies that have benefits for women, but perceivably are of little value to men. Similarly, oil industry entrepreneurs could indicate belief in environment-friendly energy technologies. However, since these technologies are a threat to non-renewable (fossil-fuel) technologies upon which oil businesses depend, the entrepreneurs would not be keen on adopting SE technologies; or they would only show superficial interest in the SE technologies.

Personal or individual cognitions as seen within the frameworks of SCT and CDT are reflected in collective cognitions, especially in groups of decision makers. Still, while agreeing that group cognitions stem from individual cognitions, West (2007) and Gibson (2001)

caution that there is no direct correlation between the two types of cognitions. The two analysts indicate that similar patterns of perceptions, attitudes, and behaviours as explained by SCT and CDT can be observed at both personal and group levels, but less predictably at the latter level. This has important implications for group activities such as policy-making, and policies made collectively. Wolfgram (nd) and Surel (2000) make the important point that cognitive dynamics with substantial roles in individual decision-making do to a certain degree influence decisions at group level. For example, national SE policies are to a marked extent shaped by cognitions of individual policy makers. Uptake of SE at the national level can therefore be informed by personal worldviews of SE.

Shaping of policies and policy implementation in relation to individual cognitions has been considered in the Contextual Interaction Theory (CIT), developed by Bressers (2004). Diverse policy contexts have also been analyzed using CIT in works that include Owens and Bressers (2013), Spratt (2009), and Dinica and Bressers (2004). According to CIT, collective policies and their implementations are determined by context-specific motivation, information and power of individual actors in the policy arena. Motivation and information can be directly linked to the cognitions of the individual players –Though some later versions of the theory use the concept of cognitions next to motivations instead of information (e.g. De Boer and Bressers, 2011), here we use the original version. Remarkably, CIT has been used widely for policy analysis and explaining policy-implementation gaps in various facets of life; e.g. in policy and practice of sustainable development by Bressers (2004), and Dinica and Bressers (2004); and in water resources development by De Boer and Bressers (2011). More importantly for this paper, CIT has been used to a large extent in policy and implementation studies related to SE.

SE studies that have utilized CIT directly or indirectly include Dinica and Bressers (2003), Lafferty and Ruud (2008), Raven and Geels (2010), Hoppe *et al* (2011), and Matos and Silvestre (2013). The studies generally demonstrate that as policy actors' level of SE information and perception increase and barring constraints of cognitive dissonance there is a corresponding rise in the efficacy and implementation of SE policies. Powers of individual actors also determine which individual cognitions dominate in the policy making processes, and are therefore determinants in the SE policy making. If the most powerful actors have negative perceptions about SE, weak SE policies could be the outcome. Implementation of the policies, however strong the policies are, could also suffer serious setbacks or could fail entirely.

Looked at in totality, SE cognitive dynamics as viewed from the perspectives of the theories considered above can be depicted as shown in Fig.3.2. Prominently coming out of this picture is the fact that SE worldviews or characterizations are a complex compound of individual and collective cognitions. For explaining personal and collective policy perceptions, attitudes and behaviours towards SE, the shown interplays of cognitive factors need to be considered. As such, it is suggested that for SE cognitive analysis, the graphical representation could be used as a conceptual framework.

3.5 Discussion and Conclusion

There is a wide array of meanings and interpretations of SE, and the lack of consensus can be traced to the diversity of views about sustainable development and sustainability, on the basis of which SE is understood. It is apparent from the analyses done in this paper that the differing worldviews of SE are reflected in people's behaviour towards the energy, especially in increasing availability and level of use of the energy. On all accounts, cognitive factors have had substantial impacts on SE, such that unexpectedly low SE growth has taken place

in the North, and SE achievements in the South have been marginal. Where the energy has been taken up, it has been in a form that is unlikely to achieve true sustainable development because of skewed understanding and application of the energy.

From a perspective of different societal contexts, SE has been interpreted in ways that suit dominant discourses within the contexts. A clear divide appears to have emerged where environmental and social advancement discourses have heavily influenced perceptions of SE in developed and developing countries respectively. Nevertheless, there is a growing shift towards an environment-centred perspective of SE in countries of the South. This change could be attributed to influences of developed countries on the South. In particular, the influences are commonly exerted through aid instrumentalism, where apparently development assistance from the North to the South is used for pushing Northern agendas in the South. The examples of Kenya and the Netherlands presented in the paper provide good insights into the respective socially centred versus environmentally centred perspectives of SE.

Largely because of cognitive obstacles such as limited knowledge and risk exaggeration associated with SE, and unwillingness to stop or reduce the use of conventional (non-renewable) forms of energy, levels of SE diffusion and adoption have generally been quite low. It is acknowledged that the cognitive barrier (cognitive obstacles in total) is only one of the barriers to SE. However, considering the many challenges that face SE, the critical role of the cognitive barrier is highly under-emphasized. The lack of sufficient recognition of the barrier seems to largely stem from a hazy and lopsided understanding of the barrier, in research and studies on constraints to SE adoption and growth. There could also be a contribution to the lack of recognition from a one-sided dominance of an economic science perspective of SE development. Taking this fact into account, there is a pressing need for a close examination of cognitive dynamics involved in SE portrayal and deployment.

In this paper, it has been seen that there is a complex interplay of cognitive variables that determine how SE is perceived and taken up. Various theories have so far been put forward to explain perceptions, attitudes and behaviours that are manifested by individuals and groups of people. Relevant theories have been selected and their interactivity analyzed in the paper, to produce a proposed conceptual framework for deeper understanding of cognitive aspects of SE. The framework is offered as an inspiration and potential platform for further research on SE cognitions. It is recognized that the study done for the paper has been limited in scope. Consequently, the work done for this paper should be seen as a contribution to

identification of fields for further research, and a challenge to energy sector stakeholders to rethink their views about and approaches to development of SE.

3.6 Chapter 3 References

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4. Chapter Four: Energy Technologies for Sustainable Development: Does Beauty Lie with the Small Ones?

Note on Chapter 4: This chapter is based on a paper (Paper 3) which has the same title. The paper is authored by Said M. Abdallah (the main writer of the paper and author of this dissertation), Professor Hans Bressers, and Professor Joy S. Clancy, all based at the University of Twente, the Netherlands. The paper has been written as a working paper of the university, with peer reviewing from outside the university.

4.1 Abstract

For achievement of sustainable development, there is need for most developing economies to pay closer attention to social conditions of their populations. Most of these populations are rural and appear to be lowly prioritized in development policies and plans of the economies. Energy strategies incorporated in the policies and plans are often discriminative of small-scale technologies that could be useful for social aspects of sustainable development. Against this background, this paper explores the place of the technologies in uplifting the social conditions of the underprivileged populations. It also seeks to find out why there is little appreciation of the importance of the technologies in sustainable development. Specific attention is focused on Kenya, having in mind that the sustainable development circumstances in the country are very similar in other low income economies of Africa and elsewhere. The findings from the paper indicate that there is low awareness and misconceptions of the social elements of sustainable development, and the important role that small-scale energy technologies could play in strengthening the social elements. There is therefore a necessity for addressing these shortcomings, especially through national policy and planning actions.

4.2 Introduction

Kenya, like a number of economies in the developing world is making concerted efforts to reach industrialization status that the developed world has already attained. The question that sustainable development watchers would be keen to ask is, however: "Is the development path being followed towards industrialization a sustainable one?" In this paper, sustainable development is taken to mean development that gives proportionate attention to economy, society, and the environment as argued by Jabareen (2008), Roseland (2000), and

Drummond and Marsden (1999) among others. From this perspective, it is imperative that for the countries targeting industrialization status to reach their goal sustainably, the countries should balance the interests of the three dimensions of sustainable development. Nonetheless, as observed by Haque (2004) and Pieterse (1998), *inter alia*, development strategies adopted by many countries of the developing world follow an economics centred growth path— aiming for overall GNP or GDP prosperity. This is regardless of whether a whole society (nation) benefits from the growth or not. Imbalance in such strategies is caused by over-emphasis on the economy strand and neglect of other strands of sustainable development. In such a situation, sustainable development is unlikely to flourish. The cited authors have also noted that the social strand has been receiving comparatively little attention relative to the economy strand, and to a lesser extent the environmental dimension

Developing countries like Kenya, which this paper focuses on, need to place a high level of prioritization on the social dimension of sustainable development. This is because there is a huge disparity between the wealthy minority who are the largest beneficiaries of economic growth, and the poor majority who could gain substantially from social growth. This is as noted by Bigsten *et al* (2014), Gakuru and Mathenge (2012), and KNBS (2013) among others. Studies by the cited authors reveal that while Kenya's growth is impressive compared to similar countries, more than half of the total population is economically and socially in dire conditions. The affected population segment is income poor and has very low access to health, modern energy, water, education, and other services needed for basic livelihood. Rural and slum inhabitants and especially womenfolk suffer high levels of socio-economic deprivation. Furthermore, the affected people aggravate sustainable development deficiency through use of resources in environmentally degrading ways. For example, the people mostly eke their livelihoods in ways resulting into land over-use, over-grazing, depletion of forests, and pollution from environment-unfriendly energy sources (e.g. kerosene).

Recognizing that energy is an essential input for development generally, and sustainable development in particular, energy that could enhance the social aspect of sustainable development is studied in this paper. In the case of Kenya, it is argued that small-scale renewable energy and energy efficiency technologies –collectively called sustainable energy technologies– have good potential for social up-scaling. The same potential for social and hence sustainable development enhancement could also exist in other low income (developing) countries. From this point of departure, the questions that the paper will try to answer are:

- a. From a theoretical point of view, are small-scale sustainable energy technologies suitable for strengthening the social aspect of sustainable development?
- b. How well are Kenyans aware and appreciative of the value of sustainable energy technologies for sustainable development growth?

Answers to these questions are sought through a literature study, including academic and grey literature; personal interviews and focus group discussions; and a quantitative survey. Data collection and analysis follow a mixed-method approach.

4.3 Theoretical Framework

4.3.1 General research approach

The study being undertaken is centred on human aspects of technology, and therefore is largely open to subjectivity and perceptual interpretations. With this in mind, a qualitative and social constructionist approach is principally taken in line with arguments advanced by Kukla (2010), Khalifa (2010), Nelson (1994), and Liu and Matthews (2005). However, the multi-disciplinary nature of sustainable development and policy aspects that are studied calls for pragmatism; making it useful to bring in some elements of quantitative research. Consequently, it has been found important to have mixed method data collection and analysis in the study, following Tashakkori and Teddlie (1998), Creswell (2003), and Onwuegbuzie and Leech (2005).

4.3.2 Specific Theoretical Standpoints Applied

As indicated in the introduction section of this paper, the social dimension of sustainable development has generally been of little concern to many, in comparison to the other major elements of sustainable development—economic and environmental aspects. This is singularly reflected in technological innovations that are designed for sustainable development. Moreover, societal dynamics associated with technologies generally are often overlooked in technological innovations. Certainly, the close association between technological and social variables has not been well comprehended from early history, and various studies have been done to improve the understanding. Among the studies are those done under the banners of “social construction of technology” or SCOT (Klein and Kleinman,

2002; Fulk, 1993; and Bijker *et al*, 1987); and “social technical systems” or STS (Andrew and Petkov, 2003; and Oni and Papazafeiropoulou, 2008).

The SCOT theory advances the argument that technologies are created, interpreted, and used according to the social meanings given to the technologies. On the part of innovators, the technological designs they bring forth are informed by their understanding of the needs of the societies they innovate for. Similarly, promoters of the technologies, e.g. international development agencies and consultants, would promote the technologies based on their understanding of societal requirements. Finally and most importantly, users of the technologies take up or accept the technologies, and they put the innovations to use according to their perceptions and meanings they attach to the technologies. For instance, in this paper the meanings attached by the three types of groups to small-scale energy technologies relative to large-scale energy technologies could be well considered through the SCOT theory.

For complementing the SCOT theory in framing technological innovations *vis-à-vis* social dynamics, the STS theory is very useful. The STS theory posits that technological and social systems co-evolve and together they act as an integrated system. It is therefore important that each system is taken into account alongside the other, bearing in mind that the two systems mutually influence each other (See e.g. Ahlborg, 2012; Andrew and Petkov, 2003; and Ulsrud *et al*, 2011). In the theory it is contended that society can be changed by the technologies, in such ways as change of lifestyles as a result of technology introduction. Conversely, technologies may need to be changed to conform to specific or changed needs of society. Some studies, among them Byrne (2014), point out that the STS theory was originally conceived with developed societies in mind; and it has been widely applied in that context. Nonetheless, the studies also indicate that the theory is appropriate for a developing countries’ context; and is increasingly being utilized for analyses in the latter context.

A plausible interpretation of the SCOT and STS theories is that it is critical for technologies to be designed and shaped to suit the unique needs and circumstances of each society or section of society. This is to say, the technologies need to be contextually appropriate, or simply appropriate—a term used in this paper for framing appropriateness. It is noteworthy that Kaplinsky (2009) interprets appropriate technology as a technological means that is appropriate for low income countries; meaning that it is labour intensive, simple to operate and repair, produces products for low income consumers at small scales, and with minimally harmful impact on the environment. Overall, this sort of thinking of appropriateness has given

rise to such conceptions as socially appropriate technology (e.g. Fressoli and Thomas, 2011).

Furthermore, it is worth noting that in earlier years Schumacher (1973) had introduced the appropriate technology and immediate technology movements. The immediate technologies emerged as technologies for developing countries; which were, on one hand, superior to traditional and overly simple technologies from early civilizations. On the other hand, the technologies were cheaper and more appropriate than advanced technologies from developed countries. However, as Hollick (1982) noted, the technologies introduced by Schumacher were criticized as too technically focused and did not sufficiently address social issues in particular, and development concerns generally—hence the emergence of socially appropriate and similar technologies (e.g. Fressoli and Thomas, 2011).

The idea behind appropriate technology innovations partly stemmed from problems of transfer of inappropriate technologies from the developed world (the North) to developing countries (the South). As Akubue (nd) has documented, technology transferred from the North was deemed inappropriate; either due to problems of affordability, adoption or adaptation capacity, or lack of acceptance. In other cases the technologies were introduced due to lack of alternatives or local innovation drives. However, it is important to note that appropriate technologies have not been accepted by many elites in the South. Kaplinsky (2009) largely attributes opposition by the elite to the perception that the technologies could retard advancement in the South. Partly due to barriers such as associated with the elite, in international development practice, technology transfers or technology prescriptions for developing countries largely disregard the requirement for appropriateness. A large body of literature document this fact (see e.g. Chambers, 1995; Lovins, 1977; Nye, 1990; Agbemabiese, 2009; and Fressoliet *et al*, 2011). The literature decries the dominance of global, standardized, top-down and linear technological solutions being prescribed for developing countries by international experts and national elites; with minimal reference to local interests.

In the case of energy that could spur sustainable development in developing countries, need has been seen for technologies that could directly serve bottom of the pyramid populations—see e.g. Bairiganjan (2010), Goldthaua (2014), Bauwens (2013) and Pandey (2002). These populations are generally the majority; and comprise poverty ridden inhabitants of rural and peripheral urban areas. Most of the stereotypical advanced, large-scale, grid-based, centralized energy and expert-led technologies transferred to developing

economies have been of little benefit to these populations. Instead, as documented by *inter alia* Gomez *et al* (2013, Papermans *et al* (2005), and Clancy (2001), small-scale, decentralized, off-grid and participatory (user-involving) energy technologies have been greatly useful to the populations. The latter people-centred technologies include systems based on for example energy saving cook-stoves, photovoltaics (PV), energy saving lighting, small-scale hydro, biogas and wind power; most of which are off-grid.

It is also important to note that from the findings of many studies (e.g. Mainali, 2014; Kolling and Gaul, 2011; and Shukla, 1997), some developing countries concretely recognize the critical role of people-centered technologies. For instance, Smits (2011) reports that in Laos the national government has a dual-stream energy development plan. The first stream targets energy for accelerated industrialization. This strand follows the conventional large-scale electricity and other major energy production and consumption strategy. The second, and no less important planning strand, follows a people-centered small-scale and generally off-grid energy strategy. Similarly, Matos *et al* (2013) point to a very active plan for developing bio-fuel production and trade in Brazil. This plan, which is running in tandem with a conventional national energy production scheme, is suitable for socio-economic growth of small farmers. The government assists farmers throughout the bio-fuel production and marketing chains, and farmers together with their associated communities are gaining significantly from the initiative. As could be expected, due to the sheer size of the initiative, some of the farmers are disadvantaged. According to Dutt (2007), a major complaint has been raised, and it resulted into protests by the affected farmers. Contentions include displacement from their small farms, to give way for large-scale farming; and unemployment resulting from increasing mechanization on sugar farms.

4.3.3 Specific Societal Context and Policies Considered

Among developing countries that have progressive development approaches, Kenya as a society is in a prominent position, particularly within sub-Saharan Africa. For example, Forbes (2014) reported that Kenya's economy is placed at number nine among the top ten most developed economies in Africa. This was after reassessment of the economic standing (rebasings) of the country in 2014, where the GDP per capita level was raised from US\$ 994 to US\$1246, meaning there was a 25% increase in the GDP per capita (World Bank, 2014 and KNBS (2014). However, the country has a social structure with a high level of inequality, the majority being generally poor and based in rural areas. Most of the countries' wealth is in the hands of a minority that is generally urban-based (Bigsten *et al*, 2014; Gakuru and

Mathenge, 2012; and KNBS 2013). This situation makes the country's sustainable development standing questionable, and in this paper sustainability issues of the country are studied. In particular, the paper focuses on energy that could be appropriate for the majority of the Kenyan population, and that could enhance sustainable development.

The study done for the paper has noted that there is an ongoing national effort towards reducing socio-economic inequalities in the country. Decentralization (devolution) of governance has been introduced and county (regional) governments have been created. Specifically, national planners envision uplifting of the low level of development of hitherto marginalized regions through dedicated governance in the regions (KNBS, 2013). Some of these counties are very active in establishing energy infrastructures of their own, renewable energy sources that are locally available being of special interest. These initiatives are likely to improve sustainable development in the counties considerably, as they promote local resources use and impact positively on socio-economic status of the local people. It is however not certain if the regional initiatives will be adequately replicated, nurtured and stepped up. Indications are that the regional governments are still having weak governance structures and development initiatives are not being undertaken consistently yet. There is also heavy reliance on the national (central) government for support; as illustrated by the following illustration of divided opinions among Kenyan politicians:

During a discussion on national television (NTV aspiring [candidate] governors' debate on 3rd March 2013, which was held in preparation for impending general elections that introduced county or regional governors for the first time, one candidate indicated that he would start a waste-to-energy project in his county if elected as a governor. Another candidate had the opposing view that starting such a project would be unnecessary. This is because the opposing candidate believed that energy projects were the responsibility of the central government.

On its part, the national government has a development agenda that is chiefly guided by an overarching strategy known as Vision 2030 (GoK, 2007). The thrust of the strategy is acceleration of the industrial status of the country, to place the economy in an industrial category by 2030. Key policies of the government are therefore being developed towards the industrialization goal. One of these policies is the Energy Policy 2015 (GoK, 2015) which places a high premium on large investments in energy infrastructure, especially for electricity capacity expansion. The policy seeks to promote renewable as well as fossil-fuel energy for provision of adequate and affordable energy for industrialization. There are elements of a

sustainable development pursuit in the policy. For example, there is an aim to increase the proportion of renewable resources contribution in the overall energy supply, and enhance access to modern energy. The elements are however underplayed, and sustainable development measures are generally symbolic. An illustration of a mindset among Kenyan politicians and planners that is contrary to the spirit of sustainable development is shown by the following:

One of the strategies of the Kenya government is to up-scale electricity supply capacity through introduction of nuclear power. This is despite abandonment of that type of power in many developed countries, which consider nuclear risks as a major threat to humanity —and hence to sustainable development. Even after occurrence of the Fukushima nuclear accident in 2012, a head of the Kenyan Ministry of Energy which was responsible for energy policy and strategies in the country made this (paraphrased) statement:

“The nuclear disaster in Fukushima that took place recently is a cause for worry; but it is now well addressed to prevent similar accidents in the future. Nonetheless, there is no reverse gear in our plans for implementing nuclear energy in Kenya”

----Statement made on national televisions (NTV and Citizen TV) 5th November 2012

While large-scale electricity initiatives feature most prominently in the Kenya government development agenda, small-scale initiatives are given secondary attention. This is despite the potential for the latter initiatives in social enhancement, and attainment of sustainable development (see e.g. Kousis, 1997). For example, small-scale biomass energy on which about 69% of the Kenyan population depends for cooking purposes is lowly ranked in government priorities (KIPPRA, 2010; and Government of Kenya [GoK, 2004 and GoK 2015]). This type of energy seems not to be perceived as sustainable, especially from economic and environmental points of view. Instead, the energy is mainly seen from negative perspectives like a cause of forest cover depletion, and smoke-related health impairment (GoK, 2015 and Saidi *et al*, 2012).

The negative perception of biomass energy seems to be persistent, in spite of intensive efforts that have been made to improve the quality of biomass cooking technologies in Kenya. The efforts have been particularly directed towards development of energy saving cook-stoves according to various studies (see e.g. Saidi *et al*, 2012, Clough, 2012, and Winrock *et al*, 2011). The studies indicate that international NGOs like Practical Action and

GIZ have been very instrumental in the development. Through the efforts, innovations of the cook-stoves have proliferated for over thirty years, and commercialization of the stoves has attained maturity. Additionally, the innovations have developed to the extent that Kenya has become an exporter of the innovations to other developing countries. However Saidi *et al* (2012) and Winrock *et al* (2011) point that in Kenya itself uptake of the energy saving cook-stoves has remained low, at about 4% for rural areas and 14% for urban area—including both charcoal and non-charcoal stoves. The low uptake is especially evident in the case of stoves that use wood-fuel that is not processed into charcoal, which is mostly used by the majority of the national population that lives in rural areas.

Major reasons for the low uptake in Kenya are given by, for example, Saidi *et al* (2012) and Mbuthi (2009), who indicate that the reasons include lack of standards and regulation, and poor coordination in the cook-stoves market. According to the literature, the deficiencies contribute significantly to high stove prices, and lack of incentives to switch from much cheaper but inefficient traditional fuel stoves. Additionally the literature indicates that various government ministries are involved in development of the cook-stoves, none of the ministries taking full responsibility for the development. In sum, therefore, it is apparent that inadequate state support and enabling environment are key barriers to the uptake. Such barriers are bound to propagate inefficient use of biomass—leading to problems like deforestation and health impairment, and narratives of biomass energy as an undesirable form of energy.

4.4 Methodology

For answering the research questions posed in the Introduction section of this paper, evidence was sought principally from Kenya, the study country. The methodology used in obtaining and analyzing the evidence is on the basis of the approach explained in section 4.2 above. The approach adopts a mixed-method strategy for data collection and analysis. At the primary level, qualitative data and contents were gathered and analyzed from literature, personal interviews and focus groups. Then the findings from the qualitative data were used for guiding sampling for a quantitative data collection and analysis. Finally, the findings from qualitative and quantitative methods were collated and overall results were derived.

4.4.1 Literature studied

Literature that focuses on energy and sustainable development generally, and for the Kenyan case in particular, is very limited. Most of it is non-academic, and to a large extent consists of

official reports from governmental and public organizations. Mass media has in addition an appreciable contribution to the literature. There is least availability of scholarly publications. However, the data obtainable from the literature available for this study was well triangulated. Literature sources used are widely cited in previous sections of this paper.

4.4.2 Qualitative data collection and analysis

Apart from literature sources, qualitative data was sought from individuals and groups in Kenya. On account of resources limitations, purposive sampling was done to get data mostly from Nairobi city, Nakuru (one of the largest towns in Kenya), and rural areas neighbouring the two urban centres. One advantage of focusing on Nairobi was that there is good representation of people from all parts of the country. Nairobi residents are also reasonably enlightened, and can represent the views of their kinspersons in areas outside the city. The 59 persons interviewed were professionals, academicians, political and other leaders, and others in lower social status. A similar composition was in the five focus groups with which discussions were held.

Following a thematic analysis approach, the data from interviews and group discussions was manually analyzed to identify patterns of views and thoughts (Braun and Clarke, 2006; and Rice and Ezzy, 1999). To start with, a deductive process indicated by Fereday and Muir-Cochrane (2006), among others, was undertaken as part of the selected analytical approach. The process involved a close study of theoretical information presented in the previous sections of this paper, to derive expected views and thoughts on the research subject (a priori themes). Then, an inductive process was undertaken in line with the argumentation of Boyatzis (1998). The latter process used a grounded methodology for obtaining from respondents views and thoughts on the research subject (ex-post themes). Finally, the inductive and deductive processes' results—a-priori and ex-post themes—were collated in accordance with Fereday and Muir-Cochrane (2006). From the collation, overall themes were obtained and the qualitative analysis was concluded.

4.4.3 Quantitative data collection and analysis

As a complement to the qualitative analytical work done, a quantitative survey was done to assess perceptions on the subject of research. For the survey, questionnaires were prepared based on a 5-point Likert-scale format as inspired by Carifio and Perla (2007), and Norman G. (2010). Eighteen statements were included in line with the overall themes arrived at in the

qualitative study (see a copy of the questionnaire in Appendix 8.2). The preparation was followed by piloting and administration of the instruments. For this purpose, a semi-random sampling process was used, where a total of 232 respondents were selected. Taking into account that the energy interests of urban and rural residents could be different, the respondents were divided into 82 urban cases, and 150 rural cases. The proportions reflect the fact that about two-thirds of the Kenyan population is rural. Areas that were selected for the survey were: Nairobi city (urban cases); and Olkalou, Bumula (Bungoma) and Isinya areas (rural cases).

Data from field responses was analyzed using SPSS 23 software, to yield separately results for all cases, for urban cases, and for rural cases respectively. At the input stage, integrated data across all statements was calculated by summing up responses for each respondent. This was to convert the data to equivalent interval status for parametric testing. Descriptive statistical analyses and t-tests were then carried out for each of the three groups of respondents.

4.5 Study Results and Discussion

4.5.1 Qualitative study results

Table 4.1 shows themes that were derived from theories (a-priori basis) and from the field data (ex-post basis). From the results, the a-priori or expected themes derived from the thematic analysis reflect the thinking from theories, and best practice examples. In the current study, the themes were compared with inductively derived (ex-post) themes arrived at from qualitative investigations in Kenya. The latter themes seem to indicate that there is limited understanding in Kenya about energy technologies that could enhance sustainable development. There is even less appreciation of the value of small-scale technologies from a sustainable development point of view. It is evident that from a sustainable development standpoint, large-scale energy technologies especially for electricity supply provision are highly valued relative to the small technologies. Both classes of small-scale and large-scale renewable energy and energy-efficient (sustainable energy) technologies are also valued more from an environmental protection than a social wellbeing level of importance.

A-PRIORI (EXPECTED) THEMES	EX-POST (EMERGENT) THEMES
Renewable energy is any energy with a source that can be regenerated	Renewable energy means solar energy
Energy for sustainability is renewable and efficient	Energy for sustainability is renewable
Renewable energy is good for social progress and the environment	Renewable energy is good for the environment
Large scale and small-scale electricity are both important for sustainability	Large scale electricity is most important for sustainability
Grid electricity should serve the rich and the poor within urban and rural areas	Grid electricity is for the rich and urban people
Grid electricity should benefit both urban and rural industries	Grid electricity is mostly for industries in urban areas
Majority of rural people should benefit from electricity from the grid and off-grid	Rural majority may not benefit from grid electricity
Small-scale energy sources like solar PV and wood should be sustainable and benefit all	Solar PV and wood energy are for rural and poor people
Efficient and environment-friendly sources should be available for cooking by all	Rural people use most energy for cooking with wood sources
Table 4.1: Qualitative Study Themes	

Table 4.2 shows the results of the quantitative survey that was done. To obtain the quantitative survey results, a Likert-scale ranging from 1 to 5 was used. The scale corresponded to the range from strongly disagree to strongly agree. The midpoint was 3, corresponding to unsure or not known. As a basis for analysis, the scale point 4 (agree) was taken as representative of the proposition that the respondents are averagely supportive of small-scale energy technologies. When the scale points were summed up across the 18 Likert statements, the scale ranged from 18 to 90. The proposition support point was 72, and this was separately used for a one-sample t-test for each of the categories of the three samples—Overall survey (total of urban and rural), urban survey, and rural survey.

4.5.2 Quantitative study results

OVERALL SURVEY RESULTS					
N	Mean	Std. Deviation	Std. Error Mean		
232	61.83	8.282	.544		
Test Value = 72					
T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
-18.708	231	.000	-10.172	-11.24	-9.10
URBAN SURVEY RESULTS					
N	Mean	Std. Deviation	Std. Error Mean		
82	62.39	8.391	.927		
Test Value = 72					
T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
-10.370	81	.000	-9.610	-11.45	-11.45
RURAL SURVEY RESULTS					
N	Mean	Std. Deviation	Std. Error Mean		
150	61.52	8.234	.672		
Test Value = 72					
T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
-15.589	149	.000	-10.480	-11.81	-9.15

Table 4.2: Quantitative Survey Statistics

4.5.3 Discussion

The theories that have been considered are clearly supportive of small-scale energy technologies as vehicles for the social aspects of sustainable development. This is particularly in respect of developing countries with non-urban majority populations. The small-scale technologies are of the renewable and energy-efficient types, and energy sources that are plentiful in rural areas of the countries are well suited to the technologies.

The technologies include biomass energy cook-stoves which are normally perceived as energy technologies for the poor, and ignored in many national energy planning models. However, it is worth noting that there are exceptions to this trend, and some countries like Laos are cognizant of the critical role that small-scale technologies can play in sustainable development. The energy planning models from such countries could be considered as best practice cases imitable by other developing countries.

As in other developing countries, small-scale energy technologies could, theoretically and from the standpoint of sustainable development, be very valuable in Kenya. However, it is clear from the qualitative survey that was done, that the normative view from theory is not shared at the ground level. This is to say that the view is held mostly by theoreticians and others who are at the abstract level; and not by communities and others occupying lower social strata at the ground level. These occupants at the ground level could benefit most from sustainable development facilitated by the technologies considered. On the contrary, the qualitative survey results show that in the case of Kenya the occupants are generally not aware and do not seem to appreciate the value of the technologies.

A corroboration of the Kenyan awareness and perceptions of small-scale energy technologies vis-à-vis sustainable development was obtained from the quantitative survey. The statistical means for the three categories—Overall survey (total of urban and rural), urban survey, and rural survey—were 61.83, 62.39, and 61.52 respectively. This is against the hypothesized mean of 72. For each category the statistical significance was less than the alpha value of 0.05. Statistically, this means there is support for the small-scale energy technologies; viewed from overall, urban, and rural perspectives. However, in practical terms, the support is generally less than would be expected; meaning that the awareness and perceptions need to be improved. This fact is consistent with the findings from the qualitative analysis.

The relatively low prioritization of small-scale sustainable energy technologies in Kenya could explain low rates of adoption, and inclusion in national policies and planning. The general population being energy consumers is unlikely to adequately take up the technologies due to an apparent cognitive gap. Similarly, energy planners and policy makers would for the same reason give secondary attention to the technologies. This would particularly lessen the level of incorporation of the technologies among viable technologies for the country's energy future. Overall, the result would be a sub-optimal pursuit of sustainable development in the country.

4.6 Conclusion

The research investigations done specifically for Kenya indicate that small-scale energy technologies are not sufficiently valued as sustainable development catalysts. This is especially so from a social angle of the development. Certainly, the samples that were used are small and may be considered as unrepresentative. However, a literature study shows conformity with the samples study. It can, as a result, be concluded that there is need for a reconsideration of the way the technologies are perceived and put into practice in the country. There could, in this regard, be important lessons for Kenya from Laos and other best practice examples.

It may not be plausible to generalize the Kenyan findings to all developing countries at the same level of development. However, the findings of this paper make a case for similar research in relevant parts of the developing world. Indications are that the problem of marginalization of the technologies is widespread in developing economies and further research could lead to remedying of the situation. There is a need for more innovations of the desired technologies as home-grown solutions. Equally, developed world innovators who are keen on sustainable growth of developing economies need to raise levels of availability of the requisite technologies.

The results of the study here could provide impetus for researchers to delve further into the subject of small-scale energy technologies for sustainable development. The subject is clearly under-researched; and especially so in the context of African countries. By taking up the challenge of further research, researchers would make the research efforts made in this paper much more fruitful. Similarly, policy makers in developing countries are urged to seriously re-evaluate their energy strategies. This is in view of the need for higher levels of incorporation of small-scale energy technologies in national energy policies and plans.

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5. Chapter Five: Energy Reforms in The Developing World: Sustainable Development Compromised?

Note on Chapter 5: This chapter is based on a paper (Paper 4) which has the same title. The paper is authored by Said M. Abdallah (the main writer of the paper and author of this dissertation), Professor Hans Bressers, and Professor Joy S. Clancy, all based at the University of Twente, the Netherlands. The paper has been published by the International Journal of Sustainable Energy Planning and Management Vol. 05 2015 41–56; [dx.doi.org/105278/ijsepm.2015.5.5](https://doi.org/10.5278/ijsepm.2015.5.5)

5.1 Abstract

Energy sector reforms with an emphasis on electricity growth have been taking place extensively and rapidly worldwide. Particularly, motivated chiefly by classical economics' standpoint of efficiency and market considerations, reforms have been made in the developed North. Models of reforms in the North have in turn been replicated in developing countries. However, questions arise as to whether the models used are suitable for the mostly rural and socioeconomically disadvantaged economies in the South. It is argued in this paper that a sustainability focused mode of reforms guided by futures studies is needed for such economies. Reforms taking place in Kenya and neighbouring countries are in particular examined from a sustainable future perspective; and appropriate improvements and further research are recommended.

5.2 Introduction

Development growth and human prosperity are heavily dependent on adequate supply, security, and efficient use of energy. With the growth, there is an ever rising demand for energy and challenges of ensuring adequate resources of the energy. Equally important is the need to ensure that the energy is obtained and used responsibly with low or minimal impacts on lives and nature. Progress in general therefore makes it necessary to constantly reform energy sectors in an effort to meet the energy demand and challenges. The oil shocks of the 1970s, which brought about unprecedented threats to energy security worldwide, are a particular example of challenges that can be faced. The challenge of oil shocks was in fact so critical that it forced a worldwide re-evaluation of the dependency on fossil fuels as a dominant energy source. Similarly, concern for environmental degradation and climate

change arising from use of fossil fuels, has been another challenge forcing search for alternative energy options from the late 1970s.

Electricity being the most versatile, efficient, and widely used form of energy has so far been given greatest attention in energy reforms. Therefore, electricity reforms have been almost synonymous with energy reforms, and for this reason approaches to electric power reforms are of particular interest in this paper. For decades, debate has been going on in respect of approaches and impacts of electricity supply industry reforms that have been taking place since the 1980s (see, for example, Pollitt [1], UNECA and UNEP [2], and Wamukonya [3]). As noted by Williams and Ghanadan [4], a major contention has been the applicability of models of reforms that are basically driven by economics, without sufficient attention to other critically important dimensions of inclusive development. The development envisaged here is one that is essential for sustainable growth of economies, especially for developing countries. Specifically, the reforms being undertaken need to satisfy the requirements of sustainable development, which according to Drummond and Marsden [5] and Davidson [6] Holling [7] and Roseland [8]-balances economic, social, and environmental interests of economies.

For developing countries, economic growth is undoubtedly of great importance as it is for developed economies. Electricity reforms specifically targeting the economic dimension of development are therefore of special significance for industrialized and non-industrialized countries. However, it should be borne in mind that poverty, uneven distribution of national income, and other social ills are some of the challenges facing developing countries that require critical attention alongside economic pursuits. For example, in comparison to affluent urban populations, rural and poor urban residents suffer high poverty levels and overpopulation ([9], [10] and [11]) Reforms need to recognize and make provision for such social imbalances; and social considerations that are important in institutional structuring need to be taken into account (see e.g. Roy [12], Helm [13]—Reddy [45], and Dubash [14]). Reforms in energy sectors require not only technological (economic) transformations but also institutional restructuring that take into full account social inclusion, as pointed out by Hvelplund and Lund [15]. In addition, the technological innovations that take place in the reforms should fully cater for present and long term (futuristic) social needs ([16] and [17])

From the works of Byrne and Mun [18], Bouille *et al* [19], and Florio and Florio [20], early power sector reforms largely ignored the considerable electricity supply related environmental degradation. This is despite the increasing environmental impacts associated with dominant fossil fuel and nuclear power generation. Interest in the use of renewable

energy and energy efficiency technologies which could reduce environmental degradation was secondary to the pursuit of economic efficiency—achievable by use of any technologies regardless of environmental consequences. Most notably, in developed economies there was wide availability of non-renewable resources like coal. This made it very attractive financially to generate power with non-renewable technologies. Following the same trend, fossil-fuel technologies were used to a large extent in developing countries as part of reforms that were replicated from the developed world {see e.g.Karkia *et al* [21], Reddy [22] and Mwasumbi and Tzoneva [23]}. The replication was done notwithstanding the fact that fossil-fuel resources have to be imported in most developing economies. The relatively high abundance of renewable energy resources in the economies was also not taken into account.

As energy reforms with a sustainable development focus are considered, it is important to bear in mind that the development is concerned about inter-generational equity. Therefore, the reforms like the development need to be informed by a futures philosophy. This derives from the Brundtland Commission Report (WCED [24]) conception of sustainable development, which was supported by Simon [25], Mebratu [26] and Jabareen [27]. According to the conception, sustainable development ensures that the needs of present generations are met without compromising the ability of future generations to meet their own needs. From this standpoint, a futures pathway is important for guiding energy sector reforms. Taking this into account, futures studies would be especially useful for the energy reforms. It is noted by Futures scholars including Bell [28] and Inayatullah [29]), and Wangel [30] that the studies systematically explore probable and desirable future positions and pathways from the present to those positions. Other Futures analysts like Dreborg [31], and Vergragt and Quist [33] see sustainable development as an optimum form of development for the world, and in particular for under-developed societies.

Initial electricity reforms models were largely designed with industrialized economies in mind; and the countries that pioneered in the reforms include England and Wales, some states in the USA, and Norway. Chile which is a developing country was also a pioneer and stands out among the early reformers [34]. The most common models entailed restructuring power sectors through vertical and horizontal unbundling, takeover of some or all the unbundled units by the private sector, deregulation, and encouraging competition among players in the sector. From an economics perspective, reforms that were undertaken had generally positive impacts in industrialized countries; including freedom of choice of suppliers, and better overall quality of services [35].

On the other hand, the dominant models were introduced to developing nations and some countries in transition, mostly by the World Bank as part of their power sectors strengthening strategies. The main objectives of reforms in these countries were to tackle poor management of power utilities, contain perverse shortages of investment that led to severe power shortages and poor infrastructure maintenance, and address failure to recover costs arising from electricity under-pricing [36]. As such, the reforms were broadly aimed at improvement of economic performance, and at the inception of first reforms economic efficiency was uppermost in the reform agenda. Issues like social and environmental wellbeing that are key for sustainable development in low income developing countries were not given much attention [37].

Resulting from the reforms that were applied in developing countries there were indeed recorded gains in efficiency of operations and financial soundness of some power utilities; and in a few cases electricity access expansion was realized as part of a social equity goal [38]. However, at the same time there were significant negative impacts. As Mebratu and Wamukonya [39] and UNECA and UNEP [40] observe, the latter impacts included deterioration of socio-economic conditions through:

- 1) Raising of prices and making power increasingly unaffordable to large sections of populations which are made up of the poor,
- 2) Focusing more attention on urban power supplies and not giving necessary priority to electricity access to rural areas where majority of people in developing countries live
- 3) Job losses for power utility employees, 4) Increase in the use of power generation plants running on fossil fuels with resulting increases in greenhouse gas emissions.

Overall, the people most affected by the adverse consequences of the reforms were the dominant populations in developing countries –largely made up of the poor in rural areas and economically deprived urban dwellers. Similarly, it was recognized that social factors require attention in developed economies' energy sector reforms. For example, studies by Lund and Hvelplund [41] have underscored the need for employment creation as a social contribution to economic reforms taking place in developed world energy sectors. Therefore, for all countries involved in electricity reforms, and particularly in developing economies, it became evident that the initial approach to reforms had to be reconsidered. Factors other than economics, including to a large extent social considerations, were given more weight in later versions of reforms.

One critical aspect of electricity supply policy that could ensure social inclusion is the design of electricity tariffs at end-user (retail) and bulk supply (generation or transmission) levels. This is as shown in studies by e.g. Cecelski et al [42], Waddle [43], and Cunha J. and P. Pereira [44]. The tariffs need social protection mechanisms that could cushion poorer members of society from pricing that makes electricity unaffordable to the members. To achieve the protection, tariff levels should not be left entirely to market forces as expected in full liberalization that comes from ideal electricity reforms. In this scenario, a regulator is needed for regulation of the tariffs. Such regulators have been increasingly established as part of energy reforms undertaken by national governments or sub-national governments especially in developing countries (see e.g. Rygg-[45] and Bouille et al [46])

An extensive examination of the wide subject of electricity reforms is outside the scope of this paper. The focus here is on those aspects of the reforms having a bearing on the development of energy that could improve the socio-economic conditions of the large populations in rural and poverty-laden urban areas, particularly with regard to provision of electricity to the populations. Towards this end, Kenya has been selected for study, and the main questions that will be addressed by the paper are:

1) Do electricity supply industry reforms and energy policies guiding the reforms in Kenya give due recognition to importance of energy provision for sustainable development? ,

2) What elements of reform require strengthening for enhancement of sustainability?

It is recognized that electrification leading to sustainable development can only succeed when undertaken as part of integrated energy growth, including non-electrical forms of sustainable energy. Therefore sustainable rural energization (holistic provision of energy), where electrification is a major component, is the broad vision targeted by this paper.

Case study evidence that is examined in the paper is especially drawn from Kenya, and partial evidence is obtained for comparison purposes from Tanzania, Rwanda and Malawi. These countries were selected by purposive sampling to fit in with other work that the main author of the paper did in Africa. Through a qualitative approach, the evidence was collected and analyzed during field research that the author undertook. The research was mainly carried out in the indicated east-central African countries; and it involved data obtained from a broad spectrum of stakeholders including actors involved in policy, commercial,

professional, research, and community development. Personal interviews were the main means for data acquisition, and further data was obtained through content text analysis from academic and grey literature, as well as from other information dissemination sources.

Based on an interpretive research approach, the data collection and analyses were informed by a desire to avoid reductionism as much as possible, and attain wholeness generally targeted by the interpretive research tradition. Quantification as used widely in reductionistic methods has therefore been largely circumvented. By keeping the size of the unit of analysis small it has been possible to carry out valid qualitative evaluations without the aid of quantitative methods.

5.3 Why Rethinking of Reforms and Rural Electrification is Imperative

For a clearer understanding of why a new approach to reforms in developing countries is needed, and the key role of rural electrification in the required reforms, three main theoretical perspectives are examined: Institutional change for economic enhancement, incorporation of social and environmental elements in reforms for balanced development, and fostering sustainable development through appropriate rural electrification. A futures study perspective for energy policies that could support suitable electricity reforms is also considered.

5.3.1 Institutional Change for Economic Enhancement

The primary goal of the institutional transformation behind the reforms was a gearing up of economic or productive efficiency within the electricity sectors. Following Newbery [47], in the developed economies, the need for raising the level of efficiency was acutely felt in the wake of the oil crises of the 1970s. As a result of the crises, there were huge increases in energy prices and there was requirement for better deployment of the excess capacity that was invested in fossil fuel facilities. At the time, the electricity supply industry was dominated by vertically integrated state-controlled utilities, the performance of which was increasingly found wanting. The same arguments apply to developing nations, where the power industry was fashioned along the lines of the industrialized counterparts. However, in addition to the problems faced in the advanced economies, utilities in developing countries faced problems of outright mismanagement; shortage of investments for system expansion, operations and maintenance; and uneconomic pricing of electricity leading to under-recovery of costs and shortage of revenue.

From an economics theory point of view, it was reckoned that necessary reforms in the power sectors could be achieved through privatization, competition and regulation; as noted by, Dubash [48], Byrne and Mun [49], and Florio and Florio [50]. By privatizing power utilities, it was expected that among other improvements private sector level of discipline would be introduced, dependence of the utilities on public funding would be removed, political controls would be minimized, and electricity users would have greater freedom of choice of suppliers. Furthermore, competition would increase efficiency by providing incentives for better performance and survival in the market, and a clear beneficiary of the competition would be the electricity user through better prices and quality of services.

Overall, efficiencies in the power sectors would be stepped up by enhanced regulation, as better standards and quality of power supply would be formulated and enforced by regulators. This would be especially important due to entry into the sectors of a greater number of players, and more diversified interests among the players. Regulation would be particularly necessary for two groups of players: power utilities and electricity consumers. While on one hand power utilities would require regulatory protection for their large and sunken investments, and would need guarantees of fair competition; on the other hand electricity users would require fair pricing, quality of services assurance, and a general first line of electricity related arbitration.

It is from the above ideals that electricity reforms models were designed, and the models were applied across the board in most countries, starting with the industrialized ones, and then with little modification to countries in transition and developing ones. It is easily understandable that the reforms worked well in the industrialized economies, as the advanced level of market dynamics there could easily fit it in with models that are narrowly focused on free market principles. The reality is however different in developing countries, where public interest is still way above private interest. This is why in most African countries, and generally in developing countries, no single case of electricity reforms has been fully implemented according to this model [3].

5.3.2 Incorporation of Social and Environmental Elements

In most developing countries public interest is synonymous with the welfare of the majority who are generally poor people or low income earners. For instance in the case of sub-Saharan Africa and South East Asia where there is the highest concentration of least-developed economies the percentage of people living below 2 US Dollars (USD) per day is

close to 80 per cent [51]. Therefore, for such countries the social equity dimension of development is critical and any reforms that have a bearing on development need to address the plight of the socially disadvantaged bulk of their populations. With this in mind, electricity reformers have increasingly incorporated regulatory mechanisms for enabling creation of safety nets for the poor, to cushion them against the impacts of power sector reforms [52].

As issues of the poor are addressed, the fact that there are strong inter-linkages between the poor and the environment requires attention [53]. The environment is one of the most important resources for poor people. For example, from the environment the people can and do obtain most of their basic energy requirements; for example woody biomass and its bi-products constitute the leading source of energy for cooking in developing countries. From the environment, some key renewable energy sources like hydro-power, wind-power, and bio-energy could be obtained. With this in mind, by proper design of electricity and energy reforms generally, optimization could be achieved in the use of the environment for the benefit of the poor and whole economies. Simultaneously, negative impacts that occur with wrong use of the environment could be redressed by for example finding alternatives to traditional biomass energy use and lessening pressure on forest and other biomass resources. Sustainable or alternative forms of energy would not only be a relief for the environment, but their production could provide a major input into employment opportunities that could alleviate poverty among rural and similar populations. Overall, sustainable development potential could be realized with small people-centred sustainable energy sources like small-hydro power facilities in decentralized grids [54]

In view of the importance of incorporating social and environmental elements into electricity reforms, there is concurrence with Dubash [55] that a sustainable development approach to the reforms should be adopted. Acosta *et al* [56] and Nilsson *et al* [57] also argue from a futures studies perspective that a desirable future is where energy policies target achievement of sustainable development; and indirectly they advocate for electricity reforms guided by such policies. The context of sustainable development envisioned is where proportionate attention is given to economic growth, social advancement, and environmental soundness. This is as envisaged by theorists like Drummond and Marsden [58], Davidson [59], and Atkinson *et al* [60]; and from their theoretical works sustainable development is understood synonymously with sustainability. The view of electricity or energy in purely economic terms is contested by David Nye [61], who stated:

Electrification is not an implacable force moving through history, but a social process that varies from one time period to another and from one culture to another.

5.3.3 Rural Electrification for Sustainable Development

Low income developing countries generally have scanty availability of electrical power and other forms of modern energy, with rural and poor urban sections of the countries being most severely affected. While rapidly industrializing countries like China have electrification levels of nearly 100 per cent, the low income ones that are mostly in sub-Saharan Africa have national averages of about 30 per cent and less than 14 per cent in rural areas [62]. This is in spite of the fact that the largest proportion of populations in the low income economies is rural. Therefore, rural electrification, especially using off-grid renewable energy sources could be a major input into socio-economic development in the economies. As such, meaningful electricity reforms should have service to rural residents as a key objective.

One of the main reasons why rural electrification in poor countries is so grossly inadequate is the common tendency of providing power from central grids, even when such a supply approach is clearly uneconomical due to the large distances involved. Because of the concentration of economic activities in urban centres, first priority in electricity provision is usually given to these centres. As a result, the central grid has good coverage of areas where the centres are located; and conversely, the farther the distance from the urban setups the lower the level of supply of power. The level of access to electricity is therefore very low in rural areas and the large populations in these areas substantially have no electricity services. Additionally, similar populations living in impoverished urban habitats are equally affected.

The low availability of electricity in rural areas has particularly been noted by The World Bank [63] which also indicates that where off-grid supplies have been given there has been a tendency of generating power from oil-based fuels like diesel, which are imported into the countries and transported to generation sites at very high costs. Overall, therefore, the feasibility of electrifying rural areas through off-grid systems and energy resources available within rural localities is being increasingly sought; and in addition use of other rural resources like human and industrial capital is being explored. Electricity reforms that aim at sustainable development accordingly need to take these considerations into account.

When considering rural electrification for developing countries, account should be taken of the fact that rural dwellers are mostly poor and form the majority of national populations. These rural residents have therefore low electricity requirements of the order of less than one KW per household on average (see e.g. Zomers [64], and Barnes [65]). The electric power that the residents need is mostly for lighting and powering small appliances like radios and battery chargers. Only in a few cases are the residents able to afford electricity for productive uses (e.g. pumping of water for domestic purposes and irrigation, and chaff or fodder cutting). Because of the low power requirements it is possible to utilize low-level technologies such as solar PV for meeting the requirements. Off-grid solutions are therefore appropriate for the residents, and costly central grid extensions are unnecessary. It is noteworthy that studies by e.g. Custet al [66] have shown a high willingness to pay (WTP) for off-grid energy technologies among the residents, compared to WTP for central grid extensions --which could in any case be unthinkable due to very long distances to nearest points to the grid.

The Alliance for Rural Electrification [67] observes that the pursuit of localized electrification is largely directed towards exploitation of renewable energy sources, chiefly solar energy, wind power, small hydropower, bio-energy, and geothermal energy. Given that these renewable forms of energy (renewables) have minimal local and global environmental impacts, they are useful for not only providing energy that can be perpetually replenished, but also for ecological protection; thus ensuring overall sustainability. As such, the renewables are where possible deployed for rural electrification together with local labour and management. Rural industrial resources that include for example manufacture of power supply equipment, and power produced by local industries, could also be used. Ultimately, electrification carried out with such use of local or rural resources contributes considerably to sustainable development; and electricity reforms aligned to the development require a strong energy localization element.

Sustainable development in rural areas requires adequate energy inputs not only from electricity, but also from other sources as well. Electricity is important for enabling productive uses such as water pumping, irrigation and grain milling which spur socio-economic development. However, heat and mechanical forms of energy have greater priority especially for basic livelihoods in homes. From this standpoint, for achievement of sustainability rural electrification should be part of an integrated energy intervention strategy —embracing all important forms of energy. Recognizing this need for total energy provision, development analysts (e.g. Bawakyillenuo [68]) advocate for rural energization rather than rural electrification. At the national policy level, some countries have also seen the need for

carrying out electricity reforms as part of national energy policy reforms where rural energization is targeted. The level of success of electricity reforms towards attaining sustainability could therefore be gauged through the extent to which non-electricity energy reforms complement electricity reforms.

5.3.4 Pursued Versus Ideal Energy Policy Futures

Corporate and institutional development strategies are increasingly employing futures studies methodologies in their planning processes. The strategies have gradually shifted to back-casting from forecasting methods that rely on probable scenarios for facilitation of selection of the most likely future, and taking action on the basis of the selection, (see e.g. Robinson [69]. According to Dreborg [70], and Vergragt and Quist [71], back-casting is a futures study process that aims at minimizing uncertainties of possible futures. Instead of leaving the future to chance, in the back-casting method decisions are made on what a desirable future should be, then strategies are systematically worked out to achieve the future. Therefore, it can be seen that the method provides the genesis of what is popularly referred to as a corporate vision—a future goal that the corporate entity strives to achieve through strategic planning. Furthermore, as Sardar [72] and Vergragt and Quist [73] argue, futures studies such as back-casting are strongly anchored on current actions for shaping the near or distant future. Therefore, the methods can achieve better results since actions that can be taken at present are relatively within human control, and sustainability or sustainable development which is premised on long time horizons would be easier to attain.

Energy policies and investment projects have long planning horizons and considerable complexities which make them amenable to back-casting processes ([74] and [75]). As a result, there is an increasing number of energy policies with visions and planning processes based on the back-casting concept. In addition, incorporation of a sustainability objective in energy policies is a growing practice. Ostergaard and Sperling [76] have especially noted that at the global scale unsustainable energy demand and carbon emissions need to be addressed, through among other things an appropriate planning framework. Back-casting which is becoming increasingly common could provide the required framework. However, Nilsson et al [77] and others have noted that political factors in energy policy-making have been responsible for policy designs and implementations that are not fully in conformity with back-casting expectations. Major aspects of energy policies like electricity reforms have consequently been less than ideal seen from a futures studies viewpoint. Evidence of this is provided in the next section, specifically in the case of Kenya.

5.4 Reform Approaches in Specific Countries and Enabling Energy Policies

5.4.1 Electricity reforms in Kenya and other African countries

Although as indicated by Karekezi and Kimani [78] low income countries of Africa have adopted electricity reforms differently, common trends have been observed. Following Gratwick and Eberhard, [79]; UNECA and UNEP [80] and Wamukonya [81] it has been noted that the general pattern of reforms includes components implemented in different sequences according to national preferences; and in certain cases some components or elements are omitted. The elements to a large extent include: Energy policy establishment or review; enactment of enabling electricity legislation, setting up an energy or electricity regulatory body and framework; restructuring of national power utility (usually vertically integrated) and a management contractor may be involved; entry of private participation into the power supply industry, especially in power generation (by Independent Power Producers or IPPs); upward adjustment of power tariffs; and setting up a rural electrification or energy body. Depending on which elements are implemented and the extent of implementation the reforms undertaken can contribute proportionately to sustainable electrification and development, or sustainability. In the remainder of this section, implementation of reforms in the study countries is analyzed with a focus on finding out how well the reforms could contribute to sustainability.

Tables 5.1 and 5.2 give a summarized picture of the electricity reforms that have been undertaken by Kenya, which is the main study country; and the three other east-central African countries that are included for comparison purposes. The latter three countries are Malawi, Rwanda, and Tanzania. In the tables, approximate comparisons are made of the levels of measures taken towards the reforms. Specifically in Table 5.1, a breakdown of the electricity reform elements is given, and it is seen that Kenya has implemented the highest number of elements, while Malawi has the least number. Although Rwanda and Tanzania have done less than Kenya, they have elements that are likely to foster rural energy sustainability to a greater degree than Kenya has. Examples of these elements are:

- 1) Integration of electricity regulation with regulation of utilities in other economic sectors, for example water;

2) Having an independent body responsible for electricity and other forms of energy in rural areas.

To a small extent, Rwanda's rural energy sustainability is likely to be eroded by relatively high power tariffs, which are highest among the four countries studied. Absence of an independent body for rural electrification or energy is also a downside for Rwanda (see Note 2 in Table 5.1 for an explanation of this factor).

On the specific aspect of sustainability, the four countries are compared in Table 5.2. In these comparisons, it is evident that Kenya has had the best achievements in measures for national power capacity expansion and reduction of capacity deficits. The country has also done best in promotion of large-scale renewable energy use for national power demand fulfillment, in part employing a Feed-in Tariff strategy. However, the renewable energy sources are to a very large extent used for power fed into the central grid. If the same level of attention had been given to small-scale renewable resources, the highest power benefit would have been gained by rural areas where the resources are largely found. For Rwanda and Tanzania, there are also intensive efforts to meet national power demand needs, but Rwanda is more successful in this respect. Use of renewable resources is additionally more pronounced in Rwanda.

	KENYA	MALAWI	RWANDA	TANZANIA
1. Energy policy formulation				
a. Original made within the last ten	X	X	X	X
b. Revised once in the last ten years	X			
c. Revised twice in the last ten years			X	
2. Legislative framework setting	X	X	X	X
a. Original made within the last fifteen			X	
b. Revised at least once in the last				
3. Restructuring of national power utility	X	X	X	X
a. Internal reorganization done	X			
b. Unbundling to separate bodies done	X	X	X	X
c. Private sector allowed in power	X		X	X
d. Private power generation achieved	X		X	X
e. Management contract established				
4. Regulatory framework setting (Note 1)		X		
a. Solely for electricity	X			
b. For energy generally				X
c. For water and electricity			X	
d. For utilities generally				
5. Rural electrification and sustainable				
a. Rural electrification in energy		X		
b. Rural electrification by national			X	
c. Separate body for rural	X			X
d. Large-scale renewables (less large	X		X	
e. Rural electrification with renewables	X		X	X

Table 5.1: Key elements of electricity supply industry reforms
(Authors compilation)

TABLE 5.1 NOTES

1. Where regulatory reforms involve as many energy forms as possible, and where non-energy utilities are included as the regulators' mandate, higher levels of sustainability could be expected

2. Rural electrification in a government ministry could suffer from bureaucratic barriers; and if included in national power utilities commercial interests of the utilities could override electrification efforts. Standalone bodies for electrification are therefore more desirable. Similarly, electrification would lead to greater sustainability if renewables are used and small-scale technologies are given priority alongside the large-scale ones.

ACHEVEMENT OF POLICY MEASURES	MAGNITUDE			
	Kenya	Malawi	Rwanda	Tanzania
Power capacity deficits reduction	XXX	X	XX	X
Electricity tariffs increase	XX	X	XXX	XX
Electricity access expansion in rural areas	XX	X	XXX	XX
Off-grid power development	XX	X	XX	XX
Inclusion of renewable energy in total electricity supply mix*	XXX	X	XX	X
Application of renewables Feed-in tariffs	XXX	N/A	XX	XX
Deployment of rural people and resources for power provision	XX	X	XX	XX
Development of complementary non-electricity renewables	XX	X	XXX	XX

Table 5.2: Levels of attainment from measures towards sustainable electrification and development
(Authors compilation)
 KEY: X = Low, XX = Medium, XXX = High
 *Besides large hydropower contribution

Overall, specific stimulus for sustainable rural electrification and development is indicated by a) achievements of measures towards electricity access expansion; b) use of rural people and resources for direct benefit of rural dwellers; and c) development of non-electricity forms of renewable energy. In all these respects Rwanda has the best rating followed by Kenya and Rwanda at nearly the same level, and Malawi trails all the other countries.

5.4.2 Enabling Energy Policies with Specific Reference to Kenya

The study done for this paper revealed that for Kenya and East-Central African countries substantial energy policies for enabling electricity reforms were largely absent when the reforms commenced. As indicated at the beginning of this paper, the reforms were mainly informed by dictates of external influences, such as World Bank prescriptions for energy sector reforms in developing countries. Increasingly comprehensive energy policies were designed and implemented in the course of electricity reforms, in part to anchor the reforms in a policy framework. This is why energy policy reviews are included as part of electricity reforms described in the preceding subsection of the paper. Energy policies have continued to grow as reforms have progressed. After start of Kenyan electricity reforms in 1997, the first fully fledged energy policy was enacted in 2004 [82] and the latest (2014) policy is in the last stages of formulation [83]

As the Kenyan energy policies have evolved, they have gradually embraced a vision with a growing sustainable development objective, and from analysis of their intent they seem to have been guided by a futures studies perspective. However, the sustainability aspect of energy policy visions appears to be partially blunted, largely by some continuing outdated planning practices that do not conform to futurist (futures studies') ways of thinking, and political distortions. Evidence in support of this contention includes:

- a) THE RIGHT VISION FOLLOWED BY A SLOW OR SKEWED IMPLEMENTATION characterized the 2004 Kenya energy policy. Drawing from the 2004 Government of Kenya policy document [84], the vision was: To Promote Equitable Access to Quality Energy Services at Least Cost While Protecting the Environment. Even without explicitly saying so, the vision had a sustainability focus, through intention of pursuing integrated social (equitable), environmental, and economic goals. However, two years after the enactment of the policy (in 2006), a report that reviewed planning for implementation of the policy had a statement from the minister in-charge of national planning saying:

“While we are proud of the progress that has been made, we are aware that our policies and planning processes have not been able to fully integrate all the dimensions of sustainable development. There has been a tendency to focus more on economic development and comparatively less on social and environmental dimensions. Yet, if we are to achieve the Millennium

Development Goals (MDGs), an adequate level of integration is critical”
(UNEP [85])

Another part of the UNEP report implicitly indicates that traditionally there has been an absence of a Futures Studies perspective of planning, especially in relation to energy policy. In particular, the revelation was in the statement:

“There are considerable weaknesses in Kenya’s energy planning with no systematic attempts to undertake integrated processes. Most energy projections in Kenya, with the exception of electricity have relied on historical growth”
(UNEP [86])

- b) SOME SUSTAINABILITY FOCUS GAINS WERE LOST in the 2014 incoming energy policy, and in other government strategies. According to the policy document [87] the vision is: Affordable Quality Energy for All Kenyans. Although the vision is strong on the economic dimension of development, and has an element of social equity, it is silent on the environmental aspect of development. It may be rightly argued that the mission statement and body text of the policy have important considerations for strengthening sustainability and a Futures Study perspective. For example, the policy underscores stakeholder participation in policy making. Additionally, decentralized planning and development processes are emphasized, and use of more environment-friendly technologies is targeted. However, the policy’s main thrust is accelerated expansion of energy supply, with its key objective being provision of adequate electricity for industrial development. Large-scale renewable energy and fossil-fuel technologies are expected to be the main source of power. Little consideration is given to sources of energy that could spur socio-economic development for the underprivileged majority of people, who heavily rely on biomass and other small-scale technologies. Environmental concerns are also given low level priority.

While the 2014 energy policy is undergoing finalization processes, a short-term strategy for rapidly up-scaling the current national power production by three-folds is underway. The politically-driven strategy, like the proposed 2014 energy policy, is substantially economics-centred; and aims at raising the national power capacity by 5000 MW within the period 2013 to 2016 [88]. Importantly, the additional capacity is expected to be installed during the term of the current government, while

implementation of the major national projects for which the capacity is designed will take much longer. Critics therefore argue that there will be stranded capacity and investments immediately after completion of installation of the additional power. What has become clear is that no systematic studies have been done for the strategy. Furthermore, the futures studies' approach to energy planning and policy making that has been gaining ground in the country is in this strategy largely disregarded for political expediency.

5.5 Discussion

In summary, the analysis done indicates that initially electricity reforms in developing countries were largely based on market considerations and were mostly prescribed in the context of international development assistance. During implementation of electricity reforms in under-developed countries it was found necessary to reshape the reforms to cater for sustainable development requirements that have a much lower priority level in the developed world. Elements of the reforms such as rural electrification with a strong social focus and that are mindful of environmental concerns were gradually but in a limited way prioritized. At the same time, need was appreciated for energy policies for guiding sustainability targeted reforms for energy generally and electricity in particular. Therefore, as electricity reforms progressed, design and implementation were done for energy policies that follow a path to sustainability, as advocated by futures and other studies

In the particular case of Kenya, electricity reforms have been undertaken as part of wider energy sector reforms and have progressed relatively rapidly. Most attention has, however, been directed towards meeting the fast rising national power demand, and significant electricity price rises have been implemented as part of electricity reforms. Nonetheless, the price increments have not been sufficient to meet power investment demands. Upward adjustments in prices to cater for the required investments have generally been opposed by stakeholders. Power users and those concerned about their wellbeing, have particularly been apprehensive of reduced power affordability and resulting erosion of socio-economic standards for the general population. Implicitly, there has been concern that the reforms would have negative consequences for sustainability, especially in the social dimension of sustainable development.

Again for Kenya, rural electrification and renewable energy have been given increasing attention in efforts towards expanding electricity access. However, grid-based electricity

supply has been the main means of electrification delivery, requiring large investment capital at the expense of off-grid electrification. Additionally, renewable energy has been promoted, but with low priority being placed on small-scale technologies. Low prioritization of the technologies which are appropriate for sustainable rural electrification and development has been a significant factor in slow growth of sustainability.

Overall, the electric power reforms in Kenya which have been implemented and are ongoing are certainly comprehensive. This is particularly true in respect of fulfillment of power capacity needs for industrial development. From this perspective, Kenya provides important lessons for other countries of sub-Saharan Africa and specifically for Tanzania, Rwanda, and Malawi considered in this paper. The importance being placed by Kenya on rural electrification and renewable energy is also noteworthy. Nonetheless, the Kenyan energy policies and strategies that are shaping electricity reforms are heavily skewed towards the economic aspect of sustainability. Energy policies and strategies could benefit significantly through reforms' lessons from the other countries that have been studied. In particular, the countries have addressed social and environmental concerns of sustainability, and there are useful lessons for Kenya in this regard.

It is also evident that in Kenya small-scale renewable technologies, and off-grid electrification, are of secondary importance despite their capacity for accelerating sustainable development. Therefore, Kenyans could learn from countries like Rwanda which have prioritized the technologies and the off-grid approach to electrification. The lessons include: i) A proportionate mix of on-grid and off-grid electrification approaches; ii) A wide application of small-scale renewable energy sources that are available in rural areas and compatible with off-grid electrification; and iii) Concrete strategies for government supported biomass technology application strategies. It is acknowledged that Rwanda's example is not yet a best practice case, but the example is an indicator for Kenya to seek and apply electricity reforms that more soundly support sustainable development.

Kenya's electricity supply industry reforms provide a good indication of attempts at replicating models of such reforms as found in many countries of the developed world. The Kenyan reforms also serve as an example for those seeking to make models focused on economic efficiency more compatible with sustainable development. Clearly, the endeavour to align the models with sustainability is not an easy one and many trade-offs are required. To a large extent, due to challenges of the alignment, Kenya is still way behind in achieving electrification that can spur sustainable development. For achievement of the sustainability

goal, the country will need to elevate the level of priority of sustainability-driven rural electrification and related energy enhancement strategies. This will require a scale-down of the current high prioritization of national power capacity expansion, which is at the expense of sustainable electrification that could serve the majority population residing in rural and poorer parts of urban areas. Rwanda, which has a modest level of electricity reforms, has some lessons that could benefit Kenya in the reorientation of the prioritization.

It is also evident from the findings of this paper that there is critical need for policies and institutions that could support energy growth with a sustainable development end-goal. In the case of Kenya, there is a dynamic growth of energy policies and institutions generally. However, sustainability seems to be a peripheral consideration in pursuit of the growth. A similar situation exists for the other countries explored in this paper, but Rwanda is doing better than all the others. In all cases, it is deemed important for a clear strategy for creation and implementation of sustainability targeted policies and institutions. National governments with support from the international development community and local NGOs should spearhead the strategy at country level. Then, where there are sub-national governments, such as in Kenya, the national strategies could be replicated at the local government level. In the latter case, local NGOs and grass-roots organizations should be deeply involved in the strategy making and implementation

5.6. Conclusion

Of great importance is the need for Kenya energy policy makers to fully adopt and keep on the track of a policy making approach informed by futures studies. Political pursuits that are forcing the policy making away from the approach would need avoiding or minimization. In the work done for this paper, the scope was not wide enough to cover energy policy practices in a sufficiently large number of countries to facilitate generalization of findings. Nonetheless, from anecdotes that the authors have encountered in their work, it can be surmised that political distortions in energy policy making process are not unique to Kenya. Further research is recommended for confirmation or giving other observations about the assumption; and subject to the confirmation, what has been suggested for Kenya could be extrapolated to the general case. On the other hand, we agree with Nilsson et al [89] that futures studies should also be developed sufficiently to be able to take into account unavoidable political interests in the policy making. Policies and strategies guided by the studies would be more robust if inevitable political factors are duly acknowledged and internalized.

This paper has mostly been based on evidence of successes and failures in electricity industry reform measures that have been undertaken in the study countries. It is recommended that further research is done to fully evaluate impacts of the measures. Outcomes of the research could give a stronger indication of successes and failures of the reforms and modifications needed to achieve a higher level of sustainability, and appropriately inform energy policy making. Nevertheless, the pointers provided in the paper could provide important inputs for policy and academic work relating to electricity supply industry reforms in a Kenyan and sub-Saharan Africa context. Furthermore, energy policy making needs to be studied more broadly to find out the extent to which futures studies' perspectives have been adopted. Such research could enable advancement of adoption of futures studies' approaches to a greater extent than is the case at present. The research could also facilitate adjustment of analytical processes in the studies to take into account unavoidable factors like political influences in energy policy making.

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5.8 Chapter 5 References

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6. Chapter Six: Overall Discussion and Conclusion

This concluding chapter starts by with summing up of the results of the four sub-studies that were undertaken; and integrating the summaries with the background information provided for the overall dissertation study. This integration paves the way for answering the main research question, which is the centrepiece for the discussion in the next section of the chapter. Equally importantly, the discussion is used as a basis for informing suggestions for future energy and sustainability actions. The actions are included in the following section, and further given in subsequent sections as policy and research recommendations respectively. In the final section of the chapter, the dissertation author concludes with self-reflection taking into account his pertinent lived experience and possible future actions that could arise from the dissertation study.

6.1 Summary and Integration of Results

6.1.1 Results of sub-study 1 (paper 1 in chapter 2)

For purposes of this dissertation study, this sub-study aims at answering the research sub-question:

How could building and using social capital, with social institutional innovations from external and internal sources enable successful accomplishment of Kenyan electrification for sustainable development?

For background information, literature reviews were done to trace relevant history of rural electricity cooperatives (RECs), as conveyers of social capital benefits for sustainable development. Successes and failures of RECs and factors that determined performance of the cooperatives were analyzed. Then, against this backdrop, investigations were done for Kenya in particular and generally for three similar African countries (Tanzania, Rwanda, and Malawi.). RECs as formal organizations have not existed in any of the four African countries. However, semi-formal community organizations not based on cooperative principles have in a few cases been used for user-owner electrification. Investigations were, as a result, conducted to explore the feasibility of starting RECs. Specifically, the possibility of harnessing social capital was examined. This was with a view to finding out whether socially deprived populations could be cooperatively engaged in providing their own electricity.

The USA was a pioneer in RECs during the 1930's as indicated in electrification literature (see e.g. Matly, 2005; Barnes and Foley, 2004; and Zomers, 2001). Rural communities were mobilized to form and develop RECs, thereby deploying the communities' social capital for electrification. The cited literature further reports that USA RECs were generally successful in providing and enhancing usage of electricity in rural areas. The achievements were such that the USA REC model became attractive for and were adopted in developing states, especially in Asia and South America. Specific countries that strongly embraced the model were Bangladesh, Costa Rica, and the Philippines. As detailed in Chapter 2, the latter countries had mixed RECs performances from a perspective of rural electrification benefits and resultant social progress for affected populations. Countries like Bangladesh and Costa Rica had positive gains from RECs; but REC experiences in countries like Philippines were not positive. (see e.g. Barnes and Foley, 2004; and Anonuevo, 2012)

In the sub-study undertaken here, it became evident that producer cooperatives are common among farmers and SMEs in Kenya and in the other African countries studied. The principal function for the cooperatives is production and marketing in agricultural and small-scale general commodity sectors. There are also cases where the cooperatives are employed in small-scale financial services, entailing non-bank savings and loans transactions. It was argued in the sub-study that the same concept of producer cooperatives could be used for RECs, and therefore the existing cooperatives were analysed. In the analysis, it was found that apart from cooperatives involved in financial services generally the cooperatives faced difficulties. . The analysis revealed that elite capture forces play a key role in the cooperative difficulties. This was the case in Kenya, and also in the other African countries that were studied. Governments and cooperative leaders have in many cases subordinated weaker cooperative members' interests to their own. Consequently, the producer cooperatives have been beset by many failures and the model has fallen into disfavour (Singh and Singh, 2013; Hedlund, 1989). It was therefore concluded that RECs could be started but would only be successful in Kenya if the negative aspects of social capital could be clearly identified and contained. From another perspective, Kenya could copy countries where RECs have been successful.

An important implication of the finding about Kenya's potential RECs is that social capital could be harnessed for RECs establishment in the country. The capital could be useful in successfully deploying RECs for electrification by and for the benefit of the rural (disadvantaged) population in Kenya. As found in the sub-study and pointed out in other parts of this dissertation, and to the detriment of national social progress, access to electricity

for Kenya's rural population, which is the majority, can be considered low—standing at about 7% with the average for SSA at 13% (International Energy Agency, 2015). The social aspect of sustainable development in the country can therefore be considered to be hampered by lack of access to electricity, in which the latter is seen by energy and sustainability analysts as a key indicator of energy for sustainable development deficiency (see e.g. Helm, 2002). In sum, the answer to the research sub-question pertinent to Sub-study 1 is: maximization of the positive elements and minimization of negative aspects of social capital could, to a great extent, enable successful accomplishment of Kenyan electrification for sustainable development. The deployment of social capital through RECs could be seen from the standpoint of a South-South knowledge transfer, where knowledge about successful use of RECs is transferred from countries like Bangladesh to Kenya. Internally within Kenya, social capital that has been positively deployed within successful producer cooperatives could be usefully applied for rural electrification. The capital could reinforce ideas of electricity cooperative innovations replicated from other countries.

6.1.2 Results of sub-study 2 (paper 2 in chapter 3)

This sub-study, in the context of the overall dissertation, aimed to answer the second research sub-question: *What role do cognitive dynamics play in the social dimension of Kenyan energy for sustainable development, and are the dynamics externally influenced?* Here, cognitive forces that shape understanding and behaviour towards energy for sustainable development (referred to in the context of this study as sustainable energy) are a key consideration. The investigations carried out in the sub-study therefore principally draw on social cognitive theory, especially in the form advanced by Bandura (1986). This strand of the theory, that places the environmental (here the meaning is the social context rather than the physical world) determinants of perceptions, attitudes and worldviews is most relevant for the sub-study. This is because the stimulus that shapes the way sustainable energy is viewed and acted upon by individuals appears to be external to the individuals; including for individuals in developing societies such as Kenya.

Drawing primarily on literature sources, (see e.g. Murphy, 2012; Cuthill, 2010; and Beg et al., 2002) it is evident that sustainable energy is viewed from an environmental lens in the North. This is in contrast to the view of sustainable energy held in the South, especially by those who stand for a socially oriented view of energy. However, the environment leaning view seems to prevail. This premise seems to be confirmed by investigations done in the sub-study. Specifically, evidence was obtained from the Netherlands as a country of the North;

and Kenya as a country of the South. It was clear from the field work that sustainable energy, in the sense of energy meeting economic, social, and environmental needs holistically, is a relatively new phenomenon in Kenya. On the other hand, from studies by e.g. Raven *et al* (2010), in the Netherlands energy has been promoted for many decades, but mainly for addressing economic and environmental concerns. Furthermore, through foreign aid support the Netherlands endeavours to stimulate sustainable energy use in Kenya. In the process, sustainable energy technologies are taken and popularized as a means for climate change (environmental) impacts mitigation. Poverty reduction, which is pursued by the North in the South, is generally taken as a social enhancement measure. However, in practice foreign assistance places is more concerned with climate or environmental impacts abatement than poverty reduction (see e.g. Michaelowa and Michaelowa, 2005; and Beg *et al.* (2002).

Through various influences, such as the above-mentioned development assistance, it would appear that energy policy in Kenya is generally built on a Northern perspective of sustainability. Consequently, environmental protection and care is a key theme in the policy. In this connection, it is worth noting that Kenya has recently discovered fossil fuel (oil and coal) deposits. The latest energy policy (GoK, 2015) includes these newly discovered energy sources as significant sources of energy production despite their negative environment impacts. The policy is, as a result, running counter to the environment-friendly narrative that is promoted by the Kenyan government with encouragement from the North. Policy measures taken by the government towards adoption of renewable energy are informed by a desire for replacement of fossil fuel energy with renewable energy. The contradiction between tapping into available fossil fuel energy sources and promoting environment-friendly energy sources is an indicator of cognitive dissonance (see Chapter 3) where practical convenience overrides belief in an ideal.

The sub-study found that the complementary factors that need to be taken into account include contextual interactions in policymaking and cognitive dissonance. The key interactions are, according to Contextual Interaction Theory (Bressers, 2004), those that occur among the actors taking part in making and implementing relevant policies. The theory argues that the interactions that shape and affect the implementation of policies are based on the policy actors' motivations, information and power. It is consequently reasonable to assume that the energy policy in Kenya is informed by the worldviews of actors from the North and by other worldviews that are informed by the interests of local Southern actors. Paradoxically, even as the local actors make and implement policies that are not entirely in agreement with environmental interests, they have to continue to show belief and faith in

environmental concerns. Hoben (1998) alluded to the fact that such behaviour is important, to ensure continuous flow of development assistance that is tied to care and protection of the environment. The local actors have therefore to strike a compromise in their policy actions, in conformity with the dynamic of cognitive dissonance –explained by Festinger (1957) as adjustment of beliefs to be in line with what is desired or convenient.

The important cognitive dynamics that have been identified in the sub-study are mostly associated with the environmental dimension of sustainable energy in Kenya. For example, it is common to come across energy development activities that are framed as environmental projects. This is as illustrated in Fig 1.5 in Chapter 1, where a renewable energy development proposal has a primary goal of climate change abatement. In Sub-study 2, it was generally shown that cognitive dynamics have raised the environmental dimension to prominence, with a notable emphasis in the context of energy policy. On the contrary, it is clear that corresponding social dynamics of sustainability in Kenya have largely been muted. The answer to the research sub-question posed in Sub-study 2 is therefore that cognitive dynamics have had the effect of promoting environmental awareness and care and, at the same time, have aggravated the neglect of social concerns. This is especially so in respect of environmental and social concerns relating to energy for sustainable development. External influences have contributed significantly to the cognitions responsible for enhancing environmental concerns while placing low priority on social concerns.

6.1.3 Results of sub-study 3 (paper 3 in chapter 4)

In this sub-study, the research sub-question being addressed in the context of the dissertation is: *How valuable are small-scale technologies for enabling the social dimension of sustainable development in the Kenyan context, taking into account externally induced perceptions of the technologies?* The research made an extensive review of the literature to obtain its theoretical underpinning, and to gather secondary evidence based on worldwide practices of the use of small-scale energy technologies for social advancement. From theoretical works, it was clear that technological systems that particularly facilitate social development need to adequately take social considerations into account as argued in Chapter 1 of this dissertation. Full incorporation of social considerations is however often overlooked; and technology designs and policies tend to be mostly focused on technical functionality to promote energy efficiency, reduce costs and environmental impacts (see e.g. Bauwens T, 2013; Agbemabiese L, 2009; and World Bank, 2008). An important consequence of the excessive technical focusing is that in countries where social

development is relatively marginal, most modern technological innovations are of little benefit. For example, electrical power technological systems are in many cases designed with advanced societies of the North in mind. The same systems are utilized by under-developed societies in the South; with the result that the systems do not appropriately serve the developmental needs of the South (see e.g. Byrne *et al*, 2014; Fressoli *et al*, 2011; and Agbemabiese L, 2009).

Again from theories and best practices in some countries, it has been shown that small-scale technologies can enhance socio-economic growth in developing countries considerably. Specifically, sustainable development simultaneously addressing economic, social, and environmental concerns in the countries could benefit substantially from the technologies. Against the background of this information, the sub-study examined how well small-scale energy technologies and systems are appreciated as possible sustainable development catalysts in Kenya. It was noted that Kenya is making significant advances in adopting large-scale energy technologies, especially for electrical power for industrial growth. Conversely, the majority of the Kenyan population is poor and rural; and chiefly uses traditional forms of biomass energy due to its inability to access modern energy. Little is being done at the policy level to improve access to the latter type of energy which is regarded as critical for facilitation of sustainable development (See e.g. Byrne *et al*, 2014; and Saidi *et al*, 2012).

The investigations carried out in Kenya indicate that there is little understanding among most energy sector stakeholders of the social significance of small-scale sustainability-enhancing energy systems (i.e. embracing both the technical and non-technical components). From interviews conducted for Sub-study 3, it seems that these types of systems are either not understood or consciously downplayed. It seems that the systems are generally deemed unimportant due to narratives that place advanced technologies used in the North at the forefront, and socially appropriate technologies that would be suitable in the South on the periphery. Thus, the answer to this sub-study's research sub-question is that small-scale energy technologies are valuable for the social dimension of sustainable development in Kenya. However, there is little appreciation of this value among Kenyans, and this limited worth attached to small-scale energy technologies can, to a significant extent, be attributed to the prevalent worldviews about such technologies in the North, which are adopted in the South.

6.1.4 Results of sub-study 4 (paper 4 in chapter 5)

For this sub-study, the applicable research sub-question is: *How important is rural electrification for the social dimension of sustainable development in the Kenyan context, particularly in view of electricity reforms promoted by foreign actors?* This issue was investigated firstly through a literature review, and then through empirical research. The review showed that energy reforms generally, and electricity reforms in particular, have been widely carried out. In essence, electricity reforms started in developed countries (the North), and reform models from the North then spread to developing countries (the South). Many of these models were designed around market considerations, and did not take into account the social and other non-market interests that are critical in the South and for a few but significant cases in the North. Specifically, sustainable development was given little or no attention.

The main focus of the sub-study was the empirical research, which was carried out in Kenya as a member of the South. Three other African countries (Tanzania, Rwanda, and Malawi) were also partially studied for comparative purposes. For all four African countries, electricity reforms were primarily analysed to identify measures for promoting electrification that could enhance sustainable development (SD). Results obtained indicated that initial reforms were broadly motivated by international development forces, chiefly led by the World Bank, which were concerned that electricity sectors in many developing countries were performing poorly and in need of reforms (see e.g. Williams and Ghanadan, 2006; World Bank, 2005; and Dubash, 2003). The reforms that were started were highly commercial in their orientation, and electrification that could be appropriate for SD was hardly considered. Gradually, however, the reforms were modified to take care of rural electrification requirements, for the benefit the bulk of populations in the countries –all of them primarily rural. Kenya, which is the largest of the economies studied, did not do as well in the electrification efforts as the smaller economies. Rwanda, the second smallest economy studied, performed much better than all the others in terms of levels of access. Moreover, it is important to bear in mind that although efforts for prioritization of rural electrification have been made by all the countries, rural electrification seems to lag behind overall national electrification.

As electricity reforms continued, it was evident that SD in an electricity context was not well understood and taken into account. While within the definition of SD used in this dissertation economic, social, and environmental interests are expected to be addressed equally, highest attention was placed on the economic interest of electrification. For example, the choices of

electricity models and technologies were mainly tailored for attainment of highest financial gains. Examples in this connection include: Centralized grid systems were preferred to off-grid systems; and large-scale energy sources, some of which are not renewable, were preferred to small-scale renewable energy sources. A most telling consequence of the rural electrification approach taken is that, despite large investments in trying to improve electricity access to rural populations, the access is still very minimal (sub-Saharan Africa average is 13% according to International Energy Agency (2015)). The social value of the electrification therefore continues to be low. Accordingly, the answer to the research sub-question of this sub-study is: the level of importance placed on the social value of rural electrification in Kenya is sub-optimal which results in a limited social enhancement for sustainable development. Driving forces that stem from the North clearly contribute to the low level of importance associated with the social value.

6.1.5 Collated Results

From the outcomes of the sub-studies carried out, there is uniformity of understanding that the social dimension⁷ of energy for sustainable development in Kenya is generally being seen and treated as a peripheral issue. This is singularly evident from a national policy and planning standpoint. In particular, the viewpoint of the social dimension is confirmed from the perspective of lack of socially inspired and cooperatively driven rural electrification. Equally, confirmation has been arrived at from the perspectives of cognitive forces at play in energy for sustainable development, small-scale and suitable energy technologies and systems, and electrification aspects of electricity sector reforms.

At the same time, the sub-studies show that there is significant influence from outside Kenya, affecting the way the social strand is taken into account. It is apparent from the sub-studies that much of the influence stems from developed countries of the North, where social issues in energy for sustainable development appear to be generally down-played.. On the other hand, it has been noted that there are some developing countries of the South that have sustainable energy initiatives with prioritization of social aspects alongside economic and

⁷As mentioned earlier in the dissertation, social here and in the rest of the dissertation document is used in the sense of a characteristic of people as individuals, groups of individuals, and relationships between or among individuals and groups. More specifically, the concept of social is as elaborated in section 1.3.1. In the dissertation, the term 'social components' is used interchangeably with the terms social aspects, elements, and dimensions, etc

environmental aspects. Kenya could benefit from such Southern initiatives. Specifically, it is reckoned that there could be positive influence from countries like Bangladesh on adoption of electricity cooperatives. Such influence from the South has however not occurred, probably because of absence of the right channels for South-South knowledge exchanges.

Based on the findings of the sub-studies, and with reference to points presented in Chapter 1 (background literature reviews and arguments), an answer can be given for the main research question: *How definitive is the understanding and actualization of social aspects of Kenya's energy for sustainable development?* The answer is: There is limited understanding and actualization of the social aspects of Kenyan energy for sustainable development among Kenya energy sector stakeholders; and the understanding seems to be informed by external agencies largely within the development aid field. The social aspects are lowly valued, just as is the case in many developed countries from where the external agencies and development aid emanate. It is reasonably clear that the latter countries have, especially through the medium of bilateral and multi-lateral assistance, substantially influenced the worldviews of the social dimension studied. Evidence obtained in the sub-studies indicates that the influence is especially exerted through development assistance actors from the North. These actors in turn pass the influence to Kenyans in general through Kenyan development policy makers and planners; and partly through civil society organizations dependent on the assistance. Ultimately, the generally socially excluded and majority population in Kenya suffers from pervasive lack of energy that is suitable for their livelihood needs and social advancement

6.2 Overall Study Discussion

6.2.1 Arguments following from results

Following the theoretical arguments in Chapter 1, and the findings from empirical investigations in Kenya, it is clear that divergent discourse coalitions exist virtually in respect of energy for sustainable development in Kenya. There are two key coalitions; the first one being the dominant economic-environment or Northern coalition. This coalition is at the international level substantially composed of actors involved in bilateral and multilateral development assistance, including national and international civil society organizations that depend on the assistance. At the national level, policy makers and planners are the most dominant members of the Northern coalition. According to the theory of Communicative Action [CAT] (Habermas, 1984), the international and national actors in the coalition can be

considered to be part of a system world that is guided by instrumental rationality. The rationality is characterized by linear, top-down, expert driven, and exclusionary (socially discriminatory) tendencies. For example, in Kenya, the apparent strong fixation with national energy initiatives that are large scale, predominantly electrical, mixed renewable and non-renewable, and mostly centralized and urban-focused, is consistent with instrumental rationality.

Social exclusion and neglect by central government are major afflictions suffered by Kenyans who are mostly rural and peri-urban citizens. Importantly, overcoming these afflictions could contribute to national sustainable development. The Kenyans are supported by international and national forces mainly consisting of members of civil society. The generally voiceless Kenyans and their supporters are here referred to as the Social-axis or Southern coalition, especially due to their mainly social and Southern concerns. The coalition would in the perspective of Habermas' theory (CAT in the previous paragraph) fit quite well in a Lifeworld, where communicative rationality is the key guiding principle. The latter rationality has as its core attributes: Consensus through dialogue, social equity and inclusivity, bottom-up approaches, and non-linear and adaptive systems. Therefore, with suitable empowerment, the Southern coalition in Kenya could, for example, employ this rationality to promote such socially beneficial energy technologies as improved⁸biomass cook-stoves and other people-centred technologies. In the same vein, large scale electricity initiatives could, for example, be of interest to the coalition. However, the electricity initiatives would be accepted provided adequate attention is also given to initiatives that are more directly beneficial to socially disadvantaged people.

It is a hypothesis derived from the findings of this research that bridging the gap between the opposing Northern and Southern coalitions could contribute to achieving sustainable national development in Kenya. One of the ways that the bridging could be done, and which is preferred in this dissertation study, is to employ communicative action as suggested by Habermas. In essence, the action entails effective use of communication to reach a common and mutually acceptable consensus between the divergent stands taken by the coalitions. Then a course can be taken based on the consensus. Therefore, a solution to the coalition differences could be obtained by firstly highlighting and making clear the need for a consensus on the opposing views. This step requires active use of various communication

⁸ That is smoke free and highly energy efficient

channels for extensively informing the coalitions. Secondly, following the information sharing, there would be need for bringing together key members from the coalitions, and negotiating a mutually acceptable and useful position. Then finally, policies, plans, and implementation activities could be established to actualize the position.

An example of a case where this process has been partially adopted is the preparation of the new energy policy in Kenya (GoK, 2015). The author of this dissertation study was made aware during a consultative session he attended as part of the data gathering for this dissertation that the Kenya Government is seeking policy making inputs from stakeholders at all levels—including rural and similar communities that are normally excluded. However, the government appeared to be giving stakeholders an opportunity for participation just as a formality. This indication could be inferred from the perfunctory manner in which the inputs were sought⁹; and a similar attempt at stakeholder involvement that was made during the preparation of an earlier energy policy (GoK, 2004). The earlier policy, according to (Byrne, 2014), was heavily informed by international aid donors' interests; and inputs by local NGOs were not given as much attention as they deserved. It seems plausible that more effective communicative action could have resulted into more inclusive policies, especially if civil society organizations (including NGOs and the mass media) were given a chance by state agencies to actively participate in policy making. This is with the understanding that these organizations have usually been social advocates in Kenya, representing the interests of socially disadvantaged in the country. Nonetheless, the ineffectiveness of the organizations could be explained by the worldwide trend of weakening of the organizations in development matters, particularly where state controls are still strong, as Edwards (2014) has noted.

In general, it is evident in this dissertation study that if we are to improve the lives of the majority of the people in developing countries through improved energy access (for example,) there is need for a cognitive and cultural transformation of the current vision of sustainable development. The critical role of the social dimension or strand of Kenya's development need to be clearly recognized and put into effect, alongside the equally important economic and environmental dimensions. Energy that is capable of optimizing the social strand should be one of the key inputs to sustainable development. Taking the case of the indicated Northern and Southern Coalitions relating to Kenya, it is manifest that amongst

⁹The author participated in some of the forums where inputs were sought and therefore has evidence reinforcing what was learned from literature sources about the manner in which inputs were sought

the differences between the coalitions is the level of prioritization of the social strand. Based on Communicative Action Theory, it is suggested that these differences could be minimized or virtually eliminated through extensive information sharing, discursive and deliberative processes, and well informed actions. On the part of the Northern Coalition, it would be important to underscore that a non-reductionistic approach, where social issues are not treated as subsets of economic and environmental issues, would be more likely to address the social aspects of sustainable development. It would also be helpful for the Northern Coalition to assist the South to generally innovate development solutions that are more appropriate for the social contexts in the South. Conversely, the Southern Coalition needs to fully appreciate and take actions that are informed by a more holistic understanding of the social strand of sustainable development.

Although the dissertation study that has been done has focused on Kenya and the indicated coalitions, it would seem from pointers in the literature consulted that the development situation in Kenya is very similar to the situations in many countries of the South. At the same time, it is conceivable that large numbers of other actors in the North and South perceive and act towards the social aspects of sustainable development along the same lines as the Northern and Southern coalitions respectively. Therefore, it might be reasonable to suggest more generalized cognitive and cultural transformation, as the one that has been proposed for the coalitions. The actors that could promote and undertake transformation include Northern state and non-state organizations and individuals. Such Northern actors could be especially relevant if they are in a position to influence sustainable development in the South. For example, the actors could comprise of state officers and politicians, business people, scholars, researchers, media reporters, religious leaders, and activists of various types. Similarly, in the South actors that could be suitable for the transformation outside the coalitions include the same type of people that have been listed for the North. Overall, it could be expected that the desired transformation among the indicated coalition and non-coalition actors would be spread through advocacy and other means to other members of Northern and Southern societies. As a result of ensuing vertical and horizontal spreads of the transformation, sustainable development could be strengthened specifically in the South and worldwide generally.

While advancing the case for the suggested general transformation, it is recognized in this dissertation study that the new Sustainable Development Goals (UNDESA, 2015) or SDGs could, on the surface, be very relevant to the transformation. The set of eight SDGs were ratified for implementation by United Nations member states in September 2015, and all the

goals are expected to be met within the period from 2016 to 2030. Notably, the set has eight out of the total of seventeen goals associated with social enhancement. The eight goals relate to eradication of poverty and hunger; and ensuring health and wellbeing, inclusivity and education, gender equality, equality for all, justice and peace, and global partnership. The rest of the goals are split between economic and environmental concerns, making the SDG set heavily in favour of social concerns. Equally importantly, the goals are specially designed to cater for development growth in the South. On the contrary, the goals' design and operational plans, or lack thereof, appear to be poorly considered as vehemently expressed by critics (see e.g International Council for Science, 2015; Economist, 2015; and Tyson, 2015). The criticisms further indicate that the goals are too many and un-coordinated, and equal weights are placed on clearly minor and major components. Costs of implementing the SDGs can therefore be expected to be high.

In view of the uncertainty surrounding the practicality and efficacy of SDGs this dissertation, research does not directly link the goals from the cultural and cognitive transformation that has been suggested in the dissertation.. The question about the transformation, which is being addressed in the dissertation, is: How is the transformation to be practically achieved? Based on the dissertation research, it is proposed to start with actions initiated with one or several developing countries. The country or countries selected could then serve as a model or models for other countries. Since Kenya has been the focus of this dissertation study, some pointers of how the transformation could be achieved for this country are indicated in following sub-sections. The pointers are included in proposals for actions along the lines:

- 1) Civic and educative actions,
- 2) Policy actions,
- 3) Research actions.

6.2.2 Proposal 1: Civic and educative actions

Various development and political visions have been introduced and revised in Kenya, and elsewhere in the developing world, through the facilitation of civil society (Muok and Kingiri, 2015; Taylor B ., 2013; Wanyande and Okebe, 2009). Here, civil society is taken to mean organizations and institutions working for human progress outside the spheres of state and business or private interests. The indicated studies observe that transformative social-political and environmental visions receive most of civil society's attention. However, although social elements of sustainable development have been advocated, concerns related

to development have not been well catered for. As such, civil society can be credited for action towards achieving sustainable development, with the proviso that their actions have been largely skewed towards a few aspects of social progress. Certainly, there is room for civil society to considerably expand its activities related to sustainable development, and civil society could facilitate the cognitive and cultural transformation sought in this dissertation. The entrenchment of the transformation could be spearheaded by members of civil society involved in formal and informal education. Once awareness and knowledge of the transformation are adequately established, other actions towards realizing the transformation could follow. This realization is envisaged as a duty not only for civil society, but also for actors from government and business.

6.2.3 Proposal 2: Policy actions

As the knowledge propagation and education phase of the desired transformation develops, there will be a need to formulate and implement public and private policies that align with the transformation. The policies will need to balance the social, economic and environmental factors of development. For example, government policies should lead to development plans that prioritize the social factor as distinct but related to economic and environmental factors. Policy implementation is becoming increasingly decentralized in the South, including in the energy sector in Kenya, and so lower levels of the government hierarchy will increasingly be required to incorporate development needs into their plans and activities. Similarly, all organizations and institutions within public and private sectors would need to be encouraged to balance the factors and to incorporate sustainability practices in their cultures.

6.2.4 Proposal 3: Research actions

The sustainable development concept is still evolving, and full acceptance of sustainability practices will take time given the uncertainties that surround the concept. The SDGs now offer an opportunity to get the approach right. A successful transformation, as suggested in this dissertation, could depend upon the removal or minimization of the uncertainties. Consequently, it is considered very important to deepen research on sustainable development, and especially related to the social component that is not so well understood. For example, it could be very valuable if researchers identify and develop new innovative parameters for measuring the key variables of the social factor. Hitherto, the social factor has been understood from a largely qualitative viewpoint. This is problematic when quantification of social parameters is needed, since social matters are perceived in qualitative and not in

quantitative terms. . Second, researchers could support the education phase of the transformation proposed in this dissertation by disseminating the existing research findings on sustainable development. Third, there is only very limited research on sustainable development in the South as the author of this dissertation has found during the course of literature search. Particularly, research by Southern researchers is difficult to get. Therefore research that is specific to the South would be particularly valuable. Researchers from the South, and those who support research in the developing world, are called upon to take up the challenge of achieving the required transformation.

6.3 References for Chapter 6

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7. Summaries

7.1 Summary in English

Energy as a technological system is a major facilitator of sustainable development; and for sustainability to be achieved the energy itself needs to satisfy economic, social and environmental interests in a balanced way. Energy meeting the requirements of sustainable development is generally referred to as sustainable energy; and this is the understanding adopted in this study. Particularly, the study seeks to research the apparent social undervaluing of sustainable energy in the South, where the social dimension of sustainable development is of critical importance. The hypothesis that a worldview that is deficient in a social dimension of sustainable energy is induced by Northern actors in the South is analyzed. Indications for this hypothesis are principally based on the following pointers : i) The worldview is shaped in the South through international development assistance and related processes; ii) The dominant actors in the provision of the assistance and the source of funding for the assistance are from the North; iii) The actors are guided by tendencies and the way that sustainable energy is perceived in donor countries' points of view; and iv) The actors in many cases push their energy and development agendas through bureaucratic, expert-led, and top-down means.

The specific focus of this dissertation study is Kenya, which was selected as an example of a developing country or nation within the South with an average economic performance showing steady growth. This country, like many in the South, has a majority of people who are socially deprived due to a lack of among other things access to resources for a decent livelihood, inequitable distribution of resources, significant exclusion from governance and decision-making affecting their lives, and capacity for improving their livelihoods. This is especially the case for rural inhabitants and urban slum dwellers forming the largest proportion of the Kenyan population. For example, to a great extent these socially disadvantaged people rely on biomass energy for provision of their most important energy need, namely energy for cooking. This is because the fuels providing this type of energy are the most accessible and affordable compared to other forms of energy. Nevertheless, its collection is time consuming for women and exposes them to physical dangers and threats. Traditional household equipment used to burn biomass produces smoke which is injurious for the health of the whole family, particularly women and girls. In recognition of importance of biomass fuels, efforts have been made by the Kenya government and other development actors to improve quality of the energy, and make the fuels a true source of sustainable clean

energy. However, the efforts are grossly inadequate, as the highest level of attention is being directed to the development of the infrastructure for electricity and other modern fuels that the socially disadvantaged can hardly access or afford.

The empirical part of the research on Kenya was done through four sub-studies. In particular, the sub-studies were conducted to explore how well social characteristics of sustainable energy were understood and taken into account in energy for sustainable development or sustainable energy programmes and projects. Four aspects were given specific attention, namely: a) Potential social capital facilitation of rural electrification; b) Cognitive factors in sustainable energy supply and use; c) Small-scale energy technologies for sustainability; and d) Social and sustainability considerations in Kenyan electricity reforms. The first sub-study on potential social capital facilitation of rural electrification explored the possible use of electricity cooperatives for enhancing electrification in Kenya. A literature review of cooperatives was made to identify the factors of success. It was found that negative aspects of social capital, such as elite capture, have had deleterious effects on the cooperative movement in Kenya and elsewhere. However, there are examples of successful electricity cooperatives from elsewhere in the world. The example of rural electrification cooperatives in Bangladesh was singled out as providing a possible model for replicating in Kenya. Overall, it was noted that social capital within the framework of electricity cooperatives could be utilized well in Kenya. However the negative side of social capital needs to be clearly identified and redressed.

In the second sub-study on social cognitive factors in sustainable energy supply and use, narratives of sustainability within the perspective of the supply and use were investigated. Particularly, the dominant narratives in the Kenyan national energy policies were identified. These narratives were compared with the ones in the Netherlands. The latter country was purposively selected as a representative country of the North. From the findings of the sub-study, it is clear that in the Netherlands as in other similar developed countries, economic and environmental dimensions of sustainable energy were of greatest interest with the social dimension receiving less attention. Notably, energy with minimal impacts on the environment is given considerable attention, especially in view of threats of climate change consequences arising from the impacts. Social improvement aspects of energy are not given specific attention, and are subsumed within economic considerations. In Kenya, energy policy makers and planners placed the highest level of priority on the economic dimension of sustainable energy. Interest in the environmental dimension has started to pick up driven by the global attention to climate change. There is negligible interest in the social dimension.

Most importantly, it was found that Northern narratives of economic and environmental prioritization have been gradually entrenched in Kenya. International development aid actors had a major contribution to this trend of North-South transfer of sustainability thinking.

Related to the second sub-study was the third sub-study on small-scale energy technologies for sustainability. In theoretical works, it has been argued that use of the technologies can enhance the social dimension of sustainable development. This argument especially makes sense in the context of developing countries, where social development is quite low. From this standpoint, Kenya as a typical developing country provided empirical evidence for the third sub-study. Analysis as part of the sub-study revealed that national policies and plans place heavy emphasis on large-scale energy production and use. This is apparently due to beliefs in the superiority of large-scale technologies compared to small-scale ones. As such, large-scale technologies, and particularly relating to electricity, are highly placed in Kenyan energy policies and planning. As a consequence, the main beneficiaries of the policies and plans are those who have access to energy from large-scale technology sources. The beneficiaries are chiefly higher income households in urban areas, and largely exclude the majority of the Kenyan population living in rural and poor urban areas.

Conversely, small-scale clean, labour saving energy technologies such as energy-saving biomass cookers and solar-photovoltaic lighting have a relatively low level of priority. This is despite the large potential benefits of these technologies, which substantially provide for the needs of the bulk of the Kenyan population at lower cost. Undoubtedly, the importance of these technologies is generally recognized by development actors both internationally and nationally; and a lot has been done especially by some non-governmental organizations to promote the technologies. However, there appears to be a cognitive barrier militating against the acceptance and use of these technologies by policy and decision makers. As a consequence, the promotional activities being undertaken have had little positive impact for the majority of the population. Moreover, it was also noted that the relegation of small-scale energy technologies is a practice that follows trends in developed countries; and clearly the practice is motivated in many ways by development aid agencies that are funded by the latter countries.

The fourth and final sub-study analyzed social and sustainability considerations in electricity reforms undertaken by Kenya specifically and generally by other selected African countries. The main focus of the sub-study is an assessment of the extent to which electrification for social development was taken into account in electricity reforms. Social development was

taken as a representation of the social dimension of sustainable development. Broadly, it was found in the sub-study that the reforms were greatly inspired by multi-lateral development agencies, led by the World Bank. Models upon which the reforms were based emanated from the developed world, from where the main sponsorship of the agencies originated. Furthermore, the models were subsequently adjusted in an effort to cater for the needs of large populations that were not able to benefit from electricity reforms. It is clear that reform measures were especially necessary for socially excluded populations that mainly live in rural areas. Rural electrification scale-up was the most important measure adopted. However, the measure was not strong enough to sufficiently address deficiencies related to social and sustainable development. This is found to be the case for Kenya and the other African countries studied.

Taken together, all the sub-studies show that there is low appreciation, understanding, and level of application of the social component of sustainable energy and by extension sustainable development. This is found to be case for Kenya with strong indications that the same situation exists in many developing countries. It is also evident that the social dimension of sustainable development is the weakest in many parts of the developing world, compared to the economic and environmental dimensions. Additionally, there are clear signals that neglect of the social dimension is a common trend in the North which is induced in the South. Therefore, it could be concluded that sustainability from a Kenyan energy perspective is in many respects influenced by cognitive and cultural factors driving sustainability understanding and applications in the North.

Taking into account the findings of the sub-studies, and evidence from secondary sources, it is deemed important to take steps towards transforming sustainability thinking and culture, in view of the predominant worldview of sustainability as a phenomenon principally relating to environmental concerns. The envisioned steps could in particular be taken in an effort to strengthen the social pillar of sustainable development. Each input into the development process, for example the energy input, would need to have its social aspect given much more weight than it has been given up to now. Especially, higher social prioritization would be required to match prioritization currently placed on the economic and environmental aspects. For achievement of the envisioned cognitive and cultural transformation, actions have been identified in the dissertation study. The actions are categorized as:

- 1) Civic and educative actions;
- 2) Policy actions; and
- 3) Research actions.

The first category would include such interventions by civil society actors as advocacy, outreach and sensitization that are critical for sustainable development enhancement. Education sector actors can also sensitise society using formal and informal education mechanisms. This first line of action is recommended principally on the grounds that similar actions are already being taken in respect of the related issue of environmental awareness and behaviour. The second category of actions would include such interventions as realignment of public and private policies by policy makers and implementers, to take into account all critical social factors of sustainable development. Policy actions could be taken alongside or as a follow-up of civic and educative actions. Finally, the third category of actions would entail research that could facilitate better understanding and materialization of all critical social factors of sustainable development. Academic researchers could take the lead in the research while they work in close collaboration with civil society, policy actors, and others involved in the first and second categories of actions.

7.2 Summary in Dutch (Samenvatting in het Nederlands)

Energievoorziening is een technologisch systeem dat duurzame ontwikkeling dichterbij kan brengen. Om duurzaam te zijn moet de energie zelf op evenwichtige manier beantwoorden aan economische, sociale en ecologische belangen. Vormen van energie die aan de vereisten van duurzame ontwikkeling voldoen worden doorgaans aangeduid als duurzame energie en zo hanteren we het begrip ook in deze studie. Meer in het bijzonder gaat deze studie in op het gebrek aan belangstelling voor de sociale aspecten van duurzame energie in het Zuiden van de wereld, waar de sociale dimensie van duurzame ontwikkeling juist van het grootste belang is. De hypothese wordt onderzocht of deze zienswijze in het Zuiden, die de sociale dimensie van duurzaamheid onderschat, is ingebracht door “Noordelijke” actoren. Deze hypothese is gebaseerd op de volgende ideeën: 1) De zienswijze wordt ingebracht in het Zuiden door internationale ontwikkelingshulp en verwante processen, 2) De dominante actoren bij het verlenen van de hulp en de bronnen van fondsen voor deze hulp komen uit het Noorden, 3) De actoren worden beïnvloed door de voorkeuren en percepties van duurzame energie in de donorlanden, 4) In veel gevallen drukken deze actoren hun energie- en ontwikkelingsagenda's door met bureaucratische, expert gerichte en van bovenaf opgelegde middelen.

De specifieke focus van deze promotiestudie is Kenya, dat werd geselecteerd als een voorbeeld van een ontwikkelingsland in het Zuiden met een gemiddelde economische prestatie en een stabiele groei. Het land, zoals veel in het Zuiden, heeft een meerderheid van de bevolking die sociaal achtergesteld is door gebrek aan onder meer toegang tot hulpbronnen die voor een fatsoenlijk leven nodig zijn, ongelijke verdeling van hulpbronnen, in belangrijke mate uitsluiting van deelname aan het bestuur en de besluitvorming die hun levens beïnvloedt en gebrek aan mogelijkheden om hun levensomstandigheden te verbeteren. Dat is speciaal het geval voor de plattelandsbewoners en de stedelijke bevolking in sloppenwijken die het grootste deel van de Keniaanse bevolking uitmaken. Deze mensen zijn bijvoorbeeld in hoge mate afhankelijk van biomassa energiebronnen als hout voor een van hun meest elementaire behoeften, namelijk energie om te koken. Dat komt omdat deze brandstoffen het meest toegankelijk en betaalbaar zijn vergeleken met andere vormen van energie. Maar het verzamelen ervan is tijdrovend voor vrouwen en stelt hen bloot aan fysieke gevaren en bedreigingen. De traditionele manieren om biomassa te stoken produceren rook die de gezondheid van de hele familie schaadt, vooral die van de vrouwen en kinderen. Onder erkenning van het belang van biomassa brandstoffen hebben de Keniaanse regering en andere ontwikkelingsorganisaties geprobeerd de kwaliteit van de energie te verbeteren

om van deze brandstoffen een echte bron van schone en duurzame energie te maken. Deze pogingen schieten echter ernstig tekort omdat de meeste aandacht is gericht op het ontwikkelen van de infrastructuur voor de elektriciteitsvoorziening en op andere moderne brandstoffen die voor de sociaal achtergestelde bevolkingsgroepen nauwelijks toegankelijk of betaalbaar zijn.

Het empirische deel van het onderzoek in Kenia werd uitgevoerd in vier deelstudies. De deelstudies gingen na in welke mate de sociale aspecten van duurzame energie werden begrepen en in aanmerking werden genomen in relevante duurzame energie programma's en projecten. Vier aspecten kregen speciale aandacht, te weten 1) de mogelijke facilitering van sociaal kapitaal bij elektrificatie van het platteland, 2) de cognitieve aspecten bij het aanbod en gebruik van duurzame energie, 3) kleinschalige energie technologieën voor duurzaamheid, en 4) sociale en duurzaamheidsoverwegingen bij de Keniaanse energie hervormingen.

De eerste studie naar de facilitering van sociaal kapitaal, ging in op de mogelijke benutting van elektrificatiecoöperaties voor de elektrificatie van Kenia. Een literatuurstudie naar coöperaties werd verricht om hun succesfactoren te identificeren. De uitkomst was dat negatieve aspecten van sociaal kapitaal, zoals het overgenomen worden door de elite, een vernietigend effect hebben gehad op de coöperatieve beweging in Kenia en daarbuiten. Desalniettemin zijn er ook voorbeelden van succesvolle coöperaties in de wereld. Speciale aandacht werd besteed aan de elektrificatiecoöperaties in Bangladesh, als een mogelijk voorbeeld voor Kenia. Meer in het algemeen werd geconstateerd dat het sociale kapitaal in elektrificatiecoöperaties goed benut zou kunnen worden in Kenia. De negatieve kanten van zulk sociaal kapitaal moeten echter duidelijk onderkend en aangepakt worden.

In de tweede casestudie naar de sociaal cognitieve factoren bij duurzame energievoorziening en energiegebruik, werden verhaallijnen over duurzaamheid in aanbod en gebruik onderzocht. Deze verhaallijnen werden vergeleken met die welke in Nederland opgeld doen. Dat laatste land werd doelbewust gekozen als voorbeeld van een land in het Noorden. Uit de bevindingen van de deelstudie blijkt dat in Nederland, net als in andere gelijksoortige ontwikkelde landen, het meeste belang wordt toegekend aan de economische en ecologische aspecten, terwijl het sociale aspect minder aandacht krijgt. Speciaal energiebronnen die een minimale verstoring van het milieu veroorzaken krijgen veel aandacht, met name ook in het licht van de dreiging van klimaatverandering. Aspecten van sociale verbeteringen rond energie krijgen geen specifieke aandacht en worden hooguit

ingebod in economische overwegingen. In Kenia plaatsen beleidsmakers en planners rond energie de hoogste prioriteit bij de economische dimensie van duurzame energie. Er is een verwaarloosbare mate van aandacht voor de sociale dimensie. Nog belangrijker was de bevinding dat Noordelijke verhaallijnen geleidelijk waren doorgedrongen in Kenia. Internationale hulporganisaties hebben een belangrijk aandeel gehad in deze trend van Noord-Zuid overdracht van duurzaamheidsdenken.

De derde deelstudie bouwde voort op de tweede met aandacht voor kleinschalige duurzame energietechnologieën. In theoretische literatuur is beargumenteerd dat de toepassing van zulke technologieën de sociale dimensie van duurzaamheid kan versterken. Deze redenering is vooral van toepassing in de context van ontwikkelingslanden waar het sociale ontwikkelingsniveau nogal laag is. Zo bezien zou Kenia als een typisch ontwikkelingsland empirische aanwijzingen voor deze stelling moeten opleveren. Analyse in deze deelstudie liet zien dat het nationale beleid en plannen zwaar de nadruk leggen op grootschalige energieproductie en –consumptie. Dit is blijkbaar het gevolg van het geloof dat deze superieur zijn aan kleinschalige. Grootschalige technologieën, vooral met betrekking tot elektriciteit, hebben veel prioriteit in de Keniaanse beleidsplannen. Dientengevolge profiteren vooral degenen die toegang hebben tot zulke energie van grootschalige technologieën. Deze begunstigden zijn met name huishoudens met hogere inkomens in de stedelijke gebieden en sluiten de meerderheid van de Keniaanse bevolking uit die in rurale en arme urbane gebieden leeft.

Aan de andere kant hebben kleinschalige en arbeidsbesparende energietechnologieën zoals energiebesparende biomassaovens en zonnepanelen als lichtbron een relatief lage prioriteit. Dit ondanks de grote mogelijke voordelen van zulke technologieën, die in aanzienlijke mate en goedkoop aan de behoeften van het leeuwendeel van de Keniaanse bevolking tegemoet kunnen komen. Zonder twijfel wordt het belang van zulke technologieën door nationale en internationale ontwikkelingsorganisatie erkent en vooral door sommige non-gouvernementele organisaties is er veel gedaan om deze te bevorderen. Bij beleidsmakers en besluitvormers lijkt er echter een cognitieve barrière te bestaan tegen de acceptatie en het gebruik van deze technologieën. Als gevolg daarvan hebben alle promotieactiviteiten die zijn ondernomen weinig positieve opbrengsten gehad voor de meerderheid van de bevolking. Bovendien werd geconstateerd dat de wijze van vervanging van de bestaande kleinschalige energietechnologieën is afgestemd op de trends in ontwikkelde landen en duidelijk op allerlei manieren wordt gemotiveerd door ontwikkelingsorganisaties die door zulke landen worden bekostigd.

De vierde en laatste casestudie analyseerde de sociale en duurzaamheidsoverwegingen bij de hervormingen van de elektriciteitsvoorziening, in het bijzonder die in Kenia en in sommige andere Afrikaanse landen. De deelstudie concentreerde zich op een inschatting van de mate waarin bij deze hervormingen rekening is gehouden met de mogelijke rol van elektrificatie voor sociale ontwikkeling, de sociale component van duurzame ontwikkeling. Het bleek dat de hervormingen vooral geïnspireerd zijn door multilaterale ontwikkelingsorganisaties, onder leiding van de Wereldbank. De modellen waarop de hervormingen zijn gebaseerd zijn voortgekomen uit de ontwikkelde wereld, van waaruit ook de belangrijkste fondsen voor de betrokken organisaties afkomstig zijn. Daaropvolgend zijn de hervormingen weliswaar bijgesteld in een poging om te kunnen omgaan met de noden van grote bevolkingsgroepen die niet in staat waren om van de hervormingen te profiteren. Het is duidelijk dat er vooral maatregelen nodig waren voor de sociaal achtergestelde bevolkingsgroepen die met name op het platteland leven. De uitbreiding van elektriciteitsvoorziening op het platteland was de belangrijkste maatregel die werd toegepast. De maatregel was echter niet voldoende om in voldoende mate de tekorten in relatie tot sociale en duurzame ontwikkeling op te heffen. Dit werd zowel gevonden in het geval van Kenia als bij de andere Afrikaanse landen die zijn bestudeerd.

Alles bijeen laten alle deelstudies zien dat er een lage mate van waardering, begrip en toepassing bestaat voor de sociale component van duurzame ontwikkeling. Dit werd gevonden in het geval van Kenia, met sterke aanwijzingen dat het ook geldt voor andere ontwikkelingslanden. Het is ook duidelijk dat de sociale dimensie van duurzame ontwikkeling in veel delen van de ontwikkelende wereld de zwakste schakel is vergeleken met de economische en ecologische dimensies. Bovendien zijn er duidelijke signalen dat het verwaarlozen van de sociale dimensie een algemene trend in het Noorden is die wordt ingebracht in het Zuiden. Daarom kon worden geconcludeerd dat duurzaamheid in een Keniaans energieperspectief in diverse opzichten is beïnvloed door cognitieve en culturele factoren die het begrip en de toepassing van duurzaamheid in het Noorden vormen.

Rekening houdend met de bevindingen van de deelstudies en met aanwijzingen uit secundaire bronnen wordt het belangrijk geacht om stappen te zetten naar het transformeren van het denken en de cultuur rond duurzaamheid, tegen de achtergrond van de dominante visie die duurzaamheid vooral als een kwestie van ecologische zorgen ziet. De mogelijke stappen zouden de sociale dimensie van duurzame ontwikkeling moeten versterken. Elke inbreng in het ontwikkelingsproces, bijvoorbeeld rond energie, zou aan het sociale aspect

veel meer gewicht moeten hechten dan het tot nu toe heeft gehad, met name in vergelijking met economische en ecologische aspecten. In deze dissertatie zijn enkele categorieën van zulke acties geïdentificeerd:

- 1) Burgeractiviteiten en educatie
- 2) Beleidsbeïnvloeding
- 3) Onderzoeksactiviteiten

De eerste categorie omvat interventies door “civil society” actoren zoals pleidooien, verspreiding van ideeën en bewustmaking die essentieel zijn voor de bevordering van duurzame ontwikkeling. Mensen en organisaties in de onderwijssector kunnen de maatschappij ook bewuster maken door formele en informele vormen van educatie. Deze eerste categorie van actie wordt aanbevolen omdat soortgelijke activiteiten al worden ondernomen als het gaat om milieubewustzijn en – gedrag. De tweede categorie van actie omvat de afstemming van publieke en private beleidsplannen door beleidsmakers en beleidsuitvoerders, om meer rekening te houden met alle sociale factoren die wezenlijk zijn voor duurzame ontwikkeling. Tot slot zou de derde categorie van actie onderzoek omvatten dat deze sociale factoren van duurzame ontwikkeling beter leert identificeren en begrijpen. Academische onderzoekers zouden de leiding kunnen nemen bij dit soort studies terwijl ze nauw samenwerken met de civil society, beleidsactoren en anderen die betrokken zijn bij de eerste twee genoemde categorieën van actie.

8. Appendices

8.1 Chapter 1 Appendices

8.1.1 Mobile phones money transfers and banking in Kenya

Vignette (Part 1)

It has long been recognized that there is a double advantage in providing sustainable development needs for the large masses of socially and economically disadvantaged people in low-income countries on one hand, and substantially achieving commercial gains from investing in serving the masses (Prahalad and Hart, 2002; and Agnihotri, 2013). That type of investment has been variously referred to as seeking “The Fortune at the Bottom of the Pyramid (BoP)”. However there are few cases where ventures have been undertaken to achieve the so-called BoP fortune. This is apparently due to skepticism about the BoP claim, and lack of proof that the socially and economically deprived could benefit from BoP businesses (Kamani, 2007; and Clay 2005).

Among the few cases where the BoP fortune proposition has been successfully put into practice is in the area of mobile-phone money transfer and banking (mmt&b). The mmt&b system was first piloted and then fully implemented in Kenya (see e.g. Orotin et ‘al’, 2013). The pioneer was a Kenyan company, Safaricom Ltd, which is a subsidiary of Vodacom of UK; but subsequently the system was scaled up in various forms by other companies that included Bharti Airtel, Orange, and Yu (Mutongwa et ‘al’, 2014; and Kirui et ‘al’, 2012). Based on the account of Cracknel (2012) and Vaughan (2013), Safaricom started with support from the parent company, and decided to explore the large untapped market for mobile phone services in Kenya. The decision was informed particularly by the absence of ICT-driven services for more than 75% of Kenyans, the majority of whom are in rural and peri-urban areas. The business concept that was developed by the company was quite simple: Enable money transfer services through mobile phones for the benefit of all, with full social inclusivity. The services were branded as M-Pesa (M stands for mobile, and Pesa is a Kiswahili word for money), and this brand remains strong among the growing competition.

Contd.....Part 2 (Next page)

Vignette (Part 2)

Studies carried out by Safaricom with seed capital from DFID (Vaughan et al', 2013) showed that mobile money transfers services could significantly enhance financial access. This would particularly apply to a large part of the Kenyan population whose transactions are usually small. The enhanced access would have a knock-on effect leading to improvement in access to many other economic and social services. From a corporate point of view, the company saw an opportunity to build its brand name and bottom-line over the medium term, and thus had to forego some short-term gains. It is against this background that Safaricom started small-scale money transfers in 2007.

Further accounts by Vaughan et al' (2013) indicate that success of M-Pesa was to a large extent facilitated by use of petty trade agents spread throughout the country. The trust that Safaricom had built among its clientele was cascaded to the agents; and accordingly customers felt their money was secure with the agents. By 2011, close to 35,000 agents had been deployed, and they were able to register almost 10,000 customers daily. The massive scale operation enabled the establishment of a customer base of nearly 15.2 million by 2011, and purchase of cellular phones and credits increased correspondingly. The scale of subscription translates to nearly 50% of Kenya's adult population. At the same time, the company's financial position grew tremendously. The commercial position is such that local mass media rate the company as the most profitable in east and central Africa (see e.g. Okoth, 2015).

Over time, M-Pesa services have immensely expanded the money transfer portfolio to include local and international remittances. Kenyan income earners residing locally or abroad are, with increasing ease and scale, able to send money to their needy relatives and those looking after the remitters' interests. Observers of the trends, including Mutongwa et al', 2014, also indicate that the M-Pesa services have expanded to include other business lines. The lines include banking for small savers, who usually have no bank accounts; small salary payments; and payments of utility bills. It is foreseen that the M-Pesa services will in due course substantially facilitate inclusion of the low status members of the Kenyan society in sustainable development. Overall, the services have enabled Safaricom to meet the principal goal of ensuring better lives for the socially underprivileged.

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8.1.2 Field data collection summary

TABLE 1 OF 4: Sub-study 1 (Chapter 2 of dissertation)

Serial No.	Collection method	Type of respondents	Number of respondents	Country and area
1	Focus group & site observations	Villagers	14	Kenya -Nyansiongo
2	Personal Interview	Political leaders	4	Kenya -Nyansiongo
3	Personal Interview	Professionals	7	Kenya -Nyansiongo
4	Focus group 7 site observations	Villagers	17	Kenya -Mumias
5	Personal Interview	Political leaders	3	Kenya -Mumias
6	Personal Interview	Professionals	11	Kenya -Mumias
7	Personal Interview	Professionals	23	Kenya -Nairobi, Nakuru, Kakamega, Kisii
8	Personal Interview	Political leaders	12	Kenya - Nairobi, Nakuru, Kakamega, Kisii

TABLE 2 OF 4: Sub-study 2 (Chapter 3 of dissertation)

Serial No.	Collection method	Type of respondents	Number of respondents	Country and area
1	Personal Interview	Unclassified	57	Kenya -Nairobi, Machakos, Thika, Kajiado
2	Personal Interview	Professionals	32	Kenya -Nairobi
3	Personal Interview	Political leaders	9	Kenya -, Nairobi, Machakos, Thika, Kajiado,
4	Personal Interview	Professionals	21	The Netherlands - Enschede, Utrecht, Den Haag, Amsterdam, Wageningen, Deventer Winterswijk
5	Site observations			The Netherlands - Hilversum, Wageningen, Winterswijk, Dieren, Roermond

8.1.2 Field data collection summary (Continued)

TABLE 3 OF 4: Sub-study 3 (Chapter 4 of dissertation)

Serial No.	Collection method	Type of respondents	Number of respondents	Country and area
1	Focus groups & site observations	Villagers	17	Kenya -Muchatha (near Nairobi)
2	Focus group & site observations	Academicians	15	Kenya -Egerton Nakuru
3	Personal Interview	Professionals	22	Kenya -Nairobi and Nakuru
4	Personal Interview	Political leaders	5	Kenya -Nairobi and Nakuru
5	Surveys	Unclassified	82	Kenya -Nairobi
6	Surveys	Unclassified	150	Kenya -Olkalou, Bumula, and Isinya

TABLE 4 OF 4: Sub-study 4 (Chapter 5 of dissertation)

Serial No.	Collection method	Type of respondents	Number of respondents	Country and area
1	Personal Interview	Professionals	61	Kenya -Nairobi, Kirinyaga, Nandi Hills,
2	Personal Interview	Villagers	16	Kenya -Kirinyaga, Nandi Hills,
3	Personal Interview	Professionals	55	Rwanda -Kigali, Gisenyi, Nyabihu
4	Personal Interview	Professionals	43	Tanzania -Dar-es-salaam and Tukuyu
5	Personal Interview	Villagers	9	Tanzania - Tukuyu
6	Personal Interview	Professionals	39	Malawi -Lilongwe, Blantyre and Mulanje
7	Site observations			Various places in Kenya, Malawi, Rwanda and Tanzania

8.1.3 Literature Survey

Literature Survey for the Dissertation Entitled:

Sustainability in Kenya's Energy and Development: An Alien Concept?

Drawing from sources such as Wohlin¹⁰ (2014) and Watson¹¹ *et al* (2012), the survey was done through the following steps:

1) MAIN TOPIC FOR SURVEY IDENTIFIED

From the research idea and guiding research question, the main topic for survey was identified as: *Energy for Sustainable Development* (ESD)

2) SUB-TOPICS IDENTIFIED

Further on the topic of *ESD*, literature survey on the following sub-topics was deemed necessary:

- a. Theories relating to ESD (Multi-disciplinary and single disciplinary types)
- b. Methodological approaches relevant for ESD
- c. Empirical work done for ESD in developing countries
- d. Empirical work done for ESD in Africa specifically
- e. Empirical work done for ESD in Kenya specifically

3) KEY WORDS AND SEARCH TERMS

For each of the sub-topics appropriate key words and search terms were developed

4) LITERATURE REPOSITORIES IDENTIFIED

¹⁰ Wohlin C. (2014): Guidelines for snowballing in systematic literature studies and a replication in software engineering, in 8th International Conference on Evaluation and Assessment in Software Engineering (EASE 2014), pages 321-330. ACM, 2014

¹¹ Watson J, R. Byrne, M. J. Robert, T. Molly, O. Flavia, C.F. Jose, and S. Castle-Clarke (2012): What are the major barriers to increased use of modern energy services among the world's poorest people and are interventions to overcome these effective? <http://r4d.dfid.gov.uk/pdf/outputs/systematicreviews/CEE11-004.pdf> accessed 28-05-2016

The repositories identified included:

- a. Library books (University of Twente Library was the main source)
- b. Other books (bought for the research or borrowed from individuals)
- c. Journal papers (from library and internet sources)
- d. Theses and dissertations
- e. Official studies and reports (paper based and Internet based)
- f. News media (print and electronic)

5) SURVEY PROCESS

A snowballing approach was used throughout the survey. The approach entails:

Formulation of key words and search terms, and reformulating them as new research insights arise from literature read.

Literature search is started from the most authoritative sources such as library books and journal articles by authors with strong academic credentials. Then literature cited in the authoritative sources is surveyed, and third to fourth level sources are derived from the second level sources; and so on.

During personal interviews and focus group discussions, and also from other personal contacts, insights on suitable literature are obtained. Literature emanating from the personal contacts is surveyed, and citations from the literature yield other means for getting further literature.

For each item of literature sampled, the abstract, summary, or introduction is read to determine the worthiness of the literature for the research being done. Notes are taken where literary material is found to have substance.

Notes from literature that has been found worthwhile are compiled. From the notes, evidence and inspiration for research being done are obtained.

8.2 Chapter 4 Appendix

Questionnaire on energy that could benefit rural and poor urban (majority of)
Kenyans and the environment

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<i>Tick the applicable box</i>		<i>STRONGLY DISAGREE</i>	<i>DISAGREE</i>	<i>NOT SURE</i>	<i>AGREE</i>	<i>STRONGLY AGREE</i>
1	Renewable energy is from solar, wind, hydro, biomass (e.g. wood and charcoal), geothermal, and similar sources					
2	Renewable energy and energy efficient technologies (e.g. energy saving lights and efficient jikos) have similar benefits					
3	Green or clean energy technologies are good for the environment and improving peoples' lives					
4	Renewable energy and energy efficient technologies are all green or clean technologies					
5	Very large renewable energy technologies (e.g. hydropower and geothermal) technologies are required for all Kenyans to get electricity					
6	Mostly, electricity is required in large amounts for Kenya's industries to grow					
7	Electricity and industrial growth will mostly benefit urban residents					
8	Rural residents who are the majority of Kenyans will not benefit much from the electricity and industrial growth					
9	Renewable energy form large-scale sources is most important urban growth than for the majority of Kenyans					
10	Electricity from small-scale renewable energy sources could be most useful for the majority of Kenyans					

Contd.....

Questionnaire on energy that could benefit rural and poor urban (majority of)
Kenyans and the environment

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<i>Tick the applicable box</i>		<i>STRONGLY DISAGREE</i>	<i>DISAGREE</i>	<i>NOT SURE</i>	<i>AGREE</i>	<i>STRONGLY AGREE</i>
11	The largest number of Kenyans use electricity for lighting and NOT for cooking					
12	For most Kenyans energy for cooking is more important than electricity for lighting					
13	In most cases Kenyans use small-scale biomass (wood and charcoal) for cooking					
14	Therefore for majority of Kenyans small-scale biomass is more important than large-scale hydropower and geothermal energy					
15	Biomass energy should be promoted as much as electricity from large-scale renewable energy sources					
16	Energy efficiency in biomass for cooking should be improved to reduce polluting and wasteful nature of biomass technology					
17	Lighting for majority of Kenyans could be obtained most effectively from small-scale solar power sources					
18	In general, green or clean energy from small-scale sources should be given higher priority					

9. Author Bio

My early years started in a rural part of Kenya, around my birthplace that is located about 25 kilometres to the southwest of Nairobi. I started school in the same area, but moved to Nairobi where I attended secondary schools, and went to the University of Nairobi for my undergraduate degree studies. As my education progressed, I made a career choice to study and then work as an electrical engineer. The engineering choice was motivated to a large extent by my father's work as a railway technician. It was therefore very fulfilling when, in 1977, I graduated with honours after successfully completing a first degree course in electrical engineering. On the strength of the university education, I was able to rapidly secure employment at the then national electricity supply company, the Kenya Power & Lighting Company. The company guided me through comprehensive training in electrical utility engineering and management. I was motivated to the extent that I served the company for over twenty years. The training that I received with the company was such that it stirred in me a desire for further education. Additionally, I found it necessary to augment my engineering competency with more people-oriented knowledge. This augmentation was important in helping me to more effectively apply engineering solutions to socioeconomic development challenges, which my work at the power company exposed me to. Consequently, upon completion of my contract with the company, I decided to pursue a Master's degree course in a development field. At the same time, I began to work as a freelance energy and development consultant, which I continue to do on a part-time basis. An opportunity for postgraduate studies was offered by Aalborg University in Denmark; and it is from this university that I graduated in 2007 with an MSc in Sustainable Energy Planning and Management. Subsequently, I had the opportunity to put my new knowledge into practice when I worked for UNEP-DTU, Roskilde, Denmark. This employment also enabled me to build my research capacity, particularly in the areas of sustainable development and climate change mitigation and adaptation. Importantly, I was able to work in Africa while based in Denmark, and therefore I acquired considerable capacity that could be applied for resolving Africa's, and especially Kenya's, energy and development challenges. It was on the strength of this, and inspiration from the studies at Aalborg University and work at UNEP-DTU, that I took the step of starting PhD studies in sustainable energy and development. Towards this end, I sought and managed to secure a doctoral placing at the University of Twente, from where I have been working since 2012. Importantly, the doctoral programme allowed me to carry out most of my research activities while based in Kenya. Therefore, the work gained significantly from empirical enrichment and well-grounded investigations, resulting in outcomes that could greatly benefit Kenya and other African countries. The PhD work culminated in this dissertation, and I intend to utilize the research competences that I have built for advancing sustainable energy and development, especially in Africa.