Renewable Energy Issues in Africa Contexts [1]

Diana-Abasi Ibanga

Centre for Environmental Governance and Resource Management - Nigeria
Department of Philosophy, University of Calabar, Cross River State - Nigeria

DOI: http://dx.doi.org/10.7358/rela-2018-001-iban Ibanga.letters@gmail.com

Abstract

The relationship between energy and ethics is gaining attention in policy rooms around the world. How does one respond to the competing interests of the environment and posterity while also addressing the energy needs of the present human generation? In Western philosophy, this question is currently subject of debate and research. However, the African philosophical analysis that is required to address this concern is generally absent from discourse/literature on energy ethics. This article aims to bridge this gap, by providing broad analysis that has been lacking from the African context. In a way, it seeks to answer such questions already raised in Western philosophy but from African perspectives. This approach is significant given the fact that Western oriented energy humanities and energy ethics seem to be inappropriate or inadequate to understanding energy dynamics in the African context. Therefore, this paper aims to inform global debate and facilitate African-specific understanding of the complex nexus of human-environment-posterity by building the discourse on Braai filosofie. It discusses specific principles that can be deployed to address trade-offs between ethics and energy, thus providing guide to investment decisions on renewable energy projects in Africa.

Keywords: energy ethics; braai; environmental ethics; renewable energy; African philosophy; land ethic; diep gesprek; future people; diep ondervraging; energy humanities.

[1] A version of this paper was first presented at the 6th Annual Conference of the National Association for Energy Economics (NAEE) at Sheraton Hotel in Lagos, Nigeria on 22nd April 2013; and a revised version was later delivered as lead paper at 16th Conference of the Business Ethics Network of Africa (BEN-Africa) at STIAS Wallenberg Research Centre, Stellenbosch University, South Africa on 9th November 2017. I thank participants at the two conferences for their feedbacks, particularly Mr. Lukhanya Ndube, Mr. Wandile Ganya, Mrs. Liezl Groenewald, Dr. Peter Obutte, Dr. Chigbo Ekwealo, Dr. Peter Osimiri, Dr. Bryan Robinson, Dr. Minka Woermann, Prof. Douglas Anele, Prof. Piet Naude, Prof. Arnold Smit, Prof. Johan Hattingh. This is an improved version from the two conferences. I also thank the editor, Giovanni Frigo, for critical/insightful comments.

1. Introduction

Renewable energy is taking up a central role in the global energy discourse because of its likely significance to meeting development and climate objective in the Sustainable Development Goals (SDGs). Such likely impact has already been simulated and analyzed by several researchers (National Academy of Science 2010; Vezmar 2014; IRENA 2016; Lehr et al. 2016; Schwerhoff and Sy 2017; York and McGee 2017). Due to this promising development, there is increasing investment in renewable energy. In a report jointly released by Frankfurt School, United Nations Environment, and Bloomberg New Energy Finance, in 2017, it was indicated that renewable energy added 138.5 gigawatts (GW) at $24.6 billion in 2016; 9% increase from 127.5 GW in 2015 roughly equaling world's 16 largest existing power plants combine, and in the process prevents estimated 1.7 GW of CO_2 emissions. The report further states that even though global investment in renewable energy went down by 34% in 2016 from record high in 2015, annual installations were still up at $27.6 billion 58% up from 2015; corporate acquisition activity in clean power sector rose 17% to $110.3 billion. Impact on the greenhouse is significant as International Energy Agency (IEA) reported in 2017 that switch to renewable energy was the main reason for greenhouse gas emission staying flat in 2016, for the third year running, despite 3.1% growth in global economy.

In Africa, African Development Bank reported, in 2017, that $1.4 billion has already been invested in renewable energy projects across the continent; developing 453 megawatt (MW) of installed capacity of electricity. (This is independent to installation purchases by individuals and small communities and major hydropower projects). The continent's investments in renewable energy will likely grow the years ahead, following global fear that if Africa's multiple renewable energy capacity is not harnessed (despite her posing a very low carbon threat at the moment) by the end of the century the continent shall become a major contributor to greenhouse gas emissions. The continent's focus on renewable energy is also due to the opportunities associated with renewable energy in terms of job creation, welfare, gender equality, facilitating SDG, and its cheaper cost per kilowatt. In 2016, the International Renewable Energy Agency (IRENA) reported that for every job created in the fossil energy sector, the renewable created double per unit of generation.

Generally, reducing environmental impacts is the main motivation for the shift from non-renewable energy to renewable energy. Despite this, turning to renewable energy would not address all environmental concerns. As we shall see later in this work, renewable energy has created new envi-

ronmental and social issues particularly as it concerns land use. Therefore, to develop sound policies, policy-makers and corporate advisors need to understand the environmental impacts of renewable energy beyond what is known in Western science and philosophy. For the African context, this is essential in order to enable policy-makers and firms to proactively identify and pursue designs, decide on project site and operations, and secure the most effective approach to ethical trade-offs that synchronizes with philosophical dispositions and cultural attitudes in Africa. In this direction, this article provides African philosophical analysis on the ethical issues surrounding renewable energy program in the African context in order to facilitate an understanding of how indigenous wisdom may shape the energy industry.

2. A non-Western concept of energy and energy ethics

In Western scholarship and thinking, energy is a property domiciled in biological and ecological forms which must be transferred to another object or converted into another form to perform work. There are various forms of energy which human beings depend on to stay alive and function in the world. However Western oriented science sees energy as a property that is stored or preserved in inanimate forms to be exploited for use by human beings. This is the thinking that has governed the development of energy science in the West. In the light of this, earth and other natural forms have been exploited (often forcefully) for energy without due care to the wellbeing of those energy sources.

In African thinking, energy is not a property domiciled, stored or preserved in some objects for human use mainly. Energy is viewed as "force" – *ǹtú* in Bantu language and *utụ́* in Annang language. This is the property that animates things and enlivens them to functionality (Unah 2002). This property permeates both the animate and the so-called inanimate world (Ekwealo 2017). All existents participate in the same force or energy. It is also force (energy) that holds the universe in balance when it is at its proper equilibrium, and can rock the balance when this equilibrium is disregarded (Unah 2002). The "balance of forces" is maintained through complementarity, relationality and sharing. This means that energy relation is not based on exploitation of other natural forms but on relating to them in mutual sense. That is, recognizing the place of every being in the scheme of things. By recognition it means one must work to protect and care for them. The idea of complementarity implies holism. This means that energy is a holistic force that is all embracing, multidirectional and interpenetrative. All beings

have a stake in the force (or energy). The force (energy) in turn affects all beings in differing inter-directional ways such that what happens at one aspect of the balance must affect all other aspects.

In this context, energy ethics is designed as a field of study to produce a set of values or principles that would preserve this balance and facilitate its restoration where necessary. Energy ethics also aims to produce philosophical analysis on the issues in energy science for the purpose of creating rigorous cultural contexts for scientific laws, theorems and principles of energy. However, one must note that such philosophical analysis must be based on differing philosophical traditions. It is from this recognition that one can draw out what I may call "African energy ethics". African energy ethics can be defined as the analysis that deals with the fundamental governing principles that defines human energy use based on African worldviews, by analyzing the basic concepts such as human and nonhumans, animate and inanimate, and examining the processes by which they (ought to) relate to energy/force within the context of an environment it shares with nonhumans and future people. This definition projects energy ethics as: a set of governing principles and a philosophical study. Further, this definition constructs energy ethics as analysis of the basic concepts employed in understanding the notion of energy. This implies: one, to critically examine energy-related ideas embedded in African traditional cultures, and two, to appraise energy science based on African philosophical discourse. The purpose is to provide a rigorous indigenous ethics for energy transitions in Africa.

3. Theoretical framework

This analysis is based on the conceptual scheme of Braai filosofie. What is Braai filosofie? A saying in South Africa states: "If, as a South African citizen, you don't know what a braai is, you should not have been given that citizenship in the first place". I am not going to define the word "braai" in a banal sense as it is widely used (although I will do so midway). What I am going to do here is to lead us into the discussion of the "filosofie van braai" (philosophy of braai) – we can also call it "Braai ethic" for purpose of convenience. Braai ethic, or simply, braai, is an aspect of Afrikaanse filosofie that is based on the Afrikaanse (Afrikaners) culture.

The concept of "Braai ethic", in the context of its usage, throws up a number of questions, if not ambiguities. It looks more like a paradox (or contradiction) to associate "braai" with "ethics" in the manner I am doing it here, that is, in ecological sense. If anything the word "braai" paints a

picture of *vleis* (meat) roasting over pieces of charred *vuurmaakhout* (firewood).

This is exactly the picture some environmentalists appear to resist. However, braai is more than just a picture of *braaivleis* (grill). Braai holds deep meaning about life in general, or human life in particular. We can place the word "braai" side by side with ubuntu in terms of relevance to addressing issues of social justice and ecology; but braai is even deeper than ubuntu. And as we shall soon see, Braai ethic, despite its controversial appearance, is rooted in deep ecology. One can also see braai as "a clearing", in the manner that word is used by Martin Heidegger to explain Dasein. Viewed this way, braai is therefore a place (or clearing) that allow *waardes* (values or ethos) to emerge.

Generally, ethics is derived from the word "ethos" – which means "the ways of a place, the characteristic spirit of a people or community" (Janz 2009, 181). It is a set of values (or virtues) of a place or the finest heritage of a culture or community – usually accepted as best practices (or principles) to guide behaviors in a place. The way I define ethics here may cause people to think of Braai ethic as an "ethic of place". To some extent, such thinking may be correct because ethics are generally about places and apply to places (but I am not using the word "place" as it is widely understood as GPS reading or spatiality). We often think of ethics as "abstract principles" and tend towards denying its context of place. When we think of ethics as placeless or as abstract principles it tends to lose its relevance in terms of its application and historical references. Braai ethic is not some abstract principles or universal maxims that decree how human beings ought to behave in a place; a characteristic that tends to projects ethic or values as those principles external to a place. Braai filosofie projects *waardes* as existing within a place, which comes into "a clearing" (manifest) when prompted. This places ethics in lived experience; yet as something that billows during *gesprekke* (conversations). That is the reason I said Braai ethic is rooted in deep ecology because of its propensity to engender *diep ondervraging* (deep questioning, i.e. self-reflection) following *gesprekke*.

Braai is a social process that brings people together often to share the same *kaggel* (fire-place), i.e. energy, in the process they involve in *gesprekke* that span social, political, economic, ecological, and cultural themes. Sometimes, they may find themselves asking about the type and source of the *vleis* and *vuurmaakhout* involved in the braai. These are questions about the environment even though they seem banal or the answers are not constructed in eco-logic manner. Braai ethic demands for *diep gesprek* (deep conversation) with the other about the braai, energy and environment. The *ondervraging* may lead to discovery of more facts, concepts, values,

etc. Moreover, in attempting to provide answers, the persons who had come together for a braai would ultimately develop ethical thinking, and eventually act sustainably towards other existents in nature and towards themselves.

Braai cut across cultures, ethnicity, race, and class. Julia Moskin (2016) observes that it is the only indigenous South African word that is recognized in all the eleven official languages in the country. Braai is held regularly on the beaches, backyards, picnic grounds, verandas, and front porches of peoples' homes for any reason and/or no reason at all. During braai, people gather around a *kaggel* to converse while braai is going on. Although braai involves a lot of plumb and romp; but as Tom le Grange (2009) notes "a braai is much more than cooking food; it is about the atmosphere, the experience and the people that you share it with". In addition to the basic pleasure, braai reflects African tradition of spending evenings together in *gesprekke* around wood fires or big trees (Moskin 2016). Some have said that in South Africa it has always been the norm to invite people you just met over for a braai.

Basically, all that braai stands for is a social process that brings people together to share the same space and resources, and participate in fireside conversations. It is from this braai philosophy of unity, hospitality and conversation that I derive the central maxim of Braai ethic – which can be formulated thus: *A thing or action is right if it allows other existents to share one's space and resources; it is wrong if it tends otherwise*. That is, the less a thing brings existents together in complementary sense the less right it is. The more an action disperses entities by isolating them the less ethical it is. The maxim can be interpreted as "live and let live", and it is inter-intuitive with most African philosophical inspirations including *Ibuanyidanda* (Asouzu 2011), *Iheniile-di bu Mma Ndu* (Ogbonnaya 2016), and *Ndu Mmili Ndu Azu* (Ekwealo 2017). There is the idea of "shared-space" embedded in African thinking which projects "ecological space as a place to be jointly lived by humans and non-humans, and of which humans-animals-plants jointly constitute in gestalt sense" (Ibanga 2017a, 1883). An Annang proverb states: "ade agwo okot inuen okot" (humans and animals depend/share the same resource). No existent (human and nonhuman) can claim sole ownership of the land and/or its resources. Land is a resource jointly possessed/shared by humans and nonhumans, and it is construed as being designed mainly to serve the wellbeing of humans and nonhumans in terms of creating conditions for satisfying primarily their biological needs. This is considered in a concentric sense, from a decentralized-to-global perspective – based on the Annang proverb "ese etongo ke esa ekwok eka anen" (one should deal from hither to thither). This concentric model pro-

jects land as designed to first satisfy the need hither and afterwards extends to serve the need thither.

In Braai ethic, the idea of sharing space with "other existents" (humans and nonhumans) also implies sharing resources not just with "distant people" (people distant by geography) but equally includes "future people" (people distant in time). This is inter-intuitive with the general practice of "kolanut breaking" which impresses upon the living people (*usaak anyin*) to share their space with the ancestors or living-dead (*uda'ya idap*) on the reason that they jointly own the community (Francis 2016a); for which reason their thoughts are consulted or valued. Braai ethic also overlaps with the Annang maxim "adia mkpọ 'nọ isong koro isong adehe ayaka 'gwo" (share your resources with the land/ecosystem because we are all relations). That is, humans should always share their supplies with the land/ecosystem (including animals, plants, and the inanimate) for we share common heritage. Braai ethic proposes that the space (including the resources on it) is not just jointly owned by the ancestors but that the future people and nonhuman existents have a stake to the claim of joint ownership. Interestingly, both the "living-dead" and the "future people" are described with the same word "uda'ya idap" or *hibernatus* (being/ those in a state of hibernation or hiatus), and this concept is based on cyclic conception of time in African cultures. So, the idea of shared-space embedded in Braai ethic is not limited to merely humans as expressed in Ubuntu maxim but extends to include nonhuman existents and future people as well. To use land/space, therefore, should be based on recognition of the joint-ownership and space-sharing principle. Most importantly, Braai ethic impels existents sharing a space to engage in *diep gesprek*.

Let me summarize this section by showing in three interrelating contexts the power and promise of Braai ethic to contribute to sustainable energy development. Braai ethic sits on a tripod, namely – unity, hospitality and conversation. In terms of "unity", braai ethic urges for inter-disciplinarity and multi-disciplinarity in the search for energy sustainability. This means that it recognizes that every discipline and sector has something to contribute to energy development. This also implies that situating energy infrastructure and policy on one-size-fit-all framework is problematic and probably wrong. This interconnects with Ibuanyidanda philosophy captured in the statement: "to be is to be in mutual complementary relationship (ka so mu adina) and its negation is to be alone (ka so mu di)" (Asouzu 2011, 42). Ibuanyidanda places premium on unity of differing entities and dimensions. Energy infrastructure that is recognized as having sustainability credentials should be multidimensional and multi-sectorial in nature. In other words, it should consider its significance and/or implications for

cultures, ecosystems, communities, human rights, social justice, values, animal rights, etc.

In terms of "hospitality", Braai ethic encourages accommodation of the other and sharing of resources; not necessarily because the other lacks it but also for purpose of resource economy and coming together. This interlinks with the Ubuntu maxim that "a person is a person through other persons", that is, we all interdependent on one another's. Ubuntu reinforces the notion that we all have common humanity. The idea of interdependence gives rise to the notion that there is need for communities, cultures, races, groups, disciplines, people, to come together to find solutions to a common problem such as climate change triggered by irresponsible energy consumption habits. (This loops back to the first leg of the tripod). The closest example of how the hospitality "leg" of Braai ethic can contribute to sustainability is car-pooling. When neighbors are hospitable towards others (or have ubuntu) they may likely pool themselves into one car rather than driving individually to work thereby contributing to emission reduction.

In terms of "conversation", Braai ethic enjoins people coming together to share space to converse and ask one another deep questions about society and environment. Such *diep gesprek* that may raise our consciousness about our place in nature/environment, in terms of the structure of our relationship to nonhumans, future people and less advantaged humans – and our obligations to them. This aspect of Braai ethic overlaps with deep ecology. Ferdinand Nwaigbo (2015, 238) avers that "deep ecology raises the searching questions about human life, society and nature; [and] asks what type of human life, or society would be best in maintaining a particular ecosystem". It asks sustainability questions about our source of energy, consumption habits, lifestyles, and social structure. These are essential questions we should frequent ly raise at *gesprekke* while we braai.

Braai filosofie calls for *diep ondervraging* of our everyday beliefs, probing of our mental attitudes, to dialogue differences and to synthesize common ideations towards shaping the Africa of the future. Braai filosofie urges for frequent summoning of "the others" for purpose of engaging in *diep gesprek* which should often lead to *diep ondervraging* towards facilitating deconstruction and reconstruction of mental attitudes in pursuit of futurity. Jonathan Chimakonam (2014) rightly avers that philosophical conversations will allow for critical analysis and logical examination of relevant substantive issues in a culture, and facilitate generation of ideas to address the perceived inconsistencies. Braai filosofie provide "a clearing" for researchers to raise deep questions about the status quo hence help in minimizing insensitivity to contemporality and apathy to problems outside one's cultural enclave. The relevance lies in its capacity to engender

the African intellectuals to earnestly begin the process of reconceptualizing concepts, themes, and social issues, through the application of the method of *diep gesprek*. By so doing it helps researchers to inaugurate new concepts/theories and point to new directions of further research. This is important, for if energy ethics must progress, practitioners must engage in sustained conversations. This establishes Braai filosofie as quite pertinent to research in energy ethics.

4. Some ethical issues arising from renewable energy program

There are a number of ethical concerns raised about renewable energy program, but I want to focus on those ones that are pertinent to Africa. Generally, in the African context, ethical issues that surround renewable energy program have to do with unethical use of land. The strategic importance of land to renewable energy program cannot be overemphasized. Most renewable energy projects require vast areas of land (Ottinger 2007; U.S. EPA 2007; Ezemonye and Ogbe 2011). In some places it has led to destruction of forest reserves (Ottinger 2007) or converting of farmlands to energy fields (Prinsloo and Lombard 2015). Ultimately, this can lead to care-withdrawal for the land. This makes renewable energy problematic because it touches on a subject – land – upon, which our very existence and the existence of other entities depend. In land is considered very substantial to collective existence of all being (including animals, plants, and the inanimate). Hence, the Annang maxim: *adia mkpọ'nọ isong koro isong adehe ayaka 'gwo*. This implies providing care and protection for the land. The parties that depend on the land to satisfy vital needs must in return show gratitude to the land in terms of care and protection. In African cultures, land is regarded as having life of its own (Ibanga 2017b). Lands are not dead things but are animated with life-force, potency of life, and they are as active as the life-forms that live in them, upon whom we depend. He, who destroys land, destroys life-force, the source of life and existence itself.

Let us look at two dimensions through which these issues are expressed.

One of the core ethical issues involving renewable energy is the argument that bioenergy production will impact food security negatively. The argument is that farmers derive greater financial benefits from growing feedstock than from food production, hence there is the possibility that the farmers would abandon food production for biofuel with serious adverse effects on food supplies (Ottinger 2007; Ezemonye and Ogbe 2011).

Biogas is usually derived from crops with high protein, fat or carbohydrate content, for example, maize, sunflower, sugar cane, palm oil, and soy. Biofuel focused cultivation triggers concerns about land use, food availability and affordability to poor communities and regions. The argument is that unbridled production of biofuel for commercial or export purposes can put pressure on food markets in developing countries leading to food crises. From the perspective of African environmental ethics, conversion of food crops to motor spirit is not necessarily unethical. The conversion is only considered as a violation of African land ethic when there is an unmet obligation regarding the world hungry. The ethic involves the use of land for the purpose of which it was intended. Accordingly, the primary purpose of land cultivation is for food production. This primary purpose of land should not be superseded by the secondary and tertiary purposes such as social infrastructure. Therefore, when land is used to cultivate crops which are not primarily meant to serve as food it decenters the teleo-ontological orientation of land and violates its ethics of use, especially when there is an unmet obligation to feed the hungry. It is in this sense that some renewable energy programs are unethical, and complicated by the fact of starvation in many developing nations.

Meanwhile, Giovanni Frigo (2016) argues that concerns about biofuel can be potentially addressed if the biofuel is made from algae rather than sourced from food crops. Principally, the algae would be grown on waste water. However, adopting the algae-based approach to biofuel production in the African place may still trigger ethical concerns if African farmers invest large amounts of their time on algae production while problem of hunger in the continent is not addressed. In African philosophical thinking, addressing hunger problem interlinks with concerns about posterity. "Present people" have an obligation to facilitate arrival of "future people" in good state of health. To meet this obligation the "present people" need to be in good state of health themselves.

Another dimension of the environmental ethics that bioenergy program might violate concern land reclamation. With the rate of investment in renewable energy, demand for land would significantly increase, and since there is limited land space, expansion in feedstock market can lead to scrambling for land. This may then result in intensified land reclamation program to augment the shrinking land space for purpose of renewable energy program. Land reclamation involves pushing back rivers and seas from their original space (or sometimes closing up small lakes) and draining the emergent land for agricultural and other developmental purposes. Land reclamation fundamentally contradicts African land ethic, and this contradiction extends to renewable energy program when land reclamation

is done for that purpose. African environmental ethics directly intertwines with land use and land boundaries.

Land reclamation, whether for renewable energy purposes or other reasons, rails against biodiversity. The ethic violated in this case is that which has been outlined in the principle of *Ndu Mmili Ndu Azu*, interpreted as "live and let live". It is a philosophy which demands respect for the right of existence, space, dignity and self-worth of other entities in nature (Ibanga 2014; Francis 2016b; Ekwealo 2017). Respecting the right of existence of other entities in nature implies not denying them space to exist, in terms of being mindful of destroying their habitat in the name of land reclamation. Land reclamation naturally leads to biodiversity loss; and it has significant impact on aquatic habitats and ecologies. For every square meter of land reclaimed from the sea, it is obvious that we may have lost a large number of aquatic species. Some of the species may be displaced from their natural habitat and exposed to the danger of extinction due to the space change or attack from other species who may view their retreating as another way of territory invasion.

In Annang-African ontology, land reclamation, whether for renewable energy purposes or other reasons, is viewed as a fundamental contradiction of the indigenous land ethic. In the indigenous African worldview, land is a fixed entity which can neither be created nor destroyed. In Annangland there is an environmental ethic which states: *K'unuk Adaha Abot* (do not alter natural order/ordering). *K'unuk adaha abot* is an ontological maxim which admonishes every existent to leave the boundaries found in nature intact as it were. It holds that everything in nature has its boundaries cut out for it by *abot* (nature). For example, the boundary between land and the sea has been determined and fixed at the point of creation by *abot*. Land is not expected to outflow to take the place of the sea and vice versa. This was done to establish ecological harmony. However, this harmony can be disrupted when one (e.g land) is made to encroach on the space meant for sea to occupy. The encroachment usually comes in form of land reclamation. It is believed that when land has overstepped its bounds, the sea must get back with dire consequences against the violator. Hence, the unethical practices have always been met with catastrophic consequences such as flooding, hurricanes, river bank breaking, etc. To avoid the catastrophic consequences that always attend violations of natural boundaries, the Annang ontological maxim warns – *k'unuk adaha abot*.

5. Trade-off principles: to base decisions on project planning, site choice, and policy

Energy policy is ultimately based on cost-benefit analysis that integrates political considerations, placed-based values (principles), and scientific/technological advances. Within the corpus of African environmental ethics there exist some Afrocentric values that can guide individuals, corporate bodies, communities, and governments, when deciding on renewable and non-renewable energy projects. I have summarized those oughts into five principles.

1. *Principle of Accommodation*: Act in such a way that nonhuman existents and future people are considered and accommodated in your daily decisions and dealings.
2. *Principle of Gratitude*: Act in such a way that reflects your gratitude towards other existents, humans and nonhumans, for contributing to support your beingness or existence.
3. *Principle of Restoration*: Always act to restore to Nature the loss you have caused it. For example, re-planting a tree after felling one.
4. *Principle of Control*: Act in such a way that you control your action from producing too much negative externalities.
5. *Principle of Necessity*: Act only on decisions and actions that are absolutely necessary.

These principles were not begotten ex nihilo but are values and maxims available within the corpus of African philosophy; what I did was to systematize and abstract them into five definite principles. These precepts or injunctions are obligations designed to guide behavior of individual human beings as members of human and nonhuman community. The principles call for restraint and circumspection in decision-making and action-taking such that one's lifestyle, behavior and dealings can lead to avoidance of wastage of resources and minimize injuries caused to other beings (humans and nonhumans) and their communities (culture, ecosystem, etc.). These principles offer us context to anticipate before acting. Let me explain how these principles should be rationalized and used.

Principle of Accommodation: This formulation refers to the biospheric aspects of the environment considered as an interrelated and interdependent whole. This is understood from the perspective of complementarity whereby individual elements (persons and objects) appear as thing-with-others, that is, interconnective with other beings not yet expressively visible. In this context, one cannot separate an individual specie from the overall environment (ecosystem) that projects it; like it is stated in an Annang adage – *agwo isi 'diahake nsaha ye abot*, one cannot separate existents from

existence. I want to further state that the term "considered" is used here in "lived" (or empathetic) sense reflecting ecocentrism, and implies respect for nonhuman existents as fellow existents under the shared-space thesis. The other term "accommodated", as used here, implies actually acting (not by doing-nothing or in passiveness) to secure this respect/right for the nonhuman and future people. "Daily decisions and dealings" refers to both professional and non-professional acts, considered as both habits and/or non-habits. The phrase "future people" as used here refers to those who have not yet come into physical existence but nonetheless exist in our minds as expected people "uda'ya idap". In African cultural thought it is the idea of "expectation" that gives credibility to their consideration as "people on the way" and it is based on the logic that we were once "people on the way". The notion of "people on the way" is configured to look like a long endless chain that allows people to arrive in batches (generations) ad continuum.

Principle of Gratitude: The term "act" refers to direct action (not passiveness). The term "reflects" implies being visible as sun such that it is capable of winning admiration and praise. "Support" should be interpreted to mean those things (oxygen, food, aesthetic, shelter, medication, etc.) we sourced from other existents to lengthen our lives; those things that without animals and plants, our lives would have long ended. "Beingness or existence" is used in past, present and future sense unitarily. This principle means that human beings have to reciprocate the supplies from nature, by offering something back to nature in return; and what one has to offer in reciprocation must be of comparative value/weight.

Principle of Restoration: In this formulation "Nature" is used as a proper noun to objectify it as animate being (if you like, Gaia), a living thing capable of being hurt and able to feel pain; and also capable of being consoled. "Consoled" here is not used in the same manner Ada Adaga (2015) is using the term in his "philosophy of consolationism", reflecting escapism in humanistic emotiveness. Rather it implies bringing relief to suffering, to comfort – by doing something to benefit the loser. To "restore" as used here implies actively seeking to return a place or thing to its original nature, by returning (directly or indirectly) what one took from it; seeking to make peace with the one, to console, or to reinstate balance/justice. The term "loss" is not used here in individualistic sense as a loss caused to an individual existent. Rather, it is used in a complementary sense, in terms what the loss may contribute to complementarity or lack of it. The "loss" is viewed more as a community loss; not a particular human community but a community that includes nonhumans, that is, cultures, ecosystems, species habitats, etc. I have given example of "replanting a tree after felling one". However, that is not end-in-itself; one must consider time-involvement

including determining how many generations would pass before the tree comes to full maturity as it were.

Principle of Control: This formulation enjoins consideration to be given about what extent an act of commission or omission should be allowed to affect communal balance. Thus, if an action is capable of disrupting balance in nature in a very significant manner then such an act is considered really harmful. This principle takes into consideration that there is no action without consequence on others (individuals, communities, cultures, ecosystems, etc.). The extent of such a consequence is not the only thing considered here but also the nature (configurations, duration, coverage, etc.) of the consequence. The term "control" as used in the principle implies actively preventing negative externalities from actions. The phrase "too much" can be determined by considering alternatives (opportunity costs) to an objective.

Principle of Necessity: This principle is the most fundamental as it serves as the basement to other principles in the set, and serves to operationalize other four principles. The term "absolutely necessary" implies that being "necessary" is not enough; necessity as the basis of one's action must be from a very rigid context. The qualifier "absolutely" raises questions about what we consider as necessary when taking decision that involves other creatures in the environment. The Principle is based on the view that we cannot determine what is necessary in a locus of nature (or about other existents) until we consider those other beings (animals and plants) with the same force of emotions and reasoning we consider fellow human beings (or better, members of one's race/tribe). What we cannot substitute the life of fellow human being to achieve; we lack the moral justification to subject other animals and even some plant species. Here, such question should be asked: "Suppose the deer or redwood is a human being, would I still act in the same manner towards it?". Further, in deciding "absolutely necessary" it becomes less or more flexible in consideration depending on context. For example, if it involves sacrificing (dispensing with) human and/or nonhuman lives, in order to advance the course of the entire ecosphere, the requirement "absolutely necessary" becomes less flexible than if it involves merely losing habitat. More priority is placed on life than on shelter or comfort. Life of an antelope weighs equally to the human life, even though human life may weigh a little bit higher depending on context. But no human comfort (e.g. shelter) weighs equal to, or higher than, the life of nonhuman (e.g. amoeba). This is summarized in the South African proverb "feta kgomo o tshware motho" (preserve life even at the expense of one's comfort) which impels humans to prioritize life over any other consideration.

6. Conclusion

Although science has fabricated different kinds of technology to tackle the present energy crisis, there is need to recognize that technology is not an end-in-itself. Technologies eventually depend on human beings to be effective. Even though technology has certain power to change the way we use energy, belief systems have even more immediate impacts on the types of technology eventually accepted in society. Therefore, more subtle work has to be done on our belief systems. This is in the domain of energy humanities and energy ethics. However, this does not call for one-sided approach to research. Rather, the multifarious nature of energy crisis impresses upon researchers to embrace trans-disciplinary and multidisciplinary approaches in energy research. The traditional approach to research, which involves strict focus on the core areas of one's discipline, will no longer work. Energy scientists and technologists have to learn to work even closer with researchers in energy humanities and energy ethics. There is need to adapt our researches to multidisciplinary methodologies. This means that there is need for frequent cross-disciplinary and inter-disciplinary conversations. Importantly, researchers should also focus on understanding the different contexts in energy studies and adapt their discourse accordingly. I think the future of energy science lies in the humanities.

References

African Development Bank. 2017. *Unlocking Private Sector Potential to Promote Energy Access and Inclusive and Green Growth*. Abidjan: African Development Bank.

Agada, Ada. 2015. *Existence and Consolation: Reinventing Ontology, Gnosis and Values in African Philosophy*, edited by Jonathan Chimakonam. Calabar: 3rd Logic Option Publishing.

Asouzu, Innocent. 2011. *Ibuanyidanda and Philosophy of Essence*. Calabar: Univeristy of Calabar Press.

Chimakonam, Jonathan. 2014. "Interrogatory Theory: Patterns of Social Deconstruction, Reconstruction and the Conversational Order in African Philosophy". *Filosofia Theoretica: Journal of African Philosophy, Culture and Religions* 3 (1): 1-25.

Ekwealo, Chigbo. 2017. *Ndu Mmili Ndu Azu: an Introduction to African Environmental Ethics*, edited by Diana-Abasi Ibanga. Lagos: Redcom.

Ezemonye, Lawrence, and Martin Ogbe. 2011. "Environmental Issues and Implications of Biofuels as Alternative Sources of Energy". In *Critical Issues on Nigeria's Development: Environment, Economy and Social Justice*, edited by Francis Okafor, 347-76. Ibadan: Spectrum Books Ltd.

Francis, Diana-Abasi. 2016a. "The African Meta-Medical Science of Ukpuho Ukpong (Soul Transplantation): a Philosophical Critique". *International Journal of History and Philosophical Research* 4 (1): 49-60.

Francis, Diana-Abasi. 2016b. Logical and Theoretical Foundations of African Environmental Ethics. *Africology: the Journal of Pan African Studies* 9 (9): 3-24.

Frankfurt School. 2017. *More Bang for the Buck: Record New Renewable Power Capacity Added at Lower Cost*. Accessed September 22, 2017. http://fs-unep-centre.org.

Frigo, Giovanni. 2016. "Algae Harvesting and Energy Ethics: an Opportunity to Enhance Responsibility towards Future Generations?". In *Energy Ethics: Intergenerational Perspectives in and for the ASEAN Region*, edited by Roman Meinhold, 67-98. Bangkok: Guna Chakra Research Center.

Ibanga, Diana-Abasi. 2014. "Climate Change and Igbo Thought: a Philosophical Analysis". In *Frontiers of Knowledge in Philosophy: Cutting Edge Issues*, edited by Martin Asiegbu and Chidozie Chukwuokolo, 179-92. Enugu: Nigerian Philosophical Association.

Ibanga, Diana-Abasi. 2017a. "Patterns, Trends, and Issues of Illicit Wildlife Hunting and Trade: Analysis Based on African Environmental Ethics". *International Journal of Development and Sustainability* 6 (11): 1865-90.

Ibanga, Diana-Abasi. 2017b. "Is Deep Ecology Inapplicable in African Context: a Conversation with Fainos Mangena". *Filosofia Theoretica: Journal of African Philosophy, Culture and Religion* 6 (2): 101-119.

International Energy Agency. 2017. *IEA Finds CO_2 Emission Flat for Third Straight Year Even as Global Economy Grew in 2016*. Accessed January 8, 2018. http://www.iea.org/newsroom/news/2017/march/iea-finds-co2-emissions-flat-for-third-straight-year-even-as-global-economy-grew.html.

IRENA. 2016. *Renewable Energy Benefits: Measuring the Economics*. Abu Dhabi: IRENA.

Janz, Bruce. 2009. "'Thinking Like a Mountain': Ethics and Place as Travelling Concepts". In *New Visions of Nature: Complexity and Authenticity*, edited by Martin Drenthen, Jozef Keulartz, and James Proctor, 181-95. New York: Springer.

le Grange, Tom. 2009. *What is a Braai?* Accessed September 3, 2017. http://www.braai.co.za/blog/what-is-a-braai/.

Lehr, Ulrike, Anke Monnig, Rafik Missaoui, Sami Marrouki, and Ghazi Salem. 2016. "Employment from Renewable Energy and Energy Efficiency in Tunisia – New Insights, New Results". *Energy Procedia* 93: 223-8.

Moskin, Julia. 2014. "South Africa, One Nation United by the Grill". *The New York Times*. Last modified May 23. https://www.nytimes.com/2016/05/25/dining/braai.html?_r=1.

National Academy of Science. 2010. *The Power of Renewables: Opportunities and Challenges for China and Unites States*. Washington, DC: National Academy Press.

Nwaigbo, Ferdinand. 2015. "Igbo Philosophy and Deep Ecology". In *Discourses in African Philosophy*, edited by Ike Odimegwu, Martin Asiegbu, and Maurice Izunwa, 13-28. Akwa: Fab Anieh Nig. Ltd.

Ogbonnaya, Lucky. 2016. *Iheniile-di, bu Mma Ndu: the Essence of Ecological Equilibrium*. Paper presented at CSP International Colloquium, University of Calabar, Nigeria, September 21-23.

Ottinger, Richard. 2007. *Biofuel – Potential, Problems and Solutions*. Biofuel Conference, August 16-19.

Prinsolo, F.C., and Andrea Lombard. 2015. *The Role of Floating Solar Systems in the Energy-Land Nexus: a Case Study on the Potential for South Africa Wineries*. Paper presented at 2nd International Conference of the Journal of Green Economy and Development, Kloof, South Africa.

Schwerhoff, Gregor, and Mouhamadou Sy. 2017. "Financing Renewable Energy in Africa – Key Challenge of the Sustainable Development Goals". *Renewable and Sustainable Energy Reviews* 75: 393-401.

Unah, Jim. 2002. *African Philosophy: Trends and Projections in Six Essays*, 2nd ed. Lagos: Foresight Press.

U.S. EPA. 2007. *Regulatory Impact Analysis: Renewable Fuel Standard Programme*. EPA420-R-07-004. Washington, DC: United States Environmental Protection Agency.

Vezmar, Stanislav, Anton Spajic, Danijel Topic, and Damir Sjivac Lajos Jozsa. 2014. "Positive and Negative Impacts of Renewable Energy Sources". *International Journal of Electrical and Computer Engineering Systems* 5 (2): 15-23.

York, Richard, and Julius Alexander McGee. 2017. "Does Renewable Energy Development Decouple Economic Growth from CO_2 Emissions?". *Socius: Sociological Research for a Dynamic World* 3: 1-6.