

Entrepreneurship in Micro, Small and Medium Renewable Energy Enterprises: A Tool for Sustainable Development in Nigeria

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Abstract

Renewable energies have a huge potential and can provide unlimited supply of relatively clean and most local energy. Its resources can be regenerated or renewed in a relative short time. Renewable energy is closely associated with the concept of sustainable development which implies meeting the needs of the present without compromising the ability of future generations to meet their own needs. Despite the availability of natural resources such as water, sun, wind and others, Nigeria is still passing through a serious energy crisis. There is growing evidence that investments in micro, small and medium renewable energy enterprises have a positive impact on energy situation. The reduction of fossil fuel which is affecting the environment negatively, economic development and energy for all can be made possible if the entrepreneurs invest in renewable energy. The paper discusses renewable energy for sustainable development, renewable energy technologies and applications, entrepreneurial competency needs for renewable energy entrepreneurs, sources for funding renewable energy enterprises, marketing strategies for entrepreneurs and motivation in renewable energy enterprises. It was recommended among others that; there should be more investment in renewable energy technologies, Government at all levels and donors should support entrepreneurs in renewable energy with capital and enabling environment and entrepreneurs should develop market strategies and employ them.

Introduction

Energy is a necessity and very essential in biological life. It is a primary component of all productive processes. It has been described as one of the most important building block in human development. To this, energy acts as a key factor in determining the economic and sustainable development of all countries (Uttarakhand Renewable Energy Development, 2013). Maczulak (2010) opined that, energy is the primary force in the universe and it defines the earth's biomes and sustains life. He further agreed that all life, starting from single – called microbes to blue whales, exists in a continuous process of consuming and storing energy. Everything we do involves energy and we use various forms of energy for day – to – day activities like lighting, heating, cooling, coking, transportation and theirs. The use of energy makes life better, easier and more efficient. Energy has established positive correlation with economic growth. Providing adequate, affordable and clean energy is a prerequisite for eradicating poverty and improving productivity. Thumann and Younger (2008) defined energy as the capacity to do work as measured by the capability of doing work. Energy has many forms in nature among others are heat (thermal energy), chemical energy, electrical energy, mechanical energy and light energy. These forms of energy come from renewable and non – renewable energy sources.

Non – renewable energy commonly refers to as conventional energy are mainly fossil fuels such as coal and oil, when used cannot be replaced or replenished. The uses of these fossil fuels are considered to be un-clean and harmful to the environment because they produce adverse smoke and gases, which make it to be regarded as not sustainable fuel. The environmental effect of fossil fuel usage, global warming including its concomitant climate change, is the most perplexing, potentially most threatening, and arguably most intractable problem. It is caused by the ever-increasing accumulation in the atmosphere of carbon dioxide (CO₂) and other gases.

such as nitrous oxide (N₂O), methane (CH₄), and chloro-fluoro-carbons (CFC), collectively called greenhouse gases (GHG) (Golomb 2007). The inevitable increase in the use of fossil fuels alongside a country's economic growth presents associated side effects of threat to the nation's energy security, as well as environmental degradation through climate change. A feasible alternative to the indiscriminate burning of fossil fuels lies in the accelerated use of renewable energy.

Renewable energy is often known as clean and modern form of energy. This is due to the fact that it pollutes less than conventional fossil fuels. The renewable energy comes from natural resources and it can be replenished. Renewable energies have a huge potential and can provide unlimited supply of relatively clean and most local energy. It resources can be regenerated or renewed in a relative short time (World Energy Council, 2004). It is further explained that renewable energy is closely associated with the concept of sustainable development which implies meeting the needs of the present without compromising the ability of future generations to meet their own needs. Oyedepo (2012) agreed to the facts that renewable energy is central to sustainable development and poverty reduction. He further said that energy consumption per capital is one of the bench mark or indicator for measuring the standard of living of people or nation.

It is sad and disheartening the state of energy supply in Nigeria. The energy supply in Nigeria is epileptic in nature and unrealizable. Although, the nation is relatively blessed with abundant natural resources but the state of energy in the country is yet to be structured and managed such that, it will ensure sustainable energy (Oyedepo, 2012). Despite the availability of natural resources such as water, sun, wind and others, Nigeria is still passing through a serious energy crisis. There is growing evidence that investments in micro, small and medium energy enterprises have a positive impact on energy situation. The reduction of fossil fuel which is affecting the environment negatively can be made possible if the Entrepreneurs invest in renewable energy.

Nwoye (2011) viewed entrepreneurship as the act of combining various input factors of production in an innovative manner to generate value to the venture with the hope that this value will exceed the cost of production, thus generating the superior returns that result in wealth creation. Therefore, Entrepreneurship in micro, small and medium renewable energy enterprises is timely, going by energy situation and negative effect of conventional energy in Nigeria.

Renewable Energy for Sustainable Development

Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it is derived directly or indirectly from the sun, or from heat generated deep within the earth. Included in the definition is energy generated from wind, solar, geo-thermal, biomass, hydropower and ocean resources (IEA, 2010). Utilizing these sources of energy to the needs of biological life is very important and crucial to national development. Renewable energy technologies can contribute positively towards alleviating poverty by providing energy for lighting, cooking and space heating. Improvement of biomass stoves and liquid and gaseous fuels derived from locally produced biomass can significantly reduce the drain of household income, while freeing up time for education and income-generating activities. By making light more affordable and reliable, renewable energy technologies also permit schools and businesses to operate in the night hours. Renewable energy can contribute to education by providing electricity to schools. Renewable energy can also contribute to improved health by providing energy to refrigerate medicine, sterilize medical equipment, and incinerate medical waste. And it can provide power for supplying the fresh water and sewer services needed to reduce the burden of infectious disease. Renewable energy has no doubt contributed positively to sustainable development of the nation. The following energy sources are discussed below.

Wind Energy: Wind is natural and it is been considered to have a potential as a global clean energy source. It is widely available through diffuse and producing no pollution during power generation. The working principle of wind turbine is to convert the force of wind (Kinetic energy) action on rotor blades rotational energy into mechanical energy and when the rotational energy is used within a generator it produces electricity. The electricity produced can be used to power electrical equipment. Wind energy is a nature renewable energy source that has been successfully deployed in many countries. It is technically and economically capable of significant continued expansion, and its further exploitation may be a crucial aspect of global GHG reduction strategies (USAID, 2008).

Solar Energy: Many developing countries have highest levels of sun expose in the world; this can be used to make some remarkable growth economically in such nation. This solar energy may serve to sustain the lives and families of millions of people in these developing countries (Freling and Ramsour, 2010). They further noted that no form of energy is more abundant than the sun. Solar energy is simply the energy which is produced directly by the sun and collected elsewhere, normally the earth. Much of the world's required energy can be supplied by solar power and more can still be provided indirectly. Hamilton (2011) opined that sunlight is the most abundant source of potential energy on the planet. If harnessed properly, sunlight could easily exceed current and future electricity demand. Solar power is a versatile means of generating electricity; it can also be used for the purpose of heating water, powering streetlights, charging battery and other applications. Solar energy is the light and radiant heat from the Sun that influences a range of systems and functions on earth, from climate and weather to photosynthetic process in plants and sustaining life. There are three main types of solar technology. Photovoltaic panels, used to convert sunlight directly to electricity are usually installed on individual buildings but can be grouped in large numbers in commercial solar farms. Solar thermal technologies are used to heat water for buildings or neighbourhoods. Concentrated solar power plants are typically large scale electricity generating installations connected to the electricity grid.

Bio Energy: Bio energy can be seen as the products of biomass that have been converted into solid, liquid or gas form which depend on the raw material base on technology employed for energy generation. Biomass can be defined as any organic that is decomposing, matter derived from plants or animals available on a renewable basis and it includes among others wood, agricultural crops, herbaceous, landfill gas, methane from waste water treatment facilities, municipal organic wastes as well as manure (IEA, 2005). The biomass may be burned directly to produce heat and/or fire to generation of electricity. It may go through a process to produce a liquid fuel such as biodiesel. It may go through a gasification process or processes of anaerobic digestion to produce gasses which can be stored and then used to produce electricity, cooling, or produce heat. Biomass energy covers a broad spectrum of technologies, from primitive applications (for example, traditional charcoal making and wood stoves) to advance bio energy processes, collectively often described as modern biomass (Matthews & Robertson, 2002)

Hydro Power Energy: Hydro power energy is a renewable form of electricity generation and it provide effective means of converting mechanical energy into electricity through the use of flowing river. Flowing water is natural and it is abundant in Nigeria. Hydro electric power is the energy derived from flowing water. This can be from flowing rivers or from manmade installations, where water is allowed to flow from high-level reservoir of dam or reservoir through tunnel. The turbine that is positioned within the flow of water extract it kinetic energy and convert it to mechanical energy. This allows turbine to rotate at high speed and driven the generator that converts the mechanical energy to electrical energy. Hydroelectric power can derive it water from rotation of turbine through storage schemes, run of river schemes, pumped storage. This type of renewable energy has the lifespan of 50 to 100 years with little maintenance

(IEA, 2010). There are different and common categories of hydropower: large and small hydro-power, which has an output of hundreds of Mega watts, while small generate up to 10 Mega watts. Mini or micro-hydro has an output of 100KW to 1MW and 5 KW to 100KW. Pico hydro has an output of 0 to 5KW.

All these renewable energy have potential for sustainable development in Nigeria. Sustainable development aimed at meeting the needs of the present without compromising the ability of future generation to meet their own needs (Oyedepo, 2012). It is certain that earth warming is due to the accumulation of greenhouse gasses (GHGs) from the intensive use of fossil fuels and this lead to intensity of extreme climatic events, such as more destructive floods, serious sustained droughts, the changes in climate affect agriculture and human health negatively. The use of Renewable energy resources can slow down and dilute the effects of global warming. The use of renewable energy helps the country to use local and available resources for the production of electricity which will meet the needs of society with less cost, increasing energy, security, provide stable and reliable energy which will help in stabilized economic and social life of people. The uses of renewable energy have significant impact in national development.

Renewable Energy Technologies and Applications

Technologies have been developed to harness energies and these technologies are called renewable energy technologies. Renewable energy technology is an answer to the energy crisis in Nigeria. Renewable energy, apart from being sustainable and inexhaustible, can be set up in small units and is therefore suitable for community management and ownership. The Table 1 presents the renewable energy technologies and its applications (USAID, 2008).

Table 1
Renewable Energy Technologies and its Applications

S/No	Renewable Energy Technologies	Applications
1	Solar water heating system	Rural clinic, Hospital, houses, School
2	Solar drying	For preserving Agricultural products
3	Solar cooker: Oven/Stove	For cooking
4	Solar distillation	For producing portable water
5	Solar cooling	Cooling applications
6	Solar Photovoltaic (PV) System	Lighting and powering electrical equipment
7	Solar PV pump	Pumping water
8	Wind turbines (Grid connected)	Residents and Industrial applications
9	Wind turbines (Stand - alone)	Lighting, cooling, heating
10	Wind pump	Pumping water (Domestic use and Agriculture)
11	Solid biomass	Cooking, Lighting, Motive movers
12	Liquid biofuel	Transportation fuel, Mechanical power
13	Biogas	Cooking, Lighting, Heating
14	Large and small hydro power	General use (Lighting, Cooling, Heating)
15	Mini and micro hydro power	General use (Lighting, Cooling, Heating)
16	Pico hydro power	General use (Lighting, Cooling, Heating)

Entrepreneurial Competency Needs for Renewable Energy Entrepreneurs
Entrepreneurship is of significant important in Nigeria economy, as the Entrepreneurs possessed the capability to contribute positively towards sustainable development. Entrepreneurship can be defined as the willingness and ability of an individual or group of person to search for

investment opportunities, establish and run a business unit successfully. It can also be viewed as an independent process in which the entrepreneur creates something new and worthy which requires time and efforts. It assumes the financial psychological and social risk but also possible reward in the form of money or personal satisfaction and independence. Lans, Hulsink, Baret, and Mulder, (2008) defined competences as a mix of knowledge, skills and attitudes. It is also viewed as broader personal characteristics such as generic, motives, traits, self image necessary for superior behaviour, as an outcome of a proper application of knowledge (Brown, 1993). The Entrepreneurs desire growth in his/ her enterprises, so it is therefore necessary for him/ her to interact with environmental forces which are required for high competency in different ways like attitudinal, intellectual, behaviour and managerial aspect. Entrepreneurs are therefore challenged to use different set of competencies to succeed in their endeavour. The entrepreneurial competencies required in renewable energy are presented in Table 2.

Table 2
Entrepreneurial Competencies Required for Renewable Energy Entrepreneurs

	Attitudinal	Behavioural	Managerial
1	Self confidence	Initiative	Information seeking
2	Self Esteem	Acting on opportunity	Systematic Planning
3	Dealings of failures	Persistence	Problem solving
4	Tolerance for ambiguity	Assertiveness	Persuasion
5	Performance	Need for activeness	Goal setting and perseverance
6	Concern for high quality	Need for autonomy	Communication skill
7	Locus of control	Risk taking	Technical knowledge
8		Drive and energy	Social skill
9		Innovation	
10		Creativity	

Sources for Funding Renewable Energy Enterprises

Financing is one of the major hindrances to the development of sustainable development in Africa and Nigeria in particular. Oboro and Ighoroje (2011) says, people often quoted that money is nothing, that may serve during a religious sermon but when it comes to enterprise, one is dead without money. Since the investment in renewable energy enterprises has promising future. The deployment of renewable energy sources and the realization of sustainable development, always require substantial amounts of money. Despite the free nature of renewable energy such as sun, wind, hydro and others, special equipment is needed to convert it to electrical, mechanical and heat energy. The upfront costs of this equipment can be daunting to entrepreneurs. Mamman (2008) noted that after successful planning of the enterprise, the next thing to do is to obtain the finance needed for implementation of the planned enterprise. He further categorized capital for investment into two; equity and debt. Equity capital comprises of personal savings and others assets of the owner(s) of the business enterprises. This type of capital includes owner's savings, contribution from relatives and friends or partners. The debt capital comprises of money and assets realized from loans through individual and/ or financial institutes like banks, financial houses and others. Ewiwile, Azu, and Owa (2011) stated the ways entrepreneurs can source for finance to implement its plans, such as: (1) The owner-savings and his or her associates, including family and friends who may or may not be partners or shareholders in the venture. (2) Partners and shareholders in the venture. (3) Banks and lending institutions. (4) The small business administration and financial assistance programme. (5) Small Business Administration licensed small business investment companies. (6) Members of the trade including suppliers of materials such as manufacturers and wholesalers, and in some instances, customers who prepay their contracts. (7) Other businesses, local capitalist sales finance companies, factor and other sources.

Mamman (2008) and UNEP (n.d) further outlined other avenues of raising capital apart from owners' capital. This includes:

1. The African Rural Energy Enterprise Development (AREED) programme was founded on the idea that impoverished people can transform their lives and break out of the vicious circle of poverty when they are empowered by clean energy services delivered by small and medium enterprises. The programme seeks to expand energy access by helping people in rural Africa start income-generating ventures using modern, clean and reliable energy technologies.
2. Government support agencies: Government at all level have established some agencies such as Small and Medium Enterprises development Agencies (SMEDA), National Directorate of Employment (NDE), National Poverty Eradication Programme (NAPEP), National Economic Empowerment Development Strategy (NEEDS), Millennium Development Goals (MDGs) and others to encourage entrepreneurship in the country through training and financial assistance.
3. Specialized financial institutions were established to develop some sectors of the economy and the role of such agencies is to provide funds to the selected sectors as equity or as loans. Such financial institutes are Nigeria Industry Development Bank (N.I.D.B), the Nigeria Bank for Commerce and Industry (N.B.C.I.) and the Nigerian Agricultural and Rural Development Bank (N.A.R.D.B) and others.

Marketing Strategies for Entrepreneurs

It is a fact that the ultimate aim of every entrepreneur is not only to identify and to create needs but also to provide goods and services for the satisfaction of such needs. This can be created through marketing to satisfy the needs of consumers (Mamman, 2008). Marketing is the management function that organizes and directs all business activities involved in assessing and converting consumer purchasing power into effective demand for a specific product or service, and in moving it to the final consumer or user so as to achieve the profit target or other objectives set by the company (British Institute of Marketing in National Open University of Nigeria, 2008). The traditional way of viewing the components of marketing is via the four Ps (Mamman, 2008); 1. Product: Goods and services (creating offerings). 2. Promotion: Communication. 3. Place: Getting the product to a point at which the customer can purchase it (delivering). 4. Price: The monetary amount charged for the product (exchange).

Marketing plays a significant role in the conduct of entrepreneurial activities; the works of entrepreneur will be futile if there is no process of marketing. It is through marketing that entrepreneurs create and maintain contact with the customers. Mamman (2008) outlined some areas of importance in the marketing to entrepreneurs which includes among others: 1. Means of determining consumer's needs. 2. Means of determining the appropriate products or services to produce. 3. Means of pricing products and services. 4. Means of determine appropriate distribution channels. 5. Ways of tracking customers' level of satisfaction 6. Ways of getting feedback from customers.

Motivation in Renewable Energy Enterprises

An entrepreneur, who has motive of moving his / her enterprise to achieve pre – determined goals must adopt certain motivational measures to move employees along a planned direction. If such is not done the employees will serve as a resistance to its effort. Burton (2012) defined motivation as predisposition to behave in a purposeful manner to achieve specific, unmet needs and the will to achieve, and the inner force that drives individuals to accomplish personal organizational goals. A person becomes motivated in order to achieve their own personal goals as well as the organizational goals. The more the employee is motivated, the more likely they are to have organizational commitment in heart and identify themselves with the organization. Mamman (2008) in his work outlined some of the ways entrepreneurs can motivate their employees, although this measures may vary from enterprise to enterprise. The measures among others are:

1. Recognition: this involves appreciation of the effort of workers; it can be either positive or negative. Positive appreciation can be through praise, gifts, public pronouncement of his or her effort while negative appreciation can be mentioned and or meaningful correction of errors or mistakes for future improvement.
2. Working Environment: refers to structures where people work, the structures must be of better condition, such as adequate ventilation, clean environment, good water supply, good sanitary and others.
3. Condition of Service: this includes favourable rules and regulations governing employees employment, job description, security (physical and social), medical services, children's education, annual leave, training and development and others.
4. Incentives: this can be seen as measures taken so as to encourage workers perform better. It can be in cash and in kind. Cash form of incentives could be salary or wages increase, bonuses, gifts, leave grand. Kind incentives could be letter of commendation, award and others forms of incentives that will help in increasing the efforts employees.

Conclusion

As a developing economy, Nigeria faces challenges of pursuing economic growth and protecting environment. For effective promotion of economic development and environmental protection, it is imperative for the country to consider new paradigms for energy production and consumption. The establishment of sustainable development systems through the use of renewable energy resources has become a general pursuit of the global community. To achieve this, entrepreneurs must rise up and be up and doing to achieve success. This can be done through acquiring proper entrepreneurial competences, exploring financial ways of developing enterprise, adequate marketing of the products and to crown it all, the employees must be motivated in other to achieve pre-determine goals.

Recommendations

The following recommendations were made:

1. For drastic reduction in energy crisis, economic development, environmental friendly and generally sustainable development, there is an urgent need for entrepreneurs to make an effort to invest in renewable energy technologies.
2. In order for entrepreneurs to make a positive impact in their enterprises, they should develop and use different set of entrepreneurship competencies.
3. Since the investment in renewable energy enterprises has promising future. Government at all levels and donors should support entrepreneurs in renewable energy with capital and enabling environment.
4. Marketing plays a significant role in the conduct of entrepreneurial activities; therefore, the work of entrepreneur will be futile if there is not process of marketing. Entrepreneurs should develop market strategies and employ them appropriately.
5. The more an employee's are motivated, the more likely they are to have organizational commitment in heart. Employees should be motivated by entrepreneurs both in cash and in kind.

References

- Brown, R. B (1993). Meta-competence: A recipe for reframing the competence debate. *Personal Review* 22(6) 25 - 36
- Burton, K. (2012). A study of motivation: How to make your employee moving. SPEA Honors Thesis Indiana University. Retrieved on July 4, 2014 from <http://www.indiana.edu/~spea/pubs/undergrad-honors/volumn-6/Burton,Kelli->

- Ewioke, S. Azu, B. & Owa, F. (2011). Effective financing and management of small scale businesses in Delta state, Nigeria: A tool for sustainable economic growth *International Journal of Economic Development Research and Investment* 2 (3) 23 - 31
- Feeling R.A & Ramsour, D.L (2010). Shinning light on renewable energy in developing countries. Retrieved August 2, 2014, from <http://www.DefinitiveSolar.com>
- Colomb, D. (2007). Fossil fuel combustion: air pollution and global warming. In B.L. Capehary (ed) *Encyclopedia of energy engineering and technology Vol 1*. London New York. CRC Press Taylor and Francis
- Hamiltons, J (2011). Carriers in solar power. Retrieved August 8, 2014, from http://www.bls.gov/green/solar_power/solar_power.pdf
- IEA (2010). Renewable energy essentials: Hydropower. Retrieved on August 12, from http://www.ieahydro.org/reports/AnnexXII_Task2_BriefingDocument_March2010.pdf
- IEA Bioenergy (2005). Benefits of bioenergy. Retrieved August 8, 2014, from <http://www.ieabioenergy.com>
- Lans, T.W., Hulsink, H., Baret, H., and Mulder, M. (2008). Entrepreneurship education and training in the small business context: Insights from the competence – based approach. *Journal of Enterprising Culture* 16 (4) 363 – 383
- Martman, A. (2008). *Entrepreneurship development and poverty alleviation in Nigeria*. Kaduna, Joyce Publisher
- Mathews, R. and Robertson, K. (2002). Answers to ten frequently asked questions about Bioenergy, carbon sinks and their role in global climate change. Retrieved on July, 20 2014 from www.joanneum.ac.at/iea-bioenergy-Task38/publication/task38faq.pdf
- Maczulak, A. (2010). Renewable energy: Sources and methods. Retrieved August 18, 2014, from <http://www.factsonlinefile.com>
- National Open University of Nigeria (2008). *Principles of marketing BHM 206*. Lagos, National Open University of Nigeria, Publication
- Nwoye, M. J. (2011). *Entrepreneurship development and investment opportunities in Nigeria*. Benin, Highcliff Publishers
- Oboro, O. G and Ighoroje, E. J (2011). Financing small scale business enterprises in Nigeria: A review of the problem and the way forward. *International ournal of Economic Development Research and Investment* 2 (3) 134 – 237
- Oyedepo, S.O (2012). Energy efficiency and conservation measures: tools for sustainable energy development in Nigeria. *International Journal of Energy Engineering IJEE* 2, (3) 86-98
- UNEP (n.d). The African Rural Energy Enterprise Development (AREED) phase II Retrieved on August 18, 2014 from http://www.ared.org/downloads/reports/AREEDII-2013_FACT_SHEET.pdf

2nd International Conference of School of Technology Education (STE), FUT, Minna October, 2014.

USAID (2010) Training manual for micro, small and medium entrepreneurs in energy business financing. Retrieved July 28, 2014 from www.gvepinternational.org

Thumann, A., and Younger, W. J., (2008). *Handbook of energy audits*. Liburn, The Fairmont press

Uttarakhand Renewable Energy Development, (2013). *Energy conservation handbook*. Uttarakhand – India, UREDA Publication.

World Energy Council (2004). *Renewable energy handbook*. Retrieved August 20, 2014, from www.worldenergy.org