

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

185,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



---

# Viewing Energy, Poverty and Sustainability in Developing Countries Through a Gender Lens

---

Pius Fatona, Abiodun Abiodun, Adetayo Olumide, Adesanwo Adeola and Oladunjoye Abiodun

Additional information is available at the end of the chapter

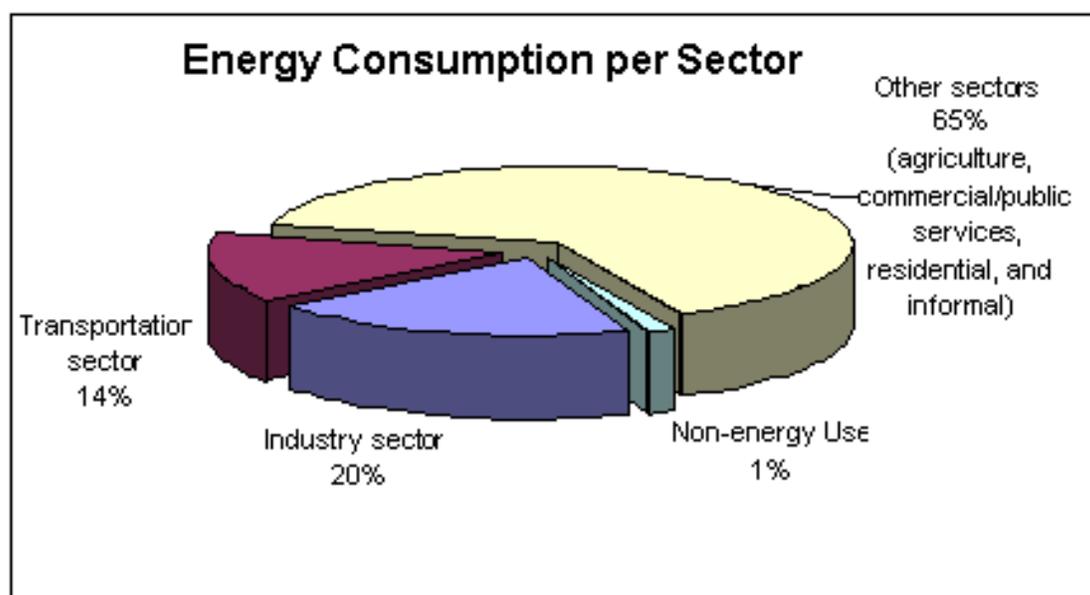
<http://dx.doi.org/10.5772/51818>

---

## 1. Introduction

Energy is central to achieving the interrelated economic, social and environmental aims of sustainable development. Energy plays a critical role in poverty reduction. Patterns of energy generation, distribution and utilization directly affect opportunities for income generation, the situation of women, environmental protection and national development. Energy services are an essential engine for growth to enable developing countries to overcome poverty and the conditions of poverty. If man is to realize the sustainable human development goal, the kinds of energy produced and the ways they are used will have to change. Otherwise the environmental damage will accelerate, inequity will increase, and global economic growth will be jeopardized. Yet, worldwide, two billion people rely on traditional fuels including wood, dung and agricultural residues to meet their daily heating and cooking needs (Karlsson and Misana - eds, 2001).

Energy is necessary for meeting basic human needs and a prerequisite for economic development (see figure 1). Increased access to energy resources is the most fundamental requirement to economic growth. Thus, international and national efforts towards less developed countries' poverty reduction and improvements to health and education cannot be achieved without addressing international and national energy policies. Without access to modern energy sources, 40% of the global population relies on traditional biomass fuels in the form of wood, straw, dung, coal and other organic material for meeting their basic household needs (Institute for Development Studies (IDS), 2003). However, the burning of biomass causes many environmental problems, increases global climate change, and is one of the leading causes of premature deaths of women and children in less developed countries.



**Figure 1.** Energy consumption per sector

Worldwide, more than two billion people lack access to sustainable and modern energy services, using traditional solid fuels for cooking and heating. Without access to basic energy services for lighting, cooking, heating, pumping, transportation, communication and other productive purposes, people – most often women - are forced to spend the majority of their time and physical energy on subsistence activities. Lack of energy services is directly correlated with the major elements of poverty, including inadequate healthcare, low education levels and limited employment opportunities.

Development literature has recently embraced the term “feminization of poverty” referring to growing gap between men and women caught in the cycle of poverty – 70% of the 1.5 billion people living on less than a dollar a day are women (United Nations Development Program (UNDP), 1995). It is increasingly evident that gender differentiates the societal processes leading to poverty and the escape routes out. Women living in poverty are consistently without access to key resources such as credit, land and inheritance. Their labor is unrewarded and unrecognized. Their health care and nutritional needs are not given priority, they lack sufficient access to education and support services, and their participation in decision-making at home and in the community are minimal. Caught in the cycle of poverty, women lack access to resources and services to change their situation.

Poverty is one of the world’s most fundamental issues, and urgently needs to be addressed. Poverty can be conceptualized in a number of ways, for example, in economic terms (an income of less than \$1 a day) or in social terms (lack of access to adequate levels of food, water, clothing, shelter, sanitation, health care and education). It is also possible to identify an energy dimension to poverty: energy poverty. Energy poverty has been defined as the absence of sufficient choice in accessing adequate, affordable, reliable, high quality, safe and environmentally benign energy services to support economic and human development

(Reddy, 2000). Energy poverty interacts with other manifestations of poverty and it is important to explore the issues that surround it, including the gender aspects.

Estimates of the number of people living in poverty put the figure at around 1.3 billion.

Poverty is particularly acute in rural areas in developing countries, and the problem is growing, since the number below the poverty line is increasing in absolute numbers if not as a percentage. Poverty is not static but rather a dynamic process: people can move out of, or into, poverty. This needs to be taken into account when policies and strategies are being designed to help people lift themselves out of poverty. Rural people voice the need for the means to provide themselves with adequate livelihoods. These livelihoods should be sustainable, in the sense that they can withstand stresses and shocks, and they should maintain, or even enhance capabilities and assets without undermining the natural resource base. However, the opportunities for people to support themselves from the land are limited. Already many rural families, who might classify themselves as farmers, have diversified their activities and social support capabilities for survival as well as in order to try and improve their standard of living.

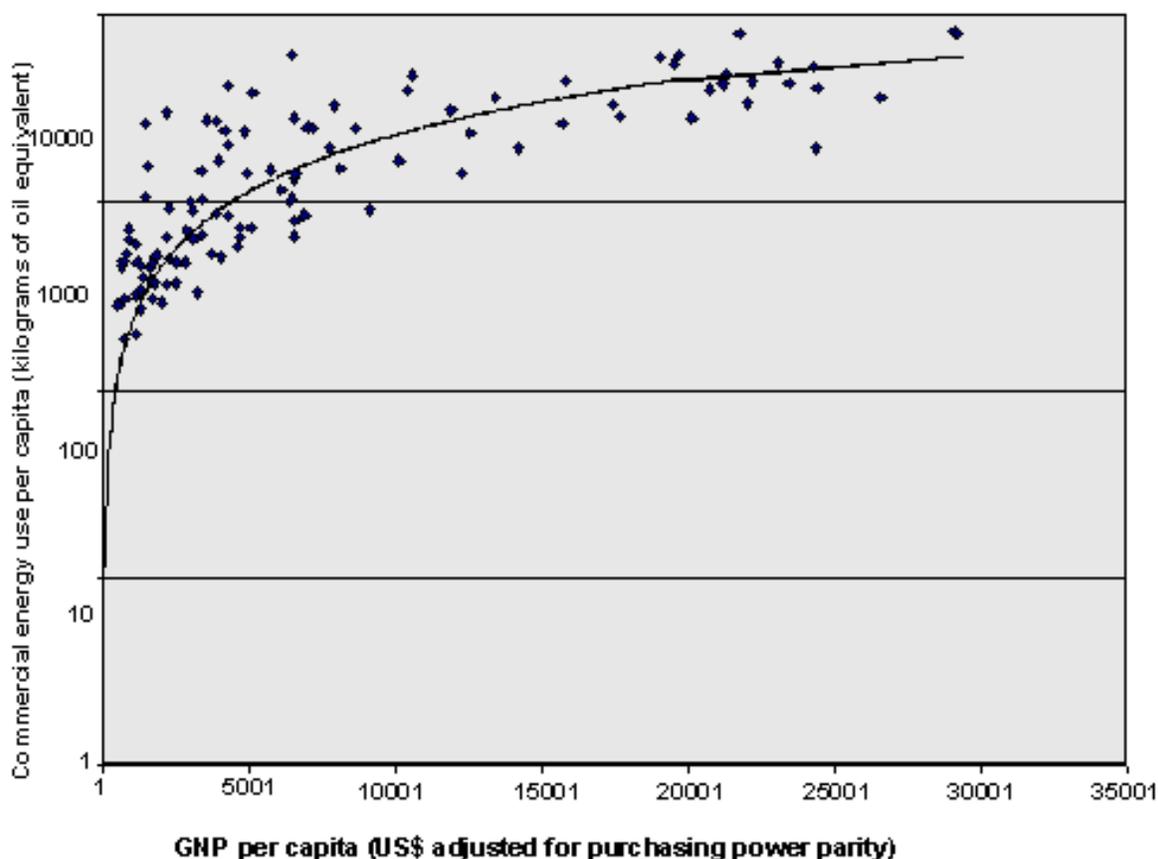
Another option is urban migration, particularly chosen by men, resulting in a large number of female-headed households in rural areas. For example, it is estimated that women make up 80% of the adult rural population in Zimbabwe (Nyoni, 1993). Access to cash incomes through non-agrarian activities might go some way towards stemming the exodus from rural areas (which reduces the total human capital and threatens the sustainability of an area), as well as contributing to the sustainable livelihoods of those who remain.

## 2. Energy as a poverty issue

Limited availability of modern energy critically impairs socioeconomic development. Industries and productive activities (agriculture, commerce) require energy in various forms to fuel machines, power transformation processes, conserve perishable goods, ensure transport, etc. According to United Nations Industrial Development Organization (UNIDO) (2004), high levels of income per capita tend to be associated with higher levels of industrialization.

Though, not specifically referred to in the targets of the Millennium Development Goals (MDGs), energy supply is an underlining requirement to achieve most of the MDGs. Without access to adequate energy services, the majority of Africans would continue to suffer from deep poverty, since energy is required for most basic household needs, such as cooking and heating. According to World Bank indicators, there is a strong correlation between modern energy consumption and Gross National Product (GNP) per capita. The GNP tends to rapidly increase as per capita commercial energy use increases (figure 2), mainly for low-income countries. When the countries reach a level of per capita energy consumption of around  $4.18680 \times 10^{11}$  (10.000 TOE), factors such as efficient utilization of energy by industries, energy production and transformation systems and households tend to make the difference

for economic growth to continue; therefore, more energy consumption does no longer imply more income for the country.



**Figure 2.** Energy consumption versus GNP. Source: World Bank, World Development Indicators database.

Energy is one of the most essential inputs for sustaining people's livelihoods. At the most basic level, energy provides cooked food, boiled water and warmth. It has long been established that poor people mostly use biomass as their energy carrier and that in many areas there is an increasing shortage in supply, which adds to the burden of the women whose responsibility it is to collect it. This was christened 'the other energy crisis' by the World Resources Institute as early as 1975, when the world was still reeling from the international oil crisis (Eckholm, 1975). However, despite the fact that around two billion people still use biomass fuels (World Bank, 1996), and the fact that these are also the two million poorest people on earth, there has been little attempt to analyze the energy-poverty nexus in depth. This can partly be explained by the fact that the biomass in rural areas is collected at zero monetary cost, mainly by women and children, and so it falls outside national energy accounts, the result of which is that the issue renders itself invisible: No data - no visibility; no visibility - no interest (Huyer & Westholm 2001).

The use of biomass has a number of repercussions for poor people. The fuel quality is low, and when burnt it gives off quantities of smoke and particulates that are recognized as having negative effects on health. The several hours a day spent in collecting fuel means that this time cannot be used for other livelihood activities. Although nearly every household in rural areas will use some biomass as an energy carrier, poor households will spend more time searching than those in higher income groups (Reddy, 2000). Wealthier households will also purchase other, higher quality, fuels, which will be used for a greater variety of end-uses than in poor households. In urban areas, poor people have to purchase cooking fuels, and they spend a higher proportion of their income, than higher income households, on fuels (Energy Assessment and Energy Sector Management Assistance Program (ESMAP), 1999). Typically, a poor urban family spends 20% of its income on fuels (Barnes, 1995). In rural areas, poor households will generally restrict fuel purchases to lighting uses (candles and kerosene).

Energy has an equity dimension: poor households use less energy than wealthier ones in absolute terms. Less water is boiled for drinking and other hygiene purposes, increasing the likelihood of water-borne diseases. Illness reduces the ability of poor people to improve their livelihoods and increases their vulnerability, not only preventing adults from working effectively but also negatively affecting children's learning. It is frequently said that more lighting for poor families would allow children to study at night, but the extent to which home lighting really improves educational performance and life chances is unknown. Lighting, in theory, also provides opportunities for extended working hours and thus improved income generation. Further, street lighting and lighting in community centers can open the way for adult education but whether it does so, and whether poor families take advantage of this, are not certain.

Wealthier people are able to exercise some choice in their energy carrier and many opt for the cleaner and more efficient "modern" energy carriers of electricity or gas, including Liquefied Petroleum Gas (LPG) or biogas, although the use of energy carriers is complex. Many better off households use mixtures of modern and traditional fuels, each matched to a specific end purpose, often, for reasons not linked to price. Modern energy carriers do not have the negative health and time effects associated with biomass. Wealthier people are also better able to afford the appliances that make use of these modern energy carriers. In situations where they are reliant on biomass fuels, they are able to purchase more fuel-efficient stoves. In doing so they may be saving a great deal of money per unit of energy consumed. Unfortunately, poor people are often unable to make such investments, opting for lower first cost options, rather than lower life cycle costs, because of their lack of capital (Reddy & Reddy, 1994). The consequences for the poor are that precious cash resources are used on low quality fuels, which are then used at low efficiency, reducing their ability to accumulate the financial resources they need to invest in strategies for improving their livelihoods.

This vicious cycle of energy poverty needs to be broken (figure3 and figure 4). Understanding the decision -making process within households when choosing energy services, which would appear at present to work against sustainable livelihoods, is important for designing effective interventions. A first step towards this should be a widespread acknowledgement among the development community that a lack of access to clean and affordable energy can, and should, be considered a core dimension of poverty. In this respect, it is therefore welcome that the World Summit on Sustainable Development acknowledged that access to energy is needed to help achieve the Millennium Development Goals.

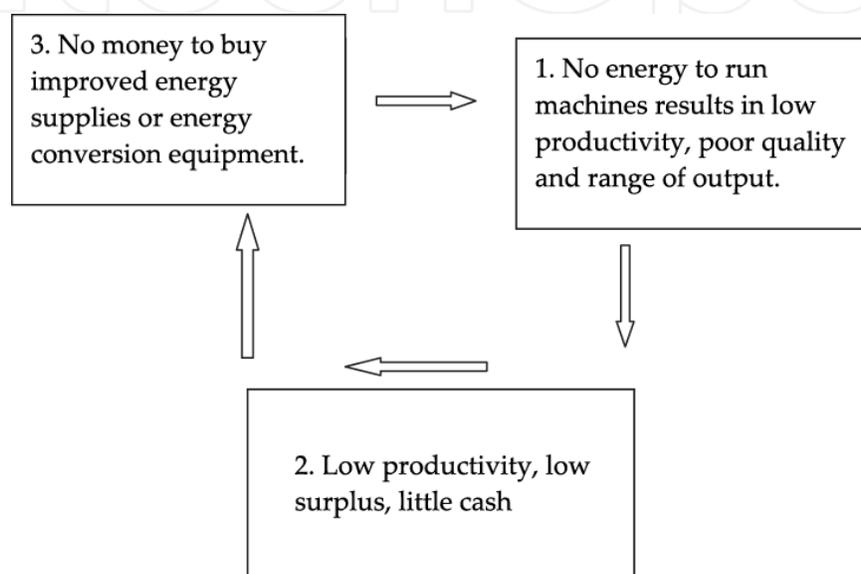


Figure 3. The vicious circle of energy poverty

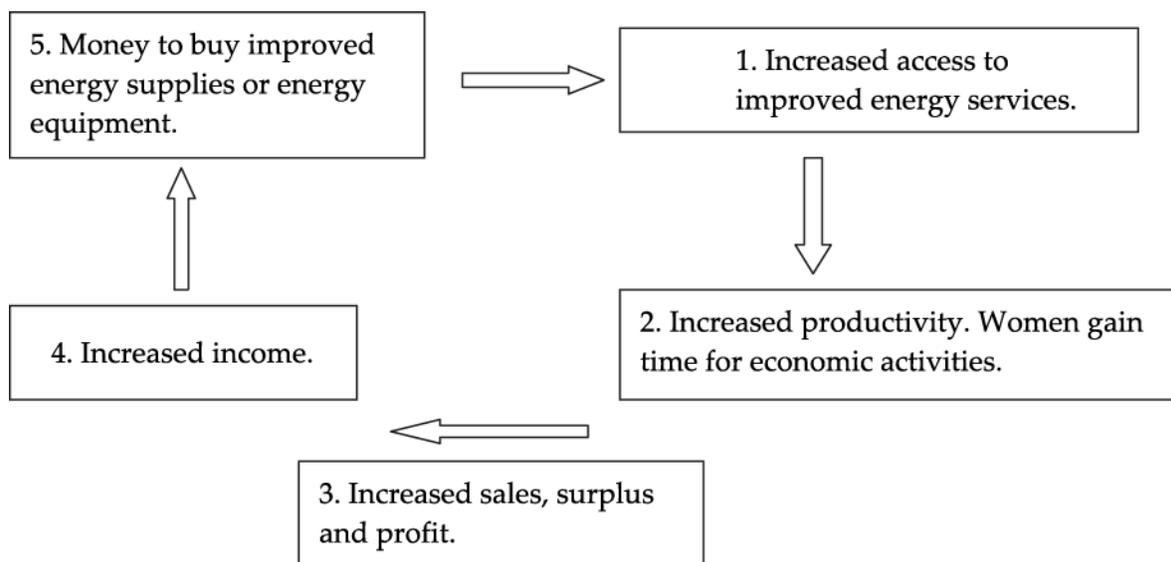


Figure 4. A virtuous circle to break out of energy poverty. Source: Institute for Development Studies (IDS) (2003)

### **3. Gender and energy**

Gender refers to different social roles that women and men play, and the power relations between them. Gender relations influence how communities, households, and institutions are organized, how decisions are made, and how resources are used. To understand how gender shapes activities that affect the environment, it is necessary to examine women's and men's roles and responsibilities, access to and control over resources, knowledge of resources and authority to make decisions about resource use. Therefore understanding women's and men's relationships to the environment plays an important role in developing solutions and meeting challenges for more sustainable use of energy resources. Ignoring gender distorts the understanding of human impacts on the environment as a whole.

From a gender perspective, 70% of the 1.3 people in developing countries living below the poverty threshold are women (Denton, 2001). Of the two billion people without access to modern energy services, most live in rural areas, where women head most of the poor households. Lack of modern fuels impacts more on women and girl child. Hundreds of millions of women and girls spend between three - eight hours carrying fuelwood, dung and other traditional biofuels everyday. The immediate family energy use need is heat; when fuels become scarcer, girl children over boy children are withdrawn from school to support family energy needs. Girls who do not go to school cannot be literate. Illiterate women have more children, larger and poorer families that reinforces the cycle of poverty and underdevelopment. 2 million people die each year due to health and respiratory effects from indoor air pollution (MacDade, 2002).

For poor people the energy problem is "we do not have it". But worse for women, the energy problem is lack of access, control, power relations and social dynamics. Men and women in a given society have different roles, needs and aspirations for energy. From a production point of view, the participation of women in the energy sector has largely been restricted to forestry and biomass management in rural areas. In urban areas women have remained victims of environmental impacts of coal based electricity production that serves middle to high income groups. A few women are involved in the formulation of energy policy, and big energy projects have remained the preserve of men. Both rural and urban dwellers have little say and choice over domestic fuels that they use. In rural areas such say and choices is determined by woodfuel availability, and to some extent availability of cash to purchase fuel such as paraffin.

### **4. The gender component of energy poverty**

The energy-poverty nexus has distinct gender characteristics. Of the approximately 1.3 billion people living in poverty, it is estimated that 70% are women, many of whom live in female-headed households in rural areas (Dutta, 1997). It is important to take note of this fact, not only because men and women have different energy needs and may have different ideas about sustainable livelihoods, but also because women and men have different access to re-

sources and decision-making. Women's access to decision-making within the household and community is restricted, limiting their ability to influence processes and resource allocation on many issues including energy.

Women spend more time than men on basic subsistence activities, such as gathering fuel-wood, carrying water, and cooking. According to the World Bank (2001) women of all developing countries spend between 2-9 hours a day collecting fuel and fodder, and performing cooking chores. The opportunity cost of these activities frequently prevents women from undertaking income-generating activities, which deprives poor families of much needed income. When rural women do engage in income-generating activities they are performed together with regular domestic work and are generally home-based micro-enterprise or piece rate projects (sewing, weaving, preparing food to sell, etc.) Home lighting, agro-processing, drinking water pumping and more efficient stoves can reduce women's workloads, provide income earnings and improve women's health.

More than half of the world's household's cook with wood, animal waste, crop residues and untreated coal, exposing primarily women and children to indoor air pollution, which according to the World Health Organization, is responsible for the premature death of over 2 million women and children a year worldwide from respiratory infections. In rural India, shifting from fuel wood to cleaner sources of energy, like kerosene or LPG, halves the mortality rate of children under five (World Bank, 2001).

Gender issues have come to the forefront in many development sectors including agriculture, forestry and water but the energy sector has been slow to acknowledge the links between gender equality, energy and development. Traditional energy policies have inadequately addressed the role of energy as an input to development and have largely ignored the critical role women play in energy systems, particularly in rural areas. Insufficient access to modern energy and existing patterns of energy use, processing, and collection affect women and men differently. Because of their socially determined gender roles, women and girls assume a higher proportion of the burden of unavailable energy services and inefficient energy use.

## **5. Moving women and their families out of energy poverty**

There is no doubt that energy plays a major role in meeting women's practical and reproductive needs (such as cooking, food processing and water hauling), but it can also be seen as a component necessary to meet their productive and strategic needs (lighting to enable evening study, street lighting for safety in attending community meetings, power for women's enterprise development). It is remarkable that the use of gender analysis in energy planning is virtually unknown, whereas it has been successfully used for many years in the health, water and agricultural sectors. This is evidently because the gender component in energy poverty has not been fully recognized. Energy planners have usually equated women's interest in energy with cooking, to the exclusion of other needs, particularly of needs related to productive activities and emancipatory goals. In addition, since the main focus of

energy planning has been on fossil fuels to the exclusion of biomass fuels, even women's practical needs have hardly been addressed.

If gender aspects of the energy-poverty nexus are to be adequately dealt with, it is clear that two major transformations have to take place. Firstly, women have to be empowered to make choices about energy. Enabling choice is linked to issues of sustainable livelihoods and poverty alleviation, including access to income generating activities. However, there is more at stake than just improvements in women's financial resources. Women should be able to act upon the energy choices open to them, and their scope for this type of action is linked to decision-making within households. Such a shift in decision-making requires women's social and political empowerment.

Secondly, it also requires changes on the energy supply-side. It will require responsiveness by the energy sector in the provision of equipment using modern energy forms that reduce the drudgery of much of women's labour, and that at affordable prices.

## 6. Energy and sustainable livelihoods

The World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 recognized the important role of energy for reaching millennium development goals. Access to affordable, reliable and sustainable energy is essential to sustainable development (Hasna, 2007). An adequate solving of energy problems will contribute to achieving progress across all pillars of sustainable development; social, economic and environmental and in meeting the UN millennium goals. Although there are no MDGs on access to energy, WSSD recognized that inadequate access to energy is both a cause and an effect of poverty and recommended the following:

*"Take joint actions and improve efforts to work together at all levels to improve access to reliable and affordable energy service for sustainable development sufficient to facilitate the achievement of the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015, and as a means to generate other important services that mitigate poverty, bearing in mind that access to energy facilitates the eradication of poverty"*.

"Sustainable development" has been defined best by the Brundtland Commission as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Hasna, 2007). Adequate and affordable energy supplies has been key to economic development and the transition from subsistence agricultural economics to modern industrial and service oriented societies. Energy is central to improved social and economic well being and is indispensable to most industrial and commercial wealth organization. It is the key for relieving poverty, improving human welfare and raising living standards. But however essential it may be for development, energy is only a means to an end. The end is good health, high living standards, a sustainable economy and a clean environment (Fatona, 2011).

Much of the current energy supply and use, based as it is, on limited resources of fossil fuels, is deemed to be environmentally unsustainable. There is no energy production or conversion technology without risk or waste. Somewhere along all energy chains - from resource extractions to the provision of energy service - pollutants are produced, emitted or disposed of, often with severe health and environmental impacts (Dasgupta, 2001;). Combustion of fossil fuels is chiefly responsible for urban air pollution, regional acidification and the risk of human - induced climate change (Dasgupta, 2001; Fatona, 2009).

Achieving sustainable economic development on a global scale will require the judicious use of resources, technology, appropriate economic incentives and strategic policy planning at the local and national levels. It will also require regular monitoring of the impacts of selected policies and strategies to see if they are furthering sustainable development or if they should be adjusted (Arrow et al, 2004).

When choosing energy fuels and associated technologies for the production, delivery and use of energy services, it is essential to take into account economic, social and environmental consequences (Ott, 2003; Wallace, 2005). There is need to determine whether current energy use is sustainable and, if not, how to change it so that it is. This is the purpose of energy indicators, which address important issues within three of the major dimensions of sustainable development: economic, social and environmental.

## **7. Gender, energy, poverty and sustainable livelihoods**

In most developing countries, the majority of informal sector enterprises are owned and operated by women, with women making up the largest proportion of the work force. Despite this, the contribution of women entrepreneurs to national economies is not explicit in national statistics, leading to the development of policies that do not deal with the specific barriers faced by women linked to their gender-defined roles. Their enterprises tend to be concentrated in a relatively narrow range of activities: beer brewing, knitting, dressmaking, crocheting, cane work and retail trading. These activities tend to have disproportionately low rates of return compared to the activities undertaken by men. However, despite the low financial returns, women's enterprises provide important sources of household income, even in male-headed households. Women-headed enterprises are frequently located in the home, and these "cottage industries" tend to be overlooked by agencies because they are in the informal sector, which is diffuse and difficult to reach. When women are forced to close their enterprises, it is often for non-business reasons, and linked to factors associated with working from home. The low rates of return prevent inward investment, hindering innovation and expansion which are regarded as key factors in enterprise sustainability (Grosh & Somolekae, 1996). There is little research to explain what forces drive these start-ups and shutdowns, and how gender influences these processes. Women's access to resources (such as credit, land and education, which are recognised as key factors in microenterprise development) is significantly less than that of men. Generally, research in small and medium-scale enterprise sustainability indicates that a lack of working capital is one of the two most

common causes of enterprise failure (Grosh & Somolekae, 1996). Although there are a number of microcredit programmes targeting women, Bangladesh's Grameen Bank being the most well known, research is increasingly questioning whether women are able to fully utilize the credit, and what degree of control they retain over the loans once disbursed (Baden et al., 1994). Women's access to decision-making within the household and community is also restricted, reducing their ability to influence processes and resource allocation.

The role of energy in the sustainability of women's enterprises is also not well understood. In food processing enterprises it has been estimated that energy costs are 20 - 25% of the total inputs, which would suggest that technological interventions could increase the scale and profitability of these businesses.

The types of enterprises that women are traditionally involved in are energy intensive and rely on biomass fuels. Even in rural areas, women may have to buy fuel wood to run enterprises such as beer making (McCall, 2001). An important issue is what sort of mechanisms can assist women in gaining access to improved energy services. Grain mills, which are very popular with women, since they improve product quality as well as reducing women's labour, are typically only provided by the private sector, and are still absent in many rural locations.

There are positive examples of women taking up energy technologies that have contributed to increasing their incomes. For example, women's groups in Ghana use LPG for fish preservation, giving them a better quality product than when using wood, and enabling them to reach export standards, and considerably improving their income (Mensah, 2001). Another example is the Multi-Functional Platform (Burn & Coche, 2001). The platform consists of a diesel engine mounted on a chassis to which a variety of end-use equipment can be attached, such as grain mills, battery chargers, oil presses, welding machines and carpentry tools. In addition, the engine can be used to generate electricity for sale, which opens up the prospect of women becoming energy entrepreneurs and setting up their own electricity service companies.

## 8. Conclusion

Energy is central to sustainable development and poverty reduction efforts. It affects all aspects of development -- social, economic, and environmental -- including livelihoods, access to water, agricultural productivity, health, population levels, education, and gender-related issues. None of the Millennium Development Goals (MDGs) can be met without major improvement in the quality and quantity of energy services in developing countries.

Since there is an energy dimension to poverty known simply as energy poverty, which manifests when there is a lack of access to clean, safe, reliable and affordable energy. Energy is opportunity, and imperative to basic activities such as boiling water, storing vaccines, reading at night. Yet, more than three billion people worldwide rely on traditional fuels such as wood, charcoal, dung, and kerosene for cooking and light.

It is well documented that there are more women than men living in poverty. Because of traditional socio-cultural roles, women and girls in developing countries bear the burden / responsibility of collecting fuel for household energy consumption. Women are at the nexus between poverty and energy, so to talk about either it's necessary to apply a gender lens.

Rural women spend long hours collecting fuel and carrying it home over long distances. The time and labour feeds into another dimension of poverty, time poverty, limiting women's ability to engage in productive or income-generating activities. Sometimes referred to as: women's invisible work, reproductive work, women's double burden, women's double day, time poverty cripples opportunity for education and income generation, which as a result often means her family will remain trapped in poverty.

Women's health suffers from carrying heavy loads of firewood long distances. In the home, over a makeshift cookstove and lantern, the exposure to smoke from fuel-based cooking and lighting contributes to over 2 million deaths per year (WHO, 2002). After-dark and without light, women suffer disproportionately from energy poverty from reduced security and gender-based violence.

An estimated 265 million tonnes of greenhouse gases are emitted annually from burning fuel for light globally, accelerating the effects of climate change and deforestation (WHO, 2002). Climate change makes women's long workday even longer due to unpredictable rains causing food, fuel and water scarcity and therefore longer treks to collect the necessities.

A number of relationships between energy, poverty and gender are clear. The poor, in general, pay more for energy than the rich, certainly in relative terms but also often in absolute terms. Those living in poverty cannot afford the upfront cash for appliances which increase the efficiency of fuel use, or enable the transition from traditional energy to modern energy. The options for poor people are in fact very limited indeed, a situation which has been called energy poverty. Biomass fuels (wood, charcoal, dung etc.) are likely to remain for some time the primary fuels for process heat and cooking because electricity is in almost all situations more expensive for such applications. Other options, such as solar cookers and household biogas systems, have not been able to meet the demand for cooking energy, probably because they require significant changes to cooking practices or are too expensive.

Having accepted that the energy sector is central to human development, the first expectation of a gender-aware policy would be that it recognizes the different needs, role, responsibilities and realities of women and men. With this in view, the gender-aware policy would ensure that the policy statement, planning and strategies for intervention promote equality and equity. The key to planning and energy policy that promotes even development of men and women while also providing remediation of past discriminations in the sector is to undertake gender mainstreaming in the sector.

This means that gender analysis must be undertaken to assess the implications of any course of action or intervention on men and women. It also means that budgetary allocations must be sufficient to address the needs of men and women. More women need to come into influential position in the energy sector.

Gender-sensitive energy programmes can ease the double burden of lack of sufficient energy and poverty that women endure as they perform traditional household and community roles. It can also provide opportunities for education and income generation that will allow women to improve their social and economic status and raise the living standards of their families and communities. However, if energy policies are to become more gender-sensitive not only will women themselves have to become more empowered to make choices about energy, but the energy sector will also have to become more responsive to women's energy needs.

Moreover, it can be concluded that the energy dimensions, both of the poverty-gender nexus and the livelihoods analysis, have been poorly understood and, hence, their significance underestimated. It is also noteworthy here that gender analytical tools and frameworks that are in standard use in the agriculture, health and water sectors (the Harvard Matrix, Gender Analysis Matrix etc.) are hardly used in energy planning. This is partly because these tools do not fully meet the needs of energy planners, focusing on general aspects of women and men's relative situations, rather than on the specific energy dimensions of poverty. To an extent the existing gender tools can be adapted to the energy sector to bring to light hidden aspects of the poverty-energy-gender nexus, but there is a clear need to develop tools specific to the energy sector to ensure that all aspects are analyzed. These gender and energy tools need to be 'user friendly' to help social planners incorporate energy dimensions in their work and energy planners to see the gender and poverty aspects of theirs.

The feminization of energy poverty is a vicious cycle impeding sustainable development. Improved access to clean energy is absolutely critical to rural women and girls' development and empowerment. From this year, 2012, the declared year of Sustainable Energy for All, let us remember to keep gender at the centre of discussion and decision-making.

The International Energy Agency (IEA) estimates that demand for energy will increase by 40 per cent in the next 20 years (IEA, 2011). The heavy dependence on fossil fuel to meet present needs, coupled with rising costs, negative environmental impacts and future growth in demand, has placed renewable energy at the forefront of sustainable development issues as a core component of future development, both in developed and developing countries.

A reliable energy source is a prerequisite for sustainable development and poverty alleviation, and the Millennium Development Goals cannot be achieved without first addressing energy issues. For example, health clinics, schools and other vital infrastructure cannot run properly, while access to drinking water and sanitation cannot be guaranteed without a reliable energy source.

Giving the energy poor access to energy is therefore a development imperative. Yet at the same time, successfully mitigating and adapting to climate change will require a global shift toward renewable energy. Unmanageable and unforeseen climate risks threaten to negate development efforts, so action taken to reduce energy poverty must also be compatible with climate protection.

In short, sustainable development requires sustainable energy. A green economy based on fairness, social welfare, and environmental integrity must be powered by green energy; en-

ergy from sources that do not unduly impact the environment or people. Green energy means satisfying growing energy needs, empowering local communities and supporting development, while not producing dangerous carbon emissions or causing other negative environmental impacts.

## Author details

Pius Fatona, Abiodun Abiodun, Adetayo Olumide, Adesanwo Adeola and Oladunjoye Abiodun

Ogun State College of Health Technology, Ikese-Ijebu, Nigeria

## References

- [1] Arrow KJ, P. Dasgupta, L. Goulder, G Daily, PR Ehrlich, GM Heal, S Levin, K-G Maler, S Schneider, DA Starrett, B Walker. (2004). Are we consuming too much? *Journal of Economic Perspectives*, 18(3):147–172
- [2] Baden S, Goetz A M, Green C and Guhathakurta M (1994), Background to Gender Issues in Bangladesh. BRIDGE Report No 26. <http://www.ids.ac.uk/bridge>.
- [3] Barnes D (1995), Consequences of Energy Policies for the Urban Poor. FPD Energy Note No7, The World Bank, Washington.
- [4] Burn N and Coche L (2001), Multifunctional Platform for Village Power, in “Generating Opportunities: Case Studies on Energy and Women”, UNDP, New York. ISBN 92-1-126124-4.
- [5] Dasgupta, P. (2001). *Human Well-Being and the Natural Environment*. Oxford University Press, Oxford.
- [6] Denton, F., (2001). Report on Gender and Energy Workshop: Moving Towards Practical Solutions of Meeting Gender Differentiated Energy Needs Within an Integrated Development Approach, 11 –13th June, 2001, Dakar, Senegal.
- [7] Dutta S (1997), Role of Women in Rural Energy Programmes: Issues, Problems and Opportunities, *ENERGIA News No.4*, pp11-14.
- [8] Eckholm, E. (1975), *The Other Energy Crisis: Firewood*. Washington DC: World-watch paper no 1
- [9] ESMAP (1999), *Household Energy Strategies for Urban India: The Case of Hyderabad*, Washington.
- [10] Fatona, P. Olugbenga (2011). Renewable Energy Use and Energy Efficiency- A Critical Tool for Sustainable Development. In Majid Nayeripour & Mostafa Khesti (eds)

(2011) Sustainable Growth and Applications in Renewable Energy Sources, INTECH, ISBN 978-953-307-573-0

- [11] Fatona, P. Olugbenga (2009). Energy Exploitation, Utilization and its Environmental Effects – the Choice to Make and the Decision to take. *Toxicological & Environmental Chemistry*, 91: 5, 1015-1019
- [12] Grosh B and Somolekae G (1996), *Mighty Oaks from Little Acorns: Can Microenterprise Serve as the Seedbed of Industrialisation?* *World Development* Vol. 24, No 12, pp 1879-1890. Elsevier Science Ltd.
- [13] Hasna, A. M. (2007). "Dimensions of sustainability". *Journal of Engineering for Sustainable Development: Energy, Environment, and Health* 2 (1): 47–57.
- [14] Huyer S and Westholm G (2001), *Toolkit on Gender Indicators in Engineering, Science and Technology*, prepared for the UNESCO Gender Advisory Board.
- [15] <http://gstgateway.wigsat.org/TA/data/toolkit.html>
- [16] Institute for Development Studies (IDS) (2003). *Energy and Poverty: A Review of the Evidence and Case Studies in Rural China*. World Bank Report; Washington DC.
- [17] International Energy Agency, (2011). 'Energy for All: Financing Access for the Poor', early excerpt of the *World Energy Outlook 2011* (OECD/IEA, Paris 2011).
- [18] Karlsson G and Misana S, eds, 2001. *Generating Opportunities: Case Studies on Energy and Women*, United Nations Development Programme, (UNPD), New York.
- [19] MacDade, S., (2002). *Energy for Sustainable Development: Meeting the Rural Energy Challenge*. Paper presented at the UNDP/WEC side event during the third United Nations Preparatory Meeting, 25th March – 5th April, 2002, New York.
- [20] McCall M (2001), *Brewing rural beer should be a hotter issue*. *Boiling Point* No 47, pp23-25. ITDG, Rugby, UK.
- [21] Mensah S A (2001), *Energy for Rural Women's Enterprises*, in "Generating Opportunities: Case Studies on Energy and Women", UNDP, New York. ISBN 92-1-126124-4.
- [22] Nyoni S (1993), *Women and energy: lessons from the Zimbabwe experience*, Working paper 22, Zimbabwe Environment Research Organisation (ZERO), Harare, Zimbabwe.
- [23] Ott, K. (2003). "The Case for Strong Sustainability." In: Ott, K. & P. Thapa (eds.) (2003). *Greifswald's Environmental Ethics*. Greifswald: Steinbecker Verlag Ulrich Rose.
- [24] Reddy A K N (2000), *Energy and Social Issues*, in "World Energy Assessment", UNDP, New York. ISBN 92-1-126-126-0.
- [25] Reddy A K N and B S Reddy (1994), *Substitution of Energy Carriers for Cooking in Bangalore*. *Energy*, 19(5): 561-71.

- [26] UNDP (1995). Human Development Report 1995. UNDP; New York
- [27] UNIDO (2004). Industrial Development Report 2004: Industrialization, Environment and the Millennium Development Goals in Sub-Saharan Africa, The new frontier on the fight against poverty, 2004, [www.unido.org](http://www.unido.org)
- [28] Wallace, Bill (2005). Becoming part of the solution: the engineer's guide to sustainable development. Washington, DC: American Council of Engineering Companies. Initiative 62(3): 282–292.
- [29] WHO (2002) "Fuel for Life: Household Energy and Health" — report by the World Health Organization).
- [30] World Bank (1996). Rural Energy and Development: Improving Energy Supplies for 2 Billion People. Washington, DC, USA. [www.worldbank.org](http://www.worldbank.org)
- [31] World Bank (2001). World Bank Database on Private Participation in Infrastructure (PPI), [www.worldbank.org](http://www.worldbank.org)