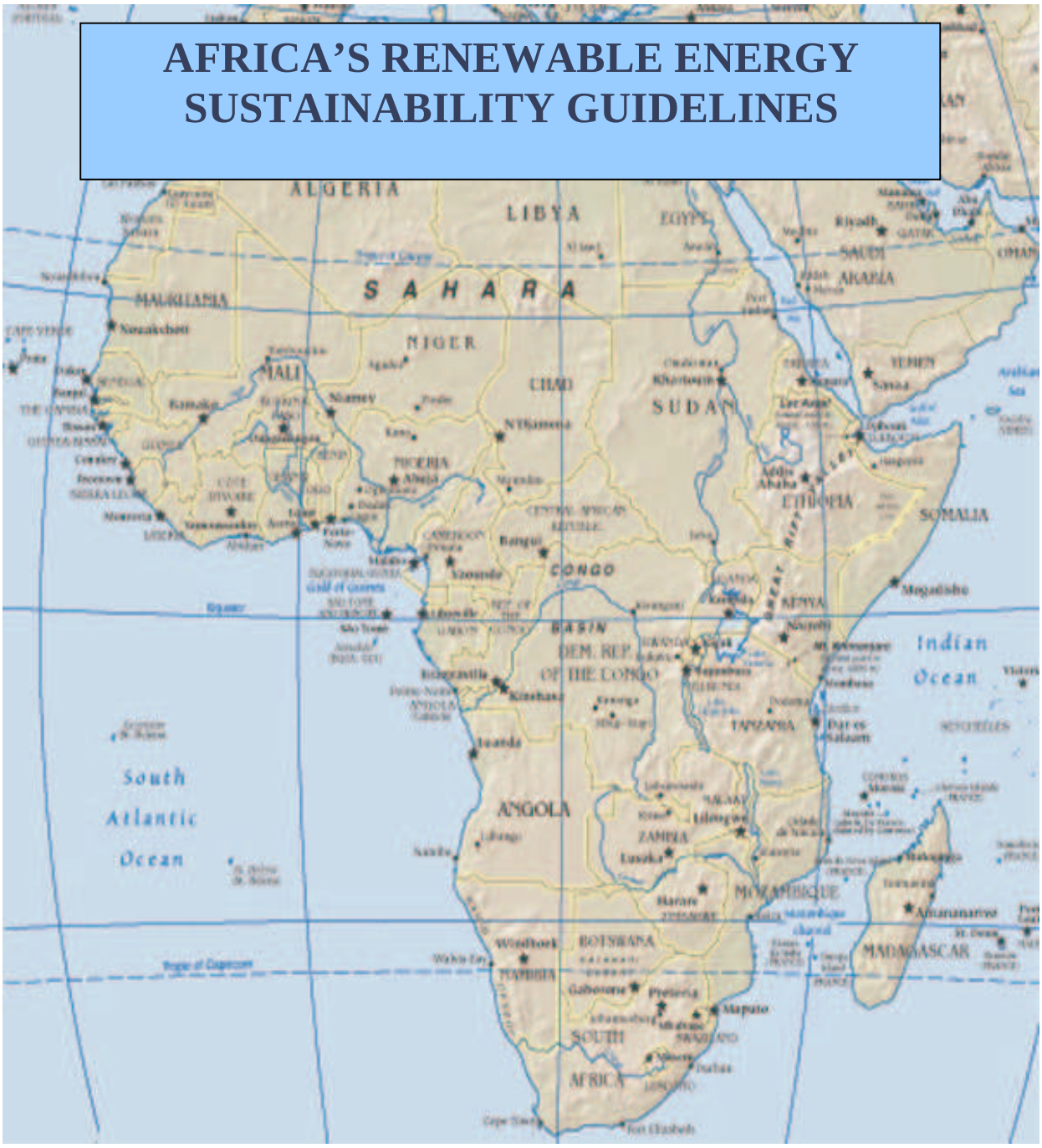
AFRICA'S RENEWABLE ENERGY SUSTAINABILITY GUIDELINES



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i. Foreword

These Sustainability guidelines have been written to promote “best practice” by governments, developers, and local cooperatives when planning, constructing, operating and decommissioning commercial wind farms as well as windmills for the local supply in developing countries.

Meeting the worldwide need for more electricity in the transition from the fossil fuels to renewable energy presents us with a demanding challenge. The significant evidence of global warming tells us we are clearly living beyond environmental limits and consequently there have been calls from a number of authorities for deep cuts in greenhouse gas emissions up to 80% by 2050. In the same way as climate change has no regard to national borders, nor should strategies that seek to address the issue.

In this context renewable energy, and not least wind power, has a significant role to play in gradually eliminating the fossil fuel intensity of the global energy supply mix. Wind energy projects are, by their very nature, environmental projects in that they are designed to find sustainable supply forms, energy that might otherwise come from fossil fuels with their harmful impact on the environment, Man and climate.

Renewable energy in comparison is a clean source of energy with the potential to contribute greatly to a more ecologically, socially and economically sustainable future for the planet. They offer the chance for a sufficient energy supply and thus they create the opportunity for peaceful development and greater global security. The amount of energy reaching the Earth from the sun (biomass, wind, waves) is equal to tens of thousands of times the present world energy consumption, so there are no natural limitations to its use for the benefit of humankind. Wind energy use will be one cornerstone of the energy supply of the future. It will be part of a future integrated energy mix including solar energy, hydropower, biomass, geothermal energy, etc.

The exponential growth of wind energy developments over the past twenty years reflects a dramatic shift in thinking about how humankind impacts on the planet’s resources and how we can tackle the many environmental and social challenges facing us. Renewable energy is providing the only realistic path forward to reducing the threat of irreversible climate change. The challenge is ensuring wind energy projects can meet economic, social and environmental sustainability criteria. These Sustainability and Due Diligence Guidelines have been written to assist in such a task.

ii. Abstract

Future Renewable energy demand in Africa will rise dramatically due to development desires and increased industrial needs. Coping up with this, demand will pose a serious challenge because of the economic and environmental constraints of the continent. Exploiting its vast renewable energy sources for this purpose will assist greatly, but financial and other barriers to the rapid growth of associated technologies are significant. This report explores measures that can be implemented to reduce these barriers. The analyses, which are based on lessons from experiences in and out of the region, show that replicating and enhancing current initiatives along with the implementation of suggested policy options could substantially increase the use of renewable energy technologies in Africa. Sustainable energy systems are widely seen as a desirable goal, but what constitutes such systems and how to make the transition from current practice to sustainable practice are more contested in Africa. Economic, technical, institutional and social obstacles are currently faced by Renewable energies like solar and wind power proponents. The latter are promoting their use in Africa because they believe; they have a role to play in Africa’s sustainable energy system. This report proposes that society can learn more about the introduction of ‘sustainable’ Wind energy technologies, which are a reflection of Africa’s future development.

iii. Purpose of the Guidelines

These guidelines have been produced to promote greater consideration of the environmental, social and economic aspects in the sustainability assessment of new wind projects. The guidelines are also relevant to the management and operation of existing wind power schemes. Thorough sustainability assessments should ensure that detrimental social and environmental impacts are avoided, mitigated or compensated. Of necessity, the principles articulated in these guidelines are generic since each project will have its own unique set of circumstances influenced by scale, geographic location, and social, legal and political environs. Issues of commercial sensitivities and public disclosure requirements will differ from jurisdiction to jurisdiction as determined by the legislation and standards applicable to each country. The guidelines will need to be adapted to the specific context of each particular project in both developed and developing countries. For example, sustainability considerations should be more readily determined and easily addressed for small projects.

The principles outlined in this document span the following six elements. Supporting comment provides further guidance where necessary:

- WWEA Policy
- The role of governments and regulatory frameworks
- Options evaluation and risk assessment
- Managing environmental outcomes
- Managing social outcomes
- Managing economic outcomes

The principles have been drafted to assist policy makers, regulators, wind power developers and operators with the evaluation and management of often competing environmental, social and economic issues that arise in the assessment, operation and management of wind power projects.

iv. Policy Context for Wind Energy Development

Access to modern energy services is a fundamental prerequisite for human wellbeing, development and prosperity. However, nearly one-third of the world's population has no access to electricity and is therefore excluded from elementary development opportunities.

At the same time as energy demand grows, climate change is becoming the world's most pressing environmental problem. The Third Intergovernmental Panel on Climate Change (IPCC) report concluded that "human activities have increased the atmospheric concentration of greenhouse gases since the pre–industrial era, leading to global warming". As a consequence, the IPCC has called for cuts in CO_2 emissions of between 60-70% by the end of the 21st Century.

In addition, supplies of fossil fuel resources, particularly that of oil and natural gas, are likely to be constrained and become depleted within the next few decades. The production of fossil oil, in particular, may peak within a short time span. Undoubtedly, this will lead to serious problems for

many countries in securing their energy supplies, especially as demand continues to increase. To overcome this it is envisaged that “renewable energies, combined with increased energy efficiency, will become a most important and widely available source of energy and will offer new opportunities for cooperation among all countries” (International Conference on Renewable Energies, Bonn 2004, Political Declaration - Point 2).

Clearly the current patterns of energy supply and demand are unsustainable. We are living well beyond the world’s environmental limits and the root cause is primarily humankind’s ever-increasing demand for energy – energy currently supplied in the main from the burning of fossil fuels such as oil, gas and coal – and of uranium.

These circumstances present an impasse in energy policy that must be resolved. On the one hand there is a need to increase the availability of energy to reduce poverty and facilitate economic activity. On the other, increases in CO_2 emissions are leading to climate change and the manifold risks of nuclear power are threatening humankind. Against this background, non-depleting renewable energy resources, such as wind, have a vital role to play. In the long run, the global energy system can only work when completely based on renewable resources. In this context, the necessary shift towards renewable energies needs to commence immediately.

The World Summit on Sustainable Development (WSSD) in Johannesburg in September 2002 noted that “with a sense of urgency, [there is a need to] substantially increase the global share of renewable energy resources with the objective of increasing its contribution to total energy supplies.”

The International Conference for Renewable Energies in Bonn (June 2004) stated that “renewable energies combined with enhanced energy efficiency, can significantly contribute to sustainable development, to providing access to energy, especially for the poor, to mitigating greenhouse gas emissions, reducing harmful air pollutants, thereby creating new economic opportunities, and enhancing energy security through cooperation and collaboration... Ministers and Government Representatives... reaffirm their commitment to substantially increase with a sense of urgency the global share of renewable energy in the total energy supply. They share the vision that renewable energies, combined with increased energy efficiency, will become a most important and widely available source of energy and will offer new opportunities for cooperation among all countries.”

1. BACKGROUND INFORMATION

Technology allows society to adapt to the environment and for the environment to be adapted to society. However, in adapting itself and the environment, society is using technologies and engaging in practices that are being recognized as unsustainable.
Kemp and Soete (1992) observe that technologies are becoming increasingly esoteric and surrounded by a complex organizational fabric. Society is thus faced with an increasing reliance on technical experts to ensure sustainable outcomes. It is also faced with a significant challenge in reaching a sustainable existence. The challenge occurs because existing laws, societal expectations, research priorities and infrastructure have to a large extent co-evolved with, and consequently support, existing technologies. As a result, socio-technical change in sectors such as energy supply and transport tends to be incremental, that is, improvement (measured against a specific set of criteria) of the existing technologies.

Energy, People, Planet & Prosperity

It is clear that a low energy path is the best way towards a sustainable future.... this requires profound structural changes in ... institutional arrangements and is an important challenge to global society. **The Brundtland Report - "Our Common Future" 1987.**

Defining Energy Sustainability

To promote sustainable development, energy systems should be environmentally, economically and socially sustainable. In practice, not all of these can be accommodated; here I mean renewable energy's like wind, Solar, Hydro, Geothermal and Biomass. Therefore, meeting energy sustainability requires meeting human energy needs upon which economic development depends, while protecting the environment and improving social conditions. No matter how we define "sustainable development", most current systems of energy supply and use are clearly not sustainable in economic, environmental or social terms for example Fossil fuels. In practice sustainable development has found acceptable trade-offs between economic, environmental and social goals whereby, Renewable energy is our main focusing point. So government's must act decisively to accelerate the process in order to break the vicious circle of energy poverty and human under-development in African countries. **Ref: Johannesburg 2002 world summit on Sustainable Development.**

Energy links with poverty issues such as: environmental degradation, macro economic, and security. Therefore, these concerns indicate that, the diverse problems faced by developing countries could only intensify if they were to follow the patterns of energy consumption that developed countries have exemplified thus far and hinder sustainable human development.

Developing countries are following policies emphasizing only growth in energy supply as a means for ensuring economic growth. Such policies are typically implemented at the expense of promoting measures to provide energy services in the most efficient manner possible, through an optimal combination of supply and demand-side options.

In addition, many countries in Africa tend to invest heavily in an energy supply infrastructure, which frequently requires huge government subsidies to support their centralized, fossil-fuel dependent, and supply-driven energy economies. This, in turn, has caused some countries to experience being "locked" into the unsustainable energy pathways that were carved out during early years of modernization.

Prevailing notions about energy are deeply supply-biased and growth-oriented, so that wide-ranging policy innovation is, in fact, needed in order to realize the objective of using energy as an instrument of sustainable human development. Moreover, the transition to sustainable energy is necessarily affected by numerous institutional impediments and shaped by current trends sweeping the world. The latter include globalization, marketization, popular participation in decision-making, the changing roles of government, restructuring of energy utilities, the changing of magnitude and mix of sources of external funding.

From the international to local imperatives it is quite clear that poverty and sustainability are priority issues and that our cities and Provinces have a lot to gain from a sustainable energy development path.

2. Global Perspective

2.1 Energy Policies at Local, National and Global Levels

Many of the technologies needed for and energy revolution are virtually ready to go. But the pace of change will be heavily influenced by the ability of societies to overcome the policy barriers that remain. The needed policy changes number in the hundreds, but most falls into one of the following categories:

1. Reducing fossil fuel subsidies and raising taxes on them to reflect environmental costs. Energy price reform is a prerequisite to the development of a sustainable energy system. In 1991, direct fossil fuel subsidies totaled some $220 billion a year worldwide. World Bank economists estimate that gradually removing such subsidies worldwide would cut carbon emissions in 2010 to 7% below the projected level.
2. Focus research and development spending on critical new energy technologies. Nuclear energy and fossil fuels have traditionally dominated the portfolios of government research efforts. In the past, funds for alternative energy were wasted on large, premature demonstration projects, but most governments seem to recognize smaller efforts to advance key technologies and cost – shared commercialization effort with private companies that are more effective.
3. Accelerating investment in the new devices. The expansion of commercial markets for technologies such as efficient electric motors, wind turbines, Solar Pv panels and a host of other innovations is a key goal for policy makers who can catalyze market – driven, multi – year purchases so that manufactures can scale up production. Government's strategies should promote continuing development of new technologies that can rely either on direct purchasing programs or on partnerships with private industry.
4. Channeling international energy assistance to developing countries. Most of the increased demand for energy over the next three decades is expected in developing countries so turning the energy market towards new technologies there is critical. The large energy assistance programs that earlier pushed them down the fossil fuels path need to be redirected as some changes have begun at the World Bank. So far, the GEF has financed several dozen energy efficiency and renewable energy projects under its mandate to support programs that reduce greenhouse gas emissions.

Energy is usually defined as 'the capacity to realize work'. The objective of an energy system is to support us in meeting our many varied needs. So it is not energy itself but the energy services for illumination, regulating indoor temperature, refrigeration, transportation and for cooking that is important in our daily lives and could be considered a basic need in Africa.

The general importance of energy for human development is unmistakable, although we often take its functions for granted. What is less obvious to many of us, however, is how closely energy

production and use are connected with major issues of concern such as economic development and job creation, poverty, gender inequality, food security, and the environment.

2.2 Energy And The Planet

Consumption of all types of energy is growing, global production and consumption of energy increased in the 1990s, despite large declines in Eastern Europe and the former Soviet Union. Consumption of all types of energy increased, with most of the increase in fossil fuels, but faster relative growth in nuclear energy and renewable energy. Use of traditional biomass in developing countries increased, although its share decreased slightly.

Most countries in sub-Saharan Africa depend on traditional biomass for most of their national energy supplies, in some cases up to 90 per cent. Most people in rural Africa do not have access to, or cannot afford, modern energy supplies. For cooking, heating and other energy needs. Over 2.5 billion people in developing countries depend on: Fuel wood or, when that is unaffordable, on crop residues and animal dung. Traditional cook stoves used in poorly ventilated spaces use biomass inefficiently and produce smoke, carbon monoxide, hydrocarbons and other air pollutants that damage the health of those who tend the stoves. About 2.5 million women and children die each year as a result of acute respiratory infections due to indoor air pollution from traditional cook stoves.

The production and use of energy have environmental consequences at local, regional, and global levels. These impacts extend throughout the fuel cycle of an energy system—the entire chain of activities from extraction of energy sources through processing to transport, storage, final conversion, and end use. They could also manifest themselves over short, medium or long time-scales, or have cascading effects by combining with other environmental problems. With centralized, large-scale operations, both production and use of energy can cause local resource depletion, either because of excessive extraction or contamination of land, water, and forests through pollution, or habitat destruction. Thus, large thermal power plants, whether they use renewable or fossil fuels, could have adverse local resource impacts related to excessive water consumption, soil and ground water pollution, or deforestation. Large industries or agricultural or transport operations that operate at high intensity can have similar adverse local resource impacts.

The main energy source in South Africa for example is coal, which is the most carbon intensive fuel (that has high carbon emissions) and is responsible for the global environmental threat of climate change. Burning coal also releases toxic pollutants at source, which contributes to poor local air quality and poor health of surrounding residents.

Small or mini-hydropower generation and wind farms are much more environmentally safe options than large hydroelectric plants. Similarly, other renewable energy technologies, such as wind and solar power, have relatively minor environmental impacts associated with them. Wind farms cause some noise pollution and also present a potential hazard to breeding birds but with modern technology this can be minimized. Solar panels using batteries also have adverse environmental effects associated with the disposal of lead and battery acid, but these can be reduced considerably with proper environmental management of waste and good housekeeping practices. The environmental risks from the use of nuclear energy to produce electricity are well known.

One of the most serious global environmental problems today is the steady and long-term increase in atmospheric concentrations of so-called greenhouse gases such as carbon dioxide, methane, nitrogen dioxide, and chlorofluoro-carbons. Long-term stability in the concentrations of

these gases is vital because they absorb outgoing radiation from the Earth's surface and effectively trap heat in the atmosphere, raising its average temperature to a level that makes life on earth possible. Substantial increases or decreases in greenhouse gases are likely to induce climate change within a matter of decades, with possibly devastating consequences for several countries. Effective mitigation and adaptation programmes for managing the aftermath of disasters caused by climate change can reduce the responsibility.

The efficient production and use of energy could provide important means to intervene positively in these vital areas of human concern in Africa.

3. Assessing Energy's Contribution To Sustainability

Sustainability must be monitored "horizontally" on the ecological, social, economic, technological and cultural/political dimensions. But it also has to be checked "vertically" since energy sustainability criteria must address the whole energy cycle, from extraction to waste disposal.

The first point to assess is to what extent the energy supply is renewable. A rough indicator could be the share of mini-hydro/Wind/Solar/Renewable biomass in the national energy budgets. Then come the environmental, developmental impacts and risks of the whole chain of energy production, prospecting extraction, conversion, storage, transport, distribution and disposal of wastes. Possible indicators include: the amount of land, water and non-renewable energy resources used; emission of gaseous, liquid and solid wastes; risk assessment including possible environmental disruption due to accidents; capital intensity of investments and financial consequences due to the opportunity cost of capital and debt; jobs created directly and indirectly; transfer of funds to beneficiaries of government subsidies and soft loans for energy production; scale of production (large or small, centralized or decentralized) and nature of producers (public or private, large or small); impact on the balance of payments; degree of technological self-reliance in energy production; diversity of energy sources available; vulnerability to fluctuations and structural changes of international energy markets.

On the downstream side (energy use) main questions are: who are main energy consumers and for what is the energy used? However, answers are strongly linked to income distribution, and the degree of concentration of energy consumption across regions and income classes. Identifying the main beneficiaries of energy production also pinpoints those responsible for the environmental impacts and risks associated with energy chains. Another crucial indicator is end-use energy efficiency in different economic sectors, regions and income classes. The ratio of useful energy to primary energy provides a first look at the level of wastefulness and opportunities for conservation.

3.1 Energy and prosperity

Energy for lighting, cooking and washing is the backbone of the household economy; the provision of energy for industry, transport and commerce is the backbone of the international, national and of course provincial economy. Without energy, nations would not be able to function and economic activities would cease.

A major obstacle to meeting this goal, however, lies in the way energy is generally perceived within the framework of overall socio-economic development. Presently, ***energy consumption***, rather than the ***level of energy services***, is seen as the indicator of development. By taking energy consumption as the measure of development, energy planners are often simply concerned with increasing fuel and electricity supplies based on existing patterns of energy use, rather than with identifying and sustaining the level of energy services that would be required to satisfy basic human needs. Energy is an essential input for the fulfillment of all basic needs. From

the standpoint of sustainable human development, therefore, what is urgently needed is a reorientation of ideas about energy to focus on the manner in which it is presently utilized, its potential for improving people's quality of life, and ways to increase access to its services for the poor.

The end uses of energy are roughly equally split among industry, transport, and others, including cooking, cooling and agriculture. From the standpoint of the end user, what matters most about energy is the level of service it provides, rather than the amount of primary energy that goes into delivering the service. Since conserving a kilowatt-hour (kWh) of electricity or fuel is generally cheaper than producing an additional kWh, the most cost-effective ways to deliver energy services often involve improving the efficiency of energy conversions to final energy or the of end-use devices. It has been estimated that a modest increase in per capita primary energy is sufficient for developing countries to provide energy services equivalent to those enjoyed in Western Europe in the mid-1970s.

While this pattern of de-coupling between energy and GDP growth is most pronounced in the examples of the USA, Germany, UK, France and Japan, even some countries, like China, and other countries in transition like Poland, follow these trends, both having recently passed a "hump" of high-energy intensity. Also, since many developing countries are entering periods of industrialization at a stage when there are already significant opportunities for energy efficiency, it is conceivable that they could "leapfrog" sooner than developed countries to points of low energy intensity

An important way for countries to exploit the numerous supply and demand side opportunities for leapfrogging energy technologies is to establish special incentives that make their adoption attractive for producers, consumers, and manufacturers of energy services. Technological leapfrogging through such policy innovation provides developing countries the opportunity to employ the most technologically advanced energy systems available on the world market to meet their energy demands, if not to actually consider deploying new, emerging technologies and systems which are not yet in wide use. Nevertheless, it is important that these technologies should be chosen wisely, to ensure their appropriateness to conditions of cheap labor markets, natural resource availability, and the satisfaction of basic needs.

3.2 Moving To A Sustainable Energy System

Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Sustainable development requires the integration of three components economic development, social development and environmental protection as interdependent, mutually reinforcing pillars. Eradicating poverty, changing unsustainable patterns of production and consumption, and protecting and managing the natural resource base underpinning economic and social development are overarching objectives of, and essential requirements for a sustainable future. Renewable energy, by definition, fulfils the sustainability criteria and will therefore deliver indispensable contributions to sustainable development.

Energy provision to alleviate poverty must look at the provision of an acceptable level of energy service. Equity issues must be addressed to ensure adequate services to all.

The world energy system is responsible for more than half the anthropogenic greenhouse gas emissions, of which the predominant gas is carbon dioxide (CO_2). Again, the majority of these emissions are due to fossil fuel use, which represents about 75% of total energy use.

A sustainable energy path to development is not only necessary to ensure the future survival of humanity, but is also a vital aspect of any agenda to eradicate existing poverty. In order to

maximize sustainability, we need to move away from non-renewable sources of energy, to phase out fossil and its derivatives, and nuclear, and to move towards renewable and increasing energy efficiency where environmental and social externalities are included in energy costs.

Instead of our over-reliance on fossil fuel and nuclear derived electricity, the energy mix should focus on more efficient use of renewable energy conversions such as Wind and solar energy. Conversion of energy into saving devices such as energy saving lights, introduction of passive energy technology such as solar water heating and a diversification of electricity production sources to include wind and bio-fuels. Diversification and implementation of energy conservation, efficiency and alternatives would result in huge energy savings, removing the need for increasing numbers of highly expensive power producers and thereby providing a more affordable, higher level of energy service than before.

Sustainable energy systems encompass more than energy efficiency and conservation. These systems are diverse, flexible, self-reliant and renewable, and such planning requires careful development, nurturing, implementation and review. It involves strong support from the community and partners at all levels.

Energy's links with poverty issues, environmental degradation, macroeconomic, and security concerns which indicates that the diverse problems faced by developing countries could only intensify if they were to follow the patterns of energy consumption that developed countries have exemplified thus far and hinder sustainable human development.

Developing countries are following policies emphasizing only growth in energy supply as a means for ensuring economic growth. Such policies are typically implemented at the expense of promoting measures to provide energy services in the most efficient manner possible, through an optimal combination of supply and demand-side options. In addition, many countries tend to invest heavily in an energy supply infrastructure based entirely on conventional fuels, which frequently require huge government subsidies to support their centralized, energy dependency, and supply-driven energy economies. This, in turn, has caused some countries to experience being "locked" into the unsustainable energy pathways that were carved out during early years of modernization.

Prevailing notions about energy are deeply supply-biased and growth-oriented, so that wide-ranging policy innovation is, in fact, needed in order to realize the objective of using energy as an instrument of sustainable human development. Moreover, the transition to sustainable energy is necessarily affected by numerous institutional impediments and shaped by current trends sweeping the world. The latter include globalization, marketisation, popular participation in decision-making, the changing roles of the government, restructuring of energy utilities, the changing magnitude and mix of sources of external funding from the international to local imperatives it is quite clear that poverty and sustainability are priority issues. Our countries have a lot to gain from a sustainable energy development path.

4. Constraints And Challenges Facing Sustainable Energy Development In Africa

Constraints on sustainable development in Africa are legion. Some are general and others are sectored or specific. Some are local while others are national or regional. It must also be admitted that, prior to the adoption of the current sustainable development paradigm, Africa lagged behind other regions in various aspects of development. Consequently, the adoption of a new development paradigm that places more emphasis on environmental resource conservation does not eliminate the existing constraints on development. Rather it requires more interdisciplinary or systems approaches, greater sensitivity to environment in policies, strategies, planning, and execution of development programmes, and stringency in defining the characteristics and nature of technologies that can be used to ensure the maintenance of environmental quality through sustainable energy system and the conservation of natural capital stock, which is imperative for sustainable development.

The constraints on sustainable development in Africa are political, socio-economic, and technological in nature.

Case studies from Eastern, Western, Northern, Central and Southern Africa show that, renewable energy systems were expected to satisfactorily deliver energy services with little attention paid to links with both centralized and traditional energy systems. As a result, current understanding of how stand-alone renewable energy technologies perform is not matched by an adequate appreciation of the enabling energy system environment that is necessary for the successful large-scale application of renewable energies.

Past attempts at promoting renewables often focused on a specific technology for generating energy whether it is a biogas plant or a wind-pump. Identified technologies were perceived as stand-alone options that excluded other conventional and traditional energy options. Institutional and cultural considerations were often under-estimated. Consequently, potentially attractive opportunities for dual renewable/fossil fuel; dual conventional/traditional energy systems were not fully exploited; and, for harnessing the latent capability of local institutions and cultural relationships were not fully exploited.

The following are problem areas that require immediate attention if renewables are to realize their substantial potential:

- Institutional deficiencies
- Pricing distortions
- Limited information on renewable energy resource base.

4.1 Institutional deficiencies

The enormous leverage and advantages that power utilities enjoy in the region constitutes an important institutional barrier to the dissemination of renewable energy technologies. The "de facto" or "de jure" monopoly on generation, distribution and sale of electricity that the power utilities hold in African countries need to be modified to allow independent power producers to operate. This monopoly, sometimes enshrined in law, acts a brake to the development and growth of independent power producers and has left many promising co-generation (particularly in the agro-processing industry) unexploited. Number African countries have begun to address this problem and the legal instruments that would facilitate independent and decentralized electricity generation as well as sale to the grid are beginning to be adopted.

Active support for independent or autonomous rural electrification agencies and encouragement of independent power producers is urgently needed. The new actors are likely to pursue rural electrification and concomitant renewable energy options more vigorously than the existing power utilities. The dispersed and modular nature of renewables is, in many respects, alien to the culture of conventional utilities, which are more comfortable with large-scale and centralized projects.

Much of the economic potential for harnessing renewable energy supplies for electricity production lies in remote settings, out of reach of the grid. The modularity and small-scale of renewable supply technologies make them particularly advantageous for remote supply systems. They can be scaled to meet smaller demand requirements than large-scale plants, and expanded as demand grows. They can be installed faster and with lower capital requirements than large-scale plants. They can also be shut down in increments and shipped out for replacement or repair when necessary, without jeopardizing the entire supply system. However, both up-front capital costs and the lack of institutional support systems act as important barriers to local power production at remote sites.

In West Africa the policy research work, which was undertaken by AFREPREN/FWD, indicates that pricing and institutional constraints continue to hamper the generation and sale of electricity. Electricity purchase prices and other contractual requirements, have posed formidable barriers to potential producers, and only a fraction of the potentially large and lucrative purchasing contracts have actually been signed.

4.2 Pricing distortions

In many African countries, where government attempts to provide basic energy services to their people have been led to partial, if not complete, dissociation between the marginal cost of energy supply and energy prices. Such policies have created major barriers to renewables. Subsidies - either directly through pricing (and relative pricing) or in the form of distorted taxes and fees that has affected fuel choices, technology choices and the quantities of total energy demand.

High priority should be given to reducing the heavy import and sales taxes imposed on renewable energy equipment that are often higher than those imposed on competing energy systems. For example, cumulative duty (import duties plus various surcharges on components) on renewable energy technologies in Malawi is estimated to be as high as 75%.

4.3 Limited information on renewable energy resource base

Limited accesses to information on the region's renewables resource base constitute a major barrier to their wider use. This is particularly true of wind, micro and mini-hydro, which require micro-level resource data. Equally important for both hydro and biomass energy technologies is the availability of comparative time series on potential at national levels.

5. How Sustainable Energy Technologies Can Be Achieved In Africa.

Measures that would encourage the large-scale dissemination of sustainable energy options such as renewable energy technologies in Africa can be grouped into the following six categories:

- Implementation of aggressive long-term renewable energy policy programmes;

- Development and application of carefully-selected technological and institutional leapfrogging strategies;
- Initiation of long-term renewable energy training and capacity building programmes;
- Institution of new and flexible financing mechanisms; and,
- Wider application of innovative dissemination strategies.

5.1 Renewable energy policy programmes

Pro-active and long-term policy-oriented renewable energy programmes aimed at senior decision-makers in both Government and the private sector should be initiated. The policy programmes should be designed to demonstrate the economic and environmental benefits of renewables technologies and propose short and medium term policy initiatives that would engender large-scale dissemination of renewables. Renewable energy technologies are generally more labor intensive than conventional and centralized energy projects and can help to address problems of both urban and rural unemployment.

5.2 Technological and institutional leapfrogging

Many experts in developed countries have recognized the importance of technological and institutional leapfrogging in countries where physical infrastructure and institutional development are still in their embryonic stage. There are several obstacles, however, to engineering technological and institutional leapfrogging.

A key obstacle is the general competition for scarce capital. Because the up-front capital requirements of adopting large-scale renewable technologies are, in general, higher than those for older, less environmentally-sound energy technologies, the solution to the investment equation differs depending upon whether one optimizes for short-term objectives of meeting pressing demand for energy services or long-term objectives of meeting demand at least economic and environmental cost.

A paradigm shift is needed in development aid for the energy sector, to support technological innovation rather than the traditional pattern of supporting proven conventional energy technologies. Aid agencies can make a significant contribution to the implementation of technological leapfrogging by not only changing their practices to support the adoption of advanced technologies, but by assuming some of the risk associated with making cutting-edge investments in renewables.

The need to adapt both new and conventional technologies to local settings should be recognized explicitly as part of this paradigm shift, and the costs of doing so should be incorporated as prerequisite to the successful support of sustainable renewable energy sector development.

5.3 Training and capacity building initiatives

Long-term renewable energy training programmes designed to develop a critical mass of locally trained manpower with the requisite technical, economic and social-cultural skills are urgently needed. Many of the engineering and technical courses that are currently taught at universities and colleges in Africa provide little exposure to energy technologies. Modest changes in the curricula of existing colleges and universities could significantly increase the supply of skilled renewable energy engineers, policy analysts and technicians.

Efforts to integrate analytical expertise within the energy sector with that of other key actors in the development process - such as expertise within the banking, social/community development and

public sectors - should be included in this area of support. This is key to understanding not only the resources and technologies available but also the institutional setting through which they may be adopted and the needs and interests of the target communities as well.

5.4 New and flexible financing mechanisms

Priority should be given to the establishment of innovative and sustainable financing programmes for renewable energy technologies. This may range from the creation of a National Fund for renewable energy projects financed by a modest tax on fossil fuels to credit schemes specifically aimed at developing renewable energy industries and endowment funding of renewable agencies.

In Ghana, a national energy fund has been successfully utilized to finance renewable energy projects and energy efficiency activities on a sustainable basis. An important challenge is the bundling of discrete renewable energy projects into large programmes, which can be financed by major bilateral and multilateral donor, and financing agencies.

5.5 Innovative dissemination strategies

Support should be channeled towards wider application of the new renewable technology dissemination strategies that have demonstrated encouraging signs of success. Many of these strategies largely revolve around the idea of participation, income generation and small-scale enterprise development.

The rationale is that if producers and distributors can make an attractive income from the manufacture and marketing of renewable energy equipment and users are fully involved in the dissemination process, then the issue of sustainability is resolved in a much more cost-effective fashion.

6. WWEA POLICY

6.1 Commitment to sustainable development

The WWEA regards sustainable development as a fundamental component of social responsibility and participation, sound business practice and natural resource management.

Sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). Sustainable development requires the integration of three components – economic development, social development and environmental protection – as interdependent, mutually reinforcing pillars. Eradicating poverty, changing unsustainable patterns of production and consumption, and protecting and managing the natural resource base underpinning economic and social development are overarching objectives of, and essential requirements for a sustainable future. Renewable energy, by definition, fulfils the sustainability criteria and will therefore deliver indispensable contributions to sustainable development.

WWEA recognises that bringing about ‘sustainable development’ is the collective responsibility of government, business, civil society, consumers and individuals. WWEA is, therefore, committed to working cooperatively with these sectors in achieving sustainable outcomes.

This commitment is supported by the following policy priorities:

- The creation of favourable legal frameworks and regulatory conditions as advocated in these guidelines.
- The creation of a level playing field and fair market entry conditions for renewable energies. This means addressing the cost gap, caused by enormous subsidies for fossil and atomic energies with their non-internalised external costs (e.g. pollution), and the implementation of appropriate tariff schemes to encourage renewable energy solutions.
- The establishment of an international agency for renewable energy to provide a broader and better representation of renewable energies in the international and national arenas.

In the long-term the goal should be a 100% renewable energy supply. This will be the best way to provide all human beings with sufficient energy in a sustainable way.

7. The Role of Governments and Regulatory Frameworks

7.1 Governments and sustainability

Good governance within each country, and at the international level, is an essential prerequisite for sustainable development. The World Summit on Sustainable Development Implementation Plan (2002) listed some key sustainability criteria. These include:

- Sound environmental, social and economic policies;
- Democratic institutions responsive to the needs of people;
- The rule of law;
- Anti-corruption measures;
- Gender equity; and
- Enabling environment for investment.

Governments that establish and maintain sound environmental, social and economic policies create a foundation for the pursuit of sustainability. It is from this position - where clear and strong sustainability goals are identified - that governments can establish the appropriate regulatory frameworks for a sustainable future.

7.2 National and regional energy policies

National energy policies are the responsibility of individual Governments and should reflect a commitment to achieving sustainability goals and maintaining a strong dedication to the pursuit of renewable energy resources based on best practice experience.

The WWEA encourages countries to have in place national and/or regional energy policies prioritising renewable energies. Each jurisdiction should clearly set out its renewable energy development strategy so that the rules are known to all and arbitrary decisions are minimised.

Basic requirements of renewable energy development and economics have to be regarded, like the provision of sufficient investment security. Clear national and/or regional policies established by governments contribute to the development of sound guidelines and frameworks that enable both government and industry to work together to achieve collective aims and encourages sustainable growth in energy resources.

7.3 Strategic assessment

National and/or regional energy policies should include a Strategic Assessment process. A Strategic Assessment should incorporate assessment of cumulative impacts, the determination of marine and land use effects and environmental priorities, as well as goals for economic growth. The policies should be framed in the context of the global need to reduce greenhouse gas emissions, to secure domestic energy supply, to increase public participation and to promote, therefore, the uptake of clean renewable energy options. They should also incorporate the three elements of sustainability -- economic, social and environmental -- in energy planning.

A Strategic Assessment process allows for the high level identification of environmental, social and economic issues and in cases where these conflict, the resolution of competing needs. This process is a mechanism by which sustainable development and global environmental goals can be reconciled with the management and conservation of more localized natural resources. It should be a participatory, streamlined process, focused on major issues, using common sense and readily available information, and with short and definite time limits for its completion. A comprehensive Strategic Assessment process applied by governments ensures that the best energy solutions are formulated and implemented for regions based on a 'best fit' energy policy, including a timeframe for the implementation of a 100% renewable energy scenario.

One of the potential benefits of going through a Strategic Assessment process is to reduce uncertainty for developers of wind energy projects by prioritising energy supply options and preferences. Likewise, a Strategic Assessment process should help to define those land or offshore areas that are available for development as well as those that are off-limits. Unsuitable sites may include, for example, areas of outstanding natural beauty, reserves and other areas of conservation significance. An adjunct to the Strategic Assessment process is for Governments to provide guidance on which social costs are to be borne by the developer and which are a government responsibility. Project critics sometimes confuse the roles of the developer and those in government determining the policy and development agenda.

7.4 Promoting wind power in energy production

Governments must consider greenhouse gas emissions in energy policy planning. There is no longer any reasonable doubt that greenhouse gas emissions are playing a key role in the increase, and acceleration, of global warming.

Against this background a continuing escalation in fossil fuel use will only worsen global warming.

There is a growing international effort; therefore, to find alternative solutions that are in principle emission-free, but at the same time meet the energy needs of the developed and developing world.

Development of renewable energy resources is an essential part of the solution to this problem. In this context wind powered energy generation has a fundamental role to play. Use of wind for electricity generation is essentially a non-consumptive use of a natural resource. And it produces zero greenhouse gas emissions. These features mean that wind energy compares very favourably when contrasted with alternative means of generation.

Wind energy generation has a minimal environmental impact, and as a direct result energy policies formulated by governments need to reflect the positive benefit of wind energy in the pursuit of lower greenhouse gas emissions as well as the increased economic, social and environmental sustainability wind power can bring about. Such benefits can include job creation, income from ground rental for landholders and supply contracts for local service and manufacturing industries. Given that wind farms are often situated in rural areas, these socio-economic benefits often occur in areas, which are economically underdeveloped. Regulations need to be structured to promote the uptake of renewable energy projects on land and offshore, and to establish a variety of ownership models including pay-for-itself solutions and equal and fair access to market conditions.

8. Managing Environmental Outcomes

8.1 Optimising environmental outcomes for wind power schemes

Wind farms can have a number of environmental impacts that need to be identified early and avoided, mitigated, or compensated. Effective environmental management over the life of the wind farm should ensure sustainable operation of the facility. Crucial in this process is the effectiveness of the initial environmental impact assessment.

8.1.1 Environmental assessment (EA) principles

Environmental assessments (also known as environmental impact assessments or environmental impact statements – EIA's and EISs) are conducted to inform decision makers of positive and negative effects of a project and associated mitigation measures.

Environmental Assessments (EIA's) should be applied at the project level.

EIA's should take account of relevant higher-level national and/or regional policies and strategic assessments, including assessments already completed for potential wind farm sites. Initial screening should be conducted to determine if a project is likely to have significant effects on the environment by virtue of its nature, size or location.

EIA's should be conducted for all on or offshore wind power projects that have the potential for

significant impacts on the environment. EIA's should be based on good science and factual information. They should be relevant to the scale and nature of the project in question and factor in existing information.

WWEA members should apply appropriate procedures or codes of practice regarding stakeholder participation and environmental protection.

Stakeholders should be given opportunities to participate in decision-making processes. Their roles, and rights to access information, should be documented in language relevant to their needs.

WWEA supports transparency of process and co-ordination between the different sectors involved - government, developer and community interests. It recommends developers consult with local and national resource agencies, defence, telecommunications and coastal management authorities at the earliest opportunity to assist in the determination of the environmental issues to be addressed, the studies required, and to clarify the timelines that apply.

Regulatory authorities should have specified and reasonable timelines for their assessment and approval processes.

WWEA acknowledges that an EIA's for a large infrastructure project, such as a wind power scheme, takes place in a broad political, social and economic context. It is one step in a wider decision making process, and is generally written to provide authorities with the following information.

- A full description of the project;
- Statements of objectives, including clear targets and proposed indicators of success;
- A description of the existing environment in the area where the project is to be developed;
- Project justification, including evaluation of project alternatives;
- Economic, social and environmental considerations, including the consequences of not undertaking the project;
- Any mitigation measures that will or could be implemented to minimise environmental harm and / or enhance the environment; and
- Description of the stakeholder's communication or consultation process should be undertaken.

WWEA supports post-construction auditing to measure performance against objectives, targets and proposed indicators of success. This should be detailed in the EIA project.

A key element for public acceptance can be the negotiation of an agreement between the proponent and the local community on the nature and scope of the collaboration required to conduct the EA.

8.1.2 Environmental management systems (EMS)

WWEA believes that wind power operators, as well as manufacturers of associated equipment, should adopt internationally recognised environmental management systems (such as ISO

14001).

The components of an EMS can be summarised as follows:

- Management Commitment;
- Environmental Policy;
- Environmental Aspects and Impacts;
- Objectives and Targets;
- Roles and Responsibilities;
- Planning and Programs;
- Regulatory Compliance;
- Document Control;
- Operational and Emergency Procedures;
- Training;
- Monitoring, Measuring, Review (including environmental audits) and Improvement.

Wind power operators should also consider incorporating their EMS as part of a broader sustainability management and public reporting program. Open and continuous stakeholder consultation enhances longer-term relationships with the local community, regulators, and shareholders.

9. Managing Social Outcomes

Communities generally benefit from efforts that will help to reduce greenhouse gas emissions from renewable energy developments such as wind farms. In addition, wind energy projects can contribute to employment, often in regional communities. Linked to this are: investment attraction, infrastructure development and local tourism opportunities. These in turn benefit local industry, support the social fabric of communities and promote economic activity. With a reliable power supply, industry is encouraged and social capital increases.

Managing social outcomes needs to include the resolution of differences between the goals of the developer and those of the local community. Gaining community acceptance requires that issues of concern are identified and resolved in an open and transparent manner.

9.1 The role for stakeholder and community consultation

The WWEA believes that social sustainability goals can be achieved if adequate consultation is undertaken with stakeholders. This needs to include residents in directly affected communities. Stakeholder consultation is effective if local community views are carefully considered and, where appropriate, incorporated in the project's assessment, design and implementation.

The following considerations should be taken into account when determining social aspects of sustainability:

- Impacts on the community, stakeholders and the environment are identified.
- Stakeholders are informed about the project and its likely implications for them.
- Negative social impacts are avoided, minimized, or adequately compensated.
- The proposed project is shown to be the best alternative, following demonstrated consideration of relevant stakeholders concerns and other social issues.
- A negotiated and agreed outcome is achieved between the developer and local community wherever possible; and
- The community and environmental resources are managed in a sustainable way, and on going monitoring and liaison with local community groups continues through the life of the project.

9.2 Gaining community acceptance – managing social impacts

Various issues affecting communities and individuals need to be managed during the planning, construction and operation of wind power facilities. Possible social impacts that require consideration are identified below:

- Changes to resource use and biodiversity in the area of the proposed project and the impacts this may have on the local community.
- Changes to visual amenity, noise levels and other impacts such as shadow flicker, dust levels and traffic congestion, during construction and operation.
- Distribution of benefits among affected parties; and
- Effectiveness and on-going performance of compensatory and benefits programmes.

9.3 Gaining community acceptance – proposed strategies

Broad community acceptance of a project, particularly in its early phases, will greatly assist in its successful implementation. To achieve community acceptance the following should be undertaken by the proponent and / or regulatory authorities:

- Adequate consultation should be undertaken, with relevant local, regional and national agencies and any legislation, regulations, codes of practice or guidelines of government agencies should be complied with;

- Providing affected communities with identifiable benefits, such as local co-operative ownership, self funding solutions and other types of investment opportunities;

- Stakeholders and impacted communities should be identified and provided with the opportunity to have informed input into the decision making process. The community must view the process as being open, fair and inclusive;

- Minority and / or vulnerable groups should be specifically identified and steps taken to

ensure that they are adequately represented in any consultation process;

- The local knowledge of communities and stakeholders should be utilized and actively involved in project planning to minimise adverse impacts and maximize benefit outcomes;

- The exchange of information provides an educative function for stakeholders and the developer alike and can lead to subsequent training opportunities;

- Affected stakeholders should participate in the development and implementation of mitigation measures;

- A process for addressing future concerns or risks from the project needs to be outlined to stakeholders at the start of the project;

- Communities and / or groups that are impacted by a project should be the first to benefit. These groups should also participate in the identification, planning and distribution of benefits;

- Support additional community infrastructure associated with the project, for example electricity connection, where positive benefits to the community will result;

- Local and regional resources (particularly labour) should be utilised in the development and operation of the project. Local communities will then experience first-hand the benefits of the scheme to their community;

- Communities that will be affected should be compensated for their loss. This will include those persons or groups displaced by associated infrastructure developments such as roads, those communities who experience loss of livelihood, and those who depend on common resources such as fisheries and agricultural land that might be altered by the project; and

- Social compensation projects (such as new roads) should undergo appropriate environmental assessment.

- Developers should be open and transparent with stakeholders and be respectful of local values and, cultural norms.

- A process should be developed to effectively deal with community queries and complaints.

- Provide information to stakeholders in language and concepts appropriate to the

stakeholder needs and requirements.

- Promote conditions where community ownership, pride and stewardship can flourish e.g opening should be celebrated with local community involvement.

10. Managing Economic Outcomes

Economic sustainability, from a project perspective, depends on the ability to generate profit, but not at the expense of the local community or the environment. Sound economic practice relating to wind power projects must consider the triple bottom line – economic, social and environmental sustainability. The efficient use of economic resources requires that alternatives have been carefully evaluated, that the best options are selected, and that hidden and unforeseen costs do not emerge in the future. This is the basis for sound economic practice.

With new developments, capital and operating costs should be taken into account over the lifetime of a project. Direct and indirect costs and benefits should be identified and, where possible, quantified in monetary terms. Nevertheless, putting money values on externalities such as environmental or social attributes is not a simple task. For example, rarely are environmental goods traded in the market place, and consequently the decision as to what price should be placed on a particular environmental, or indeed social, attribute is not necessarily easy.

Most significant wind farm financial costs are incurred at the construction stage. Once built, a wind project is virtually immune from further inflationary pressures for its planned economic life. There are no fuel costs that may escalate through time. Older wind power turbines can be replaced or decommissioned relatively cheaply. Wind power projects have favourable energy payback periods (the amount of energy derived from the generating station compared with the amount of energy used in its construction and operation). These projects can often be constructed in months, not years, and can be incrementally added to an electricity grid.

10.1 Institutional framework

Governments need to establish a suitable investment climate and communicate this widely. They should also make known their priorities. In particular, governments should ensure that:

- The legislative framework for decision making is one in which an investor can have confidence in terms of clarity, the impartiality of the legal process, and the ability to resolve disputes without undue costs or delay.

- An efficient institutional framework is in place to ensure that all stakeholders are aware of factors that could affect them and unnecessary delay or conflicts of interest are avoided.
- The long-term interests of the state should be taken into account in determining project priorities.

10.2 Identifying costs and benefits

Economic sustainability decisions should be based on a comprehensive evaluation of affected resources, and project costs and benefits. Some of these may be difficult to precisely quantify and could be unevenly distributed throughout local and wider communities. The following elements should be taken into account:

Costs

- Construction, operations and maintenance costs should be fully detailed, recognising the split between foreign and local currency, financing options, and the anticipated exposure that these might give in terms of exchange rate variation.
- The full environmental and social costs of the project need to be recognised, quantified where possible and included in feasibility assessments of the project.
- The full capital and recurrent costs of environmental and social mitigation plans should be included.

Benefits

- Allowance should be made of the accrued benefits at a national or regional level, including any additional taxes, industrial development and improved infrastructure or multiple use benefits that could be attributed to the project.
- Recognition of savings on greenhouse gas emissions, and improved local air quality, to the extent that this can be quantified.
- Where feasible, allowance should be made for benefits that accrue to local communities including integrated local renewable energy supply systems and ownership, job creation, local industry, investment opportunities and tourism.

10. 3 Allocation of benefits

The principal stakeholders in any project are future owners, the developer, the electricity user/supplier (if different), governments, financing agencies, local communities, investors and individuals directly affected by the scheme. These stakeholders should be identified early in the planning and development approval process and their legitimate interests acknowledged and taken into account in the financial and economic evaluation processes.

The above objectives imply the need for the following:

- Balanced commercial agreements in the case of privately funded projects.
- Reasonable returns on equity, consistent with the risk profile and international norms.
- Transparency in procurement processes;
- Directly negotiated contracts to be subject to independent audit; and
- Ongoing auditing/monitoring of economic performance against projected benefits.

12. WWEA Member Commitment to Sustainability

Wind power, provided that it is developed and operated in a sustainable manner, will play an important role in helping to address some of the major global challenges of the 21st century. One of these challenges is to alleviate poverty and increase living standards through the provision of affordable access to electricity and basic services. This is a necessary step towards achieving more equity between different socio-economic groups within nations, and between developed and developing nations.

Another major challenge is global warming. This is the world's most pressing environmental issue and requires the increasing development of less carbon intensive methods of energy production. A third challenge is the security of energy supply in all parts of the world, having in mind that fossil as well as nuclear resources are facing significant constraints and even depletion. On all of the three counts outlined above, wind power, especially in combination with other renewable energy forms and appropriate storage facilities, is making, and will continue to make, a significant contribution.

WWEA members are owners, operators and developers of wind power projects. They are committed, through their membership of WWEA, to the underlying principles of sustainability outlined in this document.

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APPENDIX 1

Recommendations About How Sustainable Energy Policies Can Be Achieved Through Strengthening and Diversifying the Electricity System in Africa

In order to encourage sustainable energy, then we have to create an enabling environment produce, a new energy policy framework for the private sector in order for the: industries, donors and communities to invest in the power sector. A new energy policy needs to include the following:

- Create realistic and ambitious targets to aim for in terms of percentage increases in access and sustainable energy generation in Africa for example Solar and Wind.

- Encourage sustainable energy technologies (Wind and Solar) in Africa through changing the legal framework, improving and setting up the necessary institutions and providing active support

- Removal of legal and regulatory barriers facing sustainable energy, so as to ensure that policy in technology is neutral in order to create incentives for entry and a removal of barriers.

- Simplification and changes in the license conditions regarding Renewable power production, so as to take into account the needs of sustainable energy producers.

- A review of the monopoly on supply that is held by most companies is holding back small scale producers from generating and supplying electricity locally, and a review of the power purchase agreements process, so as to ensure fair prices for sustainable energy producers from Solar and wind.

- A review of the current tariff structure and the cost of electricity to consumers.

- Strengthening electricity regulations in order to diversify generation through the encouragement of sustainable energy technologies.

- Encourage the development of biomass (e.g. biogas), small scale hydro and wind projects to contribute to the grid
- Allowing communities and the private sector to submit power proposals for investment in renewable technologies

- Strengthening the grid

- Helping professionals in Africa gain more access to master tools and instruments for the analyzing and tackling of the major energy constraints and environmental problems on the continent
- Strengthening of co-operation and dialogue between African countries and the rich countries.