Economic Commission for Africa

SUSTAINABLE ENERGY

A Framework for New and Renewable Energy in Southern Africa

Economic Commission for Africa (ECA)
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Sustainable Energy: A Framework for New and Renewable Energy in Southern Africa*

* SADC and Southern Africa are used interchangeably in this report.

Table of Contents

Tables

Boxes

Foreword

This publication presents a framework for creating a competitive and gender-sensitive environment in the new and renewable energy sector in Southern Africa. The subregional framework is a set of recommendations on how member States should align their policies in the sector, collectively develop and nurture skills in renewable energy, pool resources for development of appropriate renewable energy technologies and facilitate trade in these technologies. The ultimate objective is to increase access to affordable energy services by a majority of citizens in Southern Africa in order to promote sustainable development.

The publication addresses the constraints to renewable energy development in the subregion including, inadequate policies, legal, regulatory and institutional frameworks and limited financial flow for the development and provision of sustainable energy. The focus of the framework is the creation, by member States, of an environment where the private sector can actively participate in the development of appropriate renewable energy technologies and to facilitate the supply of these technologies to communities at affordable prices. The framework emphasizes the importance of energy as a factor of production for purposes of economic empowerment and diversification of economic activities in rural areas. The policy framework is underpinned by the important relationship between access to affordable, reliable and sustainable energy and social and economic upliftment.

I would like to express my appreciation to all the experts whose input was instrumental in refocusing the technical publication and ensuring that the policy framework adequately addresses the aspirations of the SADC Regional Indicative Strategic Development Plan and is geared towards the attainment of the Millennium Development Goals.

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The final report incorporates contributions from a group of experts who reviewed the original draft at a meeting in Lusaka, Zambia from 7 to 9 November, 2005. The experts included; Diederick Kruger (MIASA, South Africa), Buti Mogotsi (Botswana), Gideon Genesis Nyirongo (Malawi), Tuvoye Hendrina Hasheela (Namibia), Monga Mehlwana (CSIR, South Africa), Khamarunga Banda (South Africa), Maxwell Mapako (CSIR, South Africa), Daniel Dumas, (Commonwealth Secretariat, London), Dr. Lawrence Musaba (SAPP, Zimbabwe), Cornelius Mzezewa (Zimbabwe), Dr. Mohamedain E. Seif Elnasr (COMESA, Zambia), Professor Thomson Sinkala (University of Zambia), Dr. Muyoba Macwani (Zambia) and Geoffrey Musonda (Department of Energy, Zambia).

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Executive Summary

The development of a harmonized subregional policy framework for new and renewable energy is an important step towards the realization of the goal of subregional integration and the harmonization of national policies and strategies in all sectors as intended by the SADC Treaty.

After discussing the status of sustainable energy development at global and regional levels and the socio-economics of the 14–member subregional grouping, the report reviews the SADC Energy Protocol, the SADC Renewable Energy Policy Framework and the Regional Indicative Strategic Development Plan (RISDP), the pillars upon which national renewable energy policies are developed and operationalized.

National sustainable energy policies from eight countries in Southern Africa provided the foundation for the proposed subregional framework for the renewables sector. Although in their current form these national policies embrace the ideals of the SADC Treaty and the Protocol on Energy, they fail to address the expectations of the RISDP on strategic targets and are silent on gender mainstreaming in rural energy and on the role new and renewable energy plays in poverty alleviation, the supply of services and the attainment of MDGs.

The harmonization process adopted in this study, comprising standardization and policy alignment, is premised on narrowing differences in the legal and regulatory issues, standards, regulations and Codes of Practice applicable to the development and widespread utilization of new and renewable energy in the subregion. The framework builds on past and current subregional initiatives in developing the renewable energy sector and proposes a vision that will harness renewable energies for both household consumption and productive uses. Tenets of both regional and international best practice from countries such the United Kingdom, Australia, Canada, Mexico, India, Mauritius and South Africa are adapted to the subregional framework to enhance international competitiveness given the role the private sector will continue to play in economic development and investment in the subregion.

The subregional sustainable energy policy framework advocates for the use of fiscal incentives as drivers for RET development and utilization through developing a "level playing field" and adoption of fair pricing mechanisms; the use of the "polluter pays principle" in order to address externalities; gender mainstreaming and the creation of renewable Energy Enterprise Zones and prioritization of RETs. The framework provides guidelines on energy development, supply, use, distribution, pricing and governance and focuses on poverty reduction through promotion of productive use of

energy services, facilitation of women empowerment, community participation and enhancement of energy supply.

The framework recommends the adoption of measures to stimulate RETs such as obligations on the electricity industry to purchase renewable energy, supply a certain proportion of their energy from renewable sources and the development of a guaranteed market are recommended as proactive tools to grow the sector and stimulate the market. The policy framework underscores the need to set targets for achieving improved energy efficiency and adoption of new and renewable energy as part of the primary energy supply.

A harmonized subregional sustainable energy framework will result in the reduction of investment costs in RETs and improved reliability of the quality of new and renewable energy services. Member States will be able to share in the benefits of coordinated planning and operation in the renewables sector. These benefits will translate into improved access to clean and affordable energy by a majority of citizens in the subregion and a reduction in poverty and hence the attainment of MDGs.

The framework reemphasizes the importance of community participation in the development of RETs to ensure ownership and acceptance of the new sources of energy. Community participation is key to building an empowered society and adds value through the infusion of indigenous knowledge systems into the sustainable energy sector. The importance of political will and good governance in the promotion and adoption of RETs is critical to the success of the framework.

Acronyms and Abbreviations

ADB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
AFREC	African Energy Commission
AFREPREN	African Energy Policy Research Network
AREED	African Rural Energy Enterprise Development
AU	African Union
BOTEC	Botswana Technology Centre
BPC	Botswana Power Corporation
CEEEZ	Centre for Energy, Environment and Engineering Zambia Ltd
CIF	Competitive Investment Framework
COMESA	Common Market for Eastern and Southern Africa
CSIR	Council for Scientific and Industrial Research
DBSA	Development Bank of South Africa
DRC	Democratic Republic of Congo
ECA	Economic Commission for Africa
EIA	Energy Information Analysis
ETI	Energy Technology Institute
FDI	Foreign Direct Investment
FINESSE	Financing Energy Services for Small-Scale Energy Users
G8	Group of 8 Most Developed Countries
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GNI	Gross National Investment
GWh	Gigawatt-hour
GW	Gigawatt
HIV	Human Immune Virus
IEA	International Energy Agency
IEF	Industrial Environmental Forum
IKS	Indigenous Knowledge Systems
IPP	Independent Power Producer
ISES	International Solar Energy Society
ISO	International Organization for Standards
ISES	International Solar Energy Society
IUCN	International Union for the Conservation of Nature
kWp	Kilowatt-peak
kV	Kilovolt
kWh	Kilowatt-hour
LNG	Liquefied Natural Gas

LIRE	Low Impact Renewable Energy
m/s	meters per second
MDG	Millennium Development Goal
MW	Megawatt
NEPAD	New Partnership for Africa's Development
NER	National Energy Regulator
NORAD	Norwegian Development Aid
NPV	Net Present Value
NRSE	New and Renewable Sources of Energy
OECD	Organization for Economic Cooperation and Development
Pula	Botswana Currency
PRSP	Poverty Reduction Strategy Paper
ProBEC	Programme for Biomass Energy Conservation
PV	Photovoltaic
RRA	Regional Research Alliance
REEEP	Renewable Energy and Energy Efficiency Partnership
REF	Renewable Energy Fund
RERA	Regional Electricity Regulatory Association
RETs	Renewable Energy Technologies
RPS	Renewable Portfolio Standard
RRA	Regional Research Alliance
SA	Southern Africa
SABS	South Africa Bureau of Standards
SADC	Southern African Development Community
SADCC	Southern African Development Co-ordination Conference
SAPP	Southern African Power Pool
SIRDC	Scientific and Industrial Research and Development Centre
SSA	Sub-Saharan Africa
TOE	Tonne of Oil Equivalent
TPES	Total Primary Energy Supply
UNFCCC	United Nations Framework Convention on Climate Change
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNECA-SA	United Nations Economic Commission for Africa – Southern Africa Office
UNISE	The UNDP Initiative for Sustainable Energy
WAPP	Western African Power Pool
WEDO	Women's Energy Development Organization
WEHAB	Water, Energy, Health, Agriculture and Biodiversity
WSSD	World Summit on Sustainable Development
ZESCO	Zambia Electricity Supply Corporation

I. Introduction

1.1 Contextual Overview

1.1.1 SADC Membership and Subregional Socio-Economic Issues

1. The Southern African Development Community (SADC) currently comprises fourteen countries vis Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Swaziland, South Africa, United Republic of Tanzania, Zambia and Zimbabwe.

2. Since its inception[1], SADC has delivered on a sense of regional belonging, a tradition of consultation, a programme of action and implemented several economic and social development projects in line with its purpose of promoting deeper economic cooperation and integration in Southern Africa in order to help address many challenges to economic growth and socio-economic development in the subregion. The SADC Vision is one of a common future in a regional community that will ensure improvement of the standards of living and quality of life, freedom and social justice and peace and security for the peoples of Southern Africa. This shared vision is enshrined in the SADC Treaty and historical and cultural affinities that exist between the peoples of Southern Africa. The subregion's mission is to promote sustainable and equitable economic growth and socio-economic development through productive systems, deeper cooperation and integration, good governance and durable peace and security, so that SADC emerges as a competitive and effective player in international relations and the world economy.

3. The SADC Common Agenda[2] defines the region's objectives to include:

    1. Promotion of sustainable economic growth and socio-economic development;

    2. Alleviation of poverty;

    3. Enhancing the standard and quality of life of peoples of Southern Africa and supporting the socially disadvantaged through Regional Economic Integration (REI);

1 In 1980 as Southern African Development Coordination Conference (SADCC)
2 The SADC Common Agenda is spelt out in Article 5 of the Treaty

4. Achieving sustainable utilization of mineral resources and protection of the environment;

5. Achieving complementarities between national and regional strategies and programmes; and

6. Mainstreaming gender in the process.

4. Actions at regional level to achieve the subregional objectives in the SADC Common Agenda include - harmonizing policies and plans of member States, encouraging people and institutions in the region to forge ties among themselves and participate in programme implementation, promoting development of human resources, and promoting development and transfer and mastery of technology.

5. The SADC Treaty provides for the development of sector protocols which spell out the objectives, scope and institutional mechanisms for cooperation and integration at sector level. For the energy sector, the SADC Energy protocol is the legal document in the subregion.

6. The Southern African subregion had a population of over 238 million in 2004. It is endowed with vast quantities of natural resources including minerals and energy resources. Notwithstanding the abundant natural resources, the low level of modern energy consumption with an average of only 2 per cent of the rural population with access to electricity is testimony to the subregion's widespread poverty among the rural communities. With the slight exception of Botswana and Zimbabwe where over 50 per cent of the rural population has access to safe drinking water, most of the region's rural population consumes unsafe drinking water. The data in Annex 1 show that the majority of the region's citizens reside in rural areas and this coupled with very low rural electrification levels makes the need for renewable energy more pertinent. It is evident from these data that renewables can play a major role uplifting the standards of living of the majority of the region's populations. Rural electrification programmes within the subregion have not been very successful due to funding constraints. Therefore, any future energy supply strategies should embrace both grid and non-grid connected electricity in order to increase opportunities that engender productive development.

7. A summary of the subregion's socio-economic indicators appears in Annex 1.

1.1.2 Energy Sources in the Subregion

8. Commercial energy resources in the subregion include coal, petroleum, natural gas, electricity and renewables such as biomass, solar, wind, geothermal, mini hydro and tidal waves. The subregion generates electricity from both thermal and

hydroelectric resources and South Africa has the subregion's only nuclear power station. Namibia and South Africa exploit uranium for mineral exports rather than as nuclear energy sources for the domestic market. All SADC countries except DRC and Angola are net petroleum importers and hence are adversely affected by international price movements. Natural gas is prevalent in shallow and deepwater coastal areas of South Africa, Tanzania, Angola, Namibia and Mozambique. There are plans to exploit Tanzania's Songo-Songo offshore natural gas fields to convert the five liquid fuel turbines at the 112-MW Ubongo power plant to natural gas. The major coal producers of the subregion are South Africa, Zimbabwe and Botswana who exploit the resource for thermal power generation, although South Africa also uses its coal in its coal-to-liquid fuel programme at SASOL.

"Growing demand for electricity in the subregion has put pressure on current generation capacity"

9. The demand for electricity in Southern Africa has grown by about 3 per cent per year since 1998 mainly because of positive economic growth mostly in South Africa, Botswana and Namibia, rapid urbanization, population growth and the expansion of rural electrification programmes. In the absence of new investments in generating capacity for grid electricity, these developments are expected to result in a deficit in power supply by 2007 (Annex 2). Renewables could provide decentralized energy supply option to communities in remote rural areas and narrow the deficit. The utilization of new and renewable energies, such as small hydro, biomass, solar, wind, geothermal, tidal waves and biofuels is an economically and environmentally attractive alternative to fossil fuels. Further, the efficient consumption of biomass energy through the use of improved stoves guarantees sustainability of woodlots as well as reducing negative indoor air quality, which is a health hazard to women and children.

1.2 Energy Policy Context

1.2.1 Global Trends in Renewable Energy

10. The majority of citizens in Southern Africa suffer from energy poverty as they lack sufficient access to adequate, affordable, effective and environmentally sustainable energy services that could support economic and human development. Because energy poverty has an effect on, and is affected by, other aspects of poverty, it is vital to explore issues surrounding it, including the gender aspect.

11. The role energy plays in improving poor people's living conditions must be fully understood if it is to be allowed to contribute to development. Access to clean sustainable energy has become part of the international energy policy agenda in recent years. This reflects the recognition of the importance of energy in the delivery of basic services and in generating jobs and income. Energy has a direct impact on the welfare of people, it facilitates the supply of water and fuels agricultural output, helps in the

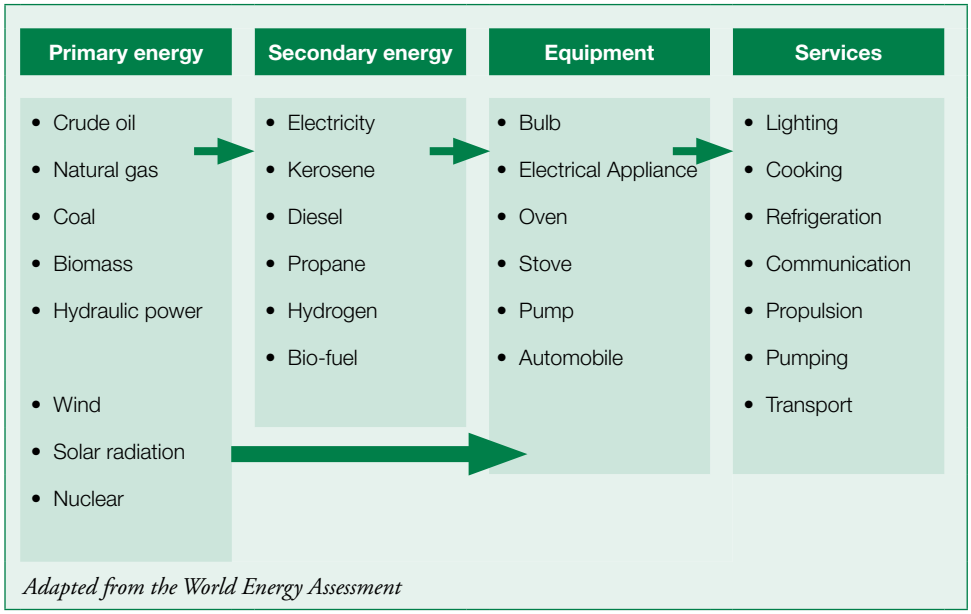
delivery of health and education, creates job and contributes to overall environmental sustainability.

"Energy availability facilitates the supply of water and delivery of education and health to rural communities"

12. The disparity in life styles of people living in rich and poor countries clearly demonstrates the vital role of energy in economic development. Globally, industrialization is associated with the excessive consumption of fossil fuels. Moreover, there is a strong and positive correlation between Gross Domestic Product (GDP) per capita and modern energy use per capita.

13. Energy services[3] undoubtedly help alleviate poverty and stimulate economic development. The idea of energy services (or useful energy) describes the end uses that the addition of fuel makes possible. These services are the last link in the "energy chain" encapsulated in Box 1. The idea considers the supply of the useful energy that can be converted into an energy service by means of an appropriate end-use technology (appliances such as motor or cooking stove) to satisfy human needs, rather than looking at the energy source or energy carrier such as electricity or fuel.

Box 1: A Definition of Energy Services



Adapted from the World Energy Assessment

14. Despite the importance of energy services in economic development, an estimated two billion people in developing countries lack access to reliable and

3 *Energy services* are referred to as the desired and useful products, processes, or services that result from the use of energy, such as cooking, water heating, lighting, refrigeration, water pumping, etc

affordable energy services including electricity. In Sub-Saharan Africa, over eighty percent of the population uses traditional biomass for cooking and heating which poses a threat to environmental sustainability and results in the wastage of valuable time collecting firewood. This poses a direct threat to the attainment of the MDGs shown in Box 2.

"80 per cent of the Southern African population uses traditional biomass for cooking and heating"

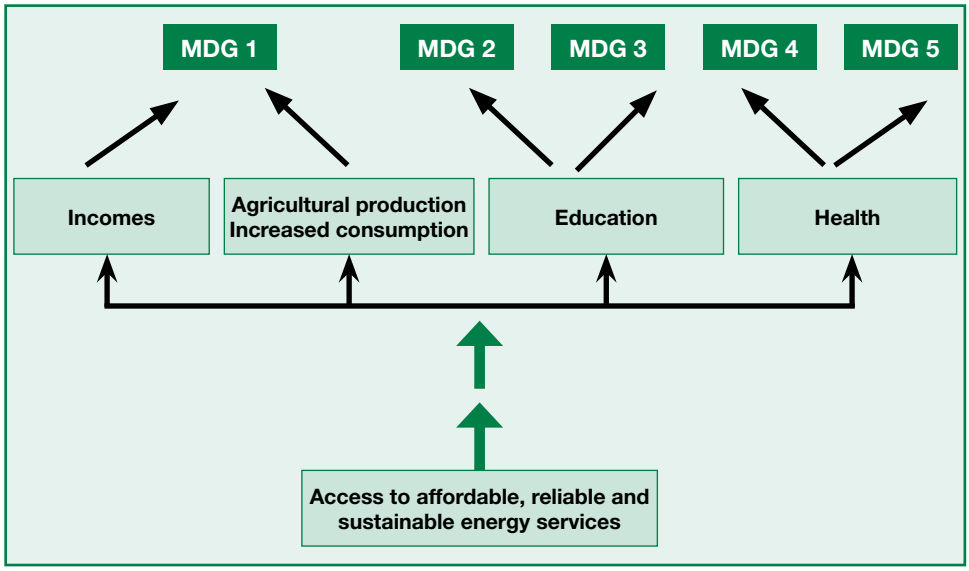
Box 2: The Millennium Development Goals

1. Reduce by half the proportion of people who live below the national poverty line - and reduce by half the malnutrition level of children under 5.
2. Achieve primary education for all by 2015.
3. Reach equal access for girls and boys to primary and secondary school by 2015.
4. Cut down by two-thirds the mortality rate of children under 5 by 2015.
5. Reduce the maternal mortality rate by three-quarters by 2015.
6. Halt and reverse the spread of the HIV/AIDS epidemic.
7. Halve, by 2015, the proportion of people living without access to drinking water and safeguard the sustainability of the environment
8. Consolidate a global partnership for development.

15. Following the Millennium Declaration agreed upon by 191 governments at the September 2000 UN Millennium Summit, the UN Secretary General issued MDGs in 2001 as a "road map" for implementing the Millennium Declaration.

16. The MDGs help shape strategic outlines for eradicating poverty through setting specific, measurable targets to be strived for. Although energy is not explicitly part of the Millennium Development Goals, its immense contribution to reaching them is widely acknowledged. Box 3 and Annex 3 adapted from DfiD show the linkages between energy and MDGs.

Box 3: Relationships Between Energy and the Achievement of MDGs



"Access to affordable, reliable and sustainable energy assists in achieving MDGS"

17. The nexus of gender, poverty and energy with regard to the achievement of some MDGs is reflected in Annex 4. Analysts agree that none of the eight MDGs can be met without major improvement in the quality and quantity of energy services supplied to the rural poor in developing countries. Subsequent to international conferences on women, particularly, the fourth World Conference on Women[4] held in Bejing - China in 1995, governments all over the world made a commitment to enhance the status of women in all sectors including energy. Equal access to energy services is cardinal according to the Beijing resolutions.

18. In addition to commitments under Kyoto to reduce green house gas (GHG) emissions through the Clean Development Mechanism (CDM) and the need for sustainable development, other recent international pronouncements that have raised the momentum towards renewable energy include:

1. UN Commission for Sustainable Development 9th Session (CSD9) which acknowledged that access to sustainable energy services is an essential element of sustainable development stating that: "To implement the goal accepted by the international community to halve the proportion of people

4 The advancement of women and the achievement of equality between women and men are a matter of human rights and a condition of social justice and should not be seen just as a women's issue. They are the only way to build a sustainable just and developed society. Empowerment of women and gender equity are prerequisites for achieving political, social, economic, cultural and environmental security among all people.

living on less than US$1 per day by 2015, access to affordable energy services is *a prerequisit*e."

2. G8 Renewable Energy Task Force, commissioned by the G8 in 2000 to report on how the barriers to the expansion of renewable energy can be overcome particularly in the South and how the G8 should support the dissemination of renewable energy for the world's poor through the European Union Energy Initiative.

3. The United Nations Development Programme (UNDP) and the World Energy Council (WEC)**,** which has published the World Energy Assessment with recommendations on how the provision of energy to poor people could be accelerated.

4. At the World Summit on Sustainable Development (WSSD) which was held in 2002, agreement was reached to significantly advance the attention given to energy particularly the issue of access to energy services. In an effort to ensure that a lack of energy services does not become an impediment to development, the UNDP has made a commitment to enhancing the visibility of the strategies.

5. In the Johannesburg Plan of Implementation (JPOI) for the WSSD code-named Water, Energy, Health, Agriculture and Biodiversity (WEHAB), each member State was asked to commit itself to meeting 10 per cent of its national energy supply from renewables by 2010.

"supply of both grid and off-grid electricity has an important role to play in addressing productive uses of energy in rural areas"

19. At national level, governments in developing countries including most in Southern Africa, prepared Poverty Reduction Strategy Papers (PRSPs) demonstrating commitment for reducing poverty and have made proposals for the actions needed to provide improved services in a number of sectors to achieve the MDGs.

20. Given the role of energy in economic development, the provision of renewable energy electricity through micro and mini-grids (decentralized systems) holds promise towards alleviating poverty in rural areas. Rural electrification programmes in the subregion have not delivered as expected due to many constraints including lack of both funding and technical support. Nevertheless, it must be stated that the electricity supply option that combines both grid and non-grid connected electricity offers better returns in addressing modern energy demand for productive uses in rural areas.

21. As a result of environmental concerns and international commitments, both developing and developed countries are actively pursuing renewable energy projects to enhance security of supply and facilitate the availability of energy to all citizens. The

sustainable energy policies of the United Kingdom[5], Australia[6], Canada[7] and other European Union countries demonstrate this international drive towards renewables and provide important lessons for promotion and regulation of the sustainable energy sector in the subregion.

22. In addition to national targets, these countries have developed and used various instruments to stimulate Renewable Energy Technologies (RET) and facilitate their incorporation into the energy sector. For instance the United Kingdom and China have set a 10 per cent target for electricity to be generated from renewable sources by 2010.

Box 4 provides details of the renewables targets in the United Kingdom.

Box 4: Renewable Obligations in the UK

This seeks to generate 5 per cent of the country's total electricity consumption from renewable energy sources by 2003 and 10 per cent by 2010. All suppliers of electricity in the UK need to supply the set percentage of electricity from renewables, or pay a penalty. For each unit of 1 MWh, rounded to the nearest whole MWh, of electricity produced per month from accredited renewable energy schemes, the generator will be awarded a "Renewables Obligation Certificate" (ROC) which can then be sold to an electricity supplier as evidence of a renewables purchase. Suppliers that fail to purchase sufficient ROCs must buy-out of their obligation. The penalty/buy-out price for 2002/3 was 0.03 GBP/kWh and has increased to 0.0305 GBP/kWh for 2003/4. The Obligation is expected to encourage development of near cost-effective renewable energy schemes.

"the development of renewable energy resources is now a major focus worldwide"

23. To attain these renewable energy targets, countries have adopted various approaches ranging from legislated requirements to the use of incentives to entice power suppliers to move towards the targets. Table 1 is a summary of selected instruments used by various countries in the developed world to stimulate RETs.

24. For the African continent, renewables featured high on the agenda of the WSSD in 2002. Although there was no consensus on the contribution of renewables to national energy supply, African countries were encouraged to aim for a 10 per cent target by the year 2010. Moreover, the Johannesburg Plan of Implementation (JPOI) called for diversifying energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies (hydro included) and their transfer to developing countries on concessionary terms as mutually agreed.

5 URL: http://www.enc.nl/
6 URL: http://www.stateplan.sa.gov.au/home.php
7 http://www.nrcan.gc.ca/es/new/denis2.htm/renewable

Table 1: Instruments to Stimulate Renewable Power generation in Selected Countries

Country	System/Instrument
Australia	Renewable Energy certificates (obligation)
Denmark	Renewable Energy feed-in tariff
France	Renewable Energy Fixed Price
Germany	Renewable Energy feed-in tariff
Japan	Renewable Energy certificates (obligation)
Philippines	Renewable Portfolio Standard (set aside), Renewable Energy Levy
Spain	Renewable Energy feed-in tariff
United Kingdom	Renewable Obligation Certificates
United States of America	Renewable Portfolio Standard (set aside), Renewable Energy Independent Power Producer tax credits

"a combination of market instruments and obligations is being used to stimulate RETs in developing countries"

1.2.2 SADC Renewable Energy Policy - Overview

25. The SADC Renewable Energy Policy Framework, the SADC Energy Protocol and the Regional Indicative Strategic Development Plan (RISDP) form the basis upon which national renewable energy policies are developed and operationalized within the subregion.

26. The SADC Renewable Energy Policy Framework (Box 5) sets out objectives and strategic priorities in the sector and is the guiding document for sustainable energy development in Southern Africa. Countries in the subregion have adopted this policy framework in developing national sustainable energy policies. Although the framework incorporates the aspirations of the RISDP and New Partnership for Africa's Development (NEPAD), it does not give prominence to gender and other cross-cutting issues despite their role in poverty alleviation and the attainment of MDGs.

Box 5: Renewable Energy Policy Framework of the SADC Region

The SADC policies and strategies aiming at developing increased production and use of renewable energy sources in an economically and socially acceptable manner embrace the following:

- Development of appropriate financing mechanism and fiscal regimes suitable for the development of RETs;
- Strengthening of the regional capacity and capability for RETs project development, management, monitoring and evaluation via training and regional human resource pooling;
- Facilitation of the link between stakeholders with a view to promoting commercialization and greater use of RETs;
- Promotion of cost-effective pilot activities and projects for diffusion of RETs;
- Collaborating with stakeholders in identifying specific needs of different energy users in order to develop programmes that tally with these needs;
- Increased public awareness of RETs by lobbying governments, donors, commercial entities and industries for their financial and political support of a RETs agenda; and
- Facilitation of contact and cooperation among institutions involved in research and development of RETs technologies with a view to establishing consistent product standard.

URL:http://www.ises.org

"RISDP and the SADC Protocol on Energy are the foundation for cooperation in the energy sector in Southern Africa"

27. The SADC Energy Protocol is the legal document for cooperation in the energy sector in the subregion. Article 3(1) of the Protocol defines the objective of energy cooperation in the subregion as to strive to harmonize national and regional energy policies, strategies and programmes on matters of common interest based on equity, balance and mutual benefit. Article 3(3) states that energy cooperation in the SADC region shall involve working together in the development and utilization of energy in the subregion in the following subsectors: woodfuel, petroleum and natural gas, electricity, coal, new and renewable energy sources, energy efficiency and conservation and other cross-cutting themes of interest to member States. According to Article 6(1) of the protocol, member States are supposed to make energy data freely available in the region to assist in planning for the sector. As a first step, it was agreed to set up a regional database to facilitate the exchange of information among institutions in order to facilitate regional energy policy formulation and planning.

28. Cooperation in the sector has continued to flourish since the signing of the protocol. Notable subregional projects implemented in line with the SADC Energy Protocol include the Programme for Biomass Energy Conservation (ProBEC) and a UNDP supported Financing Energy Services for Small-Scale Energy Users (FINESSE). The details of these two programmes are provided elsewhere in this report.

29. The RISDP outlines the necessary conditions that should be realized towards the attainment of SADC's regional integration and development goals. It also sets targets that indicate major milestones towards the attainment of these goals and sets up a logical and coherent implementation programme of the main activities necessary for the achievement of the region's broader goals with a reasonable, feasible and agreeable time frame that takes into account resource constraints.

30. The energy targets as outlined in RISDP provide details on the subregional objectives in the development of the energy sector (including renewables). The region's strategies for the energy sector and its targets are shown in Box 6. For the renewables sector, the subregion's target of increasing access to modern energy services to 70 per cent of the population by 2018 holds promise for development and access to services by a majority of SADC citizens.

31. However, apart from the modern energy target for rural areas under RISDP, the subregional renewable energy framework does not provide member States any specific targets to aim for at a national level.

Box 6: The RISDP's Strategies and Targets for the Energy Sector

Electricity Strategies:

- Promote power pooling through the extension of grid interconnections to cover all member States and upgrading/strengthening existing grids.
- Consolidate the transformation of the Southern African Power Pool (SAPP) from a cooperative to a competitive pool and create a regional electricity market.

Petroleum and gas Strategies:

Promote joint exploration and development resources, and the harmonization of policies, regulations and legislation to facilitate cross-border trade, improve capacity utilization, and cooperate in joint procurement of petroleum products in the world market.

Cross-cutting Issues Strategies:

Improving access to affordable energy services to rural communities through rural electrification and development of new and renewable energy sources.

Institutional strengthening, human resources development, information collection, processing and exchange, and research and technology development.

Targets:

- **Target 1**: Establishment and strengthening of private sector regional associations such as the Petroleum and Gas Association, and regional associations of regulators such as the Regional Electricity Regulatory Association by 2004;
- **Target 2**: Establishment of energy data banks and planning networks by 2005;
- **Target 3**: Harmonization of energy sector policies, legislation, rules, regulations and Standards by 2006 to facilitate energy market integration;
- **Target 4**: Identification and strengthening centers of excellence of energy research and technology development by 2008;
- **Target 5**: Achieve 100 per cent connectivity to the regional power grid for all member States by 2012;
- **Target 6**: 70 per cent of rural communities have access to modern forms of energy supplies by 2018.

1.2.3 SADC National Sustainable Energy Policies

32. The individual sustainable energy policies reviewed for Southern African countries are shown in Annex 5 and summarized in Table 2. The focus of these sustainable energy policies is on the development of mechanisms for promoting the widespread utilization of RETs within the subregion in line with the SADC renewable energy policy framework. The policies emphasize the need to develop appropriate Standards and Codes of Practice for the sector, promotion of research and development and the promotion of individual power providers in the electricity system.

" all countries in the subregion are committed to RETS but lack specific programmes"

33. In their current form, national renewable energy policies are unanimous on the need to open up the rural areas to solar PV systems, research and development of RETs, promotion of Independent Power Producers (IPPs) in the electricity systems, development of appropriate policy and fiscal frameworks, promotion of energy efficiency and conservation including environmental certification. However, policies are silent on important issues such as the need to create subregional Centres of Excellence in RETs, development of the skills base and integration of RETs in all government programmes. No detail on mechanisms to promote the growth of the sector, promotion and funding of research and development and gender are outlined in the policies. Gender mainstreaming in the energy needs of the rural communities is addressed only in a cursory manner in all national policies.

34. Further, with the exception of South Africa, Botswana and Namibia and to a less extent Malawi, the national renewable energy strategies are not supported by National Energy Action Programmes/Plans. They lack specific targets and programmes to match or improve on the inadequate ones set out in the RISDP. The subregion currently lacks a regulatory framework for the renewable energy sector and this partly explains the ad hoc nature of the sector's development over the years. Notwithstanding, Botswana, Namibia, South Africa, Zambia and Zimbabwe, are in the process of addressing linkages between renewables and the rest of the economy. For instance Botswana's solar water heater and PV markets have benefited from large government contracts in recent times.

Table 2: Summary of Sustainable Energy Policies within SADC

Policy Objective/Strategy	Country (ies) Embracing Policy Objective/Strategy
Promote rural electrification through adoption of innovative finance mechanisms	Namibia, Botswana, South Africa, Zambia, Zimbabwe, Mauritius, Swaziland
Develop appropriate Standards, Codes of Practice	Botswana, South Africa, Tanzania, Zimbabwe
Promote research and development of RETs	Botswana, South Africa, Zambia, Tanzania, Zimbabwe
Develop appropriate policy and fiscal framework	Namibia, Zambia, Tanzania, Botswana, South Africa
Promote IPP into the Electricity System	Zambia, South Africa, Namibia, Botswana, Mauritius
Promote public awareness of RETs	Zambia, Namibia, South Africa
Create centers of excellency	South Africa, Botswana
Promote environmental certification	Namibia, Tanzania, South Africa, Swaziland
Promote energy efficiency and conservation	South Africa, Namibia, Tanzania
Integrate RETs in all government development Programmes	Zambia
Promote human resource development	Namibia
Promote deployment of RETs equipment	Zambia, South Africa

Source: Summarized from National Energy Policy Documents

35. It is therefore not surprising that many of the region's renewable energy programmes over the years were driven by donor funds in mostly a top-down approach. Success in these programmes was limited.

36. However, most countries in the subregion are currently developing modern legal and regulatory frameworks for the sector. The subregion recognizes that a legal and regulatory framework is a prerequisite for successful integration in renewable energy to take place. The framework allows transactions to take place, facilitates arrangements for renewable systems operations, sets out a system of tariffs and outlines agreed principles and procedures for resolution of disputes. The legal, regulatory and licensing systems existing in the different countries need to be harmonized and where they do not exist, which is the case in most countries, these have to be developed.

37. Codes of Practice and Standards are designed to discourage unsustainable practices, promote sustainable production patterns and ensure providers adhere to acceptable, manufacture, and trade practices and occupational issues. South Africa is the only country in the subregion, which has developed Codes of Practice and Standards for the renewables industry. Zimbabwe has developed some Standards while others such as Botswana and Namibia are in the process of doing likewise.

"development of modern legal and regulatory frameworks, standards and codes for the RE sector is in its infancy in the subregion"

38. South Africa has fully embraced RETs Standards and Regulations through an IPP programme implemented in 2004 and has set targets for renewable energy in this regard (IPP Brochure, 2003). In a similar manner, Zimbabwe has developed biogas, solar water heater and solar panel and battery Standards. The Standards for solar water heaters were developed by the Standards Association of Zimbabwe (SAZ) together with industry and Government and those for solar batteries by the Solar Industries Association.

39. Self-regulation through industry associations, which develop their own Codes of Conduct[8], which are then adopted by affiliated members, is a common way to regulate industry. For example, the Industrial Environmental Forum (IEF) strives to engender environmental awareness in production and consumption by channeling knowledge and expertise to the industrial community and encouraging an atmosphere for innovative thinking rather than prescriptive controls. The members of the IEF voluntarily agree to a ten point Code of Conduct and are also signatories to the International Chamber of Commerce's "Business Charter for Sustainable Development". Members of the IEF are committed to continuous improvement, self-regulation and openness about performance in the environmental arena.

40. In so far as development and implementation of appropriate Standards and Guidelines for the correct use of renewable energy technologies is concerned, the South African government is working with SABS on biodiesel and Solar water heaters. Targets set out in the Renewable Energy Policy Paper 2003 are drivers of initiatives to develop appropriate Standards. The Renewable Energy Policy has targeted to raise to 4 per cent the renewable energy contribution to final energy consumption by 2013 mainly from biomass, wind, solar and small-scale hydro**.**

41. Environmental and energy efficiency Standards are already in place for the sector in South Africa. The voluntary implementation of ISO 14000 and SABS ISO 14000 Standards, obtained from the International Organization for Standardization (ISO) and adapted for South African conditions by the South African Bureau of Standards (SABS), plays a major role in encouraging sustainable consumption and production patterns. The SABS has plans to establish sectoral advisory committees to facilitate more interaction with industry. Box 7 shows tenets of the South African ISO Codes of Practice.

8 www.environment.gov.za/soer/ag_21/5.htm#top#top

Box 7: Voluntary SABS ISO Codes of Practice

- Environmental management systems – Specification with guidance for use (SABS ISO14001, 1996);
- Environmental management systems – General Guidelines on principles, systems and supporting techniques (SABS ISO14004, 1996);
- Guidelines for environmental auditing – General principles (SABS ISO14010, 1996);
- Guidelines for environmental auditing – Audit procedures – Auditing of environmental management systems (SABS ISO14011, 1996);
- Guidelines for environmental auditing – Qualification criteria for environmental auditors (SABS ISO14012, 1996);
- Environmental management – Life cycle assessment – principles and framework (SABS ISO14040, 1997).

42. The South African government has legislated these mandatory Codes of Practice, Standards and Guidelines and aligned them with international practice.

"efforts to promote renewables are currently uncoordinated"

43. Two major issues emerge from the foregoing discussion. First, the review shows that the potential for RETs investment in the region remains high given the subregion's geographical size and natural resource endowment. Second, there are some differences between renewable energy policy strategies, legal and regulatory frameworks and Codes of Practice among countries.

44. However, the similarities between national policies as shown in Table 2 offer opportunities for gradual harmonization. Therefore countries that are yet to embark on renewable energy policy development are advised to align themselves to the status quo with a vision to incorporate both the international and regional best practice for enhancement.

45. The challenge is to develop a harmonized subregional legal and regulatory framework with comparable Codes and Standards of practice for the renewables sector. To facilitate development in the sector, the framework should be dynamic, competitive and be informed by international best practice.

1.3 Study Objectives and Methodology

1.3.1 Study Objective

46. The objective of the study is to develop a framework for new and renewable energy policy harmonization in the Southern African subregion in order to improve and increase access to affordable energy, enhance security of energy supply, contribute to sustainable development and assist in the alleviation of poverty. The gender-sensitive policy framework will provide the basis for the systematic development, regulation,

utilization, and market stimulation and trade in renewable energy technologies within the subregion and beyond.

1.3.2 Methodology

47. A review of the renewable energy policies and regulatory frameworks of eight SADC member States provided primary information used in developing the subregional policy framework. Interviews with contact persons in ministries/institutions/agencies responsible for energy matters in the entire 14 SADC member States complemented the review of policies. Secondary information was obtained from many official websites including those of the ECA, UN, the World Bank, Southern Africa Power Pool, West Africa Power Pool, World Energy Council (WEC) and SADC.

48. Renewable energy policies of other countries outside the subregion including Australia, India, Mexico, Uganda, Kenya, Ethiopia, Canada and the United Kingdom were reviewed to identify key success factors in renewable energy promotion for either possible adoption or adaptation and incorporation into the subregional framework.

1.3.3 Scope

49. The approach adopted in developing a harmonized policy framework for sustainable energy in Southern Africa focused primarily on the need for a regionally consistent and gender-sensitive renewable energy policies. In developing the policy framework, it was important to establish the relevance of national sustainable energy policies to the overall objectives of the SADC region as well as the progress each member State had made in moving towards integration in the sector.

50. Furthermore, the policy framework is cognizant of global developments in RETs and has borrowed from relevant international best practice through a review of policies of selected leading countries in renewable energy promotion. Progressive tenets from the policies of these countries were adapted and incorporated into the subregional sustainable energy policy and regulatory framework.

51. Sustainability, productive use of energy, gender-sensitivity and poverty alleviation are at the core of the subregional policy framework for renewable energy in Southern Africa.

II. Status of Renewable Energy in SADC Within Energy Mix

2.1 Renewable Energy Resources

52. Renewable sources of energy are replenishable within a human lifetime by natural processes and they are wind, wave, solar, biomass (wood fuel, agricultural residues, animal wastes, biofuel and other bioenergy), hydropower and geothermal energy. The term "renewable energy" is often used to describe sustainable forms of energy that encompass many technologies and fuels with different characteristics. Another term that is often used interchangeably with renewable energy is "sustainable energy". It is defined as energy which is replenishable within a human lifetime and which causes no long-term damages to the environment." As such, sustainable energy, by its nature, promotes sustainability. Sustainability encompasses both self-sustenance (stand-alone energy supply) and the ability to promote sustainable development.

53. The renewable energy resources within the SADC region are small hydro, biomass, solar, wind, geothermal and tidal waves. Use of these energy resources is at different levels of intensity as countries are at varying stages of developing the sector.

54. While investing into conventional power plants will continue to be important in power generation, the SADC Energy Protocol and lately the NEPAD Energy Initiative is focusing more on renewable energy. Decentralized renewable energy services can offer tangible social and economic benefits to rural populations not served through grid connections. Once available at an affordable cost, renewable energy can be applied in productive uses and hence contributes to poverty alleviation in marginalized areas in the subregion.

55. Solar insolation averages around 4kWh/m^2/day in the SADC region and is sufficient for most designs of PV and thermal solar conversion or collection devices. Use of solar PV in telecommunications, vaccine preservation in remote clinics and provision of lighting in primary schools is widespread within the subregion.

56. For example, in 1992 Botswana launched a pilot project using solar photovoltaics in the rural village of Manyama to utilize the excellent sunshine resources in the country.

57. The pilot project comprised 42 residential PV lighting systems; 1 PV system for lighting and refrigeration in the clinic; 6 PV street lights; and 6 solar water-heating systems. Through an agreement signed between the Rural Industries Innovation

Centre in Kanye and the Botswana government in 1995, the former will take over the running of the residential lighting systems of the Manyana Project for two and a half years. The repayments to government will depend on the system bought e.g. Pula 28 (US$ 8.75) for a two-light system running for 4 hours/daily with provision to power a TV and radio set and Pula 100 (US$ 31.25) per month for a six-light system. The loan takers' willingness to pay is crucial and was evaluated.

58. Botswana's Energy Affairs Division of the Ministry commissioned a "Photovoltaic Rural Electrification Feasibility Study" whose first phase was funded through a revolving loan fund. The Botswana Government contributed 70 per cent to the fund, and Renewable Energy for Africa (REFAD) provided the remaining 30 per cent. Loans were amortized over 4 years with monthly payments similar to those paid by loan takers at Manyana.

"solar, mini hydros and biomass projects have been tried in the subregion and results have been mixed"

59. Zimbabwe launched a project for recharging batteries. The 1-kilo-watt solar PV station with 12 solar panels of 83 watts each is supported by the Energy Technology Institute (ETI) of the Scientific and Industrial Research and Development Centre (SIRDC), and provides power to the Musunami Medical Clinic for charging batteries. (The UNDP/GEF-funded project for rural electrification of more than 8,000 households with family-sized PV systems in Zimbabwe could provide some lessons on challenges facing renewable energy development in Southern Africa).

60. Another project in Mhondoro, Zimbabwe is based on the principle of reducing the initial costs of small-scale solar systems for home use by 50 per cent and thus making them financially attractive to poor consumers. This is in line with government's energy policy that promotes equal access to energy as a vital tool for fostering development throughout the country. The community contributed by clearing the site and operating the station while the Netherlands Embassy and the SIRDC met 60 per cent and 40 per cent of the project cost respectively.

61. Biomass energy resources are abundant in most member States and on average woodfuel accounts for more than 60 per cent of total primary energy consumed. Unsustainable woodfuel consumption practices have nevertheless led to deforestation, which has affected negatively women and children who have to walk long distances to collect the resource. The scarcity of charcoal in peri-urban areas during the rainy season, for instance, has resulted in prices beyond the reach of communities.

62. Small- and medium-scale biomass technologies have been experimented within the subregion. These technologies encompass household and community biogas projects. There is big potential for utilization of large-scale biomass that encompasses direct combustion for process heat, ethanol production, heat co-generation, biogas production and briquetting. In 1998, close to 25 per cent of the electricity generation

in Mauritius was from the sugar industry and the production of ethanol fuel took place in Malawi and Zimbabwe in the 1990s. Zimbabwe has recently intensified efforts to revive the country's sole ethanol plant in the face of increasing fuel prices and the shortage of foreign exchange.

63. Mini hydro sites in South Africa and Zambia have been harnessed for non-grid electricity generation. The Mutanda Mini-hydro Power Generation and Distribution Project, located 35 km west of Solwezi the capital of Northwestern Zambia is one example. The project supplies power to a boarding secondary school, primary school, a hospital, a large farm, staff-houses and for water pumping and grinding maize. The mini hydro power station was constructed by the Technology Development Advisory Unity (TDAU) of the University of Zambia on a canal diversion from the Mapunga River. The costs were shared between the Mutanda Evangelical Centre and the Evangelische Zentralstelle fuew Entwicklungshilfe (EZE), a German church organization and the local community provided labour. Supply of power to 82 houses at the Centre is at a fixed tariff of US$1.05 per month. Because the power supply is reliable, cheap and offers energy services within walking distance, the community, made up mainly of women, has been empowered to engage in diverse economic activities.

64. Zambia, South Africa and Namibia have geothermal energy sites (hot springs) and have investigated their potential. A feasibility study to estimate the geothermal potential for generating electric power for small rural communities at Kapisya in the Northern province of Zambia was conducted in 1987. According to official documents obtained from the Department of Geological Survey (1986), a pilot plant with a nominal capacity of 200 kilowatts was tested in the following year. However, the project stalled due to Zambia Electricity Supply Corporation's (ZESCO) failure to construct an electrical line up to the farm.

65. South Africa and Namibia are the subregion's leaders in wind energy. They are both investigating the possibility of generating wind power from coastal areas. Wind energy is primarily used for pumping water in all countries in the subregion. Feasibility studies to generate power from wind energy in Ludritz, Namibia were recently concluded. Mozambique, Tanzania and South Africa have significant potential for wind power generation.

2.2 Role of Renewable Energy in Regional Economy

66. In line with the tenets of the SADC Treaty and Energy Protocol discussed earlier, exploitation of renewables will increase energy accessibility and security of supply to member States. The subregion has the potential to supply bagasse-generated electricity to the interlinked network. Provision of modern energy for productive uses

in rural areas for example, will in the medium and long-term create wealth, empower communities with motive power and improve rural life styles.

67. The use of bioethanol and biodiesel in the transport sector has the potential of reducing fuel import bills and thus save many SADC countries foreign currency. This could also go a long way in helping to alleviate poverty in rural areas through job creation and enhancement of other linkages. Current estimates show that production of bioethanol and biodiesel in Southern Africa could directly create 62,000 jobs and 288,000 jobs respectively (Yamba and Munyinda, 2005). In a similar vein, Macwani (2005) estimates that 10 per cent ethanol blending with gasoline in Zambia's transport market could create more than 5,000 jobs by 2010 saving over US$4.5million/year in the short-term. Thus, harnessing abundant and naturally occurring non-depletable sources of energy could help overcome the subregional deficit, increase energy supply and help overcome environmental challenges.

68. Governments in the subregion are promoting biodiesel production to increase supply of diesel on the market. In Zimbabwe, the government through the National Oil Company, recently put in place financing mechanisms to enable farmers to grow jatropha for biodiesel and soap production. A total of over one trillion Zimbabwe dollars was set aside in 2006 for this programme and farmers have been encouraged to take up this project commercially. Jatropha biodiesel has the potential to replace expensive petroleum, transform rural and national economies, increase access to fuel and create parallel income for farmers.

69. The supply of energy services and the delivery of water, health, education and other human development requirements is an important part of the role of energy in the regional economy. In the face of the HIV/AIDS pandemic, the provision of energy will improve home-based health care facilities and minimize time lost caring for the sick leaving more time for productive activities.

2.3 Renewable Energy and Gender

70. Of the estimated 1.2 billion people living in poverty, 70 per cent are women**.** Gender mainstreaming in renewable energy can therefore bring tangible social and economic benefits to rural populations [WHO, 2000]. Because renewables are site specific, useful energy services can be provided at or near the home where women are to enable them perform other duties such as feeding the family and providing home-based childcare. The accessibility of renewables at affordable prices would lighten the women's workload and create new roles that lead to economic growth as well as making the women economically independent.

71. The provision of energy for process heat and motive power for income-generation is an important empowerment tool as it facilitates the growth in small-scale industries. To achieve maximum benefits, women and men should work together in formulating productive energy service projects and follow them up to implementation, monitoring and evaluation stages.

2.4 Renewable Energy and Regional Trade

72. RETs should be promoted in the context of their potential to provide energy services for domestic, subregional and international trade. In order to promote regional trade in RETs it is important to harmonize Codes of Practice, guidelines and Standards in the renewable energy sector within the subregion. Moving beyond the present emphasis on hardware manufacture and supply within a strict national context to embracing a regional approach, economies of scale can be realized in manufacturing and servicing of RETs with positive effect on hardware supply costs and quality.

"renewable energy development has important implications for gender and subregional trade"

73. Therefore, besides trading in grid and off-grid generated electricity, a strong manufacturing base for RETs including: solar water heaters, batteries, windmills, solar panels and biogas digesters is required to stimulate subregional trade. Harmonization of Codes of Practice and guidelines will enable smooth trade to take place within the subregion.

2.5 Barriers to Widespread Use of Renewable Energy in the Subregion

74. Despite the immense benefits from utilization of RETs, their use in the subregion is not as widespread as would be expected due to technical, economic and social constraints. The demand for energy in the subregion justifies greater utilization of renewable energy resources.

75. The constraints relate mainly to capacity for adoption of RETs by the intended beneficiaries. RETs remain a costly source of energy for communities as the intended beneficiaries are in the low-income bracket. Further, the lack of community participation in the design of renewables projects and the failure to supply renewable energy for productive use limit RETs penetration in rural areas.

76 The impact of the barriers discussed in the following section differs from country to country as member States in the subregion are at different stages in the development of the renewables sector. The common barriers to uptake include:

1. **Lack of legal and regulatory framework:** South Africa is the only SADC member State having a legal framework aimed at increasing access to renewable energy. Energy Regulatory agencies in the subregion are mainly focused on overseeing activities in the petroleum/electricity sectors including the promotion of IPPs. The use of legislation to create a level playing field in the sector can make RETs competitive with conventional fuels.

2. **Poor institutional framework:** Institutional capacity at all levels is lacking in the subregion. In most countries, the establishment of a co-coordinating agency responsible for RETs is non-existent and this affects the dissemination and implementation processes for renewable energy. However, in countries like South Africa, Botswana, Tanzania, Zimbabwe, Namibia and Zambia institutions spearheading grid and non-grid rural electrification are already in place but their activities are limited by lack of resources.

3. **Inadequate RET planning policies:** The most critical target for capacity development in the renewable sector involves the training of macro-planners and policy makers. Their absence weakens RET policy development in the region and slows down the proliferation of RETs. Capacity in the area of Integrated Resource Planning (IRP) is lacking and should be developed to manage all energy resources including conventional, renewables and energy saved from demand-side management (DSM).

4. **Lack of funds to expand rural electrification programmes**: The financing gap for the subregion is huge. Countries lack financial resources to invest into grid extensions to rural areas. Nevertheless, investment into off–grid renewable electricity can be viable if it is made attractive by opening it to IPPs.

5. **Lack of co-ordination and linkage in RET programmes:** The fragmented nature of RET programmes within the region makes them unattractive to domestic and foreign investors. Coordination and linkage can open and widen up the market thereby increasing promotion and widespread utilization of RETs enabling the subregion to benefit from economies of scale. Mass production of RETs will result in lower costs and hence lower prices for users on these technologies. RETs will be competitive.

6. **Pricing distortions which have placed renewables at a disadvantage:** Currently governments subsidize conventional energy development at the expense of renewables. Creation of a level playing field through removal of these subsidies can make renewables attractive to investors.

7. **High initial capital cost:** The upfront costs for renewable energy devices are presently beyond the reach of communities for which they are intended and this has an impact on the adoption of these technologies. There is need to formulate a comprehensive and innovative financing mechanisms to include smart subsidies, low interest loans and loan guarantees are needed to help reduce production costs and hence ensure the technology is available at affordable prices.

8. **Weak dissemination strategies**: There is a general lack of participation in energy markets by consumers, lack of awareness of RETs and lack of information on suppliers and resource availability. Improved information dissemination strategies can enable consumers make informed energy choices.

9. **Lack of expertise**: There is a general lack of expertise in RETs in the subregion. This is recognized as a major weakness within SADC. Most RET projects are donor driven and lack a component for skills transfer, human resource and technology diffusion. Lack of management skills and organizational performance leads to project failure when expatriates leave and hence the need to link aid-funded projects with training of local staff.

"the cost of accessing renewable energy is one of the major constraints to the uptake of RETs"

III. Past and Current Regional Initiatives to Increase Uptake of RETs.

3.1 Regional Projects

77. Various subregional initiatives to remove some of the aforesaid barriers and so increase the widespread utilization of RETs are underway. ProBEC and FINESSE are the two most prominent barrier removal programmes, which have been in use in Southern Africa.

78. The aim of ProBEC is to contribute to the improvement of the quality of life for the poor rural and urban populations by enabling them to fulfill the energy needs of households and small-scale industries in a socially and environmentally sustainable manner. Furthermore, the programme strives to enhance capacities and commitments of governments and development institutions/organizations in the participating SADC countries in order to ensure its success.

"ProBEC and FINESSE programmes have been in the forefront of RETs promotion in the subregion"

79. To achieve the above-mentioned goals, ProBEC promotes the use of energy efficient devices e.g. improved stoves and solar water heaters, profitable production and marketing of these devices, efficient woodfuel use and kitchen management, and substitution with alternative renewable energy sources. The scope of activities includes assessing existing technology and innovation potential of household- and small-scale industry devices (including solar devices), training of specialists in energy-saving technology adaptation and development for households and small-scale business. Other activities include developing new and adapting existing energy-saving technologies for households and small-scale industries and supporting production, marketing and installation of energy-saving technologies. Ultimately, the scope envisages the preparation of strategies to promote rational biomass use measures, exchanging experience among partners and enhancing decision-making through provision of policy papers. Lesotho, Malawi, Mozambique, Namibia, South Africa, Zimbabwe and Zambia are currently participating in the programme, which after the launching phase (1998–2001) has entered the second phase of implementation (2002–2005).

80. The objective of the SADC - FINESSE[9] Programme is to identify and promote ways to provide technically feasible and economically viable renewable energy and energy conservation services especially to rural areas and low-income households. The programme attempts to mainstream sustainable energy in poverty reduction

9 Originally funded through UNDP but the current programmes are funded through the African Development Bank

interventions and its main focus is to assist countries to formulate appropriate policies and regulatory frameworks and develop capacity to develop investment projects in renewable energy and energy efficiency.

81. The SADC-FINESSE programme was launched in 1997 with South Africa, Lesotho and Zimbabwe being the first beneficiaries and was later extended to Angola, Malawi and Namibia.

82. Some of the achievements of these two projects include the promotion of efficient energy consumption practices including the establishment of a demonstration project in Zimbabwe's rural villages of Hurungwe district and the EcoCity project in Midrand-Johannesburg. The HIV/AIDS demonstration project in Hurungwe district showed that cooking with improved stoves resulted in improved home based care and conserved wood. The EcoCity project in South Africa has improved living standards within Midrand and there are suggestions to extend the project to other localities.

83. Under the EcoCity project, houses were built using reclaimed bricks and equipped with solar panels. Various energy efficiency measures in houses in the area were established including insulating buildings and use of low energy light bulbs and solar water heaters. The recycling buy back centre has directly created 50 jobs and reduced waste going to landfill. Organic farmers in the area have stabilized a flood plain and rehabilitated a wetland.

84. Another initiative was the creation of Renewable Energy and Energy Efficiency Partnership (REEEP) TYPE II Initiative after the WSSD to assist developing countries to promote efficient utilization of renewables. REEEP, Southern Africa has created an enabling regulatory context for more sustainable energy service provision in the subregion and has hosted awareness promotion workshops, sponsoring tours to UK for Southern African Power Pool (SAPP), National Energy Regulator, and Green Power Traders and has given support for the development of pilot Tradable Renewable Energy Certificates (TREC's) to stimulating the investment in RE systems in Southern Africa. Other projects it supports in the region include removal of barriers to regeneration of small-scale hydro plants and establishment of a commercial green power market in South Africa.

85. The African Energy Policy Research Network (AFREPREN) based in Nairobi has been active in the renewables sector. Its mandate is to strengthen local research capacity and to harness it in the service of energy policy making and planning. Initiated in 1987, AFREPREN is a collective regional response to the widespread concern over the weak link between research in energy and the formulation and implementation of energy policies in Africa. As an information repository, AFREPREN forms an

important research-policy link as policy makers are able to access information on experiences in other countries.

86. AFREPREN conducted policy research studies in 19 African countries including Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, South Africa, Zambia and Zimbabwe in Southern Africa during the first phase of its existence. AFREPREN also maintains close collaborative links with energy researchers and policy makers from other African countries. A new research programme launched by AFREPREN in 1999 has focused on four themes, which are:

- Renewables and Energy for Rural Development: New and innovative ways of delivering energy services to the rural areas;

- Energy Services for the Urban Poor: Review and analysis of the energy needs of the urban poor for household purposes and small- and medium-scale enterprises (SMEs);

- Energy Sector Reform: Analyzing the legal and regulatory framework for promoting and ensuring reform; and

- Special Studies of Strategic Significance for the Energy Sector Development in Eastern and Southern Africa: New and emerging issues and trends on energy, energy investments and their implications for Africa.

87. The Southern African Power Pool (SAPP) established in August 1995 mainly focuses on achieving harmonization and facilitation of electricity trade and integration of electricity systems in Southern Africa. The vision and objectives (Box 8) of SAPP were recently amended in order to ensure sustainable energy development and utilization through sound economic, environmental and social practices.

Box 8: Southern African Power Pool: Vision and Objectives

The Vision

The vision of the Southern African Power Pool is to:

- Facilitate the development of a competitive electricity market in the SADC region;
- Give the end-user a choice of electricity supplier;
- Ensure that the Southern African region is the region of choice for investment by energy intensive users; and
- Ensure sustainable energy developments through sound economic, environmental and social practices.

The Objectives

The Southern African Power Pool aims to:

- Provide a forum for the development of a world class, robust, safe, efficient, reliable and stable interconnected electrical system in the southern African region;
- Co-ordinate and enforce common regional Standards of Quality of Supply; measurement and monitoring of systems performance;
- Harmonize relationships between member utilities;
- Facilitate the development of regional expertise through training programmes and research;
- Increase power accessibility in rural communities; and
- Implement strategies in support of sustainable development priorities.

88. The ongoing restructuring of utilities within the SAPP is meant to replace traditional monopolies with advanced market structures that favour competition, enhance efficiency and facilitate access at competitive tariffs (cost – reflective tariffs). The restructuring of power utilities will indeed affect the renewables sector and the new framework has to be cognizant of this. Table 3 is a summary of activities under the restructuring of power utilities in the subregion.

Table 3: Restructuring of SAPP Utilities

Power Sector Reform Activities	SAPP Member Countries										
	Angola	Botswana	DRC	Lesotho	Malawi	Mozambique	Namibia	South Africa	Swaziland	Tanzania	Zambia	Zimbabwe
New Legal Framework		IS			IM		IM	IM			IM	IM
Unbundling & IPPs				IS	IS		IP	IP				IP
Private Sector participation							IP	IP			IM	
Third Party Access												
New Regulatory Framework					IM		IM	IM			IM	IP
Reorganizing distribution		IS					IS	IP	IS			IS
Tariff Reform				IS								IS
Utility Commercialization	AS	AS	AS	AS	AS	AS	IS	IS	IS		IS	IS

Source: SAPP, 2004
Key: IM= Implemented, IP= In Progress, AS=Advanced Stage, IS=Initial Stage

"donor-funded RET programmes are of limited sustainability"

89. The Women and Energy Development Organization (WEDO) is an international organization which advocates for women's equality in global policy. It seeks to empower women as decision-makers to achieve economic, social and gender justice, a healthy, peaceful planet and human rights for all. Its main programmes include gender and governance, sustainable development, economic and social justice and US Global Policy. WEDO has been active in promoting gender-sensitive energy policies.

90. However, most of these subregional energy policy intervention programmes are donor driven and last for as long as donor funds area available. In most instances, the projects do not include capacity building components to transfer the skills to locals in a sustainable manner. Technology developed will thus lack backup staff for service and repair or for adaptation.

3.2 National Initiatives

91. National research institutions are involved in strategies to remove barriers and increase uptake of RETs at individual country levels. Organizations such as the Scientific and Industrial Research and Development Centre (SIRDC) of Zimbabwe, Botswana Technology Centre (BOTEC) of Botswana and Council for Scientific and Industrial Research (CSIR) of South Africa have pioneered new technologies and adapted other RETs for local use.

92. SIRDC's Energy Technology Institute (ETI) strives to continually establish and maintain close and permanent partnership with industry in areas of mutual benefit related to collaborative research, development of new products, provision of expert services and training in the energy field. ETI has over the years produced Standards for biogas, solar thermal and PV technologies.

93. BOTEC has been involved in the development of the Motshegaletau Solar Power Station. This is the first centralized solar PV power station designed to provide mains electricity at 220V AC to up to 50 households in a small remote village. The system enables people to plug in their television sets, radios, refrigerators or computers. Already the Health Clinic, Motshegaletau Primary School, a local bar and a number of households are connected to the Power Station, which also powers streetlights in different parts of the village. This development has added quality to the lives of the people of Motshegaletau, and helped to facilitate growth in the local business community.

"Cooperation through the regional research alliance will improve the uptake of RETs in the subregion"

94. CSIR, SIRDC and BOTEC signed a memorandum of cooperation recently with the view to pool resources together and thus increase the penetration of RETs within the SADC region through the Regional Research Alliance (RRA).

95. The Centre for Energy, Environment and Engineering in Zambia (CEEEZ) an agent of the African Rural Energy Enterprise Development (AREED) promotes energy efficiency in a number of SMEs mainly targeting rural and peri-urban areas. However, the implementation process has so far been restricted to urban centres and thus the benefits are yet to trickle down to the rural poor.

96. Malawi has a donor-funded project to remove barriers to uptake of RETs. The project is designed to help mitigate greenhouse gas emissions by addressing institutional, information, expertise, perceived risk and other investment barriers to increased use of photovoltaic energy sources by households, institutions, commercial entities and agro industries. The project is aimed at assisting local stakeholders in building local capacities to promote, install and service PV applications, help to develop and implement favourable regulatory frameworks and facilitate the establishment of viable financial mechanisms e.g. micro lending. The project addresses issues of up-front investment cost barriers and related risk perceptions. The project will help to demonstrate viability of investments in photovoltaic energy and encourage widespread replication of RETs.

97. Generally, governments and the local private sector do not participate in these donor-funded RETs projects. This has been one of the key barriers to increased RETs uptake in the subregion. Government's support in developing markets and sensitising people on the benefits of RETs is crucial. Therefore, a workable strategy that would engage key government departments and the private sector in these projects is needed.

Participation of the private sector is important for sustainability as these entities can take the projects forward.

98. The question of sustainability of these, mostly donor-driven projects, beyond external funding is key to improved uptake. ProBEC and FINESSE, for example, are donor driven. It is an important question because many well-intentioned development initiatives fold up when donor funding ends. Lack of financial resources and skilled manpower will continue to be bottlenecks for accelerated development and uptake of RETs. The buy-in by governments to support these projects is thus important. Governments can then use appropriate incentives to attract private investors into such initiatives. Commercial viability will be key for private sector capital.

IV. Priorities for the Regional Agenda in the Promotion of Renewable Energy

4.1 Research and Development in Renewable Energy

99. Research is cardinal to the development of appropriate RETs and SADC member States should support efforts by professionals to develop and commercialize advanced renewable energy technologies that can serve as cost-effective and environmentally friendly alternatives to conventional energy. Consequently, there is need for member States to increase access and enrolment of their nationals into technical/research institutions and colleges providing training in RETs development.

100. Research and development are required to adapt the production and utilization technologies of renewable sources of energy to local conditions in member States. Areas such as standardization of equipment and development of Codes of Practice in the work place and industries have to be dealt with at subregional level. The pooling of resources and research experiences by the RRA and Regional Electricity Regulators Association (RERA) are important initiatives as they help overcome country-specific constraints in RETs development.

101. Research, development and demonstration efforts contribute towards creating an enabling environment to ensure that renewable energy technologies have a thriving market and that their application is a result of both market-pull and technology-push.

4.2 Productisation and Commercialization of Research Results

102. The piloting of RETs already available in the subregion is necessary as part of market development and sensitization. It is necessary to manufacture prototypes and also to run tests to ascertain the performance suitability and acceptance of the technologies to the local market before commercialization. Mature RETs such as improved stoves, biofuels, thermal and solar PV can be adapted and commercialized within the subregion. Some governments in the subregion e.g. South Africa and Botswana have been at the forefront in subsidizing the introduction of these new RETs. According to the findings of the European Commission report [ISES-DBSA, 1999], the most commercially viable RETs within the SADC region are photovoltaic systems (PV), solar water heating (SWH), wind energy, small and micro hydro systems and biomass technologies.

103. Photovoltaic applications are the dominant renewable energy technology in the region with an installed capacity estimated at 13, 178MW. Photovoltaic systems are extensively applied in telecommunications, rural domestic electrification, clinics, water pumping and others. Solar water heating is mostly used for hot water supply while wind is traditionally used for pumping water. However, Namibia is evaluating the potential for using wind power for electricity generation at its Walvis Bay & Luderitz sites whose estimated maximum installed capacity is about 20MW.

104. There is impetus for small and micro-hydro system operators to become IPPs given the ongoing power sector reforms within the subregion. The estimated installed capacity for small hydro applications within SADC is close to 86MW.

105. Biomass energy, as firewood and charcoal, accounts for between 50 per cent and 90 per cent of total national energy supply in most countries of the subregion. Bagasse-based electricity and heat generation (cogeneration) from sugar plants has received prominence in countries like Mauritius, Swaziland, Zimbabwe and South Africa. Estimated installed capacity of bagasse-based generated electricity within SADC is about 200MW.

106. In addition to government efforts, some institutions and individuals within the SADC subregion have embarked on commercialization of some of the RET products. Some of the notable commercialization of RETs includes the rocket stove designed for optimum combustion and heat transfer efficiency by researchers in Malawi. In South Africa, the National Research and Development Strategy (2002) encompasses the development of the hydrogen fuel as a clean energy carrier. In Zimbabwe, the SIRDC has been at the forefront of developing and commercializing RETs.

107. The major constraint to commercialization are the high capital costs involved in setting up plants given the small size of the national market. The funding gap can be overcome with government assistance either through subsidies or through concessionary finance with favourable repayment terms. Market size can be overcome by developing a regional strategy of pooling resources where the market is the SADC population.

4.3 Promotion of Indigenous Knowledge Systems

108. For developing countries to achieve people centred economic growth, guided by the paradigm of sustainable socio-economic development, they must undertake energy paths that apply new technologies and approaches. They must transform old patterns of behaviour to become compatible with the challenge of sustainable development making use of indigenous knowledge systems (IKS).

109. Indigenous knowledge systems refer to the complex set of knowledge and technologies existing and developed around specific conditions of populations and communities indigenous to a particular geographic area. These populations - irrespective of their legal status – either retain some of, or the entire ownership of social, economic, cultural and political institutions. In the case of this focus area, IKS refers to knowledge developed by these populations as well as knowledge developed through interaction.

110. In project development, it is necessary to understand and to explore the potential contribution of IKS to local development especially its utilization for the benefit of its owners and the communities where it is practised. IKS should be brought into the mainstream of explaining and understanding the world in order to establish its place within the larger body of knowledge. The socio-economic potential of IKS should be considered, as should the cultural and moral values and systems of IK. Research into IKS ideally, should also be carried out with the participation of the communities in which it originates and is held as far as is practicably possible. The use of makuku (*hibiscus spp*), mambubwe[10] and mañele[11] as alternative renewable energy fuels by people living in the Bulozi Plain of Western province of Zambia, for example, is typical of how indigenous knowledge systems can mitigate the impact of energy scarcity during the floods [Macwani, 1995].

111. The UNDP Initiative for Sustainable Energy (UNISE) is one programme designed to move the world toward a more sustainable energy strategy and ultimately a more sustainable development path based on the principle of learning-by-doing, and maximizing the use of indigenous expertise and institutions. SADC - FINESSE activities are an example of UNISE support to the subregion. In order to develop a sustainable energy strategy, a country needs its own cadre of professionals who understand both the elements of sustainable energy and the country's unique situation. Besides training its human resource in renewable technologies, the SADC region ought to strengthen the institutional capacities to address creative energy issues.

112. The SADC subregion appreciates the importance of the IKS in promoting the utilization of natural resources. A number of IKS workshops have been held in the region through the IUCN-Regional Office for Southern Africa. One such workshop was conducted in Western Province of Zambia in 1995 to design and contribute towards the implementation of the Upper Zambezi Resource Management Programme. Renewable energy projects could benefit greatly from the experience of

10 Mambumbwe is an aquatic weed that dries up during summer when the water level falls in the Zambezi river, surrounding ponds and lagoons.

11 Mañele is a peculiar plant that grows in the Bulozi plain once every four years. It is used as firewood and its bark makes good sisal material.

local communities in resource utilization and conservation strategies including the development of, for example, woodfuel harvesting guidelines within communities.

4.4 Community Participation in Project Development

113.According to the SADC Energy Policy, development in all member States is achieved through consensus of ideas and expectations and attempts to engage the community in project development. Community participation is a process of consultation on options and provides mechanisms for feedback to the communities and to project proponents. As an inclusive process, consultation with communities is very important requisite for building empowered communities and assists in widening access to energy services.

114.Given that biomass consumption in rural areas is one of the major causes of land degradation, community participation in the formulation of relevant policies and their implementation is imperative.

115.Experience in the subregion has shown that lack of community participation derails the good intentions of development projects. The promotion of biogas digesters and to some extent the improved cooking stove has not been as successful as expected due to the lack of the involvement of women (the major users) in design and implementation. Community awareness and participation in the development of RETs will enhance ownership and security, which are benchmarks for achieving sustainability. In other words, developmental needs are best met when beneficiaries themselves take keen interest in identifying problems and solutions thereof.

116.Community involvement in projects is citizen empowerment. It is a condition for success and enhances project sustainability as a sense of ownership is developed. No community would like to be associated with failure, so the project will receive cooperation from the whole community. The process of RETs development has to have a solid foundation in community participation.

4.5 Linkages of Renewable Energy Development to other Sectors

117.A multi-sectoral approach is important in energy development programmes in the subregion given that energy affects all sectors. The provision of RETs cannot be considered in isolation as access to energy impacts on other productive and non-productive sectors. The new emerging global and regional energy policy imperatives relate strongly to sustainable development and point at the critical linkages of:

1. **Energy with poverty and development, including gender disparity, population growth and food security:** Communities, mostly women can improve their economic and social status through the use of renewable energies to start businesses, increase agricultural output, and increase trade. Specific RET projects have brought lighting for commercial enterprises to extend business hours, improved agricultural productivity by providing energy to pump irrigation water during the dry season, solar energy for crop and fish drying for reducing spoilage, and use of wood wastes for powering sawmills.

2. **The environment, including health impacts, acidification, climate change and land degradation:** Unsustainable harvesting of biomass for energy uses increases deforestation and GHG emissions whose impact on atmospheric climate is well documented. Further, inefficient combustion of the biomass increases respiratory diseases in women and children.

3. **The economy, including investment, foreign exchange and trade impacts and both regional and international competitiveness:** Liberalization policies adopted by SADC member States in recent times through privatization of electricity utilities have created conditions that are attractive to local and foreign investor participation. The harmonization of legal and regulatory frameworks as part of regional economic integration and incorporation of both international and local best practices will widen the market as well as boosting trade.

4. **Security concerns, such as national access to energy supplies**: The embracing of open market policies, creation of a level playing field in the electricity market especially promotion of IPPs within the subregion have the effect of guaranteeing a stable energy supply system and thus provision of modern energy to the rural communities for productive uses. Security of energy supply also empowers women and promotes trade.

V. A Harmonized Framework for New and Renewable Energy Policies in Southern Africa

5.1 The Meaning of Harmonization in Subregional Framework

118. In order to appreciate fully the nature of the framework developed from this study, it is instructive to define harmonization within the context of new and renewable energy sector in Southern Africa.

119. The harmonization of national new and renewable energy policies in Southern Africa is part of the process to achieve regional integration as intended by Article 5 of the SADC Treaty which, under objective 2(a), calls for harmonization of political and socio-economic policies and plans of member States. Further, objective 1(g) of the same Article underscores the need to achieve sustainable utilization of natural resources and effective protection of the environment. The harmonized policy framework will enable countries in the SADC region to work together in generating economic wealth through increased and efficient productive activities and ultimately eradicating poverty by ensuring improved access to clean and affordable energy by a majority of citizens. The agriculture, finance and investment and mining sectors are undergoing policy harmonization as part of the SADC process. The creation of the COMESA[12] Free Trade Area, Customs Union and Common Investment Area are notable achievements of policy harmonization in the finance and investment sector which shows the general thrust on the continent [COM/TCM/MF/VII/2, 2004]. For the mining and minerals sector in Southern Africa, a framework for harmonization is currently under consideration by the SADC Secretariat. In a similar manner, in agriculture a programme to harmonize seed production and procurement issues is currently underway in the subregion and also SADC Central Bank Governors are currently working on the harmonization of macro-economic parameters by 2008.

120. Broadly, harmonization in the sector entails the merging of new and renewable energy policies within the subregion to develop a unified approach in policy, planning, promotion and regulation. Harmonization minimizes, as much as possible, differences in member States operating environments in the sector and facilitates the emergence of similar codes, Standards, legislation and policies within the subregion.

12 Angola, Congo DRC, Madagascar, Malawi, Mauritius, Swaziland, Zambia and Zimbabwe have dual membership of SADC and COMESA.

For competitiveness and relevance, the new and renewable energy policy framework is also informed by both international and regional best practices.

121. Harmonization, as used in the context of this framework, has two key components - standardization and policy alignment.

122. Standardization refers to the quality and security of supply of technology and the need to observe green power Standards for various RETs. The areas of standardization in the subregional framework include: metering, environmental management systems, occupational health and safety, energy efficiency requirements, Standards and Codes of Practice, systems performance and physical resilience.

123. Policy alignment refers to the broad issues of legislation and regulatory frameworks applicable to increased use of new and renewable energy resources, the promotion and trade in the renewables sector. The areas of policy alignment also include: the unbundling of integrated industry structures, investment regulations, tariff reform, legal and political, economic and social issues, gender and integrated resource planning and management.

"access to quality and affordable clean energy services is important"

124. Harmonization in the energy sector in Southern Africa is not new. The process is already underway in the subregional energy sector through the activities of national and regional research institutions and power utilities. For instance, the SAPP regional Codes of Practice and Standards developed as part of the Power Restructuring Reforms has plans to harmonize national codes. Under this framework, national utilities are expected to develop local Codes of Practice and Standards from the SAPP framework. The strengthening of local transmission networks through SAPP will ensure reliability of power supply, minimize outages and boost consumer confidence.

125. The harmonization of renewable energy policies of member States will narrow differences in Codes of Practice, Standards and Guidelines across the subregion and this will facilitate easy cross-border electricity trade. These standards will ensure that the cost to interconnect is fair and good for business in the entire region and occupational health and safety Standards are similar across the region. The subregional policy framework builds on achievements made through implementation of the SADC Energy Protocol and national sustainable energy policies and develops a vision that enhances regional economic integration and policy harmonization.

126. The legislation and regulatory frameworks pertaining to the electricity industry is key to regional integration and energy trade. Energy trade can only thrive in an environment supported by an unambiguous legislation. The net metering legislation used in developed countries, for example, allows consumers who generate their own power to receive credit for any excess generation by selling it back into the electricity

grid. The excess electricity production is credited at the retail rate of electricity by reversing the conversional electricity meter thus reducing the power bill. The role of the regulator is crucial to issuance of generator licences, monitoring and stabilization of tariffs. The absence of a regulatory framework in the energy sector of some member States is a hindrance to the sector's development.

127. Harmonization in the sustainable energy sector in the subregion requires member States to develop energy policy frameworks informed by both international and regional best practices and guided by requirements of communities and investors in the sector and the need to improve access to energy by all nationals.

128. A checklist of vital components of the proposed subregional policy framework guided by a vision to promote equitable access to quality renewable energy services at the lowest possible cost while protecting the environment is shown in Box 9. The policy framework should be underpinned by: competitiveness, gender-sensitivity, open access, fair pricing, community participation, prioritization of RETs in development and expansion of rural electrification programmes. The utilization of fiscal incentives should be the driving force of private sector participation in the sector.

Box 9: Checklist for a Policy Framework for Renewable Energy in Southern Africa

Policies, Legislation and Regulatory Strategies
- Provide financial incentives for renewable energy suppliers;
- Establish portfolio standard in the electricity market;
- Create enabling legislation and mobilize financial resources; and
- Establish independent regulator to oversee licensing fees, enforce Standards.

Training and Organizational Capacity Building:
- Develop skills-oriented human resource base;
- Integrate RETs in all government development programmes; and
- Create dedicated administrative and technical structures to deal with sustainable energy issues.

Research, Development and Demonstration:
- Increase government funding support for RETs;
- Expand the technology and market scope of existing RET programmes e.g. solar water heating, solar PV, wind and bio-energy;
- Promote efficient utilization of biomass; and
- Create database for promoting information exchange and networking.

Provision of equitable electricity market access:
- Standardize interconnection requirements that are appropriate for the scale and resource availability of the RET;
- Standardize electricity prices paid for renewable electricity supplies that reflect their social and environmental values; and
- Standardize Codes of Practice and Regulations.

Investment:
- Establish micro-finance institutions and
- Promote concessionary funding as risk reduction measure for RETs programmes.

Gender in Rural Energy and Development:
- Create new income-generating opportunities e.g. small-scale enterprises;
- Develop programmes that aim at empowering women to access appropriate energy services; and
- Develop best institutional framework for mainstreaming gender in the renewable energies.

Community Participation:
- Involve communities in all phases of project activities

5.2 Issues for Harmonization in the Subregional Framework

129. The areas of harmonization in the renewable energy sector are made up of sector-specific macro and micro issues and other non-sector specific and cross-cutting issues. Macro issues such as the economic, political and social environment, investment regulations, tax regimes and foreign exchange regulations influence private sector investment and the proliferation and uptake of renewable energy technologies. In a similar manner, cross-cutting issues such as gender, human skills capacity and

human resource development influence sustainability and have to be addressed in the harmonized framework. Thus, constraints to the growth of sustainable energy use in Southern Africa have to be addressed holistically in the new framework.

130. To achieve harmonization, the subregional energy framework should build on the SADC Renewable Energy Policy Framework shown in Box 5, the aspirations of the RIDSP, NEPAD and the SADC Energy Protocol and concentrate on strengthening the following areas:

1. Renewable Energy Policy, Planning and Promotion;
2. Research, Development and Demonstration;
3. Investment Regulations;
4. Renewable Energy Skills Development;
5. Regional Energy Trade Issues in New and Renewable Energy;
6. Political, Economic and Social Environment;
7. Fiscal Environment;
8. Exchange Controls, Corporate and Withholding Taxes, and
9. Gender Mainstreaming in Renewable Energy;
10. Community Participation;
11. Productive Uses of Energy.

5.2.1 Renewable Energy Policy, Planning and Promotion

131. Given the importance of energy in socio-economic development and the alleviation of poverty, it is imperative for the subregion to develop coherent new and renewable energy policies to facilitate the increased uptake of RETs. A policy framework allows governments to outline objectives in RETs development, their expectations from all stakeholders and set targets for RETs uptake. Policy outlines the government's expectations in the sector and guides potential investors by outlining principles, goals and objectives for renewable energy. For effectiveness, the renewable energy policy has to be clear and its implementation transparent.

132. Most countries in the region are currently in the process of reviewing national energy policies including those for sustainable energy. It is important for the new and renewable energy policies to emerge from this process to be guided by national and regional aspirations as well as international developments and obligations. Ideally, the policy should:

- Clearly define the role of new and renewable energy in development;
- Be consistent across national boundaries;

- Set sustainable energy utilization targets, and

- Allow nations to share competencies, technologies and technical expertise.

133. Whereas energy policy and planning is done under government ministries, independent regulatory agencies for specific energy subsectors, e.g. electricity or petroleum or renewable energy would be involved in developing operating rules and guidelines, enforcement of rules, licensing, approval of tariffs, type-approval and Standards. In this framework, the government retains some control over the functioning of energy utilities including the scrutiny of technical operations, maintenance of adequate security of power supply for example and of financial aspects of energy sales conditions and of prices charged to the consumers.

134. In a manner similar to the operation of electricity utilities, the renewable sector would require the creation of adequately funded and dedicated agencies to spearhead development. The agency will be able to set targets and follow through on programmes set including rural electrification. Some countries in the subregion have set up rural electrification agencies; their mandate could be expanded to include all RETs.

135. The achievements of integration of energy systems such as energy planning, electricity grid interconnections and expansion of cross-border power-lines attained since SADC's inception could be consolidated in a harmonized environment to include other new and renewable forms of energy. Harmonization of new and renewable energy policy and planning frameworks in the subregion will thus improve sector performance and regulatory rules.

136. To harmonize new and renewable energy policies, planning and energy promotion, member States should:

- Develop sustainable energy policies in line with the regional policy framework. The framework should be supported by a harmonized legal and regulatory framework which sets out a system of tariffs, has dispute resolution mechanisms and facilitates trade among member states;

- Develop investment and legislative frameworks that encourage widespread utilization of RETs and create conditions that promote competition both on price and access to customers;

- Reduce subsidies to fossil fuels in order to create a "level playing field for the uptake of renewables. This will create conditions for increased uptake of RETs. Government support to establish the initial market share in the sector is important and once the sector has matured, benefits of economies

of scale enhance competitiveness and the technologies can then be adopted by a majority of citizens at reasonable cost;

- Provide open access to transmission grid in order to allow power wheeling between buyers and sellers as is the case under SAPP. Transmission services should not discriminate against or give unfair advantage to specific ownership or certain types of generation;

- Develop and enforce comparable environmental and occupational health and safety Standards on all RET equipment;

- Develop renewable energy portfolio Standards (RPS) for utilities, which require that a minimum percentage of power sold in a given country be met from renewable energy sources. The United Kingdom uses Renewable Energy Obligations (see Box 4) to achieve this objective; the region could study the operation of this system and adapt accordingly;

- Enact legislation for the establishment of reasonable Standards that protect the reliability of RETs equipment, the safety of consumers and ensure that the cost of energy services are fair;

- Establish, strengthen and adequately fund dedicated renewable energy agencies to provide leadership, enforce and monitor Standards and spearhead research and development including the expansion of RET programmes. This approach has been shown to work in other countries. For example, the Indian Government[13]created a fully-fledged Ministry of Non-conventional Energy Sources (MNES) in 1992 to specifically address renewable energy matters in the country. Through that policy change, India has increased the uptake of RETs by a factor of ten within a ten-year period and this has contributed to an improvement in the standards of living of rural people; and

- Provide incentives for the private sector to actively participate in rural electrification programmes using instruments such as tax breaks for expenditure in RETs and concessionary finance. All Southern African countries have ratified the United Nations Framework Convention on Climate Change (1997) and the Kyoto Protocol (2002) which allows them to tap into international funds through the Global Environmental Facility and the Clean Development Mechanism to reduce greenhouse gas emissions through investment in renewable energy. They could access these

13 http://www.mnes.nic.i

international resources to fund development of the sector (Annex 4 shows some projects supported through GEF).

5.2.2 Research, Development, Demonstration and Market Stimulation

137. R&D is critical in the development, conversion, transportation and use of renewable energy. The three components of energy-related R&D are: policy analysis and development, technology-oriented work and demonstration of technologies. One of the major constraints to the proliferation of sustainable energy technologies relates to cost. Renewable energy technologies tend to have high capital costs and this is a deterrent to the adoption of RETs. However, these costs fall dramatically as technology matures and uptake increases. For example, studies by the International Atomic Energy Agency have shown that promotion programmes over the last decade have typically reduced capital costs of RETs by half. However, the technological leapfrog from fossil fuel to renewables requires initial financing from the government or donor agencies. Once maturity has occurred and economies of scale set in, private players can take over the production of RETs and the distribution of renewable energy.

138. Investment in research, development, demonstration and the stimulation of the market for RETs is needed in order to enhance the growth of renewable energy uptake in the subregion. Objective 2, Section (f) of Article 5 of the SADC Treaty and Article 9 of the Energy Protocol highlight the importance of R&D. Available statistics indicate that the Third World, including SADC, spends less than 2 percent of their budgets on R&D, as compared to more than 10 percent for the developed world. It is clear that renewable energy development will require financial incentives and the worldwide trend is that governments actively fund R&D in RETs. Government resources are important to catalyze the flow of private sector funds into R&D and commercialization of RETs.

139. In the harmonization in R&D, technology demonstration and market stimulation member States should focus on the following areas:

- Developing pools of highly trained renewable energy manpower in RETs manufacture, service and repair. Develop regional technical databases with information on specific RETs in the various countries and experiences in using these technologies;

- Establishment of regional Centres of Excellency or Specialization in RETs to facilitate technology sharing for adaptation and downsizing/up scaling. Clustering of similar training and educational institutions could facilitate development of sustainable funding strategies. This could be accompanied

by the development of regional qualification standards in RETs to facilitate mobility of skilled personnel across national boundaries;

- Creation of technology support centres in areas where RETs are in use to facilitate manufacture, installation and repairs;

- Promoting collaborative research work on renewable technologies to facilitate pooling of expertise and research funding. The activities of the Regional Research Alliance should be well supported by member States;

- Stimulating the renewables market through demonstration of technology;

- Promoting RETs starting with the relatively low cost and small-scale technologies such as biomass-based cogeneration, solar heating and wind as a way of introducing the benefits of renewable technologies. This will allow government resources to be spread over many projects initially and benefit more communities;

- Creating Renewable Energy Enterprise Zones (REEZ) concept for off-grid areas;

- Developing common electricity transmission Standards and Codes of Practice with special focus on grid and off-grid electricity;

- Co-operating with foreign organizations e.g. research institutions and universities in order to benefit from their experience and share knowledge applicable to local situations;

- Developing dissemination systems for RETs information to enhance knowledge on the benefits and costs of the technology and thereby stimulate the market. Inclusion of renewable energy issues in the educational curriculum can accelerate uptake of RETs;

- Promoting private sector participation in R&D and commercialization of RETs through use of innovative schemes including tax credits for generation or development of RETs;

- Encouraging companies to commit to using renewable energy through innovative instruments such as tradable green certificates and instruments as those in Table 8; grants and tax credits have boosted wind energy demand in Denmark and photovoltaics in Japan and Germany, and

- Establishing revolving funds to finance renewable technology research development and dissemination. South Africa has established a Renewable Energy Fund (REF) to mobilize funds for green financing and this could be studied for possible use by the region. In this model, intensive non-renewable energy users, e.g., coal, contribute to the fund and the funds are used to finance research, downsizing/upscaling of renewable energy technologies. The long-term objective would be the establishment of a renewable energy industry producing modern energy that will offer non-subsidized alternatives to fossil fuels.

140. Funding is critical in R&D and market stimulation and governments have an important role to play in developing the renewables market and increasing technology uptake through removing financial barriers to participate in the RETs market.

"the fiscal environment has to be supportive of local entrepreneurs"

5.2.3 Investment Regulations

141. Southern Africa needs to expand energy services to all corners of the subregion to stimulate economic growth and help alleviate poverty. In the face of a huge savings-investment gap in the subregion, the expansion of sustainable energy programmes will continue to require the participation of the private sector, mainly foreign investors. The mobilization of private capital into specific projects requires a well functioning market-oriented economy where the investors have confidence in project security and competitive returns are assured. This is the challenge to the subregion especially in the renewables sector where initial capital costs are high and returns low.

142. The ongoing power restructuring reform programs have created an environment attractive for foreign investors as well as triggering-off increased innovation in energy technologies. For instance, the concept of micro-power systems and local production for local consumption is gaining momentum and the new and renewable energy sources are the drivers. Typical examples are the 1 kW solar PV Recharging Batteries Station in Zimbabwe and the 2.5 kW Mutanda Mini-hydro Power Station in Zambia.

143. For local investors, there is a financial capacity gap as access to credit for capital and operating expenses is a major constraint to investment in the sector.

144. For harmonizing investment regulations, member States should:

- Adopt policies that promote integration of the monetary sector in order to boost local savings for investment purposes;

- Develop concessional finance mechanisms to harness private sector energies into the renewables sector;

- Use fiscal instruments to provide incentives for the private sector to enter the renewables sector. Incentives such as tax breaks, special project status and reduction in duties for imported components could be used to improve the investment climate;

- Eliminate poor governance and inefficiency in public and private institutions in order to attract private investors into the new and renewable energy sector; and

- Create an investment climate conducive to the development of the local private sector so as to facilitate the forging of partnerships between foreign and local investors in the sector. This provides an opportunity for economic empowerment as a class of entrepreneurs is created through the elimination of barriers.

5.2.4 Development of Skills in Renewable Energy

145. Human resource development encompasses three aspects - manpower, knowledge and experience. With a population of 238.8 million in 2004 and a strong political will in renewable energy issues, the Southern African subregion can utilize its manpower to effect the desired regional integration and economic development. Knowledge of the renewable energy industry in terms of the proven applications of RETs is at a reasonable level in the subregion as shown in applications in Table 4. However, lack of operational and maintenance skills inhibit importation of newer RETs into the subregion.

Table 4: Market Size for Renewable Energy Technologies in Southern Africa

Country	Renewable Energy Source & Technology						
	Solar		Wind		Small hydro Installed Capacity (MW)	Biomass* Cogeneration Installed Capacity (MW)**	Biogas (No. of Medium –sized Digesters)
	PV Installed kWp	Thermal Installed Capacity (1000m2)	No. of Wind Pumps	Speed m/s			
Angola	10				4.7		
Botswana	13	50	200	3.0			215
The DRC				5.5			
Lesotho	200				3.26		40
Malawi	40	4.8			7		
Mauritius	8	40		8.1	18.4	50	
Mozambique	100		50	2.6	18.4	0.5	
Namibia	446	24	30,000	14.0			
South Africa	11,000	500	300,000	8.5	10	245	
Swaziland	50				1	44	
Tanzania	500		58		4.0		≥1,000
Zambia	400		100	2.5	20		
Zimbabwe	750	10	650	3.5	0.4	61	200

Source: SADC Regional Electricity Investment Conference, 2005, ISEI-DBSA, 1999. Karekezi et al, 2003.

* All biomass electricity generation is from bagasse with the exception of Mozambique, which has a single generating plant running on agricultural residues.

** All countries in the sub region except Mauritius used old bagasse-based cogeneration technology.

146. The SADC's Protocol on Education and Training signed in 2000 seeks to promote a regionally integrated and harmonized educational system especially with regard to access, equity, relevance, and quality of education interventions (RISDP, 2003). To develop skills in the sector, renewable technology should ideally be part of the curriculum in the subregion. Further, the region should adapt components of UNESCO's Global Renewable Energy Education and Training Program and the Renewable Engineering Learning Package as a way of enhancing training in RETs.

147. For harmonizing the development of skills in renewable energy in the subregion, member States should:

- Develop specialized training programmes for the sector, through cooperation with industry, universities, colleges and other tertiary training institutions;

- Create a database on available skills in the sector in the region to facilitate sharing of competencies and experiences;

- Encourage mobility of skills between countries through creation of similar qualification Standards and elimination of constraints to cross-boarder movement of skills;

- Provide adequate budgetary resources to support the renewables sector and place emphasis on developing local professionals to take up more prominent roles in the R&D;

- Deliberately integrating gender into policy formulation and management in the sector;

- Encourage the private sector to participate in funding specialized training for the sector through incentives; and

- Encourage companies in RETs to train employees in alternative skills as a social obligation and continuously train and upgrade human resource capacity in the sector.

5.2.5 Regional Trade and RETs

148. The increased uptake of RETs within the subregion coupled with harmonization of Standards and Codes of Practice will expand energy trading in the region. Regional economic integration will certainly increase the size of the market for RETs and will enhance trade not only in RETs but also in skills maintenance and repair. National energy markets are often small to justify the major investments needed to expand capacity in RETs and regional trade provides impetus for such investments.

149. In harmonizing regional new and renewable energy trade, member States should:

- Accelerate research, development and demonstration of RETs,

- Stimulate productization and commercialization of RETs;

- Share information on subregional experiences in RETs and adapt and replicate successful approaches, and

- Incorporate relevant issues emerging from reforms in the electricity sector in the region into renewable energy trade.

5.2.6 Political, Economic and Social Environment

150. Macro economic and social parameters such as the political environment, economic growth and social issues also affect investment in the sector and hence uptake of renewable energy. The responsibility for creating an enabling environment for private investment rests with governments.

151. Private investors will continue to play an important role in the sector and political stability is a pre-requisite for attracting FDI. Energy infrastructure proposals and implementation must be developed in an open, transparent manner where accountability is built in and service needs guaranteed. A stable political environment and good governance are important for the inflow of investment.

152. Issues of democratic reforms and elections and corruption impinge on the region's attractiveness as an investment destination and have to be addressed in the harmonized framework. Harmonization of the regional political agenda is thus necessary to promote integration through free movement of people and trade.

153. The basic economic and social indicators of SADC member States appear as Annex 1. Apart from Zimbabwe, which has experienced economic decline in the last few years, the rest of the region continues to enjoy positive economic growth with an average growth rate of 3.0 per cent in 2004. Although this rate is lower than that required to achieve MDGs, it shows the region is on a positive path.

154. Social indicators such as the high incidence of HIV/AIDS in the region are the biggest challenge to the manpower base. In addition to the already thin manpower base in the renewables sector, the high incidence of HIV/AIDS reduces productivity as countries lose trained personnel. Prevalence rates range from less than five per cent in Mauritius [14] to 38.8 per cent in Swaziland.

155. International investors are important in financing investments in the energy sector in Africa. However, due to unfavourable conditions, FDI flows have been modest despite increases from US$9 billion in 2000 to US$17 billion in 2001. South Africa accounted for the largest share of FDI inflows, US$ 900 million in 2000 to US$ 6 billion in 2001. Only Angola and to a less extent Mozambique among SADC member States have succeeded in attracting FDI recently, although not in the renewables sector.

156. The subregion is working to consolidate economic gains through inflation targeting, macro-economic stability and creating a wider economic base. As can be

14 http://ww.taneb.se/sadc newsletter edition 1 April 2004.htm

seen from Annex 1, average inflation was in single digits in 2003 for most countries in the subregion. This creates an environment conducive to FDI.

157. For harmonization in the renewables sector, all macro-economic parameters should converge and member States should:

- Develop systems for the promotion of social justice through democratic reforms which minimize risks to foreign investment, ensure security of property and persons as well as enforceability of contracts;

- Strategize regionally on how best to tackle corruption in order to adequately fund socio-economic programmes, reduce poverty and tackle the HIV/AIDS pandemic;

- Work towards macro-economic stability and convergence as intended through RISDP; and

- Strengthen regional political relations to achieve peace and security and ensure a regional focus is maintained.

5.2.7 Fiscal Environment

158. Governments have a regulatory mandate and through fiscal measures can influence decisions of economic agents. This can be achieved through funding research and assisting development of the products and creating markets for the products. In many countries, governments have helped to boost commercialization of particular RETs through the provision of seed money during infancy of such industries.

159. The regional framework for new and renewable energy policies should incorporate appropriate financing mechanisms and fiscal regimes for the development of RETs and market stimulation. The provision of fiscal incentives in other sectors has improved the general investment climate within the SADC subregion since the early 1990s. Incentives which have worked positively in other sectors could be extended to the renewables sector. As noted in Annex 1 Section 5(b) of the Energy Protocol, member States are expected to consider the implementation of suitable tax regimes that promote the development and use of NRSE.

160. For harmonization of the fiscal environment within the policy framework, member States should:

- Provide financial incentives and/or smart subsidies for renewable technology-based devices during start-up phase;

- Remove or lower duties on capital equipment, materials and components used to manufacture and service RETs;

- Create and fund micro-finance institutions with lending conditions which accommodate small and medium-scale entrepreneurs including women and other vulnerable groups. Most countries in the region have developed programmes for SMEs mainly in manufacturing and farming; these schemes could be extended to include the renewables sector;

- Provide soft loans to manufacturers and users for commercial and near commercial technologies;

- Create an enabling environment for banking and wheeling of power including for third party sale of renewable energy power;

- Provide grants and tax credits or relief on investment in RETs to boost demand, and

- Design incentive packages to promote private sector investment in renewable energy and off-grid electricity generation to encourage wider adoption and use of RETs and thereby enhance their role in the national energy mix.

161. Fiscal instruments are powerful tools in stimulating the participation of the private sector in renewable energy supply and in stimulating the market for renewables. A baseline study to determine the extent of utilization of RET and the current market size could be an important starting point.

5.2.8 Exchange Controls, Corporate and Withholding Taxes

162. Foreign capital will continue to play an important role as a source of investment in the region and as a result, conditions conducive to operation of international investors should be created. Although market reforms have gathered momentum in the region in recent years, a lot remains to be done to enhance competitiveness. Investment tax credits have proved to be a powerful stimulus to technology transfer and market development in other regions and the appropriateness of such instruments within Southern Africa should be investigated for possible adaptation.

163. Given the role foreign investment will continue to play in investment in the renewables sector in Southern Africa, obstacles to investment inflows such as control restrictions on foreign investment, foreign equity holdings and portfolio investment should be removed. In a free environment, Southern Africa can compete on an equal

footing in attracting foreign capital. A collective harmonization of regional tax regimes is a possible approach to enhancing competitiveness.

164. To create a harmonization environment in the sector and promote private investment, member States should:

- Remove foreign exchange restrictions and control over current capital accounts; and

- Include costs related to the acquisition of renewable energy equipment and spares in income tax write-offs.

5.1.9 Gender Mainstreaming in Renewable Energy

"solutions to the problem of access energy have to be gender-sensitive"

165. Energy bottlenecks and solutions affect men and women differently and therefore energy policies for sustainable development should be developed in a manner that is gender sensitive. Energy investment decisions, for example, have tended to support the development of hydropower plants without due regard to social impacts of large-scale dislocation of communities and employment opportunities generated/lost. Secondly, access and availability of energy supply in terms of cost, physical distribution and introduction of new energy technology may not be affordable to the poor, who are mostly women. Moreover, given the woman's lower decision-making power at the household level, the choice of energy fuels and appliances is usually left to men whose priorities may differ from those of women. Yet, being household managers, women are more vulnerable to certain energy-related health and environmental problems such as cooking smoke and burns. Their leisure time is severely curtailed by the requirement to fetch water and firewood from distant supply points. Men are also prone to occupational hazards such as exposure to dangerous chemicals or live electrical wires due to the nature of their work. Thirdly, the HIV/AIDS scourge has had a devastating impact on economically active members of the community and tends to place the burden of wood and fuel collection and caring for the sick more on older people, young children and women. The energy-poverty nexus has distinct characteristics which have to be borne in mind.

166. Diminishing biomass energy supplies imply that women and children, who are traditionally responsible for production and use of biomass fuels, are spending increasing amounts of time fetching firewood, as they have to travel longer distances. This leaves very little time for other productive activities, for women, and schooling for children. Any improvement in the availability or diversification in the choice of energy carriers will invariably benefit women directly.

167. Further, the indoor air pollution associated with use of woodfuel adversely affects the health of women and children. Therefore, it is important to mainstream gender issues into policy formulation and in energy planning, production and use.

168. Thus, strategies to alleviate poverty through access to energy are intricately linked to gender issues. As noted in the RISDP, gender is a critical cross-cutting issue in development planning which needs to be mainstreamed into all sectoral policies, programmes and activities. Annex 4 shows the relationship between gender and energy and the attainment of MDGs.

169. To harmonize gender issues in RETs, member States should:

- Involve women not only as beneficiaries but also for their active contribution in planning and implementation of renewable energy programmes. Measures to ensure women's access to opportunities in non-traditional energy fields should be supported in line with SADC's Declaration on Gender and Development;

- Direct technological innovations that meet women's practical, productive and strategic needs;

- Build capacity for women to develop in the sector at different levels – as national policy makers and as implementers of energy programmes;

- Promote the training of women as renewable energy technicians, entrepreneurs and end users;

- Address knowledge gaps in gender and energy through research;

- Use gender tools and methodologies for incorporating gender concerns into planning, implementation and monitoring processes; and

- Develop targeted assistance mechanisms such as credit to improve women's access to renewable energy services.

5.2.10 Community Participation

170. Renewable energy is targeted towards alleviating the energy requirements of the poor in rural and peri-urban areas where access to grid electricity is not economically feasible. Experience with renewable energy projects in Zimbabwe and other countries in the subregion has demonstrated that projects developed and commissioned with community participation have had higher rates of success compared with those

conceptualized from outside and then imposed on communities. The community best understands its energy requirements and constraints to accessing energy. Hence, their participation from technology conception is important to increase uptake. Lack of community participation can derail beneficial energy projects. During colonial rule, cultural knowledge was somewhat respected and therefore indigenous people were allowed the flexibility to conduct natural resources management practices within their localities. This promoted conservation of resources in that certain tree species were spared from felling for energy consumption because of their medicinal value and other uses. This approach illustrates the importance of the fusion of local knowledge and technology development and adaptation. Given the subregion's population structure, increased community participation in renewable energy projects ensures that women have a bigger role to play in productive activities in rural areas. This enhances productive capacity and empowerment.

171. The "Housing For A Healthier Future in South Africa" project launched by ex-President Mandela in 1994 is an example of community empowerment through participation in project design and implementation [Hodes G et al., 2000]. The project's objective was to demonstrate the role of low-cost energy efficient housing in generating household savings, improving indoor health, and contributing to reductions in GHG emissions. One of the sustainable development goals was to contribute to technical skills and management training of community builders and community organizations. To achieve the benefits of energy efficient housing, there was need for community awareness about energy consumption and proper operation of equipment. The consumer was empowered to make informed choices and to negotiate with provincial governments and building contractors.

172. In Mozambique, a government-funded programme to electrify approximately 250 rural health facilities was initiated in 1997. The programme includes capacity building through training and re-training of health centre staff in using and maintaining the PV systems to ensure sustainability [EIA, 2003].

173. Thus, the participation of communities in design, development and dissemination of RETs is important to enhance acceptability of projects. To harmonize the participation of communities in RETs, member States should:

- Increase public information, education on and participation in energy, environment and development issues in Southern Africa;

- Promote IKS as a way to encourage natural resource conservation e.g. consumption of biomass energy;

- Operationalize the sustainable development provisions of the CDM by improving accountability, transparency and community participation; and

- Ensure printed RETs documentation is translated into local languages for easy dissemination.

5.2.11 Productive Uses of Energy

174. Lack of access to energy for household and productive uses directly affects the participation of communities, especially women in income generating projects, and adversely affects social and economic independence. Women as managers of the home need easily accessible, efficient, safe and clean energy services for cooking, heating and lighting to reduce time spent collecting wood and water.

"access to affordable energy enhances productive capacity"

175. Energy is a factor of production and increasing access to affordable energy contributes directly to small- and medium-scale production. The Southern African region's wealth is derived primarily from rural activities (agriculture, for example) and the supply of affordable energy to small-scale farmers will increase food production and thereby contribute directly to poverty alleviation through increased output and surpluses. Thus, energy for small-scale productive use allows rural households to engage in other economic activities to help diversify their economic base, through, for example, processing of agricultural output.

176. The introduction of renewable energy technologies should be geared towards both consumption and income-generating activities that can help communities exit poverty and empower them to raise their standard of living. Productive uses such as bread baking, wheat and maize milling and hair plaiting can be supported by stand-alone or locally connected sources of energy. Information on the capabilities and limitations of RETs should be made available to communities.

177. To harmonize productive uses of energy, member States should:

- Promote entrepreneurial activities by making energy accessible for small-scale productive uses in rural areas;

- Facilitate easy access to finance for the acquisition of energy technologies;

- Involve women in decision-making at planning, implementation and monitoring levels of projects and programmes;

- Provide information on and training in RETs;

- Integrate HIV/AIDS mitigation into RETs programmes; and
- Share information about gender-sensitive RET strategies.

VI. Timeline Towards Successful Harmonization in the New and Renewable Energy Sector in Southern Africa

178. The policy framework focuses on gender, community participation, Standards, Codes of Practice, legal and regulatory issues, occupational health and safety and funding needed for RET programmes to facilitate development and dissemination.

179. Table 5 is a time period for the harmonization of the sustainable energy policies in Southern Africa based on elements of standardization and policy alignment as discussed in this report. The implementation of the proposed harmonization timetable depends on the adoption of the framework by SADC member States.

180. In the short run, harmonization should focus on standardization of renewable energy aspects such as: metering, energy efficiency (use of efficient systems including stoves), environmental management systems, Standards and Codes of Practice and occupational health and safety issues in technology development, repair and use. Policy alignment issues to be tackled in the short-run include: development of new and renewable energy policies based on the regional framework, development of legal and regulatory framework, creation of a financing mechanism to support the development of RETs, reform of tariffs and formulation of appropriate investment regulations.

181. In the long term issues of physical resilience and system performance have to be standardized and issues of policy alignment such as the economic, political and social environment, and unbundling of integrated industry structures and promotion of IPPs in the renewables sector need to be attended to in order to complete the technical process of harmonization.

Table 5: Milestones for Standardization and Policy Alignment in Southern African Renewable Energy Industry

AREAS OF HARMONIZATION	ELEMENTS OF FOCUS	TIMELINE FOR ACHIEVEMENT OF HARMONIZATION	
		SHORT TERM (0 – 5 years)	LONG TERM (6 years +)
STANDARDIZATION*	Metering	✓	
	Environmental management systems	✓	
	Energy efficiency	✓	
	Standards and Codes of Practice for RETs	✓	
	Occupational health and safety	✓	
	System performance		✓
	Physical resilience		✓
POLICY ALIGNMENT	Renewable energy policy	✓	
	Legal and regulatory framework	✓	
	Unbundling and promotion of IPPs		✓
	Investment regulations	✓	
	Financing Framework	✓	
	Tariff reform	✓	
	Political, economic and social environment		✓

* Although issues such as metering specifically apply to SAPP and electricity utilities only, any harmonization in this aspect will affect the renewables sector.

VII. Conclusions and Recommendations

182. Access to clean, reliable and affordable energy is important in poverty alleviation and the attainment of MDGs. The sustainable energy policy framework will be important in ensuring that countries within the subregion are able to tap on abundant renewable energy sources for sustainable development. The creation of a harmonized and coherent renewable energy framework will help bolster regional integration and widen access to energy especially for motive power in order to specifically increase rural productivity and improve delivery of community services.

183. The subregional sustainable energy policy should focus on:

- Developing and streamlining legal and regulatory frameworks;
- Integrating environmental sustainability and gender in all energy programmes and strategies;
- Promoting community participation in the development and implementation of RETs;
- Promoting new and renewable energy services for productive uses;
- Developing linkages between energy, poverty alleviation and economic growth;
- Promoting private sector participation in the development and service of RETs and the distribution of renewable energy;
- Developing capacity to monitor development of the sector; and
- Sharing of best practice, technologies and manpower in the subregion.

184. The key strategic areas that need to be addressed in facilitating the development of an enabling environment to enhance the uptake of renewable energy in the subregion are:

- Capacity building and education;
- Awareness raising on the benefits of RETs;
- Development of appropriate productive RETs;

- Development of appropriate legal instruments; and

- Provision of financial support through appropriate instruments to eliminate financial barriers to RETs.

185. The sustainable energy policies in the subregion should be based on principles of the fiscal incentives as drivers for RETs development and implementation, "a level playing field" through open access policy and adoption of fair pricing mechanisms, the "polluter pays system" in order to address externalities, gender mainstreaming, Renewable Energy Enterprise Zones and prioritization of RETs.

186. The strategy to stimulate the development of new and renewable energy should focus on a two-part strategy – stimulation of demand and support for research and development to assess potential, develop new technologies, disseminate information, remove barriers and stimulate industrial capacity.

VIII. Way Forward

187. To facilitate promotion of RETs, the region has to set targets for energy efficiency and adoption of new and renewable energy as part of the primary energy supply and all countries should show commitment to these regional targets. This approach is in use worldwide. For example, the OECD has set a target of 10 per cent of primary energy supply from RETs by 2010 and 25 per cent by 2020. In a similar manner, China recently announced targets of 10 per cent by 2010. South Africa provides a lead in the subregion and has set targets of 4 per cent by 2013 and 20 per cent by 2020. As a guide, the subregion should set targets for adopting RETs and for energy supply by member States.

188. A mechanism to support these targets and follow them through in the form of a strong political will is required. This will ensure that the regional vision is attained. The subregion should monitor progress in harmonization in the sector through a regional committee under the SADC Secretariat. Monitoring is necessary to ensure that changes required to policy, targets and implementation strategies are effected timely in line with regional and international environmental developments.

189. ECA has capacity to assist the SADC Secretariat and member States to unbundle the framework into programmed activities towards harmonization in the new and renewables energy sector in Southern Africa.

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Glossary

Modern/Commercial energy:	Refers to high quality and efficient energy sources usually traded in the open market e.g. electricity and petroleum products. Excludes traditional energy sources such as unprocessed biofuels.
Gross domestic product (US$ million):	The total output of goods and services produced within the domestic territory of a given country.
Gross national product (US$ million):	The total output of goods and services produced within the domestic territory of a given country (GDP), plus the net receipts of primary income from investments outside the country.
Life expectancy (years):	The estimated maximum age attained by adults in the country.
Population growth rate (per cent):	The annual percentage increase/ decrease in the number of inhabitants of a country.
Energy demand (millions toe):	The amount of modern energy required for the various sectors of a country.
Gender-sensitive energy policies:	Policies that recognize the contribution, role and impact of both men and women in energy issues.
Gender:	The classification of an individual as being either male or female.
Micro hydro:	Small-scale power generating systems that harness the power of falling water (above 100kW but below 1MW).
Small hydro	Small-scale power generating systems that harness the power of falling water (1-15MW).
Traditional energy:	Refers to low quality and inefficient sources of energy, predominantly biomass in nature and not often traded (e.g. woodfuel, crop residues and dung cakes).
Co-generation:	Refers to the simultaneous production of electricity and heat energy.
Complete horizontal unbundling (provincial utilities which are vertically integrated):	When each province owns a utility that undertakes electricity generation, transmission and distribution in vertically integrated operations.

Complete vertically unbundling:	When the generation, transmission and distribution entities are independent companies.
Electricity regulator:	The agency in charge of monitoring the electricity sector.
Independent power producers (IPPs):	Privately owned power companies that produce electricity and sell it for a profit to the national grid or to a distribution utility.
Interconnected system:	An integrated electricity generation, transmission and distribution network.
Legal and regulatory framework (LRF):	This refers to the combination of the laws, institutions, rules and regulations governing the operations of the electricity industry.
Southern African Power Pool (SAPP):	An integrated network of electricity transmission lines linking several eastern and southern African countries.
Unbundling:	The process of breaking-up a vertically integrated public utility into either different entities of generation, transmission and distribution, or into regional companies.
Vertically integrated utility:	An entity that undertakes electricity generation, transmission and distribution.
Long run marginal cost (USc per kWh):	The incremental cost of adding a unit of power (kW, MW) onto the power system. It includes the current operating costs as well as planned investments of the utility. It is designed to cushion customers from excessive power increases due to commissioning of a new power plant.
Sub-Saharan Africa:	All African countries north of the Republic of South Africa excluding North African countries (Algeria Egypt, Libya, Morocco, Tunisia).
Sustainable energy development	Implies meeting today's energy needs without compromising the needs of future generations

Annex 1: Socio-economic and Energy Data for SADC Countries

	Socio-economic Data									
	Population (millions) 2001[a]	Urban Population (%) (1999)[4]	Rural Population (%) (1999)[4]	Population Growth rate (%) (2001-2015)[b]	GDP (billions US$) (2002)[c]	GDP Growth Rate (%) (2002)[3]	GNP per capita (US$) 1999[d]	% of Population with Access to Improved Sanitation Facilities (2002)[e]		Rural pop with access to safe water (%) (1993-1997)[4]
								Urban	Rural	
Angola	13.668	33.56	66.44	2.6	8.181	6.9	270	56	16	15.0
Botswana	1.694	49.78	50.22	0.5	7.023	5.8	3,240	57	25	53.0
Congo, DRC	53.500			2.6	4.654	-3.0		43	23	
Lesotho	2.225			0.8	1.151	2.7				
Madagascar		28.98	71.02				250	49	27	10.0
Malawi	12.921	23.60	76.40	1.8	1.687	3.5	180	66	42	44.0
Mauritius	1.208	41.14	58.86		5.500	5.3	3,600	100	99	
Mozambique	17.656	38.92	61.08	1.6	4.115	8.3	220	51	14	40.0
Namibia	1.864	30.44	69.56		4.373	3.3	1,890	66	14	
South Africa	44.876	51.65	48.35	0.4	182.281	2.6	3,170	86	44	33.0
Swaziland	1.101	26.12	73.88	1.2	1.690	3.1	1,360	78	44	
Tanzania	32.222	31.70	68.30	2.9	7.287	4.5	260	54	41	45.0
Zambia	11.101	39.52	60.48	1.2	4.326	2.5	330	68	32	27.0
Zimbabwe	13.891	34.60	65.40	0.6	6.771	-0.2	530	69	51	64.0

a Ramsamy, 2003
b ECA/SA/Tpub/Mining/2004/03
c The World Bank: African Development Indicators 2004
d http://www.afrepren.org.datahandbook/rural.htm
e The World Bank: African Development Indicators 2005

Annex 1 (continued)[15]

	Inflation Rate % 2003	Official* Exchange Rate per US$1 2002	Net* FDI US$ Millions 2002	Poverty* % of Population using under 1US$/day	Female/ Male* Ratio Participating In economic Activity in 1995	Life Expectancy At birth (Years) 2004	Estimated HIV/AIDs Prevalence (% of total Adult popln) 2003	Internet Users/ 10.000 Inhabitants 2001
Angola	118.0	43.5	1,312	-	87	40.1	3.9	44.35
Botswana	9.5	6.3	54	23	93	41.4	37.3	154.13
Congo, DR	403.62	346.3	12	-	77			-
Lesotho	9.0	10.5	96	43	58	36.3	28.9	23.15
Malawi	8.0	76.7	38	42	96	37.8	14.2	17.28
Mauritius	5.8	30.2	28	-	46	38.5		1316.67
Mozambique	12.0	23,678	156	38	94	42.1	12.2	7.43
Namibia	9.0	10.5	247	35	68	45.3	21.3	251.68
South Africa	6.8	10.5	1,094	7	60	48.8	21.5	700.58
Swaziland	7.5	10.5	54	-	60	35.7	38.8	137.25
Tanzania	5.12	966.6	240	20	98			-
Zambia	16.8	4,398.6	197	64	83	32.7	16.5	23.48
Zimbabwe	420	55.0	153	-	80	33.9	24.6	73.26

Key: * Data extracted from the World Bank Report on African Development Indicators 2004.

15 UNECA-Report on Economic and social Conditions in Southern Africa, 2004

Annex 1 (continued)[16]

	Socio-economic Data				Renewable Energy Technologies Resource Potential				
	Energy Production and Use*		Rural Electrification Levels (%) 1998	No. of Rural Households Connected to Electricity - 1996	Average Wind Speeds (m/s)	Average Solar Insolation (kWh/m2/day)	Vegetation Cover ('000 hectares)	Deforestation Rate ('000 ha/year) 1990 - 1995	Afforestation Rate ('000 ha/year)
	Commercial Energy Use (KT Oil Eq.) 2001	Electric Power Consumption/ Capita kWh 2001							
Angola	8,075	101					51,863	237.0	3
Botswana			8.00	10,714	3.0	5.8	26,527	70.8	
Congo, DRC	14,607	46.6							
Lesotho									
Madagascar							23,188	130.0	12
Malawi			0.32	4,400			3,697	54.6	
Mauritius			100.00	117,720					
Mozambique	7,177	266.1	0.70	13,603	2.6	5.0	14,028	116.2	4
00Namibia	1,031		9.00	9,917	6.5		17,970	42.0	
South Africa	108,854	3,774.5	46.00	1,814,904	8.5	5.5	8,181	15.0	63
Swaziland			2.00	1,953			120		5
Tanzania	13,450	58.5	1.00	36,294	3.0		33,456	332.6	9
Zambia	6,237	537	1.40	17,499	2.5	4.0	28,674	264.4	2
Zimbabwe	10,219	810	17.00	237,977	3.5	5.7	8,792	50.0	4

* http://www.afrepren.org.datahandbook/rural.htm

16 The World Bank: African Development Indicators 2005

Annex 2: Annual Maximum Demand (MW)

	HISTORIC								FORECAST						
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Angola	209	326	250	291	330	342	374	468	846	871	898	924	952	981	1010
Botswana	239	256	285	337	362	393	402	426	452	479	507	534	562	591	609
DRC	830	841	895	929	991	994	1,012	1,063	1,070	1,100	1,138	1,172	1,207	1,244	1,281
Lesotho	69	77	85	88	89	90	90	107	115	125	130	136	142	148	152
Malawi	190	185	205	212	236	261	227	294	311	330	350	371	394	414	426
Mozambique	245	241	231	234	250	258	266	285	305	326	349	373	399	427	440
Namibia	292	314	320	335	362	371	393	596	670	681	692	703	713	724	746
South Africa	27,803	27,813	29,188	30,599	31,621	30,154	32,082	33,245	34,907	35,954	37,032	38,144	39,288	40,467	41,681
Swaziland	145	153	154	159	160	172	471.6	180	185	191	196	202	208	215	221
Tanzania	368	394	426	465	474	506	509	606	654	700	747	786	873	910	937
Zambia	1,126	1,069	1,085	1,087	1,118	1,255	1,294	1,350	1,374	1,399	1,426	1,499	1,529	1,560	1,606
Zimbabwe	1,950	2,034	1,986	2,013	2,028	2,007	2,009	2,119	2,208	2,287	2,363	2,446	2,527	2,610	2,688
TOTAL INTERCONNECTED	32,699	32,771	34,229	35,781	36,981	35,694	37,780	39,371	41,286	42,542	43,832	45,208	46,575	47,986	49,425
TOTAL SAPP	33,466	33,676	35,110	36,749	38,021	36,803	38,890	40,739	43,097	44,443	45,827	47,289	48,794	50,291	51,799

Source: SAPP,2004.

Annex 3: Summary of Links Between Energy and the MDGs

Goal 1 – Eradicate extreme poverty and hunger

- Halve, between 1990 and 2015, the proportion of people living on less than US$1 a day
- Halve, between 1990 and 2015, the proportion of people suffering from hunger

Importance of energy to attaining these targets

- Access to energy services allow companies to develop
- Lighting extends trading hours beyond daylight
- Using machines improves productivity
- Energy may be provided by small local businesses, thereby creating jobs (maintenance, etc.)
- Privatizing energy services can raise funds for governments who can then invest them in social services
- Clean and efficient fuels reduce the portion of income households spend on cooking, lighting and heating
- 95 per cent of basic food must be cooked before being eaten and require water for cooking
- Post-harvest losses are slashed thanks to conservation through drying, refrigeration and/or freezing
- Energy for irrigation boosts productivity and improves nutrition

Goal 2 – Achieve universal primary education

- Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Importance of energy in attaining this target

- Energy provides access to water, hygiene, lighting and heated/air-conditioned rooms, all of which lower absenteeism and encourage children to stay in school by creating a better environment both for them and their teachers
- Electricity makes it possible for schools to access media outlets for communication and educational ends (remote education)
- Having energy makes it possible to use all kinds of educational equipment such as projectors, computers, printers, photocopiers and scientific apparatus,
- Modern energy systems and efficiently-designed buildings cut costs and, therefore, reduce school enrolment fees, increasing access of poor families to education

Goal 3 – Promote gender equality and empower women

- Eliminate gender disparity in primary and secondary education, preferably by 2005 and in all levels of education by 2015 at the latest

Importance of energy in attaining this target

- The availability of modern energy services greatly reduces the amount of time women and girls have to spend on basic survival activities (gathering wood, drawing water, cooking, manual harvesting, etc.)
- Clean cooking equipment diminishes women's exposure to pollution and improves health
- Quality lighting makes it possible to study in the home and follow evening courses, public lighting makes women safer, and affordable energy services make it possible for women to set up businesses

Goal 5 – Improve maternal health

- Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

Importance of energy to attaining this target

- Energy services are needed to improve medical conditions for mothers – for refrigeration, sterilization, operating equipment, etc.
- Excessive work loads or manual labour are harmful to the general health of pregnant women

Goal 6 – Combat AIDS/HIV, malaria and other diseases

- Have halted by 2015 and begin to reverse the spread of AIDS, malaria and other major diseases

Importance of energy to attaining this target

- Electricity in health centres makes it possible to open them at night-time, retain qualified staff, use specialist equipment (for sterilization, refrigeration of medicine, etc.) and storage of vaccines and medicine
- Energy is required to develop, manufacture and distribute medicine and vaccines

Source: DFID, 2002

Annex 4: Millennium Development Goals - Goals and Targets related to Energy and Gender

Goal	Target	How energy contributes to achieving goals and targets	Gender perspective
Goal 1: Eradicate Extreme poverty and hunger	**Target 1:** Reduce by half the proportion of people living on less than a dollar a day	- More efficient fuels and fuel-efficient technologies reduce the time and share of household income spent on domestic energy needs for cooking, lighting and keeping warm (poor people pay proportionately more for energy) - Reliability and efficient energy can improve enterprise development - Lighting permits income generating activities beyond daylight hours - Energy can be used to power labour-saving machinery and increase productivity of enterprises	- Women and girls are generally responsible for the provision of energy for household use, including gathering fuel or paying for energy for cooking, lighting and heating - When women's time and income are freed up from those activities, they can reallocate their time toward (1) tending to agricultural asks and improving agricultural productivity (2) developing micro-enterprises to build assets, increase income and improve family well-being
	Target 2: Reduce by half the proportion of people who suffer from hunger	- Improved access to cooking fuels and energy-efficient technologies increases the availability of cooked foods (the majority (95 per cent) of staple foods need to be cooked before they can be eaten) - Pumped water for drinking, cooking needs and irrigation systems that deliver more water than what can be carried - Mechanical energy can be used to power labour-saving machinery and increase productivity along the food chain (for example, to process agricultural outputs, such as milling, husking) - Improved access to efficient fuel and technologies reduce post harvest losses and water needs through better preservation (for example, drying and smoking)	- Women are generally responsible for cooking and feeding their families and often for subsistence agriculture and food processing - A well-developed agricultural sector helps to promote economic opportunities for women, allowing them to build assets, increase income and improving family well-being

Goal 2: Achieve universal primary education	**Target 3:** Ensure that all boys and girls complete a full course of primary schooling	- Access to efficient fuels and technologies frees up children's time, who are often pulled out of school to help with survival activities (fetching wood, collecting water, cooking inefficiently, crop processing by hand, manual farming	- Girls are more likely to be taken out of school to help with domestic and agricultural chores than boys - Spending on schooling, especially for girls, increases with higher incomes for women

Annex 5: Renewable Energy Policies of Southern African Countries

BOTSWANA

Botswana's overall energy policy objective is to ensure that energy production, distribution and usage are managed through effective policies and strategies geared towards environmental protection, sustainable and economic development.

Policy objectives of New and Renewable Sources of Energy include:
- Promotion of growth of a sustainable PV/SWH market,
- Establishment of a coordinated Solar/NRSE Institutional Framework,
- Support for innovative NRSE opportunities, and
- Continued promotion of PV Rural Electrification.

Source: Ministry of Minerals Energy and Water Resources, 2004

MAURITIUS

Mauritius's short, medium to long-term energy policy attaches topmost priority to availability, security and diversity of supply of its energy resources. Secondly, it is government's policy to make energy affordable in order to ensure socio-economic development of every region of the country. Thirdly, energy conservation is another central plank of government's energy policy and fourthly, reform of the power market industry, which include the opening of certain areas of the electricity market to private sector and the corporization of the Central Electricity Board is a vital thrust of government's policy.

The Renewable Energy Policies of Mauritius seek to:
- Enhance renewable energy use such as bagasse and mini hydro;
- Develop wind energy to further diversify the country's energy base;
- Utilize solar energy for electricity generation and
- Promote private sector participation in the electricity market.

Source: Ministry of Public Utilities, 2004

NAMIBIA

Government will promote the use of economically viable renewable energy technologies, as a complement to grid electrification, to improve energy provision to rural areas.

Government's policy objectives on New and Renewable Sources of Energy are to:
- Establish an adequate institutional and planning framework;
- Develop human resources and public awareness and suitable financing systems;
- Meet development challenges through improved access to renewable energy sources, particularly in rural electrification, rural water supply and solar housing and water heating;
- Promote environmental impact assessments and project evaluation methodologies which incorporate environmental externalities and
- Promote better information collection and dissemination, and particularly with respect to energy efficiency and conservation practices in households, buildings, transport and industry.

Source: URL: http://wire0.ises.org / Ministry of Mines and Energy, 2004

SOUTH AFRICA

The General Policy Objective is to increase the share of modern renewable energy consumed and provide affordable access to energy throughout South Africa, thus contributing to sustainable development and environmental conservation. At the basic level, the RE policy attempts to remove barriers that prevent RE penetration in the South African market. The policy addresses 5 key strategic areas which seek to:

- Promote appropriate financial and fiscal instruments. This includes redirecting national resources/ investment to RETs and provision of fiscal incentives;
- Develop effective legislative instruments in order to facilitate RE dissemination. This will be achieved by passing regulations for pricing and the integration of IPP into the electricity system;
- Promote R&D of RETs through the provision of guidelines/Standards and code of practices as well as supporting appropriate R&D and local manufacturing;
- Raise public awareness of RE through support of training centres, improved information dissemination strategies, improved government communication strategy, etc
- Establish technology support centres, such as the National Energy Research Institute

Source: URL: www.dme.gov.za, 2005

SWAZILAND

Government's overall Vision of the National Energy Policy is to ensure that development goals of the country are met through the sustainable supply and use of energy for the benefit of all the citizens of the country.

The Energy Policy Objectives are to:
- Promote accessibility of energy to cater for the development needs of the Swazi nation;
- Ensure availability of energy at an affordable cost to all citizens of the country;
- Ensure that the national energy resources are harnessed with optimum efficiency whilst ensuring due attention to environmental concerns; and
- Promote sustainable use of energy resources for the future while meeting the needs of today.

Source: URL: http://ecs.co.sz/energy/energy_chapter_7.htm

TANZANIA

Government's Vision of the energy sector is for it to contribute to the growth of the national economy and thereby improve the standard of living for the entire nation in a sustainable and environmentally sound manner.

The New and Renewable Energy Policy objectives are to:
- Establish appropriate rural energy development, financial, legal and administrative institutions;
- Establish norms, Codes of Practice, guidelines and Standards for renewable energy technologies, to facilitate the creation of an enabling environment for sustainable development of renewable energy sources;
- Promote efficient biomass conversion and end-use technologies in order to save the resources, reduce rate of deforestation and land degradation, and thereby minimize threats on climate change;
- Ensure inclusion of environmental considerations in all renewable energy planning and implementation, and enhance cooperation with other relevant stakeholders and
- Support research and development in renewable technologies.

Source: Ministry of Energy and Minerals, United Republic of Tanzania, 2004

ZAMBIA

Zambia's Energy Policy is aimed at promoting optimum supply and utilization of energy, especially indigenous forms, to facilitate the socio-economic development of the country and maintenance of a safe and healthy environment. This entails establishing a viable institutional structure that will ensure the attainment of these objectives.

Thus, the objectives of the New and Renewable Energy Policy are to:

- Develop a mechanism for integration of RETs with institutions involved in developmental activities;
- Strengthen the institutional framework for research and development, and promotion of RETs;
- Apply appropriate financial and fiscal instruments for stimulating the implementation of RETs;
- Continue promotion, enhancement, development and deployment of RETs;
- Raise public awareness of the benefits and opportunities of RETs and develop capacity for their implementation and
- Promote biomass technologies for electricity generation.

Source: Ministry of Energy and Water Development, Lusaka, 2004.

ZIMBABWE

The overall objective of Zimbabwe's Energy Policy is to enhance the efficiency and resilience of the economy through supplying energy reliably and at least cost.

The objectives of the New and Renewable Energy Policy are to:

- Encourage and promote use of economically viable NRSE technologies;
- Promote commercialization of viable technologies;
- Develop and enforce appropriate Standards;
- Promote research, development and demonstration of RETs and
- Remove import duties, surtaxes in order to reduce investment cost of NRSE technologies.

Source: Ministry of Energy and Power Development, 2004

Annex 6: Experiences and Lessons from GEF Support of Grid Renewable Energy

From 1991-2000, the GEF approved 17 renewable energy projects implemented through the World Bank, UN Development Program, and Asian Development Bank. Nine of these projects promote wind power (in Cape Verde, China, Costa Rica, India, Kazakhstan and Sri Lanka), five promote small hydropower (in India and Sri Lanka), six promote biomass and bagasse power generation (in China, Cuba, Hungary, Mauritius, Slovenia and Thailand), one promotes power from biomethanation (in India), and one promotes geothermal power (in the Philippines).

In general, GEF projects take five main approaches to promoting grid-connected renewable energy: (a) demonstration of technologies and their commercial and economic potential; (b) building capacities of project developers, plant operators, and regulatory agencies; (c) developing regulatory and legal frameworks that encourage independent power producers and establish transparent, non-negotiable tariff structures; (d) creating financing mechanisms for project developers; and (e) developing national plans and programs informed by the institutional and business models piloted in projects.

Bagasse Power in Mauritius (an example)

In Mauritius, a World Bank/GEF Sugar Bio-Energy project indirectly catalyzed dramatic changes in electricity generation in Mauritius. From 1994 to 1996, the project dispersed $6 million for efficiency investments in sugar mills to provide surplus bagasse for power generation. The project also provided technical assistance and technology demonstrations to promote private/public sector cooperation in power plant ventures and evaluate ways to decrease the transport costs for bagasse and to optimize the use of sugar cane for power generation.

Electricity generation from bagasse increased from 70 GWh/yr in 1992 to 118 GWh/yr by 1996. Several sugar mills have been completed or embarked upon bagasse power plant investments on their own, independent of the GEF project, including the original mill that had been targeted for the bagasse power plant under the project. The European Investment Bank has agreed to finance a bagasse/coal-fired power plant. A project completion report states that “extensive dialogue between the public and private sector on design work, the least-cost power development plan, and power purchasing agreements have directly or indirectly led to the development of other power plants.” One of the lessons from the Mauritius project is how creating an investment climate for renewable energy power projects, and creating public/private partnerships, can lead to supportive regulatory frameworks.

In this case, the project led to the establishment of a framework for independent-power-producer (IPP) development and an administrative focal point for private/public sector partnership in IPP development. A project evaluation states that “the project’s major accomplishment was progress in helping to establish an institutional and regulatory framework for private power generation in Mauritius and the provision of technical studies and trials to support technologies for improved bagasse production and improved environmental monitoring.” Another lesson may be that technical demonstration (in this case the planned demonstration bagasse plant that was never constructed) has less of an influence on promoting markets for a technology than other types of project interventions.