MINISTRY OF MINE DIRECTORATE OF ENERGY
BARRIER REMOVAL TO RENEWALBE ENERGY PROGRAMME

DEVELOPMENT OF A REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY WITHIN THE ELECTRICITY SECTOR

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# Development of a Regulatory Framework for Renewable Energy and Energy Efficiency Pertaining to the Namibian Electricity Sector

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<tr>
<td>CDM</td>
<td>Clean Development Mechanism of the Kyoto Protocol</td>
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<td>CSA</td>
<td>Consulting Services Africa</td>
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<td>DNA</td>
<td>Designated National Authority</td>
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<td>DRFN</td>
<td>Desert Research Foundation of Namibia</td>
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<td>ECB</td>
<td>Electricity Control Board</td>
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<td>EE</td>
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<td>Energy Efficiency and Conversation</td>
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<td>GEF</td>
<td>Global Environment Facility</td>
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<td>Greenhouse Gas</td>
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<td>Government of the Republic of Namibia</td>
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<td>IEA</td>
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<td>ITAC</td>
<td>International Trade Administration Commission of South Africa</td>
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<td>LCC</td>
<td>Life-cycle Costing</td>
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<td>MDG</td>
<td>Millennium Development Goals</td>
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<td>Ministry of Environment and Tourism</td>
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<td>Ministry of Mines and Energy</td>
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<td>NAU</td>
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<td>OGEEMP</td>
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<td>PVP</td>
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<td>RET</td>
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<td>SACU</td>
<td>Southern African Customs Union</td>
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<td>SHS</td>
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EXECUTIVE SUMMARY

This project, Development of a Regulatory Framework for Renewable Energy and Energy Efficiency within the Namibian Electricity Sector, is one of several projects that have been implemented by the UNDP/GEF/MME Barrier Removal to Namibian Renewable Energy Programme (NAMREP). As the project entitle indicates, the primary objective of the project is to recommend the essential elements of a regulatory framework for renewable energy and energy efficiency in Namibia.

There are two strategic objectives that underlie the recommendations of the REEE Regulatory Framework and that should be at the heart of Namibia’s long-term energy policy and vision for sustainable development:

- To support environmentally sustainable technologies
- To attain greater energy security through a steady increase of electricity production in Namibia using fuels/energy sources that are available in Namibia (e.g. sun, biomass, wind)

There are three issues that are critical to the successful realisation of the REEE Regulatory Framework:

- Government’s vision for REEE in Namibia must be clearly defined and economically justified
- The REEE Regulatory Framework must take account of Namibia’s unique socio-economic, infrastructural and environmental features
- The REEE Regulatory Framework must aim at creating a level playing field

Furthermore, it is essential that the REEE Regulatory Framework is ‘loud, long, and legal’:

There are six general recommendations that require three legal acts and a number of different regulations. The following are the six general recommendations. A figure is also provided on the following page that provides an overview of the recommended REEE Regulatory Framework.

- **Recommendation 1**: Establish regulatory framework components that facilitate the development of RE-based electricity generation
- **Recommendation 2**: Establish regulatory framework components that facilitate the energisation of off-grid, pre-grid and informal settlement households and communities
- **Recommendation 3**: Establish regulatory framework components that promote energy efficiency and conservation in order to reduce overall electricity consumption and/or manage peak demand
- **Recommendation 4**: Establish regulatory framework components that require government-funded and government-subsidised REEE technologies to meet quality standards
- **Recommendation 5**: Establish regulatory framework components that are required for Government to source CDM funding for REEE projects and programmes (currently underway by MET)
- **Recommendation 6**: Establish regulatory framework components that are required to reduce unnecessary costs that contribute to the high retail costs of REEE technologies
### REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY

#### RECOMMENDED NEW ACTS
- **Renewable Energy**
- **Off-Grid Energisation**
- **Energy Efficiency**
- **Technical Standards**
- **Access to CDM Funding**
- **Reduction of First Costs**

#### RECOMMENDED REGULATIONS OR INSTITUTION-BASED RULES
- **Renewable Energy Act**
- **Off-Grid Energisation Act**
- **Energy Efficiency and Conservation Act**
- **Formally Adopted Register of Approved Products**
- **Designated National Authority for CDM Funding**
- **Tariff Subheadings for Solar Products**
- **Lower Duties on Selected Products**
- **Zero VAT on Residential PV**

#### ADDITIONAL ENERGY EFFICIENCY REGULATIONS AND RULES
- **Feed-In Tariff Regulations**
- **Off-Grid Energisation Levy**
- **National Target for EE**
- **Appliance Labelling Programme Regulations**
- **Electricity Tax Act**
- **OGE Fund Managing Body**
- **Net-Metering Regulations**
- **OGE Master Plan Regulations**
- **SWH Programme Regulations**
- **Off-Grid Fee-for Service Regulations**
- **MEPS Programme Regulations**
- **SWH Programme Regulations**
- **Energy Audits of Public Institutions Regulations**
- **Time of Use Tariffs**
- **EE Building Codes**
- **Ripple Control Systems**

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Development of a Regulatory Framework for Renewable Energy and Energy Efficiency Pertaining to the Namibian Electricity Sector
1. INTRODUCTION

1.1 NAMREP

This project, Development of a Regulatory Framework for Renewable Energy and Energy Efficiency within the Namibian Electricity Sector, is one of several projects that have been implemented by the UNDP/GEF/MME Barrier Removal to Namibian Renewable Energy Programme (NAMREP). The mission of NAMREP is to increase affordable access to RE services and accelerate market development for RE technologies by reducing institutional, information, human capacity, financial, technical, awareness and other market barriers.

NAMREP is comprised of the following six components:
- Component 1: Capacity Building
- Component 2: Removal of Institutional Barriers
- Component 3: Public Awareness and Social Acceptability
- Component 4: Removal of Financial Barriers
- Component 5: Removal of Technical Barriers
- Component 6: Demonstrations and Pilots

NAMREP’s key stakeholders are:
- Namibian Ministry of Mines and Energy, as National Executing Agency
- UNDP Namibia, as GEF Implementing Agency
- GEF, as main financier
- DANIDA, as co-financing institution
- Renewable energy technologies (RET) suppliers
- RET users
- GRN institutions dealing with RET issues
- Financing and Capacity building institutions
- Utilities
- ECB, as a regulatory body

All of NAMREP’s activities are managed by a small group of professionals that are known as the Project Management Unit (PMU). Mr. S.G. Hamutwe (Jr.) is the PMU’s project manager for this project.

1.2 Revision of the Project Title

The original name of this project as listed in the Terms of Reference (TOR) is Development of a Regulatory Framework for Renewable Energy Technologies. However, the Consulting Team has recommended that the title be changed to Development of a Regulatory Framework for Renewable Energy and Energy Efficiency within the Namibian Electricity Sector for the following reasons:
- The TOR specify that only the electricity sector is to be considered; therefore, it is important to call attention to the fact that the project does not recommend regulatory measures for the petroleum sector.
- The Consulting Team feels that energy efficiency is too often overlooked in the pursuit to support renewable energy, yet energy efficiency is an essential aspect of a sustainable energy policy. It therefore has been incorporated into this project.
1.3 Terms of Reference

The following is a summary of the tasks to be performed by the Consulting Team, as specified in the TOR.

- **Task 1**
  Identify critical issues for successful realisation of a RET’s regulatory framework from previous, relevant studies. This shall include, but not necessarily be limited to, institutional, legal, regulatory, financial and technical aspects to fulfil the six components of the NAMREP Barrier Removal project.

- **Task 2**
  Analyse best international and regional practices in terms of necessary elements of a formal framework to promote and realise RET’s. This shall include literature review of previous, relevant studies and projects.

- **Task 3**
  Review the existing regulations/policies governing grid electricity in Namibia, including any subsidies applicable to it.

- **Task 4**
  Review the existing regulations/policies/standards governing Renewable Energy technologies (RET’s) in Namibia, including any subsidies applicable to it.

- **Task 5**
  Develop criteria to be used for comparing RETs with grid electricity in Namibia. These shall include, but may not be limited to, cost, technical capacity and sustainability (environmental, social and economic).

- **Task 6**
  Come up with clear recommendations on regulations, which should be recommended to MME in order to regulate the implementation of RET’s with appropriate standards as well as put RET’s on a level playing field with grid electricity in Namibia.

- **Task 7**
  Recommend practically viable and effective ways to enforce these regulations through an implementation plan.

- **Task 8**
  Development of a draft proposal for a RETs Regulatory framework for Namibia that includes an implementation plan, taking due cognisance of prevailing ESI policy, legislation and GRN decisions about ESI reform, as well as the ongoing efforts to attract private investment.

- **Task 9**
  Presentation and discussion of the draft framework to a half day stakeholders workshop of about 50 participants to canvass comments and further inputs to finalisation of the framework.

- **Task 10**
  Taking into account the stakeholder feedback received, finalise the recommended RET’s Regulatory framework for submission to the Ministry of Mines and Energy for review and endorsement. The proposed framework shall include clear recommendations with regard to promotion and communication of the framework to relevant stakeholders.
2. RENEWABLE ENERGY AND ENERGY EFFICIENCY FOR NAMIBIA

2.1 Renewable Energy, Energy Efficiency and Sustainable Development

Energy is central to economic development. There is a clear correlation between increasing people's access to convenient, affordable energy and improving their living standards, such as improved education, health and economic conditions. Approximately 1.6 billion people worldwide do not have access to electricity – this represents more than a quarter of the world’s population. The International Energy Agency (IEA) estimates that modern energy services will need to be provided to 700 million people if the United Nations Millennium Development Goal (MDG) for poverty reduction is to be met. [1]

Renewable energy (RE) can be particularly appropriate for developing countries. In rural areas, especially those classified as non-grid, transmission and distribution of energy generated from fossil fuels can be difficult and expensive. Producing renewable energy locally can offer a viable alternative. Accordingly, more and more developing countries are investing in RE development programmes.

Energy efficiency (EE) and conservation is also highly relevant to sustainable development objectives of developing countries. Energy efficiency measures help reduce the amount of public funding that is required per capita for electricity generation, thus allowing more people to benefit from limited development funds.

Interest in renewable energy and energy efficiency has increased recently due to environmental concerns about global warming and air quality. It is widely accepted that the emission of greenhouse gases and other pollutants from fossil fuels are cause global warming, damage fragile ecosystems, and compromise air quality. Renewable energy and energy efficiency, on the other hand, have low environmental impacts and are sustainable, i.e. the energy resource will never run out.

High initial cost has been a major inhibitor to the widespread adoption of renewable energy. Over the past decade, however, there has been a substantial decrease in costs. Coupled with changes in market forces and improvements in technology, this trend is creating new opportunities for renewable energy.

Despite the general reduction in cost, there are still major constraints to the mainstream adoption of RE. Slow technical progress over the past decades has been a major constraint. There has tended to be a “technology push” rather than a “market pull”, with inventors looking for a market for their product, rather than responding to consumer demand. In Namibia, the regulatory framework for electricity has posed a serious constraint to the RE sector, as it has for many years promoted unsustainable, subsidised tariffs. Fortunately, the Namibian Electricity Control Board (ECB) is currently addressing this problem and intends to introduce cost reflective tariffs in the near future.

All things considered, the environmental and industry context points to two strategic objectives that should be at the heart of Namibia’s long-term energy policy and vision for sustainable development:

- To support environmentally sustainable technologies
To attain greater energy security through a steady increase of electricity production in Namibia using fuels/energy sources that are available in Namibia (e.g. sun, biomass, wind)

The challenge is to develop a clear, long-term policy framework which incentivises the electricity sector to meet both these objectives simultaneously. These two strategic objectives, rather than a simplistic focus on one particular source of energy, should determine the principles and policies for meeting Namibia’s future energy needs.

Meeting Namibia’s future energy needs requires a spirit of shared responsibility. The role for government is to establish a framework that leads to emissions reductions and energy security, and provides a clear and stable long-term climate for investment. The role for industry is to develop the best and most affordable technologies within the framework set by government. To that end, government should ensure a level playing field for alternative sources of energy supply and energy efficiency.

2.2 The Need for Regulation of Renewable Energy and Energy Efficiency

Traditionally, governments have intervened in the energy sector because they considered access to energy to be a public good. When a good or service innately benefits society, but the benefit is not captured in the market price, this product tends to be under-produced. Energy is a public good because it empowers communities and benefits one’s standard of living. Consequently, governments have justified providing subsidies and widening access through public ownership and regulation.

Now the world faces risks from global climate change and local ecosystem destruction due to the carbon dioxide emissions and other pollutants from fossil fuel combustion. These costs to society (externalities) are not included in the price for fossil fuel energy production.

The market needs help to incorporate negative externality costs into market prices. If we were to wait for the market to make renewable energy cost-competitive, it would be too late to reverse the effects of climate change, ecosystem destruction and pollution. Governments have the opportunity to accelerate the use of renewable resources through effective policy measures.

Currently, one of the biggest obstacles to mainstreaming renewables is that they are not cost competitive. Governments have the option to create policy that affects the price of both fossil and renewable fuels through subsidy reform and taxes. Also, funding renewable energy production or accelerating consumption through electricity feed-in laws, technology procurement, concessions, targets and tradable certificate programs will also lead to more equalised prices.
In sum, government must be involved with RE dissemination because markets alone are ineffective in mainstreaming renewable energy. The reasons include:

- Energy prices do not account for significant negative environmental and social impacts, both globally and locally
- Competition is diminished with natural monopolies within the energy system and with widespread government subsidies that distort energy prices
- Renewable energy development will not happen quickly enough to mitigate the negative effects of climate change
- Markets fail to value public benefits of RE, causing little incentive for companies to invest in research and development.

Therefore, in order to achieve a level playing field, the Namibian government must establish a conducive regulatory framework.

A regulation is a legal restriction promulgated by government administrative agencies through rulemaking supported by a threat of sanction or a fine. This administrative law or regulatory law is in contrast to statutory or case law. Regulation mandated by the government attempts to produce outcomes which might not otherwise occur, produce or prevent outcomes in different places to what might otherwise occur, or produce or prevent outcomes in different timescales than would otherwise occur. Common examples of regulation include attempts to control market entries, prices, pollution effects, standards of production, etc.

Rulemaking refers to the process that executive agencies use to create, or promulgate, regulations. In general, legislatures first set broad policy mandates by passing laws, then agencies create more detailed regulations through rulemaking. Legislatures rely on rulemaking to add more detailed scientific, economic, or industry expertise to a policy.

Common purposes of rulemaking include:

- Adding scientific expertise
- Adding implementation detail
- Adding industry expertise
- Adding flexibility
- Finding compromise

There is currently no single umbrella statute that provides an overarching legal framework for renewable energy in Namibia. Legal provisions dealing with renewable
energy are found in a disparate set of laws. Similarly, there is no legal framework for energy efficiency in Namibia.

However, it must be pointed out that important policy initiatives have been undertaken, including the White Paper on Energy Policy, 1998, and several important policy works commissioned by the NAMREP project, notably the Strategic Action Plan for the Implementation of Renewable Energy Policies in the White Paper. The White Paper aims at creating energy security by diversifying the energy supply and energy carriers. Currently, much of Namibia’s energy is derived from expensive imported fuels and coal- or nuclear powered energy generation. In the Strategic Action Plan, provision has been made for the drafting of a specific White Paper on Renewable Energy Policy as well as a Strategy for Energy Efficiency. The White Paper on Renewable Energy Policy should identify strategic areas that need to be addressed to create the appropriate enabling environment for the promotion of renewable energy. Typically, these areas would include financial instruments, legal instruments, technology development, and awareness raising, capacity building, research and education. Goals and objectives will be set out for each of these areas. An Energy Efficiency Strategy that aims to assist in providing energy for all Namibians by reducing energy consumption through efficient practices and sustainable energy development, also needs to be developed and implemented. Increased energy efficiency and conservation can assist greatly in reducing the effects of energy usage on human health and the environment. To achieve this, enabling instruments and interventions must be established, including financial and legal instruments, EE building codes, efficiency labels and performance standards, greater use of SWHs and CFLs, energy management, and energy audits.

All these initiatives are likely to culminate in a series of acts which will provide a set of legal principles, targets and related provisions dealing with renewable energy and energy efficiency.

The development of a regulatory framework for REEE has an important constitutional setting. The Namibian Constitution is relevant as far as Article 95 is concerned which states that “(T)he State shall actively promote and maintain the welfare of the people by adopting inter alia policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future. Furthermore, the Namibian people are, by way of National Development plans and the longer-term Vision 2030, committed to sustainable development. The concept of ‘sustainable development’ is the fundamental building block around which environmental legal norms have been fashioned in Namibia, and pure economic principles no longer determine whether a development initiative is acceptable. On the contrary: development, which may be regarded as economically and financially sound, is balanced by its environmental impact, taking coherent cognisance of the principle of intergenerational equity and sustainable use of resources in order to arrive at an integrated management of the environment sustainable development and socio-economic concerns.

The regulatory framework will only be able to create an enabling environment for REEE if decision-makers consider the following as guidance when issuing regulations:

- Adopt through targets and schedules the popular acceptance of renewable energy and energy efficiency
Align other policies, particularly transport, rural development, agriculture and education, with the wider climate change policies as propagated by the relevant world bodies

Create a legal and regulatory framework that enables REEE to compete with conventional sources of energy

Adopt full-pricing for non-renewables in a progressive schedule

Provide support programmes for REEE, gradually eliminating subsidies thereby reducing the risks associated with dependence on subsidies

Improve support for RE start-ups

Keep key financial institution decision-makers well-informed about climate change and REEE technologies and markets

Ensure multilateral and national public sector financial institutions support the transfer to REEE adequately

Measures to promote REEE need to be established. As REEE technologies are relatively young compared with the conventional energies such as oil, gas, coal and nuclear, the right political framework is needed to guarantee fair access to the market.

There are five regulatory and policy areas that can be employed in order to promote REEE:

- **Mandated Market Policies** - including price mandates, quantity mandates and competitive bidding mechanisms
- **Financial Incentive Policies** - including grants, loans, tax credits and carbon financing
- **Public Investments** - including guarantee funds and system benefit funds
- **Market Facilitation Activities** - including small power producer programmes, standardised power purchase agreements, grid interconnection rules and public awareness
- **Electric Market Deregulation** - including key issues and solutions on the impact of power sector architecture on renewable energy development

In sum, an effective policy framework must be ‘loud, long, and legal’:

- **Loud** – the signal to the market, through incentive structures or other means, needs to be ‘loud’ and clear to attract capital into the sector
- **Long** – rules and incentives need to be stable and sustained for a duration that reflects the financing horizons of the projects
- **Legal** – a legally-established regulatory framework based on targets and implementation mechanisms is needed to provide the basis for long-life capital-intensive investments

In conclusion, there are measures that would encourage the large-scale dissemination of REEE technologies in Namibia. These include the following:

- At the onset, REEE programmes should be aggressive, long-term, policy oriented, and aimed at senior decision-makers in both government and private sector. All the institutions and agencies involved should work more closely in the development and promotion of REEE technologies.
- Innovative and sustainable financing programmes for renewable energy technologies should be instituted. Of particular interest are financing programmes that mobilise local resources and facilitate the bundling of
discrete small credit schemes into major financing opportunities for major multilateral and bilateral agencies.

- All sources of energy should account for the social and environmental costs to ensure a level playing field for both renewable and conventional energy technologies.
- Wider application should be made of the new RET dissemination strategies that have demonstrated encouraging signs of success. Many of these strategies largely revolve around the idea of participation, income generation, and small-scale enterprise development. Existing systems of production, marketing and information dissemination should be utilised to the maximum to reduce cost and ensure sustainability (piggyback principle).
- Long-term renewable energy training programmes designed to develop a critical mass of locally trained personnel with the requisite technical, economic, and socio-cultural skills should be initiated. There should be maximum use of local researchers and consultants.
- There is need for greater emphasis on quality control and regular and preventive maintenance. The requisite, technical and maintenance skills should be developed.
- Countries should carry out studies to document as accurately as possible, the types, location and quantities of the various forms of renewable energy sources. This information should be made readily available and regularly updated.

3. CRITICAL ISSUES FOR SUCCESSFUL REALISATION OF A REEE REGULATORY FRAMEWORK

3.1 Identification of the Critical Issues

There are a number of issues that need to be addressed carefully if a REEE Regulatory Framework is to be successfully realised in Namibia. The following, however, are critically important:

- Government’s Vision for REEE in Namibia needs to be better defined and justified
- The REEE Regulatory Framework must take account of Namibia’s unique socio-economic, infrastructural, and environmental features
- The REEE Regulatory Framework must create a level playing field

3.2 Critical Issue 1
Government’s Vision for REEE in Namibia Should be Clearly Defined and Economically Justified

The Ministry of Mines and Energy White Paper on Energy Policy includes significant discussion of renewable energy and energy efficiency. Yet, the statements in this document alone do not sufficiently define the extent to which GRN believes REEE could and should be developed in Namibia. In fact, the White Paper supports this point with the following statement: “...there is little awareness among energy users, planners and policy-makers about the costs and benefits of using renewable energy options” [2]. Furthermore, Vision 2030, Namibia’s long-term development planning vision, does not include a vision for the development of renewable energy and energy efficiency. It is essential that GRN develop a vision for REEE based on a
sound and comprehensive evaluation of the costs and benefits of conventional and REEE technologies so that GRN leaders, policy-makers and other stakeholders will be in a better position to truly understand and communicate why a REEE regulatory framework is needed and to what extent REEE must be promoted for the benefit of the nation.

3.3 Critical Issue 2:
The REEE Regulatory Framework Must Take Account of Namibia’s Unique Socio-Economic, infrastructural and environmental features

The REEE Regulatory Framework must be developed as a “custom fit” for Namibia, in line with the important socio-economic, infrastructural, and environmental features that define Namibia. Examples of such important features include, but are limited to, the following:

- Namibia is a developing country with limited public financial resources and a stable, but struggling, national economy
- Namibia is classified as a non-Annex 1 country under the Kyoto Protocol. That means Namibia is not obligated to reduce GHG emissions, and it may apply for funding of REEE projects through the Clean Development Mechanism
- There are over 100,000 households in Namibia who currently do not have access to the electrical grid and who are not expected to have access for at least another 10 years
- Namibia has a strong dependence on imported electricity that, historically, has been ranked amongst the cheapest available in the world
- Namibia has a relatively small electricity generation sector which is likely to expand significantly in the near future when the large Kudu project is implemented
- There are an estimated 26 million hectares of bush encroached farmland, which is highly damaging to the environment and agricultural economy but which represents an enormous biomass energy resource
- Namibia has an exceptional solar radiation resource, rated the best in the world
- Namibia has excellent wind resources along the sea coast

3.4 Critical Issue 3:
The REEE Regulatory Framework Must Aim at Creating a Level Playing Field

The initial capital investment costs of renewable energy and energy efficient technologies are typically much higher than for conventional technologies. However, the external costs (externalities) of environmental damage, health problems, insecure energy supply, etc. are typically much lower for renewable energy and energy efficient technologies. Furthermore, there are hidden but significant subsidies provided to existing conventional technologies and infrastructure that result in an unfair bias against REEE technologies. The combination of unrecognised externalities and hidden subsidies creates an un-level playing field. If REEE technologies are to achieve their desired and justified level of contribution, the externalities and subsidies of conventional technologies will need to be adequately addressed by the REEE Regulatory Framework.
4. CRITERIA FOR COMPARING REEE WITH NON-REEE

4.1 Life-Cycle Costing

The initial capital investment costs of renewable energy technologies have typically been significantly higher than non-RE technologies. However, RE technologies typically have lower operation and maintenance costs. These general cost patterns are the first indication that a comprehensive method is needed to properly compare RE with non-RE technologies. Life-cycle costing (LCC) is a straight-forward method that has been widely used to compare RE with non-RE. LCC was employed in two recent NAMREP projects to compare solar water heaters (SWH) to electrical water heaters (EWH) [3] and photovoltaic water pumps (PVP) to diesel water pumps (DP) [4]. LCC determines the full, accumulated cost of a technology over its entire life-cycle (lifetime). The cost factors that are input into the LLC equations represent the criteria under which REEE should be compared with non-REEE.

4.2 Additional Costs and Benefits to be Quantified and Included in Life-cycle Cost Comparisons

4.2.1 External Costs and Benefits

In the above two project examples for SWH and PVP, there were three general types of cost factors that were input into the LCC equations: capital, operation and maintenance costs. However, there are other, less obvious, cost/benefit factors that should be quantified as costs and input into LCC equations. Since these factors have typically not been included, or internalised, in LCC cost comparisons, they can be considered as external costs or benefits (externalities).

Several years ago the European Commission initiated a 10-year programme called ExternE [6 & 7] to comprehensively identify and study energy-related externalities. Under ExternE, several reports were compiled that provide a significant amount of quantified cost data that could be used and/or modified by Namibian energy planners and policy-makers.

The following are several examples of externalities that could be considered when performing LCC cost comparisons for Namibia:

- Economic benefits of primary and secondary job creation. Note that a recent South African study, *Macro-Economic Aspects for Renewable Energy* [5], indicated that more jobs are typically created from RE electricity generation plants than from non-RE plants.
- The benefit to the agricultural economic sector as a result of removing invader bush and therefore increasing grazing areas, cattle numbers, numbers of employees, etc. An analysis recently performed by the Namibian Agricultural Union (NAU) indicates that significant positive impacts in the agricultural economic sector would be realised from the establishment decentralised biomass gasification electricity generation plants.
- The benefit of an improved trade balance as a result of establishing more electricity generation within Namibia
- The cost to national and local economies as a result of power outages
- Environmental costs (costs per kWh have been estimated by ExternE)
Global warming causes various adverse economic impacts as a result of rising sea levels and increased temperatures.

Pollutants such as NO\textsubscript{x}, SO\textsubscript{2} and O\textsubscript{3} have an adverse impact on agriculture by lowering crop yields and increasing the need for soil amendments.

Pollutants damage the building materials of existing buildings

Pollutants damage natural ecosystems through depositions of acid and nitrogen

Wind farms can result in large numbers of birds being killed if wrongly located

Health costs (costs per kWh have been estimated by ExternE)

Pollutants cause early deaths (mortality) as a result of cancers, for example

Pollutants cause sickness (morbidity) as a result of respiratory problems, asthma, bronchitis, hypertension, etc.

Excessive noise is a nuisance and in some cases is unhealthy

Energy Insecurity

World market instability of energy supplies

Exporting

The following table was prepared as part of the ExternE project, and demonstrates the extensive work that was performed to estimate the costs of important externalities.

<table>
<thead>
<tr>
<th>Type of Damage</th>
<th>Coal</th>
<th>Lignite</th>
<th>Gas</th>
<th>Nuclear</th>
<th>PV</th>
<th>Wind</th>
<th>Hydro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Health</td>
<td>0.73</td>
<td>0.99</td>
<td>0.34</td>
<td>0.17</td>
<td>0.45</td>
<td>0.072</td>
<td>0.051</td>
</tr>
<tr>
<td>Buildings</td>
<td>0.015</td>
<td>0.020</td>
<td>0.007</td>
<td>0.002</td>
<td>0.012</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td>Crops</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0008</td>
<td>0</td>
<td>0</td>
<td>0.0002</td>
</tr>
<tr>
<td>Ecosystems</td>
<td>0.20</td>
<td>0.78</td>
<td>0.04</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Global Warming</td>
<td>1.60</td>
<td>2.00</td>
<td>0.73</td>
<td>0.03</td>
<td>0.33</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.55</strong></td>
<td><strong>3.79</strong></td>
<td><strong>1.12</strong></td>
<td><strong>0.25</strong></td>
<td><strong>0.83</strong></td>
<td><strong>0.16</strong></td>
<td><strong>0.11</strong></td>
</tr>
</tbody>
</table>

4.2.2 Existing Subsidies to Conventional Grid Electricity

There is currently a project underway in Namibia regarding cost reflective electricity tariffs. Cost reflective electricity tariffs are different than what currently exists in Namibia, which are subsidised tariffs. Namibia tariffs have been subsidised as follows:

- The estimated cost required to install new electricity generation facilities in the future has not been factored into tariffs
- The cost to construct new electricity distribution infrastructure under the rural electrification programme has not been factored into tariffs
- Much of the local electricity distribution infrastructure (power lines, poles, transformers, etc.) is very old and in poor condition, having far exceeded its reasonable life cycle period. The costs required for proper maintenance, and to replace old infrastructure, have not been fully factored into tariffs.

These costs/subsidies and any others to be identified by Cost Reflective Tariff project should be included as cost factors in LCC equations comparing RE to non-RE.
4.3 Technical Criteria to Consider when Comparing REEE to Non-REEE

A common argument against RETs is that their power output is not as reliable or predictable as non-RETs. For example, compared to coal power plants, wind turbines are highly erratic in the amount of power that they deliver during a 24-hour period. Similarly, the effectiveness of SHSs and SWHs decrease during cloudy days. These types of differences and limitations must be considered when comparing REEE to non-REEE. Furthermore, minimum performance standards need to be established for RETs.

5. REVIEW OF INTERNATIONAL PRACTICES FOR REEE REGULATION

5.1 Regulation of RE-Based Electricity Generation for Grid In-Feeding

The Consulting Team reviewed numerous papers and reports written by experts that identify and evaluate current international practices in the regulation of RE for grid in-feeding. The following are descriptions of the practices.

5.1.1 National Targets in Conjunction with Pre-Established Feed-In Tariffs; or Mandatory Quotas in Conjunction with Bidding Systems or Certificate Markets

It appears that all governments that have established a regulatory framework for RE have also established national targets for the generation or consumption of RE. There are generally two types of strategies to choose from to achieve the RE target. The first type of strategy is the use of pre-established feed-in tariffs. Government establishes feed-in tariffs for all types of RETs which are then guaranteed to new IPPs. The feed-in tariffs are typically regressive, i.e. gradually decrease over time (10-15 years) which motivates the RE IPP to concurrently improve his operation efficiency. The second type of strategy is the use of bidding systems or certificate markets. This strategy involves letting the market decide the tariff to be paid to the RE IPP based on a bidding system or a certificate market. When this type of strategy is utilised, the target is generally considered as a quota. The government ensures that that the RE target is achieved by facilitating the private sector development of a sufficient number of new RE IPPs, and pays the RE IPPs tariff rates that have been established through the individual, competitive bidding processes or by the certificate market. [9]

The establishment of a feed-in tariff system or a quota system appears to be the most powerful method of increasing the percentage of RE electricity generation. As such, the decision of whether to choose a feed-in tariff system or a quota system is very significant.

There appears to be a strong consensus amongst international RE experts that a feed-in tariff system is more effective than a quota system. The countries that have been the most successful in increasing their percentage of RE generation – Germany, Spain and Denmark – have implemented a feed-in tariff system. Countries that have implemented quota systems – UK and Italy – have been less successful. It is interesting to note that feed-in tariff systems have generally resulted in lower electricity prices than the quota systems. This is evident in the following table regarding the price of wind electricity.
### Feed-In Tariff Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Price (Euro cents per kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>6.2 – 8.5</td>
</tr>
<tr>
<td>France</td>
<td>8.4</td>
</tr>
<tr>
<td>Portugal</td>
<td>7.5 – 7.9</td>
</tr>
<tr>
<td>Austria</td>
<td>7.8</td>
</tr>
<tr>
<td>Spain</td>
<td>6.3 – 7.5</td>
</tr>
<tr>
<td>Greece</td>
<td>6.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>9.6 – 9.9</td>
</tr>
<tr>
<td>Italy</td>
<td>15.5</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>10.1</td>
</tr>
</tbody>
</table>

#### Comparison of Wind Electricity Prices 2004/2005 [10]

The following are details of the feed-in tariffs for wind in Germany, Spain and France in 2005 [10]:

**Germany:** Payment for new turbines in 2005 amounted to 8.53 cents/kWh. After several years, payment decreases depending on site quality to the current 5.39 cent/KWh. In very good sites, this will be the case after a five-year period.

**Spain:** Wind-electricity producers can choose between two tariffs: a fixed (6.3-7.0 cent/kWh according to capacity) or variable feed-in tariff. The variable tariff consists of a fixed-price component of between 2.75 and 2.9 cents and the average market price of electricity. The variable rate lies between 6.9 and 7.5 cent/kWh.

**France:** 8.36 cents for the first five years; thereafter the price drops depending on the number of full load hours (0-2000 = 8.38 cents, 2000-2600 = 5.95 cents, 2600-3600 = 3.05 cents, as per official regulations from 2001), overall compensation period five years. This includes adjustments for inflation.

#### 5.1.2 Net-Metering Programme

A net-metering programme is essentially a type of feed-in tariff system, however it is geared towards households, farms and businesses rather than IPP businesses. A net-metering programme generally consists of allowing individual electricity consumers the opportunity to generate electricity from small RE systems such as SHSs and feed into the grid in order to offset their electricity consumption. A single bi-directional meter is required which is capable of registering the flow of electricity in both directions. It should be noted that dual meter programmes have been implemented, but they have been less effective and therefore are not popular. A single bi-directional meter programme is clearly the best choice. [11]

Net-metering programmes have been implemented in many states in the USA. The rules vary from programme to programme, but the basic philosophy is the same -- to credit participating households according to the offset in consumption, which is essentially a subsidised tariff rate. Net-metering programmes typically allow a maximum offset of a zero dollar monthly electricity bill, but some programmes allow the credit of excess feed-in to be rolled over to the following month(s). Net-metering programmes also typically include a limit on the maximum amount of power that can be generated from a RE system -- such as 50 kW. [12]

When the idea of net-metering is first proposed to an area, the utility company typically expresses concern regarding the potential loss in revenue. Effective
compromises have been developed however. One example is the compromise reached with utility companies in California. The programme there includes a cap on the availability of net-metering equal to 0.1% of the utilities peak demand. The cap was set low enough that the utilities could not effectively argue that the programme would have a significant impact on revenue. Yet, the cap was set high enough to allow for a significant expansion of the small-scale RET market. [11]

5.1.3 Cost-Reflective Tariffs

Cost-reflective tariffs are needed to eliminate subsidies to conventional, fossil fuel-based electricity generation. [13] Note that the ECB is currently implementing a project to determine the amounts of cost-reflective tariffs; and plans are being made to introduce the cost-reflective tariffs in the near future. Therefore, no further investigation of cost-reflective tariffs was performed for this project.

5.1.4 Develop an Independent Power Producer (IPP) Framework

IPP frameworks are emerging in developing countries. In 1999, IPPs existed in 43 developing countries [13]. A comprehensive report was recently submitted to the ECB regarding the development of an IPP Framework in Namibia [8]. There is therefore no need to expand on this aspect of a RE-related regulatory framework, except to note that there appears to be a consensus amongst international energy experts that an IPP regulatory framework is an essential pre-requisite for significant RE development [13].

5.2 Regulation of RE for Off-Grid

A thorough study of guidelines for regulation of off-grid electrification was performed in 2001 by VO Consulting and Riso [14]. The study included a review of available international studies related to off-grid regulation. The important conclusions of the VO/Riso study will be discussed in section 6.2 below.

5.3 Regulation of Energy Efficiency

The Consulting Team reviewed several papers and reports written by international experts that identify and evaluate current best practices in the regulation of energy efficiency. One of the reports reviewed was the Draft Energy Efficiency Strategy of the Republic of South Africa, 2004. The following are descriptions of the best practices that would be relevant for a developing country such as Namibia.

5.3.1 Energy Efficiency Targets

Like RE targets, many countries have established EE targets. EE targets are typically voluntary (i.e. non-binding) and do not require a law. South Africa, for example, has established a target of a 12% increase in EE by the year 2014, but this target is included in the South African EE Strategy, not in a law. In order for a country to confirm that it is making progress towards its EE target, some type of EE monitoring mechanism/agency is needed.

5.3.2 Energy Efficiency Agency

Many countries have established an Energy Efficiency Agency (EFA) which is a body separate from government dedicated to implementing energy efficient policy. The
idea behind establishing an EFA is provide technical expertise to the government and consumers which typically is not available within existing institutions. [15]

5.3.3 National Energy Efficiency Programmes and Laws

Many countries have a national energy efficiency programme. In developed countries, these programmes are often part of a wider programme to reduce CO₂ emissions. Some countries have an energy efficiency law. The purpose of establishing such a law has generally been to send a strong signal to all stakeholders that the government is serious about addressing energy efficiency. [15]

5.3.4 Energy Efficiency Standards for New Homes and Buildings

A strong focus has been placed on improving energy efficiency of buildings since they may account for up to 40% of a country’s total energy consumption. The following developing countries have established EE standards for new homes and buildings: Philippines, Mexico, Turkey, Algeria, India, Malaysia and Indonesia.

There are generally five different types of EE Building Codes [15]:

- **Envelope Component Approach**: Limitation of heat transfer through individual building components
- **Overall Envelope Approach**: Limitation of heat transfer through the building shell
- **Heating/Cooling Demand Standard**: Limitation of the annual heating/cooling demand of buildings
- **Energy Performance Standard**: Limitation of the annual energy consumption of the building. Includes all types of electricity-based energy consumption for heating/cooling, lights, hot water, etc. This is the preferred standard amongst countries making the most serious efforts to promote energy efficiency.
- **Life Cycle Standard**: Limitation of the life cycle energy consumption of the building. Includes all types of energy consumption, including the energy required to manufacture, transport, etc. the building materials. This standard is not yet realised in any country.

EE building codes have achieved mix results internationally. The key to success is proper enforcement of the codes [16]. Some type of monitoring mechanism is needed to ensure compliance by building designers and developers.

5.3.5 Labelling and Efficiency Standards for Household Electrical Appliances

Many countries have introduced labelling programmes and minimum energy performance standards (MEPS) as part of their EE programmes. When labelling programmes are initiated they are typically limited to the labelling of only a few appliances, such as refrigerators, freezers, air conditioners, clothes washers and dishwashers. There are generally two different types of labels: “comparison labels” and “endorsement labels”. Comparison labels allow the customer to compare all appliances to one another by providing an energy efficiency quantitative rating or an EE grade, such as A, B, C, D, etc. Endorsement labels simply identify appliances that are energy efficient. Comparison label programmes are the favoured approach by leading EE countries [15].
The purpose of MEPS is to prevent very inefficient (and typically very cheap) appliances from entering the market. It is critical to the success of MEPS programmes that the standards are regularly reviewed and updated (ex. bi-annually).

5.3.6 Energy Audits

An energy audit consists of a thorough review of the energy consuming and energy saving patterns, materials and equipment of a building or enterprise. The results of an energy audit include detailed energy consumption data and recommendations for cost effective measures to improve energy conservation and efficiency. Energy audits are typically performed on larger, more energy intensive buildings. Governments sometime provide economic incentives to encourage the business and industrial sectors to implement energy audits. Many countries have certification programmes for energy auditors.

5.3.7 Energy Consumption Reporting

Some governments require large electricity consumers to annually report their energy consumption. This requirement is aimed at motivating large consumers to pay closer attention to energy efficiency.

6. REVIEW OF RECENT NAMIBIAN REPORTS THAT ARE RELEVANT TO A REEE REGULATORY FRAMEWORK

6.1 Regarding RE-Based Electricity Generation for Grid In-Feeding

6.1.1 Namibia IPP and Investment Market Framework Technical Assistance [R]
Prepared by CORE International and EMCON Consulting, October 2006
Prepared for the Electricity Control Board

The Namibia IPP Market Framework report provides a comprehensive evaluation of the Namibian electricity sector and makes extensive recommendations for the “de-bundling” of NamPower and establishment of regulatory framework for Independent Power Producers (IPPs). The report provides a lot of useful information and insights. However, the following are particularly relevant to the future regulation of RE IPPs in Namibia:

- Recommendation that NamPower be de-bundled into three entities: NamPower Generation, NamPower Trading and NamPower Transmission. The establishment of NamPower Trading would represent the establishment of a “Single Buyer”, which is considered as a critical element for the development of the IPP market.
- Classification of IPPs as small (5MW<), medium (5MW<IPP<100MW) and large (>100MW). The recommended license application requirements are less complicated for small IPPs in order to facilitate the development of this market.
- The report does not go into the detail regarding feed-in tariffs vs. tariffs by bidding or certificates However, the report does state that the development of the IPP market could be accelerated if Government and NamPower put out tenders for small and medium IPPs. This appears to suggest that tariffs would be decided through the tender process (which is often done in a quota
system), but it is not clear. It is possible that the envisaged tender process could allow for the specification of feed-in tariffs with the criteria for awarding the contract being technical reliability, estimated pollution emissions, job creation, ancillary economic benefits, etc. It should be noted that the report states that small and medium IPPs would be “price takers”, while the tariffs for a large IPP would be negotiated.

### 6.2 Regarding Off-Grid Energisation

#### 6.2.1 Developing Implementation Guidelines for Off-Grid Policies for Sustainable Electrification in Namibia [14]
*Prepared by VO Consulting and RISO, April 2001*

The Off-Grid Policies report provides a comprehensive identification and discussion of regulatory issues for off-grid electrification. The report makes the following regulatory-related conclusions:

- The ECB is responsible for regulating off-grid fee-for-service schemes, and has the following responsibilities:
  - Tariff setting and control
  - Regulation of off-grid electrification businesses (ESCOs)
  - Licensing and conditions for fee-for-service contracts
  - Quality of service to be provided by fee-for-service contractors

- The White Paper states that grid and off-grid services should be treated on the same basis, therefore subsidisation of off-grid electrification can clearly be justified since the grid has been subsidised.

- A pilot project for a fee-for-service concession area should be initiated in order to sort out regulatory and implementation issues before embarking on a larger programme for fee-for-service concession areas.

- MME should identify the boundaries within which future contracts for fee-for-service concession areas should be implemented.

- Government support of off-grid electrification should be based on the implementation of an equitable and transparent off-grid electrification plan.

#### 6.2.2 Off-Grid Energisation Master Plan [17]
*Prepared by CSA, Christoph Schumann, Robert Schultz, Solar Age and Geocarta. Prepared for MME/NAMREP, August 2006*

The Off-Grid Energisation Master Plan (OGEMP) was recently submitted to NAMREP. The OGEMP is a 20-year plan to provide access to energy to over 100,000 off-grid, pre-grid and informal settlement households and businesses through an ownership-based model. The OGEMP will require subsidisation of a revolving fund to make energy products affordable, and subsidisation of the implementation management activities. The following are regulatory aspects of the OGEMP to be addressed:

- The OGEMP will require Government to dedicate a significant amount of funding. The average annual funding requirement is N$ 7 million, but would be much higher during the first few years, with a maximum annual funding requirement of N$ 12 million. It may be that Government decides to establish a small levy (e.g. N$ 0.01/kWh) on grid electricity in order to provide consistent funding for the OGEMP. Such a levy would require law to be passed. Money generated from the levy could also be used to subsidise off-grid fee-for-service tariffs.
MME will need to regulate the approved energy products to be offered by energy shops to ensure quality and content, and to control costs.

MME will need to regulate the energy shops to ensure a sufficient level of service is provided, for example adequate operating hours.

6.3 Regarding Energy Efficiency

6.3.1 Assessment of Feasibility for the Replacement of Electrical Water Heaters with Solar Water Heaters [3]
Prepared by EMCON Consulting Group for MME/NAMREP, August 2005

The Solar Water Heater report provides a comprehensive evaluation of SWHs and makes a convincing argument for the rapid replacement of EWHs. The report makes a number of recommendations for the way forward. The following are recommendations that entail regulatory-related actions:

- Government to continue support for long term financing with low interest loans
- Investigate the feasibility of obtaining funding from the Kyoto Protocol Clean Development Mechanism (CDM) for increased subsidisation of SWHs
- Consider the development of a Tradable Renewable Energy Certificate (TREC) system. As previously discussed, a TREC system is a type of RE quota system.
- MME to establish a National Co-ordinator for SWH in Namibia
- All Government capital projects must use SWHs, or at least consider them before selecting EWHs

6.3.2 Demand Side Management Study for Namibia [22]
Prepared by EMCON Consulting Group for MME/NAMREP, August 2005

Demand Side Management Study for Namibia is a comprehensive investigation of six demand side management options:

- Launching a consumer education and awareness campaign
- Introducing time of use electricity tariffs
- Disseminating compact fluorescent lights
- Replacing electric water heaters with solar water heaters
- Expanding ripple control systems
- Conducting energy audits in the commercial and industrial sectors

From the above six recommended options, there are three that involve regulatory action: introducing time of use tariffs and expanding ripple control systems. Since electricity tariffs are inherently regulatory, any revisions by the ECB and utilities to create time of use tariffs would represent regulatory actions. Similarly, the mandatory installation of ripple controls in large towns would involve regulatory actions by NAMPOWER and the REDs.

6.4 Regarding RET Standards

6.4.1 Code of Practice and Register of Products for Namibian Solar Energy Technologies [18]
Prepared by EMCON Consulting Group and Tinda ESI Consultants
Prepared for MME/NAMREP, June 2006
The Code of Practice and Register of Products has the following regulatory components:

- The report identifies acceptable products and installation practices for SHSs, SWHs and PVPs in Namibia. The approved products and practices are to be implemented on all Government funded projects and programmes
- The report recommends the establishment of a Products Evaluation Panel, which shall have the responsibility of updating and revising the approved product register

6.5 Regarding First Cost Reductions of RE Technologies

6.5.1 Development of First Cost Reduction Strategies for Renewable Energy Products and Services [19]
Prepared by SK Holdings (PTY) LTD for MME/NAMREP, April 2006

First Cost Reduction Strategies examines the possibilities for lowering the initial cost of RE products in Namibia. The following recommendations entail regulatory-related actions:

- MME to establish a RETs Market Regulation Mechanism Committee. The Committee would have the following responsibility of reviewing the prices of RETs in the open market and setting price limitations on them. This market regulation activity would occur on a quarterly basis.
- MME to decentralise the operations required to administer the Solar Revolving Fund such that regional energy offices are created with full-time renewable energy experts and SRF administrators.
- MME to improve the loan conditions provided by the SRF, such as a longer payback period or a lower interest rate.
- Government to eliminate taxes on all solar-related products

6.5.2 Assessment of Duties and Taxes [20]
Prepared by PricewaterhouseCoopers for MME/NAMREP, April 2006

The report makes a number of detailed recommendations, almost all of which entail regulatory-related actions:

- Government to communicate with the International Trade Administration Commission of South Africa (ITAC) and the World Customs Organisation (WCO) regarding the possibility of specific tariff subheadings for solar energy products.
- Government to apply to SACU for lower or duty free customs rates on regulators, LED lights, compact fluorescent lights, solar water heaters and energy efficient refrigerators to be used in conjunction with PV panels.
- MME to prepare a comprehensive request to the Department of Inland Revenue, Ministry of Finance for the zero-rating of VAT on the supply and installation of solar energy products in residential areas in Namibia.
- Government to establish a fund to significantly subsidise the capital cost of purchases made through the Solar Revolving Fund.
- Government to consider establishing lower income taxes for SMEs.
7. RECOMMENDATIONS AND AN IMPLEMENTATION PLAN FOR A REEE REGULATORY FRAMEWORK

7.1 Summary of the Recommendations

The Consulting Team has identified six general recommendations. Each recommendation consists of a number of different regulatory components and a set of actions that are necessary to establish the regulatory components. The following are the six general recommendations:

- **Recommendation 1**
  Establish regulatory framework components that facilitate the development of RE-based electricity generation

- **Recommendation 2**
  Establish regulatory framework components that facilitate the energisation of off-grid, pre-grid and informal settlement households and communities

- **Recommendation 3**
  Establish regulatory framework components that promote energy efficiency and conservation in order to reduce overall electricity consumption and/or manage peak demand

- **Recommendation 4**
  Establish regulatory framework components that require government-funded and government-subsidised REEE technologies to meet quality standards

- **Recommendation 5**
  Establish regulatory framework components that are required for Government to source CDM funding for REEE projects and programmes

- **Recommendation 6**
  Establish regulatory framework components that are required to reduce unnecessary costs that contribute to the high retail costs of REEE technologies

7.2 Regulatory Components and Implementation Plan for Recommendation 1

**Recommendation 1**

Establish regulatory framework components that facilitate the development of RE-based electricity generation for the grid

7.2.1 Regulatory Components of Recommendation 1

The development of RE-based electricity generation should be facilitated by a conducive regulatory framework. The regulatory framework should include measures that support RE-based electricity generation on a relatively large scale by IPPs and NamPower, and on a small scale by households and businesses. It is envisaged that the following regulatory components would be necessary:

- **Renewable Energy Act**
  The purpose of the Renewable Energy Act would be to establish the legal basis for Government subsidisation of RE-based electricity generation. The RE Act would include the general features described below.
- Statement of Government’s vision to achieve a specific target for RE-based electricity generation
- Statement that it will be MME’s responsibility to monitor progress towards meeting the RE target
- Confirmation of Government’s decision to achieve or exceed the target by employing a comprehensive Regressive Feed-In Tariff system which specifies an individual set of regressive tariffs for each type of RET. The Consulting Team believes it would be logical for the RE Act to assign the ECB the responsibility of developing and enforcing feed-in tariff regulations and feed-in tariff rates, but MME would have the power to reject anything with which it disagrees.
- Confirmation of Government’s decision to achieve or exceed the target by employing a comprehensive Net-Metering programme. The programme would allow households and businesses the opportunity to feed into the grid using small RE-based electricity generation systems, such as SHSs. Net-metering households and businesses would benefit by having their electricity bills offset according to the retail rate charged by the respective RED or municipality. The Consulting Team believes it would be logical for the RE Act to assign the ECB the responsibility of developing and enforcing net-metering regulations, but MME would have the power to reject anything with which it disagrees.

- Feed-In Tariff and Net-Metering Regulations
  The regulations would specify all of the details not covered in the RE Act.

7.2.2 Implementation of Recommendation 1

The following steps should be taken to realise Recommendation 1:

- Perform a comprehensive macroeconomic study of renewable energy in Namibia. Note that the South African Macro-economic Aspects for Renewable Energy [5] could be referenced as a general guideline for what is needed. The macroeconomic study would achieve the following:
  - Determine the potential electricity generation capacity of each type of RET
  - Provide an in-depth evaluation and comparison of the costs and benefits of developing RE vs. non-RE, based on the criteria described in Section 4
  - Recommend a national target for RE-based electricity generation based on sound principles of economic development and environmental protection, and considering Namibia’s unique features as described in Section 3.3

- Identify and address the technical issues related to grid management that would arise as a result of the development of small, medium and large IPPs.
- Design the Feed-In Tariff system, including drafting of detailed regulations and recommending tariffs for various RETs. An international consulting expert would likely be needed.
- Design the Net-Metering programme, including the drafting of detailed regulations.
- Draft the RE Bill
- Approval of the RE Act
7.3 Regulatory Components and Implementation Plan for Recommendation 2

**Recommendation 2**

Establish regulatory framework components that facilitate the energisation of off-grid, pre-grid and informal settlement households and communities

7.3.1 Regulatory Components of Recommendation 2

The large-scale energisation of off-grid, pre-grid and informal settlements would require a significant and consistent long-term source of funding, and would require some regulatory issues to be clarified. It is envisaged that the following regulatory components would be necessary:

- **Off-Grid Energisation Act**
  The Off-Grid Energisation Act would include the following features.
  - Statement of Government’s intent to establish a small levy (ex. N$ 0.01 per kWh) on the sale of all electricity for the purpose of subsidising long-term programmes to provide access to energisation in off-grid, pre-grid and informal settlement areas.
  - Designation of a body to manage the funds generated by the levy.
  - Statement of Government’s support for the implementation of the Off-Grid Energisation Master Plan
  - Statement of Government’s support for MME to explore other possible programmes of off-grid energisation, such as fee-for-service concession contracts

- **Off-Grid Energisation Master Plan Regulations**
  - Regulations by MME regarding the quality and content of the approved energisation products to be offered by energy shops, and regarding how the costs of those products will be controlled.
  - Regulations by MME to ensure a sufficient level of service is provided by the energy shops, such as adequate operating hours.

- **Off-Grid Fee-for-Service Regulations**
  The regulations will state the details of how off-grid fee-for-service tariffs will be determined and subsidised. Other regulatory issues will also be addressed that were raised in the report, *Developing Implementation Guidelines for Off-Grid Policies for Sustainable Electrification in Namibia* [14]

7.3.2 Implementation of Recommendation 2

The following steps would need to be taken to realise Recommendation 2:

- MME should confirm that it would be interested in further investigating the feasibility of the Off-Grid Energisation Master Plan (or similar individual ownership model), and further investigating fee-for-service schemes.
- Implementation of a pilot scale Energy Shop
- Implementation of a pilot scale fee-for-service concession contract
- Confirmation by MME, ECB and others that a small levy on electricity could and should be established for the purpose of funding off-grid energisation programmes
- Draft the Off-Grid Energisation Bill
Approval of the Off-Grid Energisation Act
- Establish the Body that will managing the funds generated by the Off-Grid Energisation Levy
- Initiate the Levy
- Use funds generated to implement the Off-Grid Energisation Master Plan and other energisation programmes such as fee-for-service concession contracts

7.4 Regulatory Components and Implementation Plan for Recommendation 3

**Recommendation 3**
Establish regulatory framework components that promote energy efficiency and conservation in order to reduce overall electricity consumption and/or peak demand

7.4.1 Regulatory Components of Recommendation 3

Energy efficiency and conservation are critically important to the economy and environment. MME needs to ensure that EE is boldly promoted, and effectively enforced where practical and necessary. In order to do that, MME needs to be supported by a strong regulatory framework. It is envisaged that the following regulatory components would be necessary:

- **Energy Efficiency and Conservation Act**
  The Energy Efficiency and Conservation Act would include the following features:
  - Statement of Government’s vision to achieve a specific target for EE within the electricity sector
  - Statement of Government’s intent to establish an appliance labelling programme for selected appliances. MME would be assigned the responsibility of oversight of the programme, but should outsource the implementation of the programme to others.
  - Statement of Government’s intent to establish minimum energy performance standards (MEPS) programme for selected appliances. MME would be assigned the responsibility of overseeing the programme, but should outsource the implementation of the programme to others.
  - Statement of Government’s intent to require SWHs in all new buildings of Public Institutions (GRN, Regional Councils & Municipalities) and Parastatals, where practical; for all retrofits in existing Government and Parastatal buildings, where practical; and in all new NHE houses, where practical.
  - Statement of Government’s intent to require all (large) existing buildings of Public Institutions and Parastatals that exceed a specified size to receive energy audits on a regular basis (bi-annually, for example)
  - Statement of Government’s intent to require the Department of Works, Regional Councils and Municipalities to develop, adopt and enforce Energy Efficiency Building Codes for public buildings, and for (large) private buildings that exceed a specified size.

- **Appliance Labelling Programme Regulations**
- **MEPS Programme Regulations**
- **SWH Regulations regarding Public Institutions and Parastatals**
7.4.2 Implementation of Recommendation 3

The following steps would need to be taken to fully realise Recommendation 3:

- Trial consumer testing of Time of Use (TOU) tariffs as specified in Demand Side Management Study for Namibia [22]. Nation-wide establishment of TOU tariffs by NÂMPOWER, REDs and ECB based on the trial tests.
- Installation of ripple controls in large towns by the REDs, after first obtaining approval by the ECB.
- Preparation of a Baseline Study of Energy Efficiency, similar to what has been produced for South Africa. The Baseline Study would
  - Establish a national energy balance
  - Determine detailed consumption statistics, where possible
  - Determine both current and possible future benchmarks
- Preparation of a comprehensive National Strategy for Energy Efficiency and Conservation, similar to what has been produced for South Africa. The National Strategy should discuss and recommend policies, and recommend a national target for EE.
- Design of the proposed labelling programme and regulations
- Design of the proposed MEPS programme and regulations
- Consultations between Government and Parastatals regarding the proposed law to require SWHs
- Design of practical, model EE Building Codes that can be easily adopted by the Department of Works, Regional Councils, Municipalities and Parastatals
- Establishment of a certified training course for future Energy Auditors
- Drafting of the Energy Efficiency and Conservation Bill
- Approval of the Energy Efficiency and Conservation Act
- MME to formulate and adopt detailed regulations regarding the various components of the Energy Efficiency and Conservation Act
- Department of Works, Regional Councils, Municipalities and Parastatals to adopt EE Building Codes
- MME to appoint a body to implement the labelling programme and MEPS programme.

7.5 Regulatory Components and Implementation Plan for Recommendation 4

Recommendation 4
Establish regulatory framework components that require government-funded and government-subsidised REEE technologies to meet quality standards
7.5.1 Regulatory Components of Recommendation 4


7.5.2 Implementation of Recommendation 4

MME to develop and approve regulations that would be required for it to formally adopt the Code of Practice and Register of Products for Namibian Solar Energy Technologies.

7.6 Regulatory Components and Implementation Plan for Recommendation 5

Recommendation 5
Establish regulatory framework components that are required for Government to source CDM funding for REEEE projects and programmes

7.6.1 Regulatory Components of Recommendation 5

Designated National Authority (DNA) to be established within the Ministry of Environment and Tourism, or outsourced by the Ministry to a suitable organisation, for the purpose of allowing Namibia the opportunity to access funding from the Clean Development Mechanism (CDM).

7.6.2 Implementation of Recommendation 5

The following steps would need to be taken to realise Recommendation 5:

- MET to co-ordinate with the CDM Executive Board regarding Namibia’s intent to establish a DNA for the purpose of accessing future funding through the CDM.
- Preparation of a comprehensive baseline study for greenhouse gas emissions.
- Establishment of the DNA.

7.7 Regulatory Components and Implementation Plan for Recommendation 6

Recommendation 6
Establish regulatory framework components that are required to reduce first costs of REEEE technologies

7.7.1 Regulatory Components of Recommendation 6

- New tariff subheadings for solar energy products.
- Lowered customs rates on regulators, LED lights, compact fluorescent lights, solar water heaters and energy efficient refrigerators to be used in conjunction with PV panels.
- Regulations by the Department of Inland Revenue, Ministry of Finance allowing the zero-rating of VAT on the supply and installation of solar energy products in residential areas in Namibia.
7.7.2 Implementation of Recommendation 6

The following steps would need to be taken to realise Recommendation 6:

- Government to communicate with the International Trade Administration Commission of South Africa (ITAC) and the World Customs Organisation (WCO) regarding the possibility of specific tariff subheadings for solar energy products.
- Government to apply to SACU for lower or duty free customs rates on regulators, LED lights, compact fluorescent lights, solar water heaters and energy efficient refrigerators to be used in conjunction with PV panels.
- MME to prepare a comprehensive request to the Department of Inland Revenue, Ministry of Finance for the zero-rating of VAT on the supply and installation of solar energy products in residential areas in Namibia.

7.8 Summary of Recommended Regulatory Framework

A comprehensive regulatory framework has been recommended concerning renewable energy for grid in-feeding, off-grid energisation, energy efficiency, technology quality standards, access to CDM funding, and reduction of first costs. The following figure summarises the recommended framework.
Development of a Regulatory Framework for Renewable Energy and Energy Efficiency Pertaining to the Namibian Electricity Sector

REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY

RECOMMENDED NEW ACTS

RECOMMENDED REGULATIONS OR INSTITUTION-BASED RULES

ADDITIONAL ENERGY EFFICIENCY REGULATIONS AND RULES
LIST OF REFERENCES


6. 2005, External Costs: Research Results on Socio-Environmental Damages due to Electricity and Transport, prepared for the ExternE programme to the European Commission


10. German Wind Energy Association (BWE), June 2005. Minimum Price System Compared with the Quota Model – Which System is More Efficient?


14. VO Consulting and RISO, April 2001, Developing Implementation Guidelines for Off-Grid Policies for Sustainable Electrification in Namibia


16. International Institute for Energy Conservation, Energy Labelling, Standards and Building Codes: A Global Survey and Assessment for Selected Developing Countries, prepared for the United States Agency for International Development


22. EMCON Consulting Group, Tinda ESI Consultants, Solid Productions, VO Consulting, November 2006, Demand Side Management Study for Namibia, prepared for the Electricity Control Board
APPENDIX A

SUMMARY OF EXISTING ACTS GOVERNING GRID
ELECTRICITY AND REEE
Electricity Act

As far as the generation of electricity with renewable energy technologies is concerned, the Electricity Act of 2000 provides for the following:

**Duty to obtain a license**

1. Subject to the provisions of this Act, no person may establish or carry on any undertaking for -
   (a) the generation of electricity;
   (b) the transmission of electricity;
   (c) the supply of electricity;
   (d) the distribution of electricity;
   (e) the importation of electricity; or
   (f) the export of electricity,

   unless such person holds a license issued under this Act that authorises the particular activity.

2. A separate license is required for each of the activities mentioned in subsection (1).

3. Notwithstanding subsection (1), a license is not required for the generation of electricity by means of a generation plant which -
   (a) has an installed capacity of less than 500 KVA; and
   (b) is used for the supply of electricity exclusively for own use by the person in control of such plant and on premises owned or occupied by that person.

The stipulation quoted above clearly demarcates when the provisions of the Energy Act apply and, by deduction, when another regulatory framework applies or needs to be established.

As far as renewable energy applications are concerned, the following is implied by the law:

- in case more than 500 KVA is generated, and
- if the supply of electricity is distributed for use by persons other than the owner of the plant

a licence must be granted by the Electricity Control Board, and the workings of such renewable energy plant is subsequently regulated by the stipulations of the Energy Act, 2000.

**2006 Electricity Bill**

The new Electricity Bill, 2006, currently being finalised by legal drafters, provides for the following:
Objects and functions of the Board

(1) **The objects of the Board are** -

(a) **to exercise control over and regulate the provision, use and consumption of electricity in Namibia;**

(b) **to oversee the efficient functioning and development of the electricity industry and security of electricity provision and the electricity system;**

(c) **to ensure the efficient and effective provision of electricity;**

(d) **to ensure a competitive environment in the electricity industry in Namibia with such restrictions as may be necessary for the security of supply and other public interest; and**

(e) **to promote private sector investment in the electricity industry,**

Of interest to note is that the Electricity Control Board is to ensure a competitive environment and to promote private sector investment.
APPENDIX B

NATIONAL WORKSHOP INFORMATION AND DOCUMENTS
REGULATORY FRAMEWORK FOR
RENEWABLE ENERGY TECHNOLOGIES WORKSHOP

20 November 2006

PROGRAMME

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## REGULATORY FRAMEWORK FOR RENEWABLE ENERGY TECHNOLOGIES WORKSHOP

**20 NOVEMBER 2006**

**HABITAT RESEARCH AND DEVELOPMENT CENTRE**

**REGISTRATION FORM**

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Honourable Governors and Councillors, Ladies and Gentlemen, may I welcome you all to this important workshop on the establishment of a “Regulatory Framework for Renewable Energy”. Those of you who have been regular participants at these workshops will realise that we have made great strides as far as the sustainable introduction of renewable energy in Namibia is concerned. We have moved from the policy level to the level of strategic action and master plans. What we will discuss today are the regulations that need to be put in place so that we can establish an equal playing field for renewable energy technologies.

Before we get there, allow me to inform you that the work of the Ministry of Mines and Energy and that of the NAMREP Project will be greatly enhanced by way of strategic inputs from a revived REEECAP Project that will commence during the course of this week. As you are aware, the REEECAP Project is a NAMREP co-financing initiative of the Danish Government. Outputs from the Project that are of general relevance to the renewable energy sector include

- the establishment of Renewable Energy Baseline Data,
- a Renewable Energy Macro Economic Study, and
- a Renewable Energy Monitoring System.

The REEECAP Project Management Unit - that is the Renewable Energy and Energy Efficiency Institute of the Polytechnic and Desert Research Foundation of Namibia - has the enormous task of initiating, monitoring and finalising project activities to the value close to N$ 7 million by the end of next year.
I appeal to you as stakeholders to provide all the support and cooperation that will be required.

Ladies and Gentlemen, the Ministry of Mines and Energy’s concern with renewable energy is based on the strategic objectives which are at the heart of Namibia’s long-term energy policy, namely

- reducing carbon emissions from the electricity supply industry, and
- guaranteeing affordable security of electricity supply.

The challenge for the Ministry is to develop a clear, long-term regulatory framework that obliges the electricity supply industry to meet both these objectives, giving the industry the confidence to make the right long-term investments in the new generating capacity we need. These two strategic objectives, rather than a simplistic focus on one particular source of energy, should determine the principles and policies for meeting Namibia’s future energy needs.

Meeting these energy needs will require a spirit of shared responsibility. The role for the Namibian Government is to set a framework which leads to emission reductions and energy security, and that provides a clear and stable long-term climate for investment. The role for industry is to develop the best and most affordable technologies within the framework set by Government. Government must ensure a level playing field between alternative sources of energy supply. Alternative sources of energy should compete on the basis of how they contribute, affordably, to the strategic objectives of carbon reduction and energy security.

We should continue viewing energy as a public good because it empowers communities and benefits our standard of living. It is for this reason that governments have justified providing subsidies and widening access through public ownership and regulation.

Now the world faces risks from global climate change and local ecosystem destruction due to the carbon dioxide emissions and other pollutants from fossil fuel combustion. These costs to society - commonly referred to as ‘externalities’ - are not included in the price of energy produced from fossil fuel.
Last week the UN Summit on Climate Change held in Kenya delivered a grim message: Africa is more vulnerable than initially thought, with looming threats to crops and coastal infrastructure.

Decentralised renewable energy technologies might be a key to buffering Namibia against the effects of global warming, but the time to act is now.

The market needs help to incorporate negative externality costs into market prices. If we were to wait for the market to make renewable energy cost-competitive, it would be too late to reverse the effects of climate change, ecosystem destruction, collapsing industries, rampant poverty and pollution. Particularly since the market has marginalised renewable energy based on heavy direct subsidisations of non-renewable energy sources and technologies. Our Government has now the opportunity to accelerate the use of renewable resources through the establishment of an effective regulatory framework.

Ladies and Gentlemen, the Namibian Government has no intention to unduly interfere with the accepted market forces. However, the Ministry of Mines and Energy must be involved with the dissemination of Renewable Energy Technologies because markets alone are ineffective in mainstreaming renewable energy.

In order to achieve a level playing field for renewable energy, we must establish a conducive regulatory framework. I therefore encourage you to identify the strategic areas that need to be addressed to create the appropriate enabling environment for the promotion of renewable energy. Typically, these areas would include: financial instruments, legal instruments, technology development, and awareness raising, capacity building and education.

Thank you very much and I wish you good luck during your deliberations.
REGULATORY FRAMEWORK WORKSHOP
PRESENTATION
I. INTRODUCTION

A. OBJECTIVE

Project Objective

To develop a regulatory framework for renewable energy within the electricity sector.

Note: The Consulting Team decided to add Energy Efficiency to the regulatory framework since it is also very important to a sustainable energy policy.

Frequently Used Abbreviations

RE: Renewable Energy
RET: Renewable Energy Technology
EE: Energy Efficiency
REEE: Renewable Energy and Energy Efficiency
BARRIER REMOVAL TO NAMIBIAN RENEWABLE ENERGY PROGRAMME (NAMREP)
DEVELOPMENT OF A REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY WITHIN THE ELECTRICITY SECTOR

I. INTRODUCTION

B. TERMS OF REFERENCE

Terms of Reference

1. Identify critical issues for the successful realisation of the Regulatory Framework
2. Evaluate best international practices in terms of necessary elements for a Regulatory Framework
3. Review existing policies for grid and renewable energy-based electricity in Namibia
4. Develop criteria to be used to compare RE with conventional grid electricity technologies
5. Develop clear recommendations for regulations on RET’s
6. Recommend an implementation plan

C. WHY ARE RE & EE IMPORTANT FOR NAMIBIA?

Energy and Development
There is a clear correlation between energy and development. As people are provided with improved access to convenient affordable energy, their living standards improve (education, health, economic). RE offers a way to provide access to energy in isolated off-grid areas. Note: there are over 100,000 households to be targeted by the Off-Grid Energisation Master Plan.

Global Warming
There is great concern internationally regarding the impact of conventional energy technologies, such as coal power plants, on global warming. While Namibia is not obligated by the Kyoto Protocol agreement to reduce GHG emissions (since it is a non-Annex I country), it is morally obligated to do its best to reduce GHGs. REEE offer a way to reduce GHG.

Energy Security
Namibia imports more than 50% of the electricity that it consumes. This represents a potential weakness to Namibia’s energy security, due to lack of control of imported tariff rates. REEE within Namibia offers a way to decrease electricity imports. In addition, RE offers a way to establish decentralised electricity production, which is also recognised by international experts as an improvement to energy security.
I. INTRODUCTION

D. RE & EE ARE RECOGNISED AS IMPORTANT INTERNATIONALLY

Renewable Energy Regulatory Policies in Developing Countries

The following examples demonstrate the importance of Renewable Energy in other developing countries during 2005/2006:

- Egypt was developing a wind power programme
- Turkey passed a RE promotion law
- Uganda wrote and was expected to approve a new renewable energy policy
- Iran was developing a RE promotion law and started to allow independent power producers
- Thailand was working on a feed-in tariff policy for small power producers
- China introduced a comprehensive renewable energy law, which includes feed-in tariffs for RE
- Pakistan initiated a feed-in tariff for wind power development, and also waived import duties on wind turbines
- Mexico was expected to pass a RE promotion law
- Cape Town developed a solar water heater policy
- A number of countries in North Africa and the Middle East were developing solar water heater regulations
- The following countries initiated or continued national off-grid electrification programmes based on RET's: Ethiopia, Honduras, Argentina, Bolivia, Brazil, Chile, Thailand, China, India and Pakistan

Significantly less information was available regarding energy efficiency policies in developing countries. However, the following are a few examples that could be determined:

- Appliance labelling programmes in Thailand and Brazil
- Energy efficient building codes in India, Indonesia, Philippines, Brazil and Mexico
- China reported radical improvement in national energy efficiency and conservation as a result of removing price subsidies to conventional electricity
I. INTRODUCTION

D. RE & EE ARE RECOGNISED AS IMPORTANT INTERNATIONALLY

REEE Regulatory Policy Development in South Africa

A number of REEE studies have been performed in South Africa since 2002 as part of the Capacity Building Project in Energy Efficiency and Renewable Energy Project (CaBEERE). The CaBEERE studies have helped establish the groundwork needed for informed national policies and a regulatory framework for REEE in SA, and provide good examples for Namibia to consider as it takes steps to develop a REEE Regulatory Framework. The following is a list of the CaBEERE studies performed:

I. Regarding Energy Efficiency

- Baseline Study for Energy Efficiency (2002): A comprehensive report that was needed to evaluate existing energy consumption patterns and allow for the establishment of a national target for EE.
- Energy Efficiency Appliance Labelling Study (2002)
- Industrial Norms and Standards for Energy Efficiency (2005)

II. Regarding Renewable Energy

- Macro-economic Aspects for Renewable Energy (2004): Comprehensive study of the potential benefits and costs of RE development. This study is needed to set national targets for RE, and provides some justification for feed-in tariffs.
- Formulation of Market Rules for RETs (2004): Includes important recommendation for Feed-In Tariff System for South Africa
- Assessment of Commercially Exploitable Biomass Resources (2004)
I. INTRODUCTION

E. CRITICAL ISSUES FOR SUCCESSFUL REALISATION OF A REEE REGULATORY FRAMEWORK IN NAMIBIA

Critical Issue 1
Government's Vision for REEE in Namibia Must be Clearly Defined and Justified

Namibia’s White Paper on Energy Policy includes significant discussion of REEE. However, more is needed to indicate Government’s commitment to REEE and to explain/justify why this commitment is being made. A sound economic evaluation of the costs and benefits of REEE development is needed to support Government’s vision and commitment for REEE.

Critical Issue 2
The REEE Regulatory Framework Must Take Account of Namibia's Socio-Economic, Infrastructural and Environmental Features

The REEE Regulatory Framework needs to be custom-fit design for Namibia which considers the following:

- Namibia is a developing country with limited public funding resources
- Namibia is a non-Annex 1 country within the Kyoto Protocol, therefore no obligation to reduce GHGs but opportunity exists to apply for CDM funding for RE projects
- Over 100,000 households would not have access to electricity for at least the next 10 years
- Namibia has a strong dependence on imported electricity that historically has been amongst the cheapest available in the world
- Namibia has plans for a large electricity generation plant (Kudu - 600MW)
- There are approximately 26 million hectares of bush encroached farmland – rough estimated capacity for electricity generation on a sustainable basis is at least 1000 MWe (5 tons/ha & 15 year re-growth period)
- Best solar radiation resource in world
- Excellent wind resource along sea coast

Critical Issue 3
The REEE Regulatory Framework Must Aim at Creating a Level Playing Field

The costs of REEE technologies are typically high when compared to existing grid electricity tariffs. However, the existing playing field upon which REEE has been compared to non-REEE has been unfair because:

> The external costs of environmental damage, health problems, energy insecurity, etc. are much lower for REEE technologies, but are typically not accounted for in cost comparisons.

> There are subsidies to conventional grid electricity that have not been accounted for, such as:
  * the costs of the rural electrification programme have not been incorporated into tariffs
  * the original capital investment costs for Namibia’s power plants were paid for by the previous SA regime and not factored into tariffs
  * much of the existing local electricity distribution infrastructure is very old and in poor condition. The actual costs required for proper maintenance and replacement have not been factored into tariffs.

External costs and subsidies both need to be considered when comparing REEE to non-REEE and setting objectives/targets for REEE.
Critical Issue 3 (More Discussion of Externalities)
The REEE Regulatory Framework Must Aim at Creating a Level Playing Field

The European Commission conducted a 10-year programme to identify and quantify external costs (externalities) for conventional energy technologies/fuels and renewable energy technologies/fuels. The name of the programme is ExternE. ExternE identified the following types of external costs:

- Noise
- Damage to ecosystems
- Health
- Global warming
- Building deterioration
- Energy insecurity (not quantified on a cost per kWh basis)
- Agricultural crop impacts

The following table of external costs was produced by ExternE:

<table>
<thead>
<tr>
<th>Type of Damage</th>
<th>Coal</th>
<th>Lignite</th>
<th>Gas</th>
<th>Nuclear</th>
<th>PV</th>
<th>Wind</th>
<th>Hydro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.005</td>
<td>0</td>
</tr>
<tr>
<td>Health</td>
<td>0.73</td>
<td>0.99</td>
<td>0.24</td>
<td>0.17</td>
<td>0.45</td>
<td>0.872</td>
<td>0.001</td>
</tr>
<tr>
<td>Buildings</td>
<td>0.015</td>
<td>0.000</td>
<td>0.007</td>
<td>0.006</td>
<td>0.12</td>
<td>0.202</td>
<td>0.001</td>
</tr>
<tr>
<td>Crops</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0008</td>
<td>0</td>
<td>0.0007</td>
<td>0.0002</td>
</tr>
<tr>
<td>Ecosystems</td>
<td>0.20</td>
<td>0.78</td>
<td>0.04</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Global Warming</td>
<td>1.60</td>
<td>2.00</td>
<td>0.73</td>
<td>0.03</td>
<td>0.33</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Total</td>
<td>2.55</td>
<td>3.79</td>
<td>1.12</td>
<td>0.35</td>
<td>0.83</td>
<td>0.16</td>
<td>0.11</td>
</tr>
</tbody>
</table>

I. INTRODUCTION

Critical Issues for Successful Realisation of a REEE Regulatory Framework in Namibia

II. DEVELOPMENT OF A REEE REGULATORY FRAMEWORK

A. IDENTIFICATION OF REEE SECTORS REQUIRING REGULATION

Six General REEE “Sectors” Requiring Regulation

- RE-based Electricity for Supply to the Grid
- Off-Grid Energisation
- Energy Efficiency
- Technical Standards
- Access to CDM Funding
- Reduction of the First Costs for REEE Technologies
II. DEVELOPMENT OF A REE REGULATORY FRAMEWORK

B. TYPES OF REGULATORY POLICIES TO BE CONSIDERED

I. RE-Based Electricity Generation for Supply to the Grid

The consultants considered regulatory policies for commercial-scale and household-scale electricity production:

**Commerical Scale RE-based Electricity Generation**

There are two general philosophies regarding regulatory policies to support commercial-scale RE:

1. National Targets in Conjunction with Pre-Established Feed-In Tariffs
   - A country sets a national target for RE-based electricity production and tries to achieve target by setting supportive, yet sustainable, feed-in tariffs
   - The feed-in tariffs vary for each type of RET (ex. solar PV tariffs are typically much more than wind tariffs)
   - IPPs are guaranteed of being paid the feed-in tariff rates
   - The tariff rates slowly decline over time, forcing the IPP to improve operation efficiency

2. National Quota in Conjunction with RE IPP development by a Tender Process or Market-based Certificates
   - A country sets a national quota for RE-based electricity production and then achieves it by facilitating RE IPP development through a competitive tender process, or by requiring utility companies to purchase a given amount of RE certificates which are traded and sold in the market
   - The tariffs and terms of contract are typically determined during the tender process

3. National Targets in Conjunction with Pre-Established Feed-In Tariffs have generally been More Effective
   - Feed-In Tariffs are apparently more predictable and have facilitated more investment funds from from banks and investors
   - The price of electricity as a result of feed-in tariffs is generally less expensive than that resulting from a quota system – refer to the following table:

<table>
<thead>
<tr>
<th>Country</th>
<th>Price (Euro cents per KWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed-In Tariff Countries</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>6.3 – 8.5</td>
</tr>
<tr>
<td>France</td>
<td>8.4</td>
</tr>
<tr>
<td>Portugal</td>
<td>7.5 – 7.9</td>
</tr>
<tr>
<td>Austria</td>
<td>7.8</td>
</tr>
<tr>
<td>Spain</td>
<td>6.9 – 7.5</td>
</tr>
<tr>
<td>Greece</td>
<td>8.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>9.6 – 9.9</td>
</tr>
<tr>
<td>Quota Countries</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>15.5</td>
</tr>
</tbody>
</table>

   **Price of Wind Electricity in Comparison 2004/2005**
**II. DEVELOPMENT OF A REE REGULATORY FRAMEWORK**

### B. TYPES OF REGULATORY POLICIES TO BE CONSIDERED

#### I. RE-Based Electricity Generation for Supply to the Grid - Continued

**Household Scale RE-based Electricity Generation**

There are two general philosophies regarding regulatory policies to support household scale RE, but no reports comparing the two were available to the Consulting Team.

1. **Feed-In Tariff System**
   - Same system as for commercial scale, i.e. a household may receive payment for grid in-feeding according to pre-established feed-in tariffs

2. **Net-Metering System**
   - A household is allowed to offset its electricity bill at retail cost according to the amount of electricity generated from a SHS and using a bi-directional meter (note: two meter systems are not commonly used)
   - The credit accumulated from excess electricity production may or may not be allowed to be rolled over to the following month(s).
   - A limit is set on the maximum allowable power generation per household (ex. 20 kW)
   - The Government may put a cap on the total amount of electricity that may be produced for grid in-feeding from net metering, for example 0.5% of peak demand

#### II. Off-Grid Energisation

There are two general types of off-grid energisation models that require different types of regulatory policies. Note that VO Consulting & RISO prepared a report in 2001 regarding policies and regulatory issues for off-grid electrification. There are not many examples of off-grid regulatory policies available for comparison.

**Ownership-Based Off-Grid Energisation Model**

- Individual households purchase and own their own SHSs.
- Government typically supports the programme through low-interest loans and/or subsidisation of first cost
- Regulation is typically needed to support the subsidisation scheme and the quality standards
- The recent NAMREP project, Off-Grid Energisation Master Plan is an ownership-based model

**Fee-for-Service Energisation Model**

- An existing utility, or a new energy supply company (ESCO), installs SHSs or mini-grids and charges customers a fee-for-service, such as a tariff per kWh.
- A concession may be granted to a contractor for provision of energisation services. The concession areas are predetermined by government.
- The Government may subsidise the tariffs/fee-for-service, and would likely establish technical quality standards
- The electricity regulator would monitor and regulate tariffs
II. DEVELOPMENT OF A REEE REGULATORY FRAMEWORK

B. TYPES OF REGULATORY POLICIES TO BE CONSIDERED

III. Energy Efficiency

There are a number of different regulatory policies employed to increase energy efficiency

Energy Efficiency Targets

• A national target is typically set for increased energy efficiency, such as the South Africa target

Energy Efficiency Agency

• A non-governmental institution responsible for implementing energy efficiency policies

Energy Efficiency Building Codes

• Building codes concerning energy efficiency, such as requirements for insulation and other requirements for thermal efficiency

Appliance Labelling and Minimum Energy Performance Standards (MEPS)

• Appliance labelling programmes typically target selected appliances, most frequently refrigerators, freezers, air conditioners, clothes washers and dishwashers
• MEPS prevent products with very poor efficiency from entering the market

Energy Audits

• Review of energy inefficiencies in larger buildings. May be required for government buildings and/or very large buildings

Energy Consumption Reporting

• Large electricity consumers are required to report annual energy consumption in order to make them more aware of their energy consumption patterns.

IV. Technical Standards

• Standards regarding the quality and performance of REEE technologies
• Under NAMREP, EMCON prepared Code of Practice and Register for Products for Namibian Solar Energy Technologies

V. Access to CDM Funding

• Funding is available from the Clean Development Mechanism of the Kyoto Protocol
• A non-Annex I country may apply for funds for a RE project programme based on the amount of carbon dioxide emissions that would be avoided
• In order to apply for CDM funds, the non-Annex I country must establish a Designated National Authority (DNA)

VI. Reduction of First Costs

• Two reports prepared under NAMREP regarding reducing first costs: Development of First Cost Reduction Strategies for RE Products and Services and Assessment of Duties and Taxes
• Both reports make recommendations that require a regulatory framework components
III. SUMMARY OF RECOMMENDATIONS AND IMPLEMENTATION

I. RE Grid Electricity Regulation

1. Perform comprehensive macro-economic study of RE in Namibia (similar to SA) to provide an in-depth evaluation of the costs and benefits of developing RE vs. non-RE, considering the following:
   > available resources
   > external costs
   > economic benefits (job creation, benefits to agricultural sector, reduced imports, etc.)
   > recommend a national target for RE

2. Study technical issues related to grid management as a result of development of small and medium IPPs

3. Design Regressive Feed-In Tariff system regulations

4. Design Net-Metering programme regulations

5. Draft a Renewable Energy Bill that would include
   > National target for RE
   > Statement of Government’s intent to monitor progress of the RE target
   > Foundation for a Feed-In Tariff system
   > Foundation for a Net-Metering programme in all Regional Councils and Municipalities
III. SUMMARY OF RECOMMENDATIONS AND IMPLEMENTATION

II. Off-Grid Energisation Regulation

1. Confirmation by MME that it would like to further investigate feasibility of the Off-Grid Energisation Master Plan and Fee-for-Service schemes
2. Implementation of pilot scale Energy Shops
3. Implementation of a pilot scale Fee-for-Service concession contract
4. Confirmation by MME, ECB and others that a small levy on electricity should be established to fund off-grid energisation programmes (e.g., N$0.01 per kWh)
5. Draft Off-Grid Energisation Bill that would include the following:
   a. Establishment of the Off-Grid Energisation Levy
   b. Designation of a body to manage the funds generated by the levy
   c. Statements supporting implementation of the 20-year Off-Grid Energisation Master Plan
   d. Statement of Government’s support to MME to explore other possible programmes for off-grid energisation, such as fee-for-service concessions.

III. Energy Efficiency Regulation

1. Preparation of an Energy Efficiency Baseline Study (similar to SA)
2. Preparation of a National Strategy for Energy Efficiency (similar to SA)
3. Design of an appliance labelling programme and regulations
4. Design of minimum efficiency performance standards and regulations
5. Consultations between Government and Regional Councils, Municipalities and Parastatals regarding future requirements for SWH’s in publicly funded buildings
6. Design of EE Building Codes for Department of Works, Regional Councils, Municipalities and Parastatals
7. Establishment of a certified training course for Energy Auditors
8. Drafting of the Energy Efficiency and Conservation Bill to include:
   a. Government’s vision to achieve a specific target for EE within the electricity sector
   b. Statements supporting the establishment of an appliance labelling programme
   c. Statements supporting a minimum energy performance standards programme
   d. Statement of Governments intent to require SWHs in all new buildings and retrofits of Public Institutions, where practical.
   e. Statement of Governments intent to require energy audits for public institution buildings of a certain size
   f. Statements supporting the establishment of EE Building Codes for new public institution buildings, and enforcement by Department of Works and others.
DEVELOPMENT OF A REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY WITHIN THE ELECTRICITY SECTOR

III. SUMMARY OF RECOMMENDATIONS AND IMPLEMENTATION

IV. Technical Standards Regulation

1. Department of Works and MME to formally adopt in regulations the Code of Practice and Register of Products for Namibian Solar Energy Technologies

V. Regulation Supporting Access to CDM Funding

1. Ministry of Environment and Tourism (MET) to coordinate with the CDM Executive Board regarding Namibia’s intent to establish a Designated National Authority for the purpose of accessing CDM funding.
2. Preparation of a comprehensive baseline study for greenhouse gas emissions
3. Formal establishment by MET of the DNA and regulations regarding who should operate it and how.

VI. Regulation Supporting Reduction in First Cost

1. Government to communicate with the International Trade Administration Commission of South Africa (ITAC) and the World Customs Organisation (WCO) regarding the possibility of specific tariff subheadings for solar energy products
2. Government to apply to Southern African Customs Union for lower or duty free customs rates on regulators, LED and CFL lights, solar water heaters and energy efficient refrigerators to be used in conjunction with PV
3. MME to prepare a comprehensive request to the Department of Inland Revenue, Ministry of Finance for the zero-rating of VAT on the supply and installation of solar energy products in residential areas in Namibia

Thank You