**THE KINGDOM OF LESOTHO**

**MINISTRY OF ENERGY AND METEOROLOGY**

Department of Energy

National Sustainable Energy Strategy

(Draft)

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# LIST OF ABBREVIATIONS

|  |  |
| --- | --- |
| ACE | African Clean Energy |
| ATS | Appropriate Technologies Services |
| CO2 | Carbon Dioxide |
| COP | Conference of Parties |
| CSP | Concentrated Solar Power |
| DoE | Department of Energy |
| ECCD | Early Childhood Care Development |
| EDM | Electricidade de Mozambique |
| EIA | Environment Impact Assessment |
| EU | European Union |
| FOCAC | Forum on China-Africa Cooperation |
| FREA | Facility for Rural Energy Action |
| GDP | Gross Domestic Product |
| GHG | Green House Gases |
| HIV/AIDs | Human Immunodeficiency Virus & Acquired Immunodeficiency Syndrome |
| IAEA | International Atomic Energy Agency |
| ICM | Integrated Catchment Management |
| IFC | International Finance Corporation |
| INDC | Intended Nationally Determined Contributions |
| LEC | Lesotho Electricity Company |
| LEDs | Light Emitting Diode |
| LEIP | Low Emissions Investment Plan |
| LESOC | Lesotho State Oil Company |
| LEWA | Lesotho Electricity and Water Authority |
| LHDA | Lesotho Highlands Development Authority |
| LMS | Lesotho Meteorological Services |
| LPG | Liquefied Petroleum Gas |
| LREBRE | Lesotho Renewable Energy Based Rural Electrification |
| M&E | Monitoring and Evaluation |
| NCDC | National Curriculum Development Centre |
| NGOs | Non-Governmental Organizations |
| NREF | National Rural Electrification Fund |
| NSDP | National Strategic Development Plan |
| NUL | National University of Lesotho |
| PPP | Public Private Partnership Programme |
| PV | Photovoltaic |
| RESCOs | Rural Energy Service Companies |
| REU | Rural Electrification Unit |
| SACU | Southern African Customs Union |
| SADC | Southern African Development Cooperation |
| SAFEGE | Société Anonyme Française d'Etude de Gestion et d'Entreprises |
| SAPP | Southern African Power Pool |
| SCBI | Strategic Capacity Building Initiative |
| SE4ALL | Sustainable Energy for All |
| SES | Sustainable Energy Strategy |
| SPPA | Standardized Power Purchase Agreement |
| SREP | Scaling Up Renewable Energy Programme |
| SOLTRAIN | Southern Africa Solar Thermal Training |
| SWH | Solar Water Heating |
| TAF | Technical Assistance Facility |
| TB | Tuberculosis |
| TED | Technologies for Economic Development |
| UNDP | United Nations Development Programme |
| UNFCCC | United Nations Framework Convention for Climate Change |
| UNIDO | United Nations Industrial Development Organization |
| UAF | Universal Access Fund |

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# Executive summary

While electricity in particular and energy in general remain vital to social economic development of Lesotho, unfortunately the majority of Basotho still depend on Biomass as their main supply of energy especially for cooking and space heating. The entire power generation in the country (72 MW) comes from only one hydro source, which renders the country extremely insecure in case the Muela power plant failed for any reason. As the power demand exceeds this generation capacity, the rest of the power used in the country which counts for about 50% of the total capacity used today in the country is imported from South Africa and Mozambique, certainly affecting the foreign currency reserves for the country. The current power demand has already exceeded the total supply and therefore the Government needs to come up with extra generation. But also, to increase access to the population, which is critical for priming the social economic development through facilitating the productive uses across the country, grid extension shall be essential with other economic power supply solutions for the consumers that are far away from the grid. Other sector challenges include Inadequate access to finance by the consumers, Lack of energy efficiency strategy, Inadequate capacity to install and maintain renewable technologies.

Despite all these challenges, Lesotho is blessed with clean energy resources including enormous wind potential, hydro and solar which if well harnessed could easily reverse this troubling situation.

Cognizant of this potential, the Government decided to undertake a systematic approach to explore and exploit these potentials. An energy policy (2015-2025) was developed in 2015 as an essential tool that would guide all other initiatives as a path for Lesotho to achieve an access rate of 50% by 2020 as called for by the national vision 2020 which would in turn drive the economy to the benefit and wellbeing of all Basotho. However, to effectively implement this policy, a strategy is required upon which clear actions shall be pronounced with indicative budgetary implications all meant to enable timely policy implementation success.

In this respect, the strategy suggests to promote renewable energy sources and energy efficiency among other issues being addressed by the policy. Promotion of cleaner forms of energy and technologies will attract incentives. The goal is that the share of cleaner fuels in the energy supply mix increases while the share of non-sustainable forms of energy accordingly reduces. This proposed path of energy sector development is consistent with the three major objectives of SE4All that advocates for universal access to modern energy, increased energy efficiency and doubling the renewable energy sources in the total energy mix.

To achieve this, the strategy calls for review of institutional mandates; particularly energy related institutions affiliated to the energy department. This is expected to provide a platform for participation of different stakeholders in the implementation of the policy.

To inform the formulation of the strategy, a country wide consultation process has been undertaken in order to understand and take into account all the views of the population in order to have an all-inclusive ownership of the policy and its strategy. The table below provides a summary of the key aspects the strategy shall be anchored on, and based on that the action plan shall be drawn.

|  |  |
| --- | --- |
| **Summary of Strategies and Proposals** | |
| 1. **ENERGY GENERATION AND ACCESS** | |
| * 1. **ELECTRICITY SUBSECTOR** | |
| **Electricity Generation** | **Electricity Demand:** The current projections of demand for electricity range between 160 MW to 300 MW, requiring a total of installed generation capacity of 360 MW (considering a 20% reserve margin)**.** LEC (which is now allowed to engage in generation), along with LHDA and different IPPs, will ensure generation that is in line with demand.  **Electricity Generation:** The currenttargetis tohave an additional installed capacity of about 300 **MW by 2022**. Government is prioritising developing the feasibility of different generation sources to reduce the perceived delivery risks and lay ground for more private sector participation. |
| **Access to Electricity** | Government will support programs to ensure that **75% of households get access to electricity** through grid and off-grid solutions by 2022. This will be done through;  **Grid connections (currently 42% of households):** The plan is toextend the network of electricity across the countryfor on-grid connections**.** The national grid will be extended across the entire country connecting commercial consumers who will drive economic growth and households consuming sufficient electricity to make the connections financially sustainable. LEC is working on updating the power Masterplan with details of network routing, capacity and connections.  **Off-grid installations (5000 households):** Households located away (atleast 5 kilo metres) from the grid, and those that are consuming insufficient electricity to make a grid connection financially viable, will be serviced through off-grid solutions such as micro and mini-grids as well as Solar PV rooftops. |
| **Tariff and Subsidies** | **Subsidies:** Government plansto eliminate subsidies to the tariff whilst in order to maintain a regionally competitive tariff. However, there will be a plan for the pro-poor (life line) tariff structure. This should be in place by 2020.  The pro-poor pricing mechanism is intended to ensure that tariffs were designed to be affordable to the most vulnerable in society.  **Tariff Segmentation:** LEWA, in consultation with LEC, shall review the tariff structure to ensure that it is aligned with the NSDP objectives of economic development and poverty reduction.  Lewa is currently undertaking a “cost of service” study that shall enable LEC come up with realistic and cost reflective consumer tariffs. This economic tariff shall assist LEC as a power off-taker to enter into agreements with IPP relatively easier than how the situation has been with the current tariffs. |
| * 1. **BIOMASS** | |
| **Sustainable biomass solutions** | Government plans to decentralise implementation of Biomass and Bioenergy programmes from central to local government level to streamline implementation. Specifically, the Government shall:   * + - **A strategy that focuses on producing more biomass by improved forestry management**     - **A strategy that focuses on substituting more biomass with other energy sources that are environmental friendly;**     - **A strategy that focuses on saving more biomass** |
| * 1. **PETROLEUM** | |
| **Security of supply** | **Increase Security of supply:** 3 months’ supply reserve storage capacity to be executed by both government and private sector.  **Aim at decreased import costs and Increased price stability:** Through promoting and facilitating bulk purchasing of petroleum with Lesotho’s regional neighbours.  Enabling local companies to undertake transportation of petroleum products  **Maintain and increase quality:** Improve standards and testing to ensure consistently high quality. |
| **LPG and Kerosene** | **Increase access of petroleum products:** Government will construct and lease regional depots of LPG and Paraffin in growth centres. |
| 1. **ENERGY EFFICIENCY AND DEMAND SIDE MANAGEMENT** | |
|  | * **Improve energy efficiency in the electricity sector:** Phase-out the incandescent bulbs by 2022 * **Promote energy efficiency in Public Buildings**: Introduce Solar water heating in public hospitals and encourage private homes to use SWHs. * Promote and increase solar powered street lighting * Maintenance of electricity network in the country by LEC to reduce technical losses. * Encourage and enhance use of efficient biomass cookstoves |
| 1. **ENABLING ENVIRONMENT** | |
| * 1. **INSTITUTIONAL SETUP** | |
|  | The institutional framework aims to ensure the necessary institutional support to implement the energy strategy. This shall typically take the form of supportive agencies and institutions (governmental and non-governmental), academic and other educational institutions, information management and raising awareness, policy making and planning, training and organizational development, mobilization of resources, etc. |
| * 1. **LEGAL AND REGULATORY FRAMEWORK** | |
|  | The legal and Regulatory framework constitutes mainly of the regulations and obligations pertaining to sector activities' execution including investments. It is of main importance that the legal and regulatory framework remain transparent and that the regulations’ requirements and obligations are enforced. This pertains to several aspects including licensing for power generation and/or distribution and trading, tariff regulation, obligations related to the utilities and other energy service providers, etc. |
| * 1. **MOBILIZATION OF FINANCIAL RESOURCES** | |
|  | The financial resources mobilization strategy aims at securing access to finance for energy (especially renewable energy) projects. This could take form of engaging the private sector participation, the public-private partnerships, establishment of revolving funds, favourable clean energy loans, direct subsidies, etc. |
| * 1. **FISCAL REGIME** | |
|  | The fiscal regime would consist of the fiscal incentives in accordance with clean and renewable energy policy focus. This could take form of for example CO2 taxes, tax credits, institutional investor incentives, duty exemptions for RE equipment), VAT reductions, etc. |
| **4. PRIVATE SECTOR** | |
|  | The highest proportion of economic activities in Lesotho is attributable to the private sector. In the primary sector, the highest contribution to GDP comes from privately owned mines and agricultural farms. The industrial sector consists of manufacturing and construction sub-sectors and all of these are entirely in the private hands.  Private sector is also the main source of tax revenue, contributing to public funding of health care, clean drinking water, food and agricultural inputs for the poor and satisfying other public demands.  Unfortunately, involvement of private sector in the energy sector is still limited. With an exception of LHDA which is rather a parastatal, there is no known IPP in the country so far, neither is the involvement in Biomass energy related activities very visible to make an impact.  Strategic interventions shall include;   * Promoting training and capacity building actions to meet energy requirements for investments * Strengthening the ability of private sector to influence state decisions and policy making process. * Advocating for a positive involvement of private sector to deal with energy investments * Supporting private sector firms interested to develop energy activities particularly in renewable energy and energy efficiency. * Improving and facilitating access to finance for local investors * Enforcing rules and regulations and providing enabling environment to facilitate the activities of private sector related to energy investments in the country. * etc |
| 1. **CIVIL SOCIETY** | |
|  | The civil society of Lesotho faces among other challenges; absence of institutional regulatory framework for effective contribution and involvement in energy related activities, and consequently, low involvement of civil society in development activities, as well as inability of civil society to access government facilities as shared information on opportunities of technology transfer and international funding.  Strategic interventions shall include;   * Promoting training and capacity building in energy related activities * Advocating for a positive change * Encouraging effective representation of citizens in energy discussions and decisions including policies, etc. * Facilitating access to financing for energy activities * Enforcing rules and regulations to facilitate the activities of civil society * etc |
| 1. **CROSS CUTTING ISSUES** | |
| **Capacity Building** | * The current levels of human and institutional capacity are not sufficient to deliver on the sector commitments with ease. To implement energy sector projects on time, and scale up project delivery, some enabling institutional framework and skilled personnel is a pre-requisite. * This energy sector strategy puts in place measures of improving energy sector organization and management and develops capacity building plan to cover incumbent skills gaps for the sector. * **Trainings and Knowledge transfer**-The capacity of energy sector staff will be enhanced through knowledge transfer from long term experts and through short training courses. There will also be recruitment of external expertise for major transactions in order to ensure that government is getting beneficial deals.   **Strategic Capacity Building Initiative (SCBI**)-The ministry has hired both local and international sector counterparts sponsored by the European Union to boost the energy sector. Local counterparts will learn from their international counterparts and it’s hoped that with the expiry of their (international counterparts) contracts, local expert’s contracts will be able to move the sector to further desired levels. |
| **Gender promotion and**  **Women Economic Empowerment** | * The strategy will address the energy needs for vulnerable groups in the communities. Animal herd boys in rural areas of Lesotho require energy for heating and cooking. * Some of the most profound impacts of the energy sector will be improvements in the lives of rural women. * Empowering women is empowering the nation. * Reliable electricity supports SMEs in which majority women are employed, raising their incomes and saving time spent on domestic household chores like firewood collection. * The average duration of study time for school going females will increase, and female dropout rate is expected to go further down. On the demand side, especially in rural areas, there is a need to relieve women and children from the burden of searching for firewood collected in long distances away from their homes. * All stakeholders within the energy sector need to participate and take deliberate sensitization actions to encourage women participation in energy related education, training sessions, programmes and projects, planning, decision-making including energy policy implementation * The sector will reinforce the production, presentation and use of gender disaggregated data and regularly shared with interested parties and decision makers using the sector Management Information System (MIS) and other reporting platforms. * Future policy making and strategy reviews should be very much informed by the gender disaggregated data. * Women are exclusively held in domestic household chores of cooking, fetching water, and collecting fire wood especially in rural areas without access to affordable electricity. * Providing easy access to electricity for boiling water and cooking will specifically address women’s time burden and they will use their time productively. * The Biomass and Biogas strategy looks to ensure supply of improved cook stoves to especially the rural poor (predominantly women) as well as biogas for cooking and heating. * This will help reduce women’s burden of collecting fire wood, reduce government cost of preserving the environment through reforestation and ensure women productivity. |
| **HIV and other communicable disease issues** | * The Ministry of Health broadcasts all her health-related programs on radios and Television alongside other social media. * All these facilities require constant power supply without which communication will be delayed and or derailed. HIV and TB awareness campaigns to be broadcast over the same media will help reduce on infection and transmission rates as well and treatment provided by health centres. * The energy sector Strategic Plan targets to electrify 100% by 2022 of health administration centres to promote health services provision and facilitate campaigns to combat killer diseases such TB and HIV/AIDs. |
| **Environmental Conservation and Green Growth** | Although Lesotho still enjoys low carbon footprint, so far, she remains a net emitter of GHG. Efforts must be put in place to develop appropriate mitigation measures to reduce the levels of GHG emissions and enhance the county’s sink capacity. As she develops, Lesotho should target to become a carbon neutral country.  Lesotho has potential for renewable low carbon energy resources mix which is the foundation for a low carbon economy.  The development of Lesotho’s energy resources will be in harmony with the green growth efforts. The Lesotho Meteorological Services (LMS) is finalizing a Climate Change Policy whose strategy among others is to encourage green energy sources that shall ensure environmental conservation. The new domestic generation technologies such as solar, hydro and wind would be used for preserving the environment.  Overall, efforts to mitigate impacts of climate change and preserve the environment include the following among others;   * **Reduce reliance on traditional biomass energy.** Government is working on a campaign to reduce reliance on traditional forms of biomassfrom 70% to 30% by 2022. This is being planned through the use of improved cooking technologies that reduce demand for wood fuel and emit less GHGs to the environment. Other initiatives related include the biogas program that is geared towards replacing wood fuels for cooking as well as Improved charcoal carbonization techniques, increasing charcoal yield and so does the demand for wood cultivation. * **Focus on local and renewable energy sources**. The strategy for the next 5 years going forward is to put preference on the exploitation of domestic resources such as solar, wind and hydro. * I**ncreasing energy efficiency.** This will be done through **energy efficient** devices such as LEDs, Solar Water Heaters. Government encourages having all the new buildings installed with solar water heating systems to reduce use of electricity and biomass energy for boiling water. This is expected to reduce a great deal of the impact on the environment. * **Mandatory Environment Impact Assessment (EIA)**. All power projects are presupposed to have environmental clearance and the Impact certification before project implementation. Where plants are operational before environmental clearance, a mandatory Environmental audit is proposed. |
| **Regional Integration** | Lesotho as a member of SADC enjoys electricity network interconnection with South Africa, which beyond providing a routing for import and potential export of power to South Africa and beyond, it supports Lesotho’s network in terms of stability. That way, the country is able to install solar PV to the extent that would not have been supported by the Lesotho network if it was isolated. Regional regulatory framework and standards, exchange of good practices, etc., are other factors the community countries are benefitting from. |

*Table 1: Summary of key Strategic aspects and solutions*

# CHAPTER 1: Introduction

The Kingdom of Lesotho has embarked on achieving increased access to safe, reliable and cost effective energy as part of the contribution towards achieving the ambitious levels of growth defined under the Government Vision 2020 as well as LNSDP. It remains a fact that there is a strong correlation between a country’s energy usage and the level of development. The energy sector in Lesotho consists of three main components: Electricity, Biomass and Petroleum, with each playing a key role in the country’s social economic development.

The primary source of energy in Lesotho continues to be biomass, principally used in cooking and heating. The most basic forms of Biomass are firewood, shrubs and charcoal. Across the globe, firewood is associated with environmental, social and health problems, stemming from deforestation and the emissions from wood and charcoal burning respectively. To address the social and health problems emanating from use of biomass, the government through the Ministry of Energy and Climate Change is promoting the use of alternative fuels such as Biogas from animal and human waste. This will free up the time of women and children currently spent collecting firewood, giving them enough time to study and undertake more productive commercial activities.

Electricity is an essential driver of modern technologies and a prime mover of socio-economic development. Use of electricity is required for both low consumption devices such as lights and mobile phones and large users such as industry which will enable industrial processing activities, value addition, driving exports and job creation. Electricity access in the country could be through on-grid connections to households and businesses and off-grid solutions especially to rural areas that are located far from the national grid.

Current priority is to extend the network to allow heavy users of electricity across the country that drive the economy to connect to the grid, while for lighter users of electricity, grid connections are unlikely to make economic sense in the short term and as such, off-grid solutions such as Solar PV and Micro-hydro or even wind will be preferred. Overall, the government intends to support up to 50% of the population with access to electricity by 2020.

To keep pace with the increasing demand for electricity, but also reduce the risks of power import dependence, the government will ensure increased electricity generation capacity above the current capacity of around 72 MW. Diversification of power generation sources going beyond the current (only) hydro, solar and wind shall be significantly promoted. There is considerable private sector interest in electricity generation in the country, and as such financing of such investments won’t be an entire Government undertaking.

This strategy document provides a detailed roadmap of investments which will allow meeting of the energy requirement as projected. Around 120 MW of additional generation is likely to come from Hydro, whilst targeting the development of around 50 MW of wind and about 40 MW of solar. Benefiting from the regional partnership on power trade, part of off-grid solutions in some identified districts shall be provided through importing power from South Africa, especially to the districts that are close to the powered neighbourhood in South Africa. That way, all shall be needed is installation of networks on to those beneficiary districts.

Promotion of Biomass and Biogas shall remain an important undertaking taking into account the enormous requirement of both for cooking and heating especially during the cold season of the year. While promotion and dissemination of efficient cook-stoves shall be a main focus on Biomass efforts, Biogas technology promotion and dissemination shall be focused on.

The other component of Lesotho’s energy mix is petroleum. Petroleum products are essential for industrial use, lighting, and transport. Over the course of economic development, maintaining a stable supply of low-cost petroleum products will become more and more important. Strategic storage shall also be key in order to maintain minimum stock for the country but also in absorption of price shocks and fluctuations that occur from time to time with petroleum products. Modern energy sources including Kerosene and Liquid Petroleum Gas shall be encouraged for lighting, cooking and heating respectively.

# CHAPTER 2: COUNTRY OVERVIEW

Lesotho is located in the south-eastern part of southern Africa and is completely surrounded by South Africa. It is located between latitudes 28oS and 31oS and longitudes 27oE and 30oE in the interior of Southern Africa. The country is dominated by topography higher than 1000 metres above sea level (masl). It is situated at the highest part of the Drakensberg escarpment with altitude ranging from 1,400 m to 3,482 masl (Chakela, 1997). The country has a total area of 30,355 km2 and is divided into four agro-ecological zones across the ten districts, the Lowlands, Foothills, Mountains and Senqu River Valley **(figure 1).** The districts are further divided into 80 constituencies, each represented by a single seat in the National Assembly.

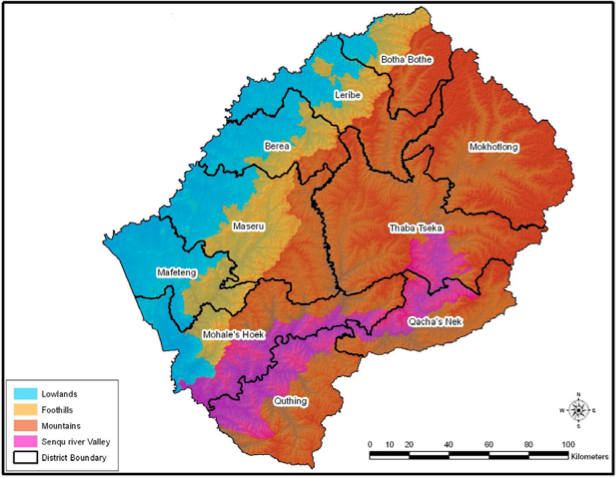


Figure 1: Map of Lesotho

The Basotho nation was founded King Moshoeshoe in 1820; the country gained its independence from the United Kingdom in 04 October 1966. Lesotho is democratic country, headed by King Letsie III. The country is a monarchy with a population growth rate of 0.08 percent per annum (BOS, 2006). According to the Bureau of Statistics 2016 Population and Housing Census Preliminary Results Report”, 2017, the population of Lesotho is estimated at about 2million habitants with 73 percent and 30 percent of the overall population residing in rural and urban areas respectively. Livelihoods in the rural areas depend on agriculture as a main source of income; the agriculture sector contributed to 6.3% of the Gross Domestic Product (GDP) in 2015/16. The Bureau of Statistics National Accounts depicts that the GDP of Lesotho is being driven by large industries of mining, construction, food products and textile and by service sectors; wholesale and retail trade.

The major impediment to human development in Lesotho is poverty, resulting from limited resources, low productivity and other factors. Unemployment for women is 33.1%, for youth is 37.6%, and the overall poverty level is high at 56.6% of the population. Almost half of the population lives below the poverty line (Central Bank, 2015).

# CHAPTER 3: ENERGY SECTOR OVERVIEW

# 3.1 Global perspective

Modern energy services are crucial to the human well-being and to the economic development of any country. Yet, over 1.3 billion people in the world do not have access to electricity and 2.6 billion people do not have clean cooking facilities. They use inefficient means to burn wood, coal, charcoal or animal waste to cook their meals and heat their homes, with the result of depleting biomass resources and exposing themselves and their families to smoke and fumes that damage their health and kill nearly 2 million people annually[[1]](#footnote-1).

Without access to modern and sustainable energy services, the attainment of the Sustainable Social and Economic Development is far-fetched. The same applies to the promotion of economic development and protection of the Earth's climate and ecosystems.

# 3.2 National Development Frameworks and Instruments

# 3.2.1 The Development Path

**Vision 2020**

**NSDP: 2012/13 – 2016//17 – NSDP 2016/17 – 2021/22**

**Policy: 2015 - 2025**

**Strategy: 2018 -2022**

**Action plan: 2018 - 2022**

***Monitoring and Evaluation***

*Figure 2: The strategy within the entire sector development chain*

# 3.2.2 Lesotho’s Vision 2020

The Vision 2020 was formulated in 2000; the policy states that “By the year 2020 Lesotho shall be a stable democracy, a united and prosperous nation at peace with itself and its neighbours. It shall have a healthy and well-developed human resource base. Its economy will be strong, its environment well managed and its technology well established”. The Vision 2020 targeted to have at least 35% of the population connected to electricity by 2015, 50% by 2020, and to reduce the rate of wood use in national energy consumption.

# 3.2.3 National Strategic Development Plan 2012/13 – 2016//17

The NSDP 2012/13 – 2016//17 was developed as an implementation strategy to the National Vision 2020. The strategy identified energy as a growth enabler. The NSDP sets out the development growth strategies and provides national strategic direction to all agencies. The plan prioritises ‘clean energy and green technologies’ - 17 - (MFDP, 2011: 33) with investment in hydro, wind and solar power generation to meet Lesotho’s electricity demand (base load). The NSDP identified the following strategic goals for the energy sector:

* Increase clean energy production capacity to attain self-sufficiency,
* Expand electricity access to centres of economic activity, other sectors and households
* Increase energy conservation, safety and access to alternative (non-electricity) energy products and efficient technologies

The NSDP strategic goals will be to:

* Pursue high, shared and employment creating economic growth
* Develop key infrastructure
* Enhance the skills base, technology adoption and foundation for innovation
* Improve health, combat HIV and AIDS and reduce vulnerability
* Reverse environmental degradation and adapt to climate change
* Promote peace, democratic governance and build effective institutions.

The NSDP 2012/13 – 2016//17 is currently being revised, and this report provides inputs to the NSDP II under the energy sector consideration.

# 3.2.4 Energy Policy 2015-2025

In the year 2015, the Government of Lesotho through the Ministry of Energy and Meteorology launched the **National Energy Policy 2015-2025**, the policy provides strategic direction in the energy sector. The policy vision pronounces that “***Energy shall be universally accessible and affordable in a sustainable manner, with minimal negative impact on the environment.*** The Energy policy has 15 policy statements that are targeted at attaining the strategic priorities identified the NSDP.

# 3.3 Current Country Energy Profile

The country’s primary energy base consists of hydroelectricity, biomass, and petroleum products. The chart below shows the Lesotho Energy mix in 201/16. Most households generally use a combination of energy sources for cooking that can be categorised as; traditional (such as dung, agricultural residues and fuel wood), intermediate (such as coal and kerosene) or modern (such as liquefied petroleum gas (LPG) and electricity).

*Figure 3: 2015/2016 Energy Mix*

*Source: Extrapolation of Data from DOE Statistics*

# 3.3.1 Energy Demand

In Lesotho, energy is utilized by rural households, urban households, government buildings and institutions, commerce, industry, agriculture and transport. Energy demand is highly dependent on factors related to the accessibility, affordability and, reliability of energy resources.

The dominant energy resource used in the rural sector in Lesotho is biomass, which, in its various forms, is used for cooking and space heating. Almost 90 per cent of energy consumption in the rural areas is sourced from indigenous biomass fuels consisting of shrubs, firewood, crop residues and cow-dung. Paraffin is used for cooking, heating and lighting. Other fuels such as LPG and coal play a relatively minor role in rural areas. Electricity access is generally very low in rural areas. Biogas is another emerging source of energy that is getting used for especially cooking, but it is still at its infancy development level.

Urban residents depend on commercial energy resources and firewood for cooking, space heating, water heating and lighting. Predominant fuels are coal, firewood, paraffin, electricity and LPG.

Government buildings and institutions mainly use electricity and coal as energy source for their various activities and ninety percent of the consumption for these two fuels is for space heating and lighting. Generally, electricity is used for space heating in urban areas and outlying towns, and rural institutions use coal where grid electricity is unavailable.

Commercial sector energy consumption is dominated by electricity (75 percent) for lighting and space heating. Other forms of energy such as coal, diesel, firewood and LPG constitute only 25 percent. Most industries use electricity for lighting and coal or electricity for space heating and process heat.

Agriculture in Lesotho is almost entirely at the subsistence level and there is virtually no commercial farming. Most energy is provided through human labour or animal power, though tractors are used to a limited extent (for ploughing and milling). While the energy demands of agriculture are quite small in terms of commercial energy, the sector is important in terms of its contribution to biomass fuels (wood, crop residues and animal dung) as well as the possibilities for income-generating activities that require energy as an input.

# 3.3.2 Energy Sources, Applications and Potential

# 3.3.2.1 Electricity sub-sector

Lesotho generates 72 MW of electricity from Muela Hydropower plant. According to LEWA annual report 2015/16, Lesotho had a peak demand of over 150MW in 2015/16, which was met by imports from Electricidade de Mozambique (EDM) in Mozambique and ESKOM in South Africa. Lesotho is a member of the Southern Africa Power Pool (SAPP), which interconnects the power utilities (transmission) in the SADC region. Over 50% of the electricity consumed in Lesotho is imported from South Africa (Eskom) and Mozambique (EDM). The table below shows the annual electricity imports from the 2010/11 to 2015/16.

Table 2: Lesotho Maximum Demand Profile (MW) for Period 2009/10- 2015/16

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Maximum Demand (MW) | Installed Capacity (MW) | Imported Capacity (MW) |
| 2009/10 | 133.4 | 72 | 61.4 |
| 2010/11 | 138 | 72 | 66 |
| 2011/12 | 141.69 | 72 | 69.69 |
| 2012/13 | 147.63 | 72 | 75.63 |
| 2013/14 | 143 | 72 | 71 |
| 2014/15 | 149 | 72 | 77 |
| 2015/16 | 152.98 | 72 | 80.98 |

*Table 3: LEWA Annual report 2015/16*

An overall assurance of supply depends on top-up on to the skyrocketing regional prices of electricity imports from Eskom and EDM. Domestic Muela Hydro Power (MHP) bulk tariff average stands at M 12/kWh: ($ 0,01/kWh) while the Eskom & EDM import tariff average stood at M 78c/kWh: ($ 0,065/kWh) in 2013/14.

The government of Lesotho has a target to achieve 50% of electrification rate by 2020 and to ensure security of electricity supply using locally available renewable energy resources.

1. **Grid Electricity**

The grid electricity is concentrated in urban areas with about 70% of households connected to the grid and the rural households account to a little less than 8% of the total national electricity connections. The 2015/16 LEWA annual report states that the rate of connection to the main electricity grid is about 42% which translates to 192,838 connected households, thus at the 2015, the electricity per capita was about 300kWh. This connection is primarily concentrated in the urban and growth centres where infrastructure services are relatively well developed in terms of transmission and distribution. Less than 8% of the area serviced by grid is defined as rural.

1. **Off-grid Electricity**

The off-grid electricity in Lesotho is mainly targeted at hard to reach areas. The applications include solar home systems and mini-grids electricity generation. The country currently has one operational off-grid hydro-power plant at Semonkong with a generation capacity of 180 kW. The deployment of solar home systems has reached several rural communities and they are mainly used for lighting and other small household energy needs such as charging phones, powering televisions and radios.

The Government of Lesotho in collaboration with UNDP has a project aimed at energising rural communities using off-grid application. The project will span for 5 years from 2016 to 2020 and targets to establish 5 mini-grids and 10 energy centres.

1. **Electricity Demand**

According to Lesotho Electricity Company 2016 data, the largest share of electricity is consumed by the industrial sector with 35% of electricity followed by domestic with 33% and commercial sector with 19%. The chart below shows LEC electricity sales by sector in 2016/17. As a developing country, Lesotho’s industry is expected to grow and the demand for electricity will also grow. Lesotho National Development Cooperation (LNDC) projections predict that there will be large demand of energy as the country develops.

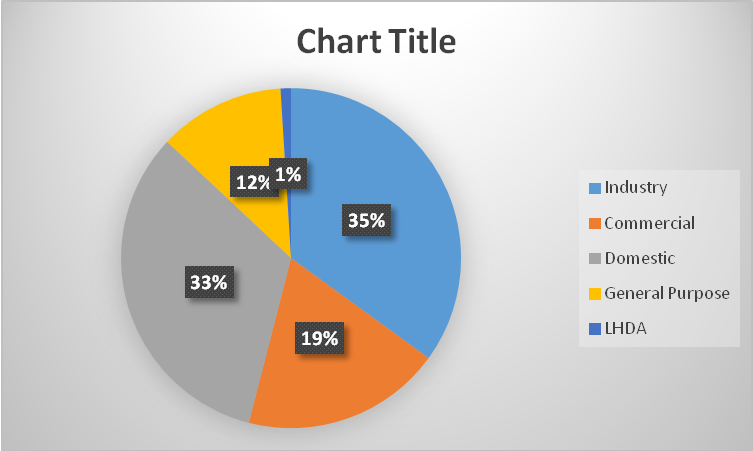


Figure 4*: Electricity consumption pattern*

Average per capita consumption of electricity in Lesotho is 300kWh, less than half the Sub-Saharan African average of 488 kWh, but has been growing since 2009 because of new household connections. Electricity demand peaks during the winter months of June and August, when there is high demand for heating, and is lowest in the summer.

**iv. Electricity Generation**

1. **Hydro Electricity**

Lesotho has one large 72MW hydro power station: Muela hydropower plan that was commissioned in 1998 under the phase 1 of the Lesotho highlands Water Project. In addition to Muela there is one other operational small hydro power plant 180 kW at Semonkong.

Assessment and prefeasibility studies in the Draft Generation Master-Plan 2006 indicate that Lesotho has over 500MW hydro power potential. The assessed sites include Senqu River with an estimated potential ranging between 100 and 200MW, the Makhaleng River with potential of 10 to 20MW as well as Hlotse River among others.  Detailed feasibility studies are required for the development of these projects.

1. **Solar Energy**

Solar energy comprises of different categories namely: solar Photovoltaic (PV), Concentrated Solar Power (CSP) and Solar Water Heating (SWH). Lesotho experiences some of the highest levels of solar radiation in the World. Solar technologies are either solar thermal collectors or photovoltaic. Solar energy can be used to generate electricity; heat water; and to heat, cool and light buildings. There is a considerable potential for solar energy generation in Lesotho as identified by the draft Electricity Generation Master-plan. The technologies used in Lesotho include solar water heaters, solar home systems and solar PV; however, they have not been fully deployed. Solar energy is used by several sectors in Lesotho, this include communication industries, Health, Public institutions and households. The deployment and promotion of solar energy during the implementation of Africa Adaption Programme and Lesotho Renewable Energy Based Rural Electrification (LREBRE) contributed significantly to the utilisation of solar energy.

1. **Solar Electricity Generation**

Solar energy can be used for electricity generation both as photovoltaic and solar thermal. The technology can provide electricity generation ranging from small to medium stand-alone applications to large scale grid connection. Lesotho currently has one grid connected solar power plant located at Moshoeshoe 1 international airport with an installed capacity of 280Kv. There are other small solar home systems installed by private sector at various households for provision of electricity needs.

1. **Wind Energy**

Wind energy uses the naturally occurring energy of the wind to generate electricity. Lesotho has a great wind power potential. According to the NSDP, preliminary assessments indicate that Lesotho has potential to harness about 6000MW of wind power (NSDP 2012-2017….). According to the National Energy policy statement number 4 “Renewable energies” is targets to promote renewable energy resource wind included. International Finance Corporation (IFC) developed a feasibility study on three sites to assess wind power generation, the sites were Mafika-Lisiu and Lebelonyana, the findings of the study further emphasize the wind power potential for Lesotho.

**v. Electricity Transmission, Distribution and connection**

**Transmission and distribution**

Transmission and distribution lines in Lesotho are owned by LHDA and LEC. LHDA owns the transmission

and distribution lines that were developed under Phase I of the Lesotho Highlands Water Project.

The Transmission network evacuates power from the generation sources namely 'Muela Hydropower (LHDA), Eskom (South Africa) and EDM (Mozambique) to LEC load centres. The supply fr​om 'Muela and Eskom plus EDM (at Maseru intake) is transmitted through the 132kV lines to Maputsoe Substation and Mabote Substation respectively. The supply from Eskom (Clarence intake) enters Lesotho through 88kV line at Khukhune Substation in Butha-Buthe, while Qacha's Nek intake is through 22kV line from Matatiele.

The transmission lines are of voltage levels 132kV (588Km), 88kV (86Km), 66kV (80Km), and 33kV (863Km). However, there are places where LEC distributes with 33kV like Thabana Morena in Mafeteng. The transmission voltages are stepped down to distribution voltages through 45 substations of which six of them namely Mabote, Mazenod, Maputsoe, Ramarothole, Litsoeneng and Khukhune Substations are critical for the supply of electricity countrywide. Qacha's Nek and Mokhotlong districts are the only districts that are not connected to the main national grid.

The Distribution network distributes power from substations to electricity users. The Distribution network ranges from the voltage of 11kV up to the customers supply at 220V and 380V.

**Electricity connection**

The 2015/16 LEWA annual report states that the rate of connection to the main electricity grid is about 42% which translates to 192,838 connected households, thus by 2015, the electricity per capita was about 300kWh. This connection is primarily concentrated in the urban and growth centres where infrastructure services are relatively well developed in terms of transmission and distribution. Less than 8% of the area serviced by grid is defined as rural.

**vi. Recent Developments in the Electricity subsector**

1. **Institutional and Regulatory Developments**

* **Establishment of Universal Access Fund**

The Universal Access Fund has been established by LEWA with a purpose of providing financial resources for electrification projects identified in rural areas through the Rural Electrification Unit. The fund has significantly resulted in the increase of national electrification rate.

* **Renewable Energy Regulatory Framework**

The electricity regulator LEWA developed the Grid Code as regulatory requirement in 2015/16, the aim of the Grid Code is to specify technical requirements for connection to, and use of the transmission system. The framework will create an enabling environment for the implementation of the Energy Strategy.

* **Cost of Service Study**

The cost of service study aims at establishing electricity pricing framework meant to provide guidelines to ensure cost reflective consumer tariffs that shall ensure economic sustainability of the off-taker, which is currently the power utility. This shall also assist in having benchmarks for the feed-in-tariffs from different sources. The study is funded by the African Development Bank and will commence in June 2017.

1. **Increasing Access Developments**

* **Electrification Initiatives**

The government of Lesotho established a project management unit in the Department of Energy, the Rural Electrification Unit (REU). REU is aimed at engaging in rural electrification initiatives in rural communities outside the service territory. The unit developed a financing scheme to enable communities to access electricity in their households. According to LEWA annual report 2016/17, the electrification rate increased from 34% in 2013/14 to 42% in 2016/17. This increase was achieved through funding from the Government of Lesotho, Universal Access Fund (from LEWA) and contributions from individual households.

The market for electricity is characterized by the country’s geography and in particular, the small, largely rural and sparsely distributed population. The electricity consumption for the currently electrified consumers has been increasing steadily. The newly connected rural households consume between 75 and 112kWh each, while urban households consume between 95 and 164 kWh per month.

* **Electricity systems Improvement and network rehabilitation**

Lesotho Electricity Company (LEC) is responsible for transmission and distribution of electricity. Over the years there has been minimal maintenance of electricity infrastructure which led to capacity losses. Poor infrastructure also adversely impacts the electrification rate. In 2015/16, the Government of Lesotho developed a proposal for rehabilitation of electricity infrastructure.

Consisting of the refurbishment of switching stations and transmission lines, the project also entails construction of an 8km, 132kV transmission line and expansion of the Khukhune substation. Improving the reliability and quality of electricity supply to existing and new customers in Lesotho are among the objectives of the project.

The upgrade of the electric power distribution system is expected to result in the reduction of losses and outages by two percent and 25 percent respectively, and an increase of five percent in the system availability.

The rehabilitation of the switching stations in the main load centre, Maseru, is expected to reduce interruptions in supply and have positive impacts on the entire countywide distribution network. This would enable expansion of access to various parts of the country in the short-term. The project is being implemented through the Lesotho Electricity Company (LEC).

1. **Electricity Generation Developments**

* **35MW wind Power Plant: Lets’eng La Terai**

A 35MW wind power plant at Letséng La Terai in the Botha-Bothe district has been identified by a private contractor. Feasibility studies on the development of the plant have been completed and await the finalisation of land issues. The power plant targets at powering the Letséng Mine which requires large amount of electricity for its operations. The proposed wind power plant at Letséng has a great potential to reduce the nations over reliance on electricity imports.

* **Semonkong Wind Power Plant: 15 MW**

Further wind energy feasibility study of wind potential at Semonkong has been completed by Mo-Sun Clean Technology.

The development of power plant is awaiting the electricity transmission infrastructure at the proposed site

* **20MW Solar Power Plant**

The Ministry of Energy has advertised a call for proposal for the development of 20MW solar power plant. The power purchase agreement with the preferred bidder is currently being negotiated with the power off-taker – the utility company. The development of the plant will attest to achieving the national goal of increasing security of electricity supply.

* **EU Supported call for proposal project on mini-grids in rural areas**

The European Union Delegation “Called for Proposal” with an objective of increasing energy access in rural areas through increasing household devices, distribution, after sales structures and mini-grids. The project entails piloting mini-grids in rural areas, commercialisation of access to improved energy household devices including energy efficient stoves and solar home systems. The call further extends to establishing infrastructure and addressing logistical challenges associated with developing sustainable energy products and service businesses within rural communities. The target beneficiaries for this project are rural communities and small enterprises. Actions under this project should aim at sound business models, provision of clean energy and energy efficient household devises and access to renewable energy in isolated un-electrified rural areas.

* **UNDP initiatives on rural electrification projects**

The Department of Energy is implementing a 5-year project in collaboration with the United Nations Development Programme. The purpose of the project is to catalyze investments in renewable energy-based mini-grids and Energy Centers to reduce GHG emissions and contribute to the achievement of Lesotho’s Vision 2020 and SE4All goals. The activities of the project include development of creating enabling environment for the deployment of renewable energies and climate change mitigation, energy data collection and analysis as well as pilot of village energization schemes through energy centers and mini-grids.

**d. Feasibility Studies**

The hydro power generation component of the Lesotho Highlands Development Authority project is currently under way. Hydro power projects to be implemented as per Lesotho and South Africa Power water supply-treaty is at the stage of power plants site identification. The feasibility study for hydro power plants along the LHDA catchment is being developed.

Pre-feasibility studies for electricity generation have been identified under the draft Generation master-plan and require development of detailed feasibility studies to assess their respective viability. Below are some of the identified sites:

**e. Electricity Masterplan**

The Department of Energy is the process of updating the Electrification Masterplan. The project is aimed at increasing electricity access and identifying countrywide electricity generation options for Lesotho through Technical Assistance Facility (TAF) of the European Union.

The TAF also has a component of reviewing the energy stakeholder mandates and strengthening the coordination function of the Department of Energy. Moreover, TAF has proposed the financing frameworks for electrification in Lesotho. The proposal is that grid expansion should be partly financed under the Universal Access Fund while all off-grid electrification should be the mandate of rural electrification unit. It is further proposed that, the rural electrification unit should be restructured into a rural energy agency and financed through different approaches including establishing a levy on concessional tariffs and from international donors. Tables 2, 3 and 4 provide the Power Masterplan developed in 2009 which is currently being updated, however, it provides the overview of the situation in general.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project** | **River** | **Capacity/Specification** | **Cost** | **Status** | **Remarks** |
| 1. Muela Hydropower Project (Phase-1) | Malibamatšo / Senqu(orange) | Capacity=72MW | M483.0 mil  Sept 1989 | Plant was commissioned in 1998 and has been under commercial operations since. | Taking into account the existing situation in the region (ecological, energetic and other) this project is considered to be positive |
| 2. Muela Hydropower Project (Phase-1) | Malibamatšo/ Senqu (orange) | Capacity =110MW Output=516GWh/annum Ave net head=170m |  | Plant is an expansion (phase) of the  ‘Muela Hydropower generating station, the detailed feasibility of which will be  considered holistically with LHWP phase  2 feasibility studies. | The expansion of the Muela Hydropower has to be made with Polihale project after full feasibility study, as it is envisioned in the second phase of the LHWP. |
| 3. Oxbow Hydroelectric Project | Malibamatšo | Capacity=80MW  Output= 516GWh/ annum | US$ | Feasibility studies completed in 1989 by  Monenco Consultants Ltd of Canada under funding from CIDA. Project suspended due to LHWP Phase 1  certainty. | Despite of lack of information the project needs to be restudied. As the project was finished in 1989, the feasibility study has to be reassessed and it has to be defined  whether it envisions current demands or not. |
| 4. Jordan Multipurpose Project | Senqunyane | Capacity=36MW Output=200  GWh/annum | M396.0 mil  Jan.1984 | Original pre-feasibility done by HYDROPLAN Consultants under west German Aid Program. Project also  envisaged as a water supply scheme to the lowland. Project suspended due to LHWP Phase 1. | None |
| 5. Quthing small Hydropower Project | Quthing | Capacity=15MW |  | Identification and pre-feasibility studies funded by the Austrian Government in  1984. SADCC Energy Ministers approved im1989 as SADCC project  3.3.5 Attracted very little interest in favor of big plants. | As the project was finished in 1984, the feasibility study has to be reassessed and it has to be defined whether it envisions current demands or not. It can be reviewed as the last stage of Quthing cascade. |

Table 4: Large hydropower stations

*Source: Lesotho Power Generation Master Plan Project # lec/gen/1-2009*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project** | **River** | **Capacity/ Specification** | **Cost**  **(USD**  **million)** | **Status** | **Remarks** |
| 1. Tlokoeng | Khubelu | 670 KW | 0.321 | Commissioned in early 1990 | Despite the fact that the station is in operation, the negative part of  this project is lack of generation balance and duration of operation. |
| 2. Motete | Motete | 524 KW | 0.408 | Feasibility Study was conducted in early 1980s by SOGREAH  Consulting of France | As the project was finished in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 3. Qacha’s Nek | Tsoelike | 482 KW | 0.526 | Feasibility Study was done by  SOGREAH funded by France. Commissioned in mid 1990. | As the study was conducted in 1990, the feasibility will have to be  reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 4. Mokhotlong | Bafali | 242 KW | 0.400 | Feasibility Study was conducted  in early 1980s by SOGREAH Consulting of France. | As the study was conducted in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 5. Mokhotlong | Sehonghong | 205KW | 0.480 | Feasibility Study was conducted in early 1980s by SOGREAH Consulting of France. | As the study was conducted in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 6. Semonkong 1 | Maletsunyane | 120 KW | 0.320 | Phase-1 180 KW Plant commissioned in November 1988. Phase-2 not started although provisions are in place to expand  the station to 400KW | As the study was conducted in 1988, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 7. Lesobeng | Lesobeng | 110 KW | 0.496 | Feasibility Study was conducted  in early 1980s by SOGREAH Consulting of France. | As the study was conducted in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 8. Sehonghong | Sehonghong | 700KW | 1.640 | Feasibility Study done by  SOGREAH, funded by France | The feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 9. Sehlabathebe | Tsoelike  (Leqooa) | 100/245 KW | 0.760 | Feasibility Study was conducted in early 1980s by SOGREAH  Consulting of France. | As the study was conducted in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 10. Mokhotlong 1A | Mokhotlong | 800 KW | 0.281 |  | None |
| 11. Mokhotlong 2A | Mokhotlong | 700 KW | 0.265 |  | None |
| 12. Mokhotlong B | Mokhotlong | 1500 KW | 0.288 |  | None |
| 13. Semonkong | Maletsonyane | 340 KW | 0.088 | Feasibility Study done by  NORPLAN, funded by Norway. | As the study was conducted in 1984, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 14. ‘Mantšonyane | Mantšonyane | 2000 KW | 0.098 | Feasibility Study done by  NORPLAN, funded by Norway. | As the study was conducted in 1984, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 15. Sehlabathebe | Tsoelike  (Leqooa & | 150 KW | 0.680 |  | None |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project** | **River** | **Capacity/ Specification** | **Cost (USD million)** | **Status** | **Remarks** |
|  | Tsoelikana) |  |  |  |  |
| 16. St. Teresa | Masnat | 200 KW | 0.380 |  | None |
| 17. Lethena | Quthing | 2000 KW | 0.244 |  | None |
| 18. Mosetlelo | Quthing | 2500 KW | 0.344 |  | None |
| 19. Likhabaneng | Likhebaneng | 4500 KW | 0.400 |  | None |
| 20. Pitseng | Tsainyane | 70 KW | 0.384 | Pre-feasibility studies were conducted by Taiwan Power Company in the mid-1980s. | As the study was conducted in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 21. Ha Ntsi | Liphiring | 30 KW | 0.904 | Pre-feasibility studies were  conducted by Taiwan Power  Company in the mid-1980s. | As the study was conducted in 1980s, the feasibility will have to be reassessed, to define exact technical parameters and its ability to comply with current requirements. |
| 22. Mokhothlong | Mokhotlong | 795 KW | 0.235 |  | None |

Table 5: Micro and mini hydropower stations

*Source: Lesotho Power Generation Master Plan Project # lec/gen/1-2009*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project** | **River** | **Capacity/ Specifications** | **Cost** | **Status** | **Remarks** |
| 1. Monontša  Pump/ Storage | Pitseng River  (tributary of the  Caledon River) | Capacity=1 000MW Net  Static Head=620m |  | Memorandum of Understanding on the  Project was signed between LHDA and  Eskom in April 2004. Pre-feasibility  studies shortly to commence. | The project is acceptable, but for the next stage of the  project development diversion length has to be  reassessed together with the reservoir location. |
| 2. Three other pumped storage project | On 4 different  Location. | ≥1 000MW each option at net head of ≥500 m |  | The first pumped storage project  Monontša was the most preferred site of the three identified in comparison of a number of factors. The 3rd option to consider is the feasibility of up to 1,500  MW peaking plant at LHWP Phase2  Mashai Dam. | Despite of the lack of information on LHWP phases  2, 3, 4, and 5, we still can conclude that during the reservoir operation the water level changes down to minimum operation level will cause the increase of waterway length, which will have negative influence  on Pumped Storage Plant. |

Table 6: Pumped storage plants

*Source: Lesotho Power Generation Master Plan Project # lec/gen/1-200*

**i. Challenges in the electricity subsector**

The challenges in the electricity subsector include

1. High risk of lack of diversification of power sources – dependency on only one domestic source (Muela hydropower plant)
2. high reliance on electricity imports,
3. lack of maintenance of network systems infrastructure,
4. low electrification rate,
5. capital intensity of electricity generation projects,
6. lack of institutional and regulatory frameworks in the electricity sector.
7. still practicing non-cost reflective tariff

**viii. Proposed solutions to electricity subsector**

|  |  |
| --- | --- |
| **Challenge** | **Proposed intervention** |
| Risk of dependence on one  domestic power source | Engaging the private sector in power generation: a number of projects  under negotiations (solar, wind and hydro) |
| Low electricity generation:  High reliance on electricity  Imports | Developing power generation projects through solar, hydro and wind |
| Promote energy efficiency in electricity subsector: Demand side  Management |
| Rehabilitate electricity infrastructure to minimise electricity losses |
| Low electrification rate | Promotion of off-grid electricity generation projects especially in rural  areas: Mini and micro-grids using solar and hydro sources as well as  cross-border imports from South Africa |
| Strengthen the capacity of LEC and REU to implement the  electrification projects |
| Expand electricity network infrastructure |
| Capital intensity of electricity  generation projects | Develop energy guarantee fund to facilitate the financing of  generation projects by the private sector |
| Develop enabling policies for private sector participation in generation  Projects |
| Undertake PPP arrangement in investments for medium and large  Projects |
| Organize regional and international investment forums to encourage  foreign investments into the sector |
| Lack of effective institutional  arrangement and  regulatory frameworks | Develop local capacity to implement, monitor and evaluate electricity  Projects |
| Non-cost reflective tariffs | Undertake cost of service studies to establish realistic tariffs |
| Apply Universal Access fund and/or any other sustainable  mechanism to subsidize tariffs in the rural areas |

Table 7: Proposed solutions to electricity subsector

# 3.3.2.2 RENEWABLE ENERGY[[2]](#footnote-2)

Lesotho is well endowed with an immense potential of renewable energy sources namely; hydro, wind and solar. Lesotho has approximately 300 days of sunshine annually. The geographical location the snow-capped mountains and expansive plateaus possess more hydro and wind power potential. Biomass is the most commonly used form of energy in Lesotho and accounts to over 60% of household energy needs.

1. **Solar**

Except for a few days in the rainy season, the sun appears all day for 10.2 to 13.8 hours, and most parts of the country get 300 days of sunshine a year with required radiation that can be used effectively to produce electricity. The theoretical solar power reception in Lesotho is about 60 x 1012 kWh per year. This is equivalent to 5159 million tons of oil equivalent (mtoe) per year. With 14% solar-to electricity conversion efficiency via PV modules, usable energy is 280 KWh/m2/yr. Solar PV is seen as having a very high potential especially in rural electrification for off-grid installations in households, schools, hospitals etc. Due to very mountainous terrain and sparse population, grid extension is not viable in the southern parts of the country. Solar energy is also seen as a means for water heating and the government has embarked on a project to equip public buildings with solar heaters. Solar cookers and solar dryers are also discussed for rural households. An analysis undertaken by the Department of Energy indicates that about 30 per cent of rural households could afford solar PV if there is a financing mechanism (whereby owners buy on credit) in place.

1. **Wind**

Lesotho offers the opportunity to build one of the highest windfarms in the world, with more than 80% of its territory lying at least 1,800m above sea level. Estimates have ranged that there is the potential to generate over 6,000 MW of wind power in the foreseeable future. Wind is a potentially significant source of energy for Lesotho not only for its own uses, but as well for export to its neighbours which present higher energy demands. Despite the potential to be one of the world’s highest wind farms, Lesotho is susceptible to one of the highest rates of localised lightning strikes. Another concern is the ability of the aluminium composite blades to withstand the Mountain Kingdom’s icy (down to -20°C) winters. Ice accumulation is a problem that can worsen in low-wind scenarios, which impacts economic viability.

**iii. Hydro**

The Lesotho Highlands Water project offers opportunities for mid to large scale hydropower development and several studies have been conducted on possible pumped-storage plants as well. In most cases, the units are not operating at their full capacity because of drought and siltation. However, it is estimated that the large-scale hydropower generation potential for Lesotho is approximately 450 MW. As to small scale hydro, there are currently four mini hydro-power stations in the mountains at Semonkong, Tlokoeng, Tsoelike and Mants’onyane. It is estimated that there are roughly other 20-40 sites available for exploitation with a combined potential of more than 20 MW. The situation in Lesotho is conducive to developing small hydropower systems due to adequate existing hydropower resources and a settlement pattern in rural areas that favors decentralized energy systems. The current legislation that allows independent power producers to generate electricity for the national grid and the creation of a National Rural Electrification Fund by the government is seen as facilitating the uptake of small hydropower technology.

**iv. Biomass**

Lesotho’s energy balance is dominated by biomass energy, which contributes 66% to the energy mix. Biomass used in Lesotho consists of wood, shrubs, animal dung and waste crop, these resources are used mainly for cooking and space heating.

The overwhelming reliance of rural households on biomass fuels places tremendous pressure on the already meagre forest resource. The percentage of households in Lesotho with access to energy efficient stoves is growing, however, this reliance on biomass is not sustainable. Fuelwood scarcity is already evident through the Lesotho’s reliance on imports for fuelwood and coal to complement its domestic supply. In addition, there is no institutional support for promoting alternative energy fuels such as LPG and the efficient use of biomass.

Biomass not only results in an environmental burden (reduced CO2 sequestration due to non-renewable utilisation), but also presents a social burden since women and children are largely responsible for menial chores such as the collection of firewood and water.

Biomass is however closely associated with environmental degradation in the form of deforestation and soil erosion, this phenomenon is likely to continue until alternative energy options are explored. Below are options to deploy in order to minimise dependence on biomass:

* Energy Efficient cook stoves
* Biogas Digesters
* Waste to Energy
* Promotion of alternative energies

**Recent Developments in the Biomass Subsector**

1. **Low Emissions Investment Plan**

The Scaling Up Renewable Energy Programme (SREP) funded by World Bank will also create an enabling environment for private sector participation in the renewable energy sector. The SREP will assist Lesotho develop a Low Emissions Investment Plan, the plan will serve as the investment prospectors for renewable energies in Lesotho.

present.

1. **Energy Efficient cook-stoves**

The improved methods of combustion such as clean stoves that are more efficient when combined with sustainable utilisation of wood biomass can also benefit rural communities

The government implemented a pilot project at Lekokoaneng Multipupose Clean Energy Centre, the centre is community owned entity located in the Berea district. The pilot project was aimed at introducing Pro Poor Public Private Partnership through the energy sector. The project entailed established of an energy centre that is aimed at promoting renewable energy technologies and information dissemination. The centre serves as a one stop shop of renewable energy technologies including among others energy efficient cook stoves and solar geysers.

Energy efficient cook-stoves are being assembled in Lesotho and distributed by local NGOs to rural communities through various subsidy and financing schemes. According to the African Clean Energy Survey (Lesotho) approximately 4,560 African Clean Energy (ACE) and 10,000 Solar Lights cook stoves have been sold in Lesotho; the estimated total available market is about 353,000 households. There are also retained heat devices like wonder bag (Sephehise sa mohlolo) that are being promoted by the local NGO (Technology for Economic Development) this device reduce burden on biomass. Furthermore, the GoL through it research and development centre, Appropriate Technologies Services (ATS), is also developing affordable efficient cook stoves that have a dual function for space heating. ATS is also trying to develop other energy efficient household technologies including solar fruit and vegetable driers, commercial scale solar box cookers, and solar hot water collectors.

1. **Biogas technology**

Biogas technology is used to reduce burden on biomass used massively for cooking and heating, but also responds positively to other environmental concerns, for example, the effluents from biogas digesters are a very nutritious organic fertilizer.

The local NGO, Technology for Economic Development (TED) takes the institutional project lead with international, national and local contacts and skills, supported by the Department of Energy (Ministry of Energy, Meteorology), and the Department of Environmental Health (Ministry of Health).

The main objective of the project is to address the needs of rural households and communities in Berea District (a pilot district) to have secure and sustainable access to cooking and heating energy, as they are currently suffering from the ever-decreasing biomass resources that has been the sole source of fuel needed for cooking and heating. Due to this shortage, women have been burning animal dung instead of applying it for improved soil fertility. In addition to prefabricated biogas plants, the connection of safe toilets to the systems will enhance the rehabilitation of the environment and protect water sources from fecal contamination.

For the first time, 100 prefabricated biogas plants of different technology providers - connected to hygienic dry toilets, will be installed in up to 5 locations in Lesotho. In rural communities, biogas energy production is estimated to provide up to 75% of a household's cooking energy.

**i. Recent Developments in Renewable Energy subsector**

1. **Renewable Energy Framework**

LEWA developed and adopted the renewable energy framework in 2015/16, the frameworks include the Renewable Electricity Generation Licence, Electricity Transmission Licence, Distribution and Supply licence templates were approved by LEWA and hence adopted by the ESI. Furthermore, a Standardised Power Purchase Agreement (SPPA) for renewable electricity. The objective of the framework is to promote participation private sector in the renewable energy subsectors.

**b. Power Generation using Renewable Energy Resources**

Lesotho has developed a draft Electricity Generation masterplan which highlight prefeasibility studies of electricity generation plants. A 35MW wind farm at Lets’eng la Terai feasibility study has been completed by an Independent Power Producer; further wind energy feasibility study of wind potential at Semonkong has been completed by Mo-Sun Clean Technology. Other developments in the renewable energy sector include implementation of SE4ALL project implemented by UNDP; the project is aimed at energising the rural communities of Lesotho using inter alia mini-grids and by promoting renewable energy and energy efficiency technologies. Moreover, the Grid Code and the Renewable Energy Framework developed by LEWA are instruments that will attract investment in the renewable energy sector.

**c. Low Emissions Investment Plan**

The Scaling Up Renewable Energy Programme (SREP) funded by World Bank will also create an enabling environment for private sector participation in the renewable energy sector. The SREP will assist Lesotho develop a Low Emissions Investment Plan, the plan will serve as the investment prospectors for renewable energies in Lesotho. The programme has engaged a consultant to develop LEIP, the plan has identified potential renewable energy projects for Lesotho as well as the options study report.

**ii. Mapping of Renewable Energy Potential**

The Ministry of Energy has signed a Memorandum of Cooperation the Government of Italy. The objective of the cooperation is to mitigate climate change; the focus area on energy is to develop and promote the use of renewable energies and associated technologies, to achieve a concrete step towards attaining low-emission development pathway. The activities of the project include development of a hydrological map of Lesotho, identifying potential sites for power generation (micro, mini and large), production of a wind atlas for Lesotho which will identify specific sites with the most potential for power generation and production of a solar radiation map which defines the different levels of radiation intensities and sunshine duration as well as development of biomass resource map to determine how much biomass is available locally

**iii. Challenges in the renewable energy subsector**

* Over-reliance on biomass for energy especially for cooking and heating
* Lack of energy efficiency strategy
* Inadequate access to finance by the consumers

1. **Proposed solutions to Renewable Energy subsector**

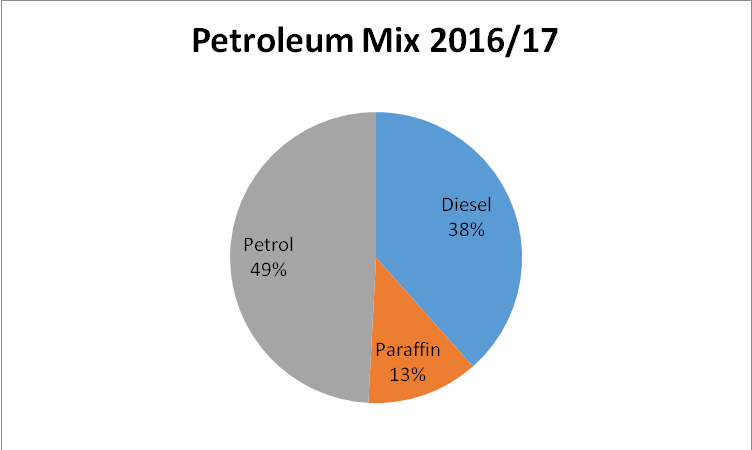
|  |  |
| --- | --- |
| **Challenge** | **Proposed intervention** |
| **Biomass Energy:**  High reliance on biomass  energy: declining  biomass resources | * **A strategy that focuses on producing more biomass by improved forestry management** * Encouraging and providing incentives to private forest plantations to use their wood for their own use or commercial purposes (the factories for tea and matches are good examples) * Integrating tree planting into farm landscapes * Strengthening the voluntary tree planting schemes especially in rural based communities * Encouraging Institutions (public and private) to establish their own woodlot schemes to provide fuel wood supply*.* |
| * + - **A strategy that focuses on substituting more biomass with other energy sources that are environmental friendly;** * Substitution by compressed and/or carbonized biomass briquettes: * Substitution by Liquid Petroleum Gas (LPG) and paraffin: * Substitution through the use of biogas and other bioenergy technologies: Promoting the use of bio digesters within households and institutions. The target is to deliver 300 bio digesters by 2022. Already, successful efforts are being registered by TED, a civil society organization in the country. * Substitution by use of solar energy for lighting and water heating: * Substitution by wind: Wind utilization as an alternative can easily provide power to communities where wind regimes are encouraging. And there are several places in the country with very encouraging wind speeds. * Substitution by hydro power schemes: |
| * + - **A strategy that focuses on saving more biomass** * Use of energy saving cook stoves in urban areas: All these groups shall be supported in acquisition of raw materials for effective mass production of improved stoves. * Use of improved domestic cook stoves in rural areas: in rural areas, sensitization and training on energy conservation and environmental issues targeting women associations for self-construction of stoves at district level. These women would be trained as trainers so that they can train others at the county and village levels. The aim is to have at least one improved stove per family. * Use of improved cook stoves in institutions: This focuses on schools, clinics, military camps, prisons, etc. |
| **Lack of energy efficiency**  **strategy** | Promote Demand Side Management Strategies and corresponding Technologies  government buildings and households, street lighting, water heating, etc. |
| **Inadequate access to**  **finance by the consumers** | Develop a sustainable financing mechanism for vulnerable people to  access renewable energy technologies |
| Establish incentives to encourage private investments in the sub-sector |
| Establish cost reflective retail tariffs in order to have realistic and attractive  feed-in-tariffs to investors |
| **Inadequate capacity to**  **install and maintain**  **renewable technologies** | Develop renewable energy capacity building programme with academia. |

*Table 8: Proposed solutions to Renewable Energy subsector*

# 3.2.3 Petroleum Subsector

Lesotho does not have any natural gas, oil or coal reserves and is highly dependent on imported fossil fuels for its energy requirements for transport, household and industries. Petroleum plays an important role in development of the economy particularly in the transport, household and services sectors.

The Lesotho Energy Balance 2009-2011, states that there was a total supply of 11,095.98TJ of which comprised of 1976.87TJ of Electricity and 8493.98TJ imported Petroleum. The picture below illustrates the petroleum mix for Lesotho in 2016/17:



*Figure 5: Petroleum products mix in Lesotho*

*Source: Department of Energy 2016/17 report*

As shown above, petrol constituted to 49% of the total petroleum mix followed by diesel and paraffin with 38% and 13% respectively. The total volume of petroleum imports was 237,800 litres. Illuminating Paraffin is mainly used for household cooking and lighting purposes, while petrol and diesel are used for transport and industry energy needs. The demand for fuel has increased significantly over the past years; this is demonstrated by the increased amount of fuel consumption. The table below depicts fuel consumption trends for financial year 2016/17.

*Figure 6: Fuel consumption patterns*

The current Lesotho oil industry has a commercial buffer stock of approximately 3 days which is not sufficient to sustain local demand when there is fuel supply disruption from RSA. This may lead to significant negative economic repercussions.

**i. Recent Developments in the Petroleum Subsector**

**a. Petroleum Bill**

In its mandate, the DoE is required to develop policy and regulatory frameworks in the energy sector. The DoE has drafted the Petroleum Bill. The Bill creates enabling environment for private sector participation in the petroleum sector.

**b. Revenue collection**

The revenue collection from Petroleum levies and Motor vehicle assurance are entrusted to the DoE through its Conversional Energy Division. In 2015/16, the DoE proposed increase in the oil levy from M0.44c to M0.60c. MVA increased from M0.08 to M0.10c. These increments lead to a significant increase in the revenue collected. Below is a table comparing the revenue collection before and after the levy changes.

|  |  |  |
| --- | --- | --- |
| **Revenue** | **2015/16** | **2016/17** |
| Oil Levy | 91,930,131.87 | 113,375,213.52 |
| MVA | 17,491,878.00 | 19,681,795.26 |

*Table 9: Revenue collection before and after the levy changes*

**c. Transportation of petroleum by Basotho**

The Ministry of Energy has taken strides towards the implementation of Energy Policy 2015-2025, in 2015/16, the government sent call for expression of interest to private Basotho transporters. The call was targeted to identifying potential local transporters of fuel in Lesotho. The development of these activities addresses the goal of job creation and private sector participation in the energy sector.

**d. Strategic Fuel Reserve**

The Government of Lesotho established the national oil company named Lesotho State Oil Company (LESOC) in 2010. The company was established with the purpose of purchasing and importing petroleum products into Lesotho from the international oil markets, supplying to the local oil marketing and distribution companies as well as managing the strategic fuel storage of the Country. In the 2015/16, the DoE advertised and call for proposal on the development of the strategic fuel reserve feasibility study. The programme is on-going a company have been shortlisted. The objective of the fuel reserve facility is to store at least 60days strategic reserves of petroleum products.

1. **Regional Fuel Depots**

The Ministry of Energy submitted a project proposal for funding from Petroleum Fund. The project comprises of undertaking a study on the distribution of petroleum products in Lesotho. The results of the study will determine the construction of petroleum products infrastructure in the under-served and or growth centre in order to increase energy access. The petroleum products infrastructure (filling stations) in growth centres will be multi-purpose centres where essential energy products will be sold.

**ii. Challenges in the petroleum subsector**

The challenges in the petroleum sector include;

1. lack of security of supply,
2. lack of standards and compliance on petroleum products,
3. inadequate petroleum fuel storage infrastructure

**iii. Proposed interventions in the Petroleum subsector**

|  |  |
| --- | --- |
| **Challenge** | **Proposed Intervention** |
| Security of fuel supply: 3 days’ commercial stock | Developing 90 days Strategic Fuel Reserve |
| Inadequate fuel storage infrastructure | Developing fuel depots for leasing to private sector where  Necessary |
| Standards and compliance | Developing capacity to ensure compliance to and  enforcement of petroleum products regulation |

*Table 10: Proposed interventions in the Petroleum subsector*

# 3.3 Energy Efficiency and demand side management

Lesotho’s greatest potential for energy efficiency is the household and service sectors. Household and industry sectors are largest consumers of energy in Lesotho and possess a great potential for energy efficiency interventions. Fossil fuels and electricity constitute the bulk of energy consumption in the industrial sector. Electricity and fuel wood dominate the residential sector with coal, paraffin and LPG, also playing a substantial role. In both sectors these fuels are used primarily for thermal purposes; heating and processing.

Lesotho energy efficiency interventions deployed include energy efficient cook-stoves and solar water-heating. A roll-out programme of installation of solar water heating in industrial and commercial buildings and houses has the potential to defer the need for building new power plants which are a Lesotho’s concern to achieve security of electricity supply. The promotion of energy efficient cook stoves also protects and environment and health of Basotho.

# 3.3.1 developments In energy efficiency and demand side management

**i. Households**

The then Ministry of natural Resource, today the Ministry of Energy and Meteorology in collaboration with Lesotho housing drafted building code for houses in Lesotho. The code provides appropriate guidelines for the construction of thermally designed houses; the structure is aimed at minimising energy consumption in the household sector.

Other initiatives that can lead to energy efficiency in the household sector include:

1. Replacement of electric geysers by solar water heaters;
2. Replacement of incandescent bulbs by energy efficient bulbs;
3. Installation of smart metering

Lesotho Electricity Company developed a proposal on smart-metering; the objective of the project is to manage electricity demand through promotion of energy efficiency. The project entails installation of smart meters, management system and communication network to link smart meters and management system.

**ii. Service Sector**

Energy efficiency measures in Lesotho service sector include installation of solar water heaters in public institutions such as the health sector. The Ministry of Health installed solar water heaters in health clinics.

**iii. Solar Street lighting**

The Department of energy developed a project proposal on solar street lighting, the objective of the project is to minimise electricity consumption. This initiative will reduce reliance on electricity imports while at the same time delaying development of new electricity generation plant.

# 3.4 enhAncement of private sector participation

The highest proportion of economic activities in Lesotho is attributable to the private sector. In the primary sector, the highest contribution to GDP comes from privately owned mines and agricultural farms. The industrial sector consists of manufacturing, utilities and construction sub-sectors and all of these are entirely in the private hands.

Private sector is also the main source of tax revenue, contributing to public funding of health care, clean drinking water, food and agricultural inputs (e.g. seeds) for the poor and satisfying other public demands.

The private sector development helps in reducing unemployment which have far reaching implications for both economic and social lives of the country’s population. Jobs and incomes created by the private sector enterprises lead to economic diffusion of growth by having a direct impact on poverty alleviation.

Moreover, developing the private sector helps in making more people to be actively involved in economic activities and decision-making processes by attracting new stakeholders into the economy, provided the driving motive behind the economic activity is profit.

Unfortunately, involvement of private sector in the energy sector is still limited. With an exception of LHDA which is rather a parastatal, there is no known IPP in the country so far, neither is the involvement in Biomass energy related activities very visible to make an impact.

Strategic interventions shall include;

* Promoting training and capacity building actions to combat climate change
* Strengthening the ability of private sector to influence state decisions and policymaking process.
* Advocating for a positive involvement of private sector to deal with energy investments
* Supporting private sector firms interested to develop energy activities particularly in renewable energy and energy efficiency.
* Improving and facilitating access to finance for local investors
* Enforcing rules and regulations and providing enabling environment to facilitate the activities of private sector related to energy investments in the country.
* etc

# 3.5 support to civil society participation

The civil society of Lesotho faces among other challenges; absence of institutional regulatory framework for effective contribution and involvement in energy related activities, and consequently, low involvement of civil society in development activities, as well as inability of civil society to access government facilities as shared information on opportunities of technology transfer and international funding.

Strategic interventions shall include;

* Promoting training and capacity building in energy related activities
* Advocating for a positive change
* Encouraging effective representation of citizens in energy discussions and decisions including policies, etc.
* Facilitating access to financing for energy activities
* Etc

# Cross-cutting Issues

# 3.6.1 Climate Change:

The climate in Lesotho is characterized by droughts, floods, frosts, snow, hailstorms, whirlwinds and strong winds. Under climate change, the afore-mentioned conditions might get more pronounced and hence undermine sustainable development efforts. According to the Lesotho's Second National Communication, the Lesotho is likely to experience increase in temperatures, changes in rainfall patterns, increase in the rate of evaporation and increase in the intensity and frequency of extreme weather events. Climate change is expected to affect all sectors of the economy such as health, agriculture, environment, water and energy.

The energy sector has been identified under the Second National Communication to climate change as the second largest emitter of Green House Gas emission accounting to 31% of the Lesotho's total GHGs. Reduction of emissions in this sector will not only avoid levels of dangerous climate change but will shift the economy of the country towards a low carbon development path.

Lesotho is a party to the United Nations Framework Convention on Climate Change(UNFCCC) and is expected to meet the global objectives of the convention.

# 3.6.2 Intended Nationally Determined Contributions (INDC)

The government of Lesotho developed the INDC in 2015 with an objective of addressing the UNFCCC Article 2 on contribution to stabilizing GHG concentrations in the atmosphere. The document has identified climate change mitigation measures under the energy sector as tabled below:

|  |  |
| --- | --- |
| **Mitigation Policy /Programs** | **Targets & Assumptions** |
| Continued development of hydropower  resources, particularly in terms of advancing technical design and sourcing funding for development of identified sites | * Improving energy efficiency by 20% by 2020, * Increasing electricity coverage /access to 35% of households in 2015, 50% in 2020 and 80% by 2030; * With increase in rural electriﬁcation, paraffin   consumption is expected to come down from 30, 434  kilolitres (2014) to 25,000 kilolitres in 2020, with a  GHG saving of 12 Gg   * CO2e and 20,000 kilolitres in 2030 with a GHG saving 24   Gg CO2e in the BAU.   * Potential reduction of transmission and distribution   loses from 2015 until 2030 by 0.5% per annum (total of 7.5.0%)   * Increase renewable energy sources by 200 MW by 2020: 40MW from Solar (2017/2018); 35 MW from wind (2017); 125 MW from hydropower (2025) |
| Design and implementation of demand-side management techniques to encourage better use of existing distribution infrastructure, and Reduce peak demand. |
| Promotion of renewable energy |
| Improving distribution efficiency of the power system through measures to reduce transmission and distribution losses |
| Continuing to develop and promote uptake of renewable sources of energy, particularly wind and solar (where feasible) |
| Develop low energy investment plan |

*Table 11: Climate change mitigation measures under the energy sector*

# 3.6.3 Capacity Building, Education and Training

# 3.6.3.1 Integration of Energy into curricula at all level of formal education

Education plays an important role in the development of every nation. The Government of Lesotho has pronounced itself to strive for Education for all and has embarked on various initiatives to ensure education for all inter alia the “***free primary Education.”***

In 2012, the Department of Energy in collaboration with the National Curriculum Development Centre (NCDC) drafted the guidelines to integrate energy into curricula at Primary and Secondary levels. Recent developments on the integration of energy into curricula include submission of proposal to UNDP to finance development of energy teacher’s training manual and teaching aids for primary and secondary schools.

The tertiary intuitions of Lesotho (National University of Lesotho and Lerotholi Polytechnic) have developed short-term sustainable energy courses under the Physics and Electronics Department. The courses include: Solar Thermal and Photovoltaic Systems, Energy and Energy Efficiency and Electrical Power Systems, Energy Economics, Finance and Project Management, and Energy Policy, Regulation and Environment. These courses are meant to increase education on energy and will be developed into full programmes.

# 3.6.3.2 Southern Africa Solar Thermal Training (SOLTRAIN)

SOLTRAIN is a regional capacity building programme and demonstration of solar thermal systems in the SADC region. The programme started in Lesotho in 2012 and focuses on raising awareness on the potential in solar thermal, building of competence in solar thermal technology, creating solar thermal technology platform and demonstrating that solar thermal works.

# 3.6.3.3 National University of Lesotho Renewable Energies Training Initiatives

The National University of Lesotho has introduced renewable energy module that are offered to middle and high level technical personnel involved in the energy space. The department of Energy technical personnel as well as the Lesotho Electricity Company staff are the major beneficiaries. The programme modules offered include; solar energy (PV and thermal systems), wind energy, hydropower, bio-energy, engineering design for rural villages, electrical power systems as well as energy policy and regulation.

# 3.6.4 Women and Youth

The Ministry of Gender, Youth, Sports and Recreation (MGYSR) developed the Gender and Development Policy in 2014. The policy states that women and youth are the most vulnerable groups in Lesotho. Rural women are more marginalised to energy challenges because of their household chores of collecting wood for cooking and heating, they are subject to health hazards posted by use of biomass. Increasing energy access will considerably improve the livelihood of women, who are mostly engaged in income generating activities and will also reduce the distance that women walk when collecting fuel. The MGYSR has developed women development programmes aimed at increasing energy access.

# 3.6.5 Data and Information dissemination

The Department of Energy and the Bureau of Statistics have embarked on energy sector data collection exercise. The pilot data collection results indicate that energy consumption is increasing rapidly. The purpose of the data collection is to develop an up to date energy database that can be used to inform national energy plans and policies.

# CHAPTER 4: SUSTAINABLE ENERGY STRATEGY

# 4.1: Rationale and scope

The Government of Lesotho, like several other Governments and consumers has decided to take measures to embark on developing the sustainable energy strategy to achieve, among other others, three principal outcomes which are interlinked;

* to improve energy security;
* to encourage and foster economic development, and,
* to contribute to the protection of climate and the wider environment from impacts of the use of destructive energy sources

To this effect, the developed National Sustainable Energy Strategy lays out the implementation roadmap of the Energy Policy 2015-2025. It is a 5 - year rolling plan and shall address the implementation roadmap which comprises energy sector proposed solutions to be implemented in the near-term (2018-2020), and the medium-term (2018-2022) time horizons.

# 4.2 Approach and Methodology

Figure 3 below demonstrates a schematic overview of the methodology and approach  
used in the development of the strategy. (A detailed Methodology is annexed to this strategy)

# 4.2.1 overview of the methodology and approach

**Methodology & Approach**

**Participatory and Consultative Approach**

**Evidence based Approach**

**Literature Reviews**

**Situation analysis/Interviews**

**Workshops**

**Breakout Sessions**

**Interviews and Consultations**

*Figure 7: Overview of the methodology and approach used*

The sustainable energy strategy is an important tool that is meant to guide the implementation of the energy policy. For it to be well informed, reflect population inclusiveness, be owned and thus effective in driving the energy sector development agenda, intensive consultations had to be carried out countrywide. The main objective of the consultations was to gather views, understand the situation on the ground including the needs, challenges faced and the citizens’ expectations in order to come up with well-informed recommendations and roadmap for implementing the policy.

The consultations made covered all Ministries in the Government, other relevant Government Departments including the Parliament, Department of Energy (DoE), Lesotho Meteorological Services (LMS), National University of Lesotho (NUL), Lesotho Electricity Company (LEC), Rural Electrification Unit (REU), National Bureau of Statistics, Lesotho Highlands Development Authority (LHDA) – Katse and Mohale Dams, Muela hydro power station, Lesotho Electricity and Water Authority (LEWA), and Lesotho Petroleum Fund. Other stakeholders consulted are a number of private sector organizations, civil society agencies, as well as all Development Partners in the country. Besides these stakeholders, district administrators, councillors, Chiefs as well as community grassroots in all 10 districts were consulted.

While the dialogue held with some of the stakeholders including the Ministries was conducted through direct interviews, a questionnaire was used to gather information from the grass root communities in order to systematically understand the views of the citizens in regards to the energy supply situation in different ecological zones of the country. Reference was made on to the Lowlands, Foothills, Senqu River Valley and the Highlands for which characteristics vary from each other.

In some cases, consultations were done through participated in a number of public gatherings that were held by the Honourable Minister of Energy and Meteorology. Annex 2 provides the summary of the findings from the stakeholder consultations from which the key ‘action oriented’ recommendations form part of the strategic framework.

* **Participatory and consultative approach** involved workshops. The Workshops were designed to engage stakeholders to generate discussion and to identify the most important issues related to energy supply situation, the effect and the impact to the people.
* **Evidence-based approach,** which involved the identification and prioritization of measures and actions based on literature review and an analysis of the linkages of sustainable energy to the socio-economic development of Lesotho. In addition to this, comprehensive literature reviews were conducted to fully understand and appreciate the energy sector prevailing situation. Data sources included national documents, existing relevant studies and other global related information and data.

# 4.2.2 stakeholders key messages

The stakeholders consulted were categorised in the following groupings, the feedback indeed reflected their respective day to day observations and concerns.

# 4.2.2.1 ministries

* Active participation, engagement and involvement of women in project planning and implementation since they are the main beneficiaries of natural resources.
* Capacity building and skills transfer: organizational training for strengthening expertise and skills on issues related to energy.
* Mitigation and low Carbon Development – This would aim at ensuring that actions are implemented in sectors that are emitters of greenhouse gas emissions. Energy and agriculture are key in this context.
* Private Sector: Supporting and Capacitating (finance models, partnerships models, investment incentives) the private sector play a meaningful role in sustainable energy projects.
* Managing the water-energy relationship: Addresses the nexus between water and energy. Along with the vast quantities of water that are abstracted and consumed during energy production, the massive amounts of electricity required for the conveyance, treatment and application of water in various circumstances is an issue of growing concern.

# 4.2.2.2 other government institutions

1. **LEC is a monopoly transmitter, distributor and supplier of energy**

* Considering engaging in more clean energy generation for energy supply security purposes
* Need for Institutional Structural adjustment to address transparency through unbundling of activities (Generation, Transmission and Distribution) to meet legal and regulatory requirements

1. **REU**

* Need for clear mandate and Resources
* Clear policy on rural electrification with regards to independent grids and tariffing especially when using IPPs

1. **LHDA is the main generator of electricity through ‘Muela Hydropower plants.**

* Recognizes the importance of formulating the Policy due to the impacts of climate change on water. ICM - key for Lesotho’s sustainable social economic development

1. **LEWA**

* LEWA encompasses the generation, transmission and distribution of electricity, and the supply as well as import and export of electricity. One of LEWA’s prime responsibilities is to ensure that the supply of electricity is provided to industry and business, as well as domestic, public and government institutions in a manner that is affordable, reliable and cost-effective. LEWA Appreciates having a CC policy and SE strategy in place.
* Recognizes that there can’t be a conducive and welcoming legal and regulatory environment without guiding policies on the regulated sectors.

1. **Petroleum Fund**

* Willing to contribute to Universal Access fund (increasing access through promotion of clean energy sources
* Need of catering for sufficient fuel strategic reserve for security of supply and price controls

1. **Districts (Administration and Grass Roots Communities) on energy use**

* In Lesotho, the majority of the population is directly dependent on natural resources for survival. This dependence directly and indirectly, affects human welfare and sabotages the attainment of sustainable human development and also undermines environmental recovery.
* The majority of Basotho especially in deep rural areas depend on biomass energy (crop waste, coal, wood, animal dung and straws/shrub/grass) for cooking and space heating, and paraffin, LPG and to a lesser extent electricity for lighting.
* Cost of Electricity, LPG and Paraffin: Energy supply is increasingly becoming very difficult compared to traditional energy uses therefore government should consider ways of subsidizing the costs.
* Need for assistance in using clean energies: The electricity network covers major urban and some peri-urban centres, and supplies have been extended through most parts of the lowlands and the Senqu River Valley to reach all district headquarters in the mountains. Nevertheless, the electricity connections tending to be concentrated in the lowlands, rural areas remain heavily reliant on indigenous biomass fuels.
* Government should tap into other forms of energy, such as solar, wind and hydro since the country has them in abundance.
* Local communities need to be assisted through education on use of clean energies such as roof tops solar systems and for government to subsidize communities on the clean technologies in general, especially on rural based schools and clinics.

1. **Civil Society**

* Need for Adequate support from government for renewable energy and energy efficient technologies.
* Need for strong support in responding to enhancing and promoting sustainable biomass energy including Biogas needed for cooking and heating which also reducing environmental degradation. The success of Ha Bua Sono village in Berea district being promoted by TED was cited and needed strong support from Government for propagation in other districts in the country.
* Promotion of solar and hydro power sources in areas far from the grid to improve living condition in rural areas.
* Consideration of cultural uses/inclination of the use of firewood –, Basotho will always use wood for cultural ceremonies hence the Need to vigorously promote Afforestation and reforestation programmes done by Basotho themselves. Under such programmes, the National Tree Planting Day may be reinstituted.

1. **Private Sector**

* Need for Government support in promoting local manufacturers of energy products and technologies.
* Building expertise for production of clean energy technologies and products was cited as a requirement.
* Need for incentives to encourage engaging in clean energy technologies. This could be in form of tax wave on imports, etc.
* Support to ease difficulties in finance acquisition from Banks and/or guarantee funds or any other models/packages to facilitate financing.
* Development of new Industrial Infrastructure including Industrial zones, to facilitate ease in getting infrastructure support (electricity, water, communication) from Government, etc

1. **Development Partners**

* Recommending Public Private Partnership (PPP) especially on costly projects.
* Need for establishment of energy trade and service centres to facilitate backstopping services
* Involvement, empowerment and support to local communities - ownership of the projects and programmes.
* Need for a well-coordinated, broad – based stakeholder engagement including development partners themselves.
* Inter and intra – sectoral coordination mechanism and structures, but also amongst Development Partners to avoid duplication of efforts.

1. **CoP22**

* Lesotho participated in the CoP 22 negotiations that took place in Morocco in 2016.
* **Private Sector Involvement:** Since CoP21**,** it is had been deliberated on that more than 200 companies have committed to set emissions reduction targets. The Lesotho Private Sector should learn from best practices and other successful international initiatives on climate change,
* Several linkages with international institutions have been made to discuss opportunities on technology transfer through technical and/or financial assistance
* The Moroccan Agency for Solar Energy expressed interest to partner up with Lesotho based companies to promote solar technology in Lesotho.

# CHAPTER 5: SUSTAINABLE ENERGY STRATEGY FRAMEWORK

# 5.1 Background

The Lesotho Sustainable Energy Strategy 2018-2022 is developed in response to the need to meet Lesotho’s energy needs. The Government had made pledges that energy will be available for all Basotho at an affordable and sustainable manner and declared that the government will attest to achieving 50% electrification rate by 2020, ensure security of electricity supply using locally available renewable energy resources and to construct strategic fuel reserve that would assist other sectors of the economy by the year 2020.

The Ministry of Energy and Meteorology through the Department of Energy is mandated to administer and coordinate the sector. The mandate of DoE further extends to the creation of a conducive environment for the development of energy resources through the development of energy policies, strategies and plans. **The Energy Strategy 2018-2022 is therefore meant to be a 5-year rolling implementation plan** for the National Energy Policy 2015-2025. The strategy aims to achieve the near and medium term policy pronouncements that are reflected through the policy statements; namely; increasing energy access and increasing security of energy supply while promoting economic growth and job creation as stipulated in the National Strategic Development Plan (NSDP), among several others.

The Sustainable Energy Strategy shall make close reference to the key Energy Policy Goals, and Statements as outlined here under;

1. **Energy Policy Goals**

* Contributing towards the improvement of livelihoods
* Contributing towards economic growth and investment
* Ensuring security of supply
* Contributing towards the protection of the environment

1. **Energy Policy Statements**

* **Policy Statement 1:**

***Institutional and Regulatory Framework for the Energy Sector;*** *Government will introduce appropriate institutional and regulatory framework for the management and development of the energy sector.*

* **Policy Statement 2:**

***Information Management and Outreach***; *Government will ensure that sufficient information and data on all energy resources become available and are regularly updated.*

* **Policy Statement 3:**

***Bioenergy;*** *Government will ensure sustainable supply of bioenergy resources.*

* **Policy Statement 4:**

***Renewable Energies****; Government will improve access to renewable energy services and technologies.*

* **Policy Statement 5:**

***Energy Efficiency in Electricity;*** *Government will promote energy efficient practices and equipment in all sectors of the economy.*

* **Policy Statement 6:**

***Power Generation;*** *Government will ensure the security of electricity supply in the country.*

* **Policy Statement 7:**

***Power Transmission****; Government will develop and sustain a reliable and efficient transmission network in order to avoid interruptions in the power supply.*

* **Policy Statement 8:**

***Power Distribution;*** *Government will increase access to electricity for all socio-economic sectors to meet electrification targets within the framework of reliability, affordability and efficiency.*

* **Policy Statement 9:**

***Power Supply and Trad****ing; Government will ensure transparent and competitive electricity market operations where participating players have equal opportunities.*

* **Policy Statement 10:**

***Electricity Connections****; Government desires to ensure more connections and utilization of electricity by end-users.*

* **Policy Statement 11:**

***Importation and Storage of Petroleum Products;*** *Government will take measures to ensure security of supply of petroleum products.*

* **Policy Statement 12:**

***Distribution of Petroleum Products (Retailing and Transportation);*** *Government will ensure petroleum products are available and equitably distributed across the Country.*

* **Policy Statement 13:**

***End Users of Petroleum Products;*** *Government will ensure wider access to petroleum products and related services accessible to the end-users.*

* **Policy Statement 14:**

***Investment Framework and Financing;*** *Government will create an enabling environment that will attract investment and financing at all levels of the energy sector value chain.*

* **Policy Statement 15:**

***Energy Pricing;*** *Government will ensure that energy prices allow cost- recovery and that price setting is transparent.*

The strategy 2018-2022 will further play a pivotal role in the attainment of International and National goals that Lesotho has ratified to and developed. These include among others the SDGs, especially Goal 7 (Access to affordable reliable, sustainable and modern Energy), as well as other relevant Goals including Goals 6 (Clean Water and Sanitation, ensuring availability and sustainable management of water and sanitation for all); Goal 13 (Climate Action: combating climate change and its impacts) and Goal 15 (Life on Land: protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification), and halt and reverse land degradation and halt biodiversity loss), etc,

Further consideration is on the African Union Commission Agenda 2063 especially its aspiration 1 that calls for a prosperous Africa based on inclusive growth and sustainable development;

# CHAPTER 6: Sustainable energy strategy country - roadmap 2018-2022

The Sustainable Energy Strategy (SES)of Lesotho lays out the implementation roadmap of the Energy Policy 2015-2025. The SES is a 5-year rolling plan and shall address the implementation roadmap which comprises energy sector proposed solutions to be implemented in the near-term (2018-2020), and the medium-term (2018-2022) time horizons.

# 6.1 Vision of the Energy Sector

Energy shall be universally accessible and affordable in a sustainable manner, with minimal negative impact on the environment.

# 6.2 Mission

Provide reliable and efficient energy on a sustainable manner for the prosperity of the nation.

# 6.3 Objectives

* + To increase energy access.
  + To promote availability of up-to-date energy resources information.
  + Contribution to government revenue.
  + To explore environmentally friendly energy sources and technologies.
  + To improve Departmental service delivery.
  + Ensuring security of energy supply.

# 6.4 rationale

# 6.4.1 Energy contribution to economic transformation and rapid growth

Energy undergirds civilization and has powered sweeping economic changes that have transformed the world over the last two and a half centuries. However, just as the economy has changed, so has the energy mix that fuels it. The development of the modern world has been a story of evolving new uses for energy and constantly growing energy demand. New forms of energy and new technology to harness that energy have been developed over time, shifting the energy balance and expanding the menu of energy sources (World Economic Forum, 2013)

Lesotho’s economy like any other economy derives its growth significantly from energy resources. All the sectors of the economy from transport, manufacturing, construction, and mining among others all require energy supplied adequately and cost effectively if the investors in these sectors are to reap economic benefits. At a micro level, energy enables people to cook, heat, transport, and entertain, all these being the dominant areas that employ most of the people of Lesotho. Electricity to power the TVs, fuel for our cars, or heat for our homes, is supplied by the energy sector. It is therefore apparent that economic growth is inextricably linked to energy. As energy is tied to our economy, our required economic growth is dependent upon equitable access to energy, sufficient supply at affordable rates.

**Energy contribution to economic transformation and rapid growth**

Going by economic theories, for every 10% increase in energy supply, 7% GDP growth shall be registered

|  |  |
| --- | --- |
| **Community Priority Need** | **Energy contribution and effects** |
| * + - **Boost on business Development** * Income generation * Employment creation | * The cost of power contributes a significant portion to the overall cost of production in the country. The sector strategy looks to ensure affordable and sufficient power supply by diversifying and promoting domestic sources of energy. This will boost local investments into large, small and medium Enterprises, creating employment opportunities and positively impacting on the state of all Basotho’s welfare. * People will be able to use electricity for income generation activities like putting up welding shops, hair salons, kiosks, grain milling centres, etc, across the country. |
| * + - **Agricultural Transformation** | * To reduce seasonal disruptions in agricultural productivity through reduced harvests, an elaborate irrigation program has been designed by Ministry of Agriculture. Irrigation systems require adequate power supply in form of electricity to pump the water to irrigated areas or adequate supply of affordable fuel to run diesel generators. * The energy strategy will aim to ensure security of supply of both electricity and fuel to irrigation projects that promote agriculture transformation. * It is expected that providing reliable power supply to rural and dry mountainous areas will make it possible for farmers to keep to their irrigation schedules, conserve water, save on pump maintenance costs and use labour more efficiently. These and other benefits will help drive agricultural production to new heights while improving the quality of life for agro based households. |
| 1. **Iii. Rural Development**  * Improved social economic welfare * Reduction of rural urban migration | * There are currently visible disparities between rural and urban areas in terms of access to electricity and income levels. Rural access to electricity stands at 6% percent compared to 38% for urban areas. The aim of the energy sector strategy under the NSDP objective is to increase electricity access from the current 34 percent (2012) to 75 percent through grid and off-grid connections respectively by 2022. The REU will focus on the rural areas and a great deal of rural households and business units are set to benefit from the Unit’s initiatives. This effort will bridge the rural-urban disparity in access to electricity, thereby improving on businesses start-ups, enable long working hours and promote rural based employment. * Rural electrification will support the initiatives to construct better schools, hospitals and clinics, roads and other social amenities and there will be no more need for rural dwellers moving to urban areas in search of better quality of life. Established social infrastructure and reduced Rural Urban Migration will ensure retention of productive labour force to rural areas, reverse to urban rural exodus and support rural development. * Electronic devices such as radios and television are common media of communication to rural areas, thereby bridging the rural-urban knowledge gap and information asymmetry especially market related issues. All these quick mediums of communication require reliable power supply to avoid delayed information dissemination. |
| **iv. Universal Primary Education**   * Free basic education for all. * Increases access to quality Early Childhood Care Development (ECCD). | * Electricity availability at home and schools enables access to educational media and distance learning. * Good quality lighting enables home-based study. * Lighting in schools allows evening classes and study, and helps retain teachers, especially if their accommodation has electricity. * Availability of electricity services free children’s and especially, girls’ time from helping with survival activities such as fetching water and collecting firewood. * Availability of power allows early computer literacy to young children |
| **V. Basic Health services**   * Improving access to quality essential health care and social welfare services. * Strengthen health promotion and disease prevention. | * Electricity for refrigeration allows vaccination and medicine storage for prevention and treatment of diseases and infections * Enables access to health education media through information communication technology. * Cleaner energy technologies are expected to reduce energy-related (biomass) health problems/diseases. |
| **vi. Water and Sanitation** | * Improve the supply of clean potable water supply to rural areas. * Electricity can be used to pump ground water locally and thereby reducing time spent collecting it |
| **vii. Promotion of mining and mineral value**  **addition** | * Providing access to affordable, stable and sufficient power supply is a positive step towards efficient mining activities. The country is rich in Diamonds and efficient power supply may encourage mineral processing for value addition in exports but also for cost competitiveness. For this to happen, there is need for unhampered supply of cheap and adequate electricity. |
| * + - 1. **Boosting industrialization plans** | * For Lesotho’s economy to be transformed, there is need for a structural shift from traditional agriculture to industry and service sectors. Industries and factories will require sufficient energy solutions to generate desired output. * The national energy strategy will ensure sufficient supply of electricity required in industries and factories and at economically affordable tariffs and this will be a formidable tool for economic transformation. * The target for the next 5 years is to ensure 100% sufficient access to clean and affordable energy by industries and Medium and large enterprises that are engines of economic growth. |
| **ix. Reduction on trade imbalance**   * Developing a sufficient strategic reserve capacity for petroleum products. | * The petroleum strategy looks to improve petroleum strategic reserves capacity to avoid supply shocks that affect fuel prices. * Oil products contribute significantly to Lesotho’s import bill and an unplanned price fuel price hikes affect government planning and worsen the trade balance due to a spike in oil import bill. |
| **x. Demand stimulation**   * Affordable power tariffs | * Increased energy prices reduce demand by reducing use of energy services and motivating selection of higher conversion efficiency equipment. * For example, the price per liter of petrol will affect transport and other costs of running machines, with a final price implied to the final consumers. * This will affect demand especially for commodities with fairly elastic demand. The energy strategy looks to ensure affordable power supply that in a way will have a systemic price effect on the final commodities on the market and act as an indirect approach to demand stimulation since reduction in commodity prices is the same as increase in consumers’ income. Higher effective demand is a stimulus to economic growth and transformation. |
| **xi. Productivity and Youth Employment** | * By the standard definition, a youth is anybody between the ages of 15 to 35. * According to the available statistics (Lesotho Demographics profile 2016), the age group between 15-24 years constitute 19.56% and 25-54 years constitute 37,58% of the population of Lesotho, and this is a formidable tool to Lesotho’s future economic prosperity. However, this group, especially the 15-24 years requires skills and expertise if they are to meet the labour market demands. Government has established Technical and Vocational Education Training colleges to accommodate these youths and equip them with hands-on skills into carpentry, welding, plumbing, building and construction as well other engineering activities, there is strong need for cheap and adequate energy resources if these activities are to bear meaningful results. * In Lesotho, most of these youths are employed in Small and Medium Enterprises including electricity shops, photography, hair salons, plumbing works, construction, and others. These require sufficient uninterrupted power supply to run smoothly. |
| **xii. Accountable Governance** | * Itis the responsibility of any pro people government to provide socio-economic necessities. * Government will ensure transparent and competitive electricity market operations where participating players have equal opportunities. * Government plans to ensure more local participation in the development of their own energy resources. This reflects a deliberate effort by government to make its citizens part of the nation state governance though direct or indirect ownership of their development process. |
| xiii. **Cross Cutting Issues**  **a. Capacity Building** | * The current levels of human and institutional capacity are not sufficient to deliver on the sector commitments with ease. To implement energy sector projects on time, and scale up project delivery, some enabling institutional framework and skilled personnel is a pre-requisite. * This energy sector strategy puts in place measures of improving energy sector organization and management and develops capacity building plan to cover current skills gaps for the sector. * **Trainings and Knowledge transfer**-The capacity of energy sector staff will be enhanced through knowledge transfer from long term experts and through short training courses. There will also be recruitment of external expertise for major transactions in order to ensure that government is getting beneficial deals. * **Strategic Capacity Building Initiative (SCBI**)-The ministry has hired both local and international sector counterparts sponsored by the European Union to boost the energy sector. Local counterparts will learn from their international counterparts and it’s hoped that with the expiry of their (international counterparts) contracts, local expert’s contracts will be able to move the sector to further desired levels. |
| **b. Gender promotion and women economic empowerment** | * The strategy will address the energy needs for vulnerable groups in the communities, boys in Lesotho herd animals in remote areas and require energy for heating and cooking. * Some of the most profound impacts of the energy sector will be improvements in the lives of rural women. * Reliable electricity supports SMEs in which majority women are employed, raising their incomes and saving time spent on domestic household chores like firewood collection. * The average duration of study time for school going females will increase, and female dropout rate is expected to go further down. On the demand side, especially in rural areas, there is a need to relieve women and children from the burden of searching for firewood collected in long distances away from their homes. * All stakeholders within the energy sector need to participate and take deliberate sensitization actions to encourage women participation in energy related education, training sessions, programmes and projects, planning, decision-making including energy policy implementation * Empowering women is empowering the nation. * Women are exclusively held in domestic household chores of cooking, fetching water, and collecting fire wood especially in rural areas without access to affordable electricity. * Providing easy access to electricity for boiling water and cooking will specifically address women’s time burden and they will use their time productively. * The Biomass and Biogas strategy looks to ensure supply of improved cook stoves to especially the rural poor (predominantly women) as well as biogas for cooking and heating. * This will help reduce women’s burden of collecting fire wood, reduce government cost of preserving the environment through reforestation and ensure women productivity. |
| **d. Gender Energy Related Data** | * The first step towards ensuring that the specific basic needs of men and women are addressed over the short and long term is to collect data broken down by sex. Collecting, analysing and using gender-disaggregated data both at national and decentralized levels is necessary for the energy sector to take effective gender based policy decisions. * The sector will reinforce the production, presentation and use of gender disaggregated data and regularly shared with interested parties and decision makers using the sector Management Information System (MIS) and other reporting platforms. * Future policy making and strategy reviews should be very much informed by the gender disaggregated data. |
| e**. HIV and other Endemic Diseases’ issues** | * The Ministry of Health broadcasts all her health-related programs on radios and Television alongside other social media. * All these facilities require constant power supply without which communication will be delayed and or derailed. HIV and TB awareness campaigns to be broadcast over the same media will help reduce on infection and transmission rates as well and treatment provided by health centres. |
| **f. Environmental Conservation and Green Growth** | Although Lesotho still enjoys low carbon footprint, so far, she remains a net emitter of GHG. Efforts must be put in place to develop appropriate mitigation measures to reduce the levels of GHG emissions and enhance the county’s sink capacity. As she develops, Lesotho should target to become a carbon neutral country.  Lesotho has potential for renewable low carbon energy resources mix which is the foundation for a low carbon economy.  The strategic objective of the climate change and low carbon development strategy is partly to achieve Energy Security and a Low Carbon Energy Supply that supports the development of Green Industry and Services.  Green growth is an emerging concept that recognizes that environmental protection as a driver of global and national economic development. The development of Lesotho’s energy resources will be in harmony with the green growth efforts. The Lesotho Meteorological Services (LMS) is finalizing a Climate Change Policy whose strategy among others is to encourage clan and green energy sources that shall ensure environmental conservation. The new domestic generation technologies such as solar, hydro and wind would be used for preserving the environment.  Overall, efforts to mitigate impacts of climate change and preserve the environment include the following among others;   * **Reduce reliance on traditional biomass energy.** Government is working on a campaign to reduce reliance on traditional forms of biomassfrom 66% to 30% by 2022. This is being planned through the use of improved cooking technologies that reduce demand for wood fuel and emit less GHGs to the environment. Other initiatives related include the biogas program that is proposed to replace wood fuels for cooking as well as Improved charcoal carbonization techniques, increasing charcoal yield and so does the demand for wood cultivation. * **Focus on local and renewable energy sources**. The strategy for the next 5 years going forward is to put preference on the exploitation of domestic resources such as solar, wind and hydro. * I**ncreasing energy efficiency.** This will be done through **energy efficient** devices such as LEDs, Solar Water Heaters. Government encourages having all the new buildings installed with solar water heating systems to reduce use of electricity and biomass energy for boiling water. This is expected to reduce a great deal of the impact on the environment. * **Mandatory Environment Impact Assessment (EIA)**. All power projects are presupposed to have environmental clearance and the Impact certification before project implementation. Where plants are operational before environmental clearance, a mandatory Environmental audit is proposed. |
| **g. Regional Integration**3[[3]](#footnote-3) | The goals of SADC Regional Energy Access Strategy and Action Plan developed in 2010 at the strategic level were meant to harness regional energy resources to ensure, through national and regional action, that all the people of the SADC Region have access to adequate, reliable, least cost, environmentally sustainable energy services, and at the operational level that the proportion of people without such access is halved within 10 years for each end use and halved again in successive 5 year periods until there is universal access for all end uses.  Drawing on the analysis of the current energy access strengths and weaknesses in the region and guided by the expectations of the different stakeholders, the framework for achieving the above goals consists of the following 7 elements:   * **Statistics**: improved systems of providing accurate information, especially quantitative data, on energy access. * **Applications**: focus on energy end-uses rather than technologies * **Biomass**: recognition of the dominant role of biomass in the present and projected energy balance of most SADC countries. * **Prices:** cost-reflective but competitive prices * **Subsidies:** prioritize access over consumption subsidies * **Development**: focus on use of energy to enhance economic productivity for poverty reduction and enhanced quality of life * **Capacity**: ability and willingness to implement, operate and maintain energy access projects and programs   Lesotho as a member of SADC enjoys electricity network interconnection with South Africa, which beyond providing a routing for import and potential export of power to South Africa and beyond, it supports Lesotho’s network in terms of stability. That way, the country is able to install solar PV to the extent that would not have been supported by the Lesotho network if it was isolated. Regional regulatory framework and standards, exchange of good practices, etc., are other factors the community countries are benefitting from. |

*Table 12: Economic Transformation for Rapid Growth*

# cHAPTER 7: ENERGY SECTOR STRATEGY PILLARS

|  |
| --- |
| 7.1 Energy Strategy Pillar 1: Security of Energy Supply Energy security of supply variables to be considered are classified into electricity, petroleum and biomass. It is important to identify potential diversification of the energy mix, enhancement of transmission and distribution infrastructure. Under this strategy pillar, supply of sufficient energy with at least 20% reserve margin shall be enforced. |

# 7.1.1 Electricity subsector

The electricity subsector comprises electricity generation, transmission and distribution. It is critical for Lesotho to become self-sufficient with its electricity. The country needs reliable electricity sources to meet base load. The Lesotho Electricity Company identified hydro as an important source to meet Lesotho’s grid electricity base load. On the basis of expected electricity demand as per LEC reports, the incorporation of new generation capacity has to meet part of the demand and adhere to national electricity targets.

# 7.1.1.1 On-grid electricity Generation

According to LEC, hydro power is the most favourable source of electricity for Lesotho, because it is considered a stable source that can meet base load. The construction period of utility scale hydro power plants is between 5 to 7 years. During the construction phase of the planned hydro power plants, Lesotho will install solar and wind power plants. Below is list of potential power plants for Lesotho:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source** | **IPP** | **PPP (LHD)** | **LEC** | **Total** |
| Solar | 40MW IPP |  | 20 MW | 60 MW |
| Wind | 35 MW Letseng  15MW Semonkong |  | 20MW | 70 MW |
| Small Hydro | 40 MW (Makhaleng, Hlotse and Quthing) |  |  | 40 MW |
| Medium and Large Hydro |  | 135 MW (Senqu) |  | 135 MW |

*Table 13: Potential power plants for Lesotho*

# 7.1.1.2 Off-grid solutions

* REU or any other designated body shall be responsible for off-grid solutions as part of rural electrification efforts.
* It is expected that by 2022, REU shall have generated about 20 MW
* **Mini and Micro grids: SE4ALL project: 10 mini grids in 5 project sites in districts**

The purpose of the project is to meet local base load demand by local generation which links with the NSDP objective of producing a medium-long term strategy for improving national energy security. The project also addresses the objective of the National Energy Policy 2015-2025 of “ensuring security of supply” using alternative energy resources: Mini-grids installation is one of the options to undertake thereby increasing economic development in isolated areas. The following proposed projects could be considered.

|  |  |  |  |
| --- | --- | --- | --- |
| **Settlement / Village**  **Cluster** | **District** | **Project Type** | **Size (KW)** |
| **Ramabanta** | **Maseru** | **SPV** | **1.075** |
| **Ketane** | **Mohale's Hoek** | **SPV** | **1.075** |
| **Linakeng** | **Thaba-Tseka** | **SPV** | **1.075** |
| **Nkau** | **Mohale's Hoek** | **SPV** | **1.075** |
| **Sehonghong** | **Thaba-Tseka** | **SPV** | **1.075** |
| **Kolobere** | **Thaba-Tseka** | **SPV** | **1.075** |
| **Sehlabathebe (Mavuka, Polasi)** | **Qacha's Neck** | **Mini-Hydro** | **100** |
| **Lesobeng** | **Thaba-Tseka** | **Mini-Hydro** | **100** |
| **Letsika** | **Thaba-Tseka** | **SPV** | **1.075** |
| **Malingoaneng** | **Mokhotlong** | **SPV** | **1.075** |
| **Molikaliko** | **Mokhotlong** | **SPV** | **1.075** |
| **Motete** | **Butha-Buthe** | **Mini-Hydro** | **500** |
| **Kao** |
| **Liqhobong** |
| **Seng** | **Maseru** | **SPV** | **1.075** |
| **Sani Pass** | **Thaba-Tseka** | **SPV** | **1.075** |
| **Mphaki (Mahlomola)** | **Quthing** | **Mini-Hydro** | **100** |

*Table 14: REU Projects to be considered*

Source: Restructuring of the Rural Electrification Unit: Genesis 2017

* **Imports from South Africa to border districts**: For distant districts from the national grid but bordering South African regions that have electricity, importation across shall be ideal as part of regional integration and power trade. The Dili-Dili Senqondo pilot in Quthing District where about 278 households have been connected is a successful model. Solar street lighting;
* Facilitate the establishment of Rural Energy Service Companies (RESCOs)
* Promote the application of renewable energy technologies to income-generating activities
* DOE project 2016/17-2022

The draft Strategic Plan of the Ministry of Energy and Meteorology 2016/17 aims to implement the energy sector projects in an effort to achieve the national development goals and plans. Following projects are earmarked.

|  |  |  |
| --- | --- | --- |
| **Project Title** | **Responsible** | **Objective** |
| Electrification Schemes | REU | To supply the rural poor of Lesotho with reliable, affordable and sustainable electricity  to enhance access to electricity service |
| Northern Districts Electrification Project | REU | To supply the rural poor of Lesotho with reliable, affordable and sustainable electricity  to enhance access to electricity service |
| Strategic Fuel Reserve | DoE | Assurance of Security of Supply of petroleum products |
| Development of Cornerstone Public Policies and Institutional Capacities to accelerate Sustainable Energy for All (SE4All) Progress | DoE | To Develop Cornerstone Sustainable Energy for All (SE4ALL) Strategies  To provided village-based energization schemes  To Collect Baseline energy data and monitoring for SE4ALL |
| Enhancing Energy database: IAEA | DoE | To develop local capacity to operate and manage energy database and models, conduct energy surveys and policy development |
| Low Emissions Investment Plan (LEIP) | DoE | To scale up renewable energy  To increase energy access |
| Solar Street lighting in growth centres | REU | To enhance public safety by providing night lighting in populated peri-urban areas |
| Urban Infrastructure rehabilitation project | LEC | To ensure sufficient electricity network capacity through rehabilitation and network improvement |

*Table 15: Rural electrification projects*

* Solar Home systems: SE4ALL project Energy Centres: 2016/17-2020

The Sustainable Energy for all project funded by UNDP will establish energy centres in 5 districts of Thaba-Tseka, Mokhotlong, Quthing, Mohale’s Hoek and Qacha’s Nek. The rationale behind Energy centres is to facilitate access to energy technologies including solar home systems. The SE4All project will establish 10 energy centres.

# 7.1.1.3 increasing electrification rate through network expansion

**Transmission and Distribution Network**

Lesotho Electricity Company and the Lesotho Rural Electrification Unit, which also manages the National Rural Electrification Fund (NREF), are responsible for the development of the transmission network in the country. The Government of Lesotho has established the revamping of the electricity distribution network as one of the main priorities to fulfill its strategic development objectives. It is needed to increase the safety and reliability and to expand connections to households and potential growth areas. The poor maintenance and aging of infrastructure has caused frequent power cuts. The Lesotho Electricity Corporation states that it aims to add 120MW of supply capacity to the grid by 2017. The main project in the pipeline is the Kobong Transmission Line (400kV) which is due in 2017. Furthermore, the Ministry aims to ensure guaranteed access of all licensed renewable energy electricity generators (IPPs) of at least 500 kW to the transmission grid

* Network expansion Project undertaken by LEC; Mazenod – Semonkong - Qacha’s Nek: 132 kV Transmission line:

The proposed 132 kV transmission line will span a length of approximately 146 km and shall commence at a new switching station in the vicinity of the Mofoka area and terminate at the proposed Mpiti B 132 kV substation.

# 7.1.1.4 feasibility studies

1. **Power Generation:**

* Hydro Power Generation 100-200MW plant at Hloahloeng
* LHDA developing feasibility study for 120MW hydro power plant at Senqu River
* Feasibility study development by Lowlands Water for multi-purpose dams at Hololo, Hlotse 10MW, Makhaleng 40MW
* **70 MW solar Plant funded under FOCAC**:

The proposed solar project will be will be executed in two phases; 20MW shall be installed in the first phase, which shall commence in June 2018 and the completion time shall be in December 2019, and the total cost is USD 43.3 million, the predicted generating capacity is 869.37 million kwh for 25 years, or 34.8 million kwh yearly. The plant will produce enough electricity for approximately 29,000 Lesotho households. The remaining 50MW shall be installed in the second phase, which will commence in January 2019 and the completion time shall be December 2020. The cost is USD 101.47 million. The predicted generating capacity is 2.173 billion kWh for 25 years, or 86.937kwh yearly. The plant will produce enough electricity for approximately 72,500 Lesotho households.

# 7.1.2 petroleum subsector

The Petroleum subsector shall be strengthened through the following strategic actions

* Strategic Fuel Reserve: Feasibility Studies: 90 days’ strategic reserve by 2020 following the Government call for Building and maintaining an adequate storage facility that will meet at least three months of fuel supply
* Regional Depots: Construction at Mants’onyane through Petroleum Fund support
* Developing and Ensuring Standards in collaboration with Ministry of Trade by 2020
* Setting and clearly defining minimum commercial “buffer” stock to be kept by oil companies
* Maintaining joint procurement of petroleum products within the Southern African Customs Union (SACU) region
* Developing guidelines for entry, operation and exit of petroleum sector market to ensure petroleum products delivery is not interrupted
* Empowering local business to participate meaningfully in the petroleum and gas industry
* Investigating and introducing alternative mechanisms of fuel supply (road, rail or pipeline) in collaboration with the Petroleum and Gas industry
* Working in collaboration with the Ministry responsible for mining to explore oil and gas.

# 7.1.3 Biomass and biotechnogies subsector

Lesotho shall embark on promoting and disseminating biomass and biotechnologies including biogas in the country through the following strategic actions

# 7.1.3.1 strategy that focuses on producing more biomass through forestry management

* Higher fuel prices for wood fuels which will attract private producers to devote more of their scarce farmland to produce wood instead of crops;
* Encouraging and providing incentives to private forest plantations to use their wood for their own use or commercial purposes (the factories for tea and matches are good examples)
* Integrating tree planting into farm landscapes
* Strengthening the voluntary tree planting schemes especially in rural based communities
* Encouraging Institutions (public and private) to establish their own woodlot schemes to provide fuel wood supply*.*

# 7.1.3.2 strategy that focuses on substituting more biomass with other clean energy sources

* Substitution by compressed and/or carbonized biomass briquettes:
* Substitution by Liquid Petroleum Gas (LPG):
* Substitution through the use of biogas and other bioenergy technologies
* Substitution of fuel wood by use of paraffin:
* Substitution by use of solar energy for lighting and water heating:
* Substitution by wind: Wind utilization as an alternative can easily provide power to communities where wind regimes are encouraging. And there are several places in the country with very encouraging wind speeds.
* Substitution by hydro power schemes:

Lesotho, referred to as a Mountain Kingdom, has numerous rivers, waterfalls, and potential sites for water dams, which when harnessed properly is all capable of producing electricity for the country and the region. In rural areas, the installation of mini- and micro-hydro power plants, combined with suitable independent distribution networks, can make a significant difference to the lives of the people in those areas. Electricity is one of the critical requirements in the rural schools, clinics and commercial centers.

# 7.1.3.3 strategy that focuses on saving more biomass by use of efficient appliances

* Use of energy saving cook stoves in urban areas: All these groups shall be supported in acquisition of raw materials for effective mass production of improved stoves.
* Use of improved domestic cook stoves in rural areas: in rural areas, sensitization and training on energy conservation and environmental issues targeting women associations for self-construction of stoves at district level. These women would be trained as trainers so that they can train others at the county and village levels. The aim is to have at least one improved stove per family.
* Use of improved cook stoves in institutions: This focuses on schools, clinics, military camps, prisons, etc.

# 7.2 Energy Strategy Pillar 2: energy efficiency and demand side management efforts

The Government and other stakeholders including the private sector shall engage in efforts to enhance energy efficiency and demand side management initiatives.

Energy efficiency is considered to be one of the main aspects of the national energy strategy in the Lesotho by 2020, and as a means of reducing electricity consumption. Under this strategy, energy efficiency development in the country by 2022 will include the developed institutional framework, capacity and methodology infrastructure, practical experience in different industries and government buildings.

There is potential to save energy by promoting energy efficient lighting bulbs, demand side management\* and minimising electricity losses by maintaining and rehabilitating electricity network infrastructure.

* Encourage the replacement of electric geysers with solar water heaters in industrial, commercial, residential and general purpose sectors
* Phase-out incandescent bulbs in buildings and street lighting

Demand Side Management Strategies and proposed Technologies\*

|  |  |
| --- | --- |
| Demand Side Management Strategy | Demand Side Management Technology |
| Efficient appliances and lights | Current limiters |
| Commercial load scheduling | GridShare |
| Restricting residential use | Distributed Intelligent Load Controllers |
| Price incentives | Conventional meters |
| Community involvement, consumer education, and  village committees | Prepaid meters, Advanced metering systems with  centralized communication |

*Table 16: Demand Side Management Strategies and proposed Technologies*

# 7.3 Energy Strategy Pillar 3: effective institutional governance

The strategy entails having effective and efficient Institutional governance in place. Efficient and effective performance of the sector shall much depend on the governance of the sector along the entire chain of responsibilities and the sector governing hierarchy.

# 7.3.1 Ensure institutional setup and define clear mandates

* Define functions and the respective responsible organs with clear demarcations of activities and mandates as well as clear chain of command within the Department
* Match the functions and responsibilities including titles of officials to regional practices

# 7.3.2 Establish well functioning legal and regulartory framework

* Set and ensure compliance to minimum safety, health, environmental, risks, Quality (SHERQ) and service standards in the energy sector.
* Ensure adherence to the Transmission Grid Code as well as Quality of Supply and Service Standards to guarantee reliability of power supply.
* Enforce compliance to the Distribution Grid Code and Quality of Supply and Service

Standards to ensure reliability of power supply.

* Develop standards, codes of practice and specifications for mini and off-grid solutions.
* Regulate tariffs including the REF-in-Tariffs to ensure level ground power trade and encourage investments
* Monitor the performance of energy operators including the utility to ensure quality service to consumers
* Establish technical standards and quality assurance for the purchase, installation, and maintenance of electricity production and energy storage facilities used for self-supply.
* Impose where necessary and relevant and collect levies on energy services and products.

# 7.3.3 strengthen institutional capacity

* Assess the skills and capacity gaps in the Department of Energy and all its affiliate sub-departments.
* Establish the required training both in house and out as deemed appropriate
* Develop a capacity building plan

# 7.4 Energy Strategy Pillar 4: private sector particpation in energy activities in the country

# 7.4.1 ESTABLISH CAPACITY BUILDING/TRAINING NEEDS AND DEVELOP THE training PLAN FOR LOCAL PRIVATE SECTOR PLAYERS in energy sector

* Promoting training and capacity building actions to engage in energy activities
* Support the NUL to come up with tailor made programs that shall assist the private sector nationals in different skills needed for undertaking energy related projects. This may include but not limited to the understanding of Res in depth. Preparation of business plans, basic engineering and designs for RE projects, etc.
* Strengthening the ability of private sector to influence state decisions and policy making process.
* Advocating for a positive involvement of private sector to deal with energy investments

# 7.4.2 put in place enabling investment environment to attract private investments

* Supporting private sector firms interested to develop energy activities particularly in renewable energy and energy efficiency.
* Enforcing rules and regulations and providing enabling environment to facilitate the activities of private sector related to energy investments in the country.
* Develop standard Concessions, and Power Purchase Agreements to reduce time wastage in negotiations and transactions.
* Liaise with LEWA in coming up with known REFITs for both on- and off-grid solutions
* Aim at having more than 50% of private investments run by nationals by 2022

# 7.4.3 enhance technology transfer and financing through facilitating partnerships between local actors in the sector and foreign potential investors for joint invetsments

Improving and facilitating access to finance for local investors by establishing guarantee fund, similar to the scheme UNDP practiced.

# 7.5 Energy Strategy Pillar 5: Civil society particpation in energy activities in the country

The Government shall undertake to support the civil society participation in energy activities especially in the rural areas.

# 7.5.1 build capacity to civil society organizations acting and wishing to engage in the sector

# 7.5.2 share all the necessary information related to energy with civil society to leverage on their advocacy potential role with wider population in the country

# 7.5.3 enhance technology transfer and financing through facilitating partnerships between local actors in the sector and foreign potential iNGOs interested in the sector

# 7.6 Energy Strategy Pillar 6: women and youth participation in energy related activities

# 7.6.1 Collect data brocken down by sex.

* + - Carry out analysis using gender-disaggregated data both at national and decentralized levels
    - Make effective women/youth based strategic decisions.

# 7.6.2 Build capacity of both the women and youth in energy related business activities

* Come up with tailor made short training course and seminars related to small and medium enterprises that enable them create their own businesses
* Link them to the energy centres so that they may act as agents for energy business and trading

# 7.7 Energy Strategy Pillar 7: Response to environment, women and climate change

# 7.7.1 Aim at becoming a carbon neutral country

* Targeting 100% investments in renewable energies as the source of electricity generation in the country
* Aim at using clean alternative energies for cooking and heating
* Ensure atleast 70% of the population use efficient cookstoves by the year 2022
* Ensure mandatory environmental and social impact assessment meeting the necessary environmental requirements as well as having the mitigation measures in place where needed

# 7.7.2 ensure enforcement of biomass energy management in the country

The Government shall ensure enforce strategic actions towards Biomass management through;

* Producing more Biomass needed for cooking and heating
* Substituting more Biomass by using other clean energy alternatives, and
* Saving more biomass by use of efficient appliances

# 7.8 Energy Strategy Pillar 8: Regional Integration

The Government through DoE shall endeavor to participate in all relevant regional integration efforts.

# 7.8.1 engage in cross-border power trade

* Harness Lesotho’s rich RE resources for power export in the region
* Import electricity from the Republic of South Africa to power rural based districts that are located closer to SA and far from the national grid.
* Leverage on the power interconnector with SA to invest in solar energy for network stability purposes

# 7.8.2 harmonization of regulations and standards

* Harmonise regulations and standards in order to allow for smooth power trade in terms of infrastructure and tariffs

# 7.8.3 technology transfer and exchange of good practices

* Exchange of good practices by staff attachment and internships in other countries in the region where relevant. This could be through technology exchange, skills enhancement

# 7.9 Energy Strategy Pillar 9: rescource/funds mobilization efforts

The Government through the Ministry of Energy and Meteorology and the DoE shall work hand in hand along with other stakeholders to put in place resource/funds mobilization mechanisms

# 7.9.1 create energy fund

# 7.9.1.1 enforce collection of levies and taxes where relevant

# 7.9.1.2 universal access fund from the Petroleum fund and lewa

# 7.9.1.3 organize regional and international investment forums to allow for energy foreign investments

# 6.10 Energy Strategy Pillar 10: energy managment information systems (EMIs)

The Government through DoE shall develop an EMIS as tool that shall assist in providing the real-time information and enable the department to make informed decisions pertaining to the day to day operations of the Department. This tool shall also assist the Department in the performance monitoring of the Department

# 7.10.1 expected outcomes

* Early Detection of Poor Performance
* Support for Decision Making
* Effective Performance Reporting
* Auditing of Historical Operations
* Identification and Justification of Energy Projects

# 7.10.2 required inputs for action

* Energy Data
* Targets
* Reports
* Training
* Decision Support
* Audited Success
* Benchmarking and Best Practices

# 7.11 Energy Strategy Pillar 11: Project monitoring and evaluation

Monitoring and Evaluation (M&E) is an important process for ensuring proper implementation of the project/program under consideration*.* Effective monitoring of the program is considered to be essential to tracking how effective the delivery of inputs, money and goods, is during Project implementation. The DoE shall ensure putting in place the M&E system and to ensure its effective execution.

# 7.11.1 requirements for comprehensive system of m&e

* Defining the expected outcomes,
* Identifying/observing the monitoring indicators for final and intermediate outcomes, as well as outputs that contribute to achieving the outcomes,
* Ensuring that baseline data are available, and
* Targets/milestones are set to assess progress, and
* Making use of the EMIS to collect, analyze and report the data, and monitor progress.

# 7.11.2 M&E process

Program and Projects performance will be monitored through the regular tracking of indicators and organized reviews related to the objectives of the Program. The performance analysis shall allow the management of the activities to make adjustments as necessary with a view of improving the overall impact of the Program support.

The project will be monitored through specified indicators. The M&E system and tools shall reflect the indicators to be monitored including the goal indicators, objective indicators, outcome indicators and activity level indicators. The system plan shall also include timelines for measuring objectives, plans for establishing baselines and determining targets, when necessary, and frequency of measurement during the project/programme duration.

# 7.11.3 indicators for measuring project/programme performance

The indicator definition frame shall be prepared and shall provide a detailed definition of each indicator, unit of measure, source of data, methods and frequency of data collection, and entity responsible for such collection of data. The Program results will be measured through quantitative, objective and reliable indicators. Each indicator will have one or more expected results, i.e. targets, that include the expected time by which that result will be achieved.

# CHAPTER 8: implementation of the sustainable energy strategy framework

# 8.1 global strategy guiding principles

The National Sustainable Energy Strategy which addresses among others, the Renewable Energy component, shall address at least the following areas:

* Clear thresholds and targets for renewable energy production for the near and medium term (energy strategy pillar 1)
* Strategy on mix of renewable energy solutions across the country matched with needs (energy strategy pillar 1)
* Strategies to dismantle and removal of the barriers for investment in, and access to, green technology (energy strategy pillars 3 and 4)
* Strategies for market-based tariff mechanism that is viable long-term (energy strategy pillar 4)
* Incentives for foreign and national investments (Energy strategy pillars 4 and 9)
* Regulatory framework requirements to enable private sector participation, directly or through PPP (Energy strategy pillar 4).
* Strategies to develop and publish data on opportunities for investment in green technologies (energy strategy pillar 10)
* Standards to promote energy efficiency across public and private sectors (energy strategy pillar 2)

# 8.2 implementation Framework blocks

**Financial resources mobilization**

**Fiscal Regime**

Figure 8: Key sector main areas of focus

**For analytical purposes, four key focal areas are considered;**

Realizing that there is no blueprint for creating a perfect puzzle for a right strategy, the right fit will be highly country specific, vis-à-vis barriers to realizing the Sustainable Energy Strategy for Lesotho.

# 8.2.1 LEGAL AND REGULATORY FRAMEWORK

The legal and Regulatory framework constitutes mainly of the regulations and obligations pertaining to sector activities' execution including investments. It is of main importance that the legal and regulatory framework remain transparent and that the regulations’ requirements and obligations are enforced. This pertains to several aspects including licensing for power generation and/or distribution and trading, tariff regulation, obligations related to the utilities and other energy service providers, etc.

# 8.2.2 THE FINANCIAL RESOURCES MOBILIZATION

The financial resources mobilization strategy aims at securing access to finance for energy (especially renewable energy) projects. This could take form of engaging the private sector participation, the public-private partnerships, establishment of revolving funds, favourable clean energy loans, direct subsidies, etc.

# 8.2.3 THE FISCAL REGIME

The fiscal regime would consist of the fiscal incentives in accordance with clean and renewable energy policy focus. This could take form of for example CO2 taxes, tax credits, institutional investor incentives, duty exemptions for RE equipment), VAT reductions, etc.

# 8.2.4 INSTITUTIONAL SET UP AND CAPACITY STRENGTHENING

The institutional framework aims to ensure the necessary institutional support to implement the energy strategy. This shall typically take the form of supportive agencies and institutions (governmental and non-governmental), academic and other educational institutions, information management and raising awareness, policy making and planning, training and organizational development, mobilization of resources etc.

# 8.3 path to implementing the strategy

Install atleast 1000 Biogas Digesters and achieve atleast 70% of households using efficient cooking stoves, 50% of LPG use, and 70% of rural clinics using SWH by 2022

**Increased Access to Electricity**

**Maintain a cost reflective tariff**

**Develop Sustainable Sources of Energy for cooking and heating**

**Increased Electricity Generation Capacity**

**Maintain secure and economic supply of petroleum products at predictable prices**

**75% on and 50% off-**

**grid access by 2022**

**Develop 360 MW of installed Generation capacity by 2022**

**Competitive tariff at both domestic and regional levels**

**Maintain 3 Months Reserve Stock**

**LEC, REU and IPPs**

**Engagement in Generation, Transmission, and Distribution Roadmap**

**Finalize and implement**

**Generation Masterplan**

**Finalize LEC Cost of Service Study and conduct Tariff Review**

**Popularize and support country-wide use of Biogas technology, efficient cookstoves, LPG, and SWH**

Manage import costs

**Enhance price stability**

* Enabling environment allowing for the participation of the private sector and Civil Society including women and youth in Sustainable Energy Initiatives
* Effective legal and regulatory framework in place

APPROACH TARGETS OBJECTIVES

|  |
| --- |
| **Path to achieve the 2022 National Sustainable Energy Strategy** |

Figure 9: The roadmap to achieving the Sustainable Energy Strategy targets

# 8.4 institutional roles and mandates

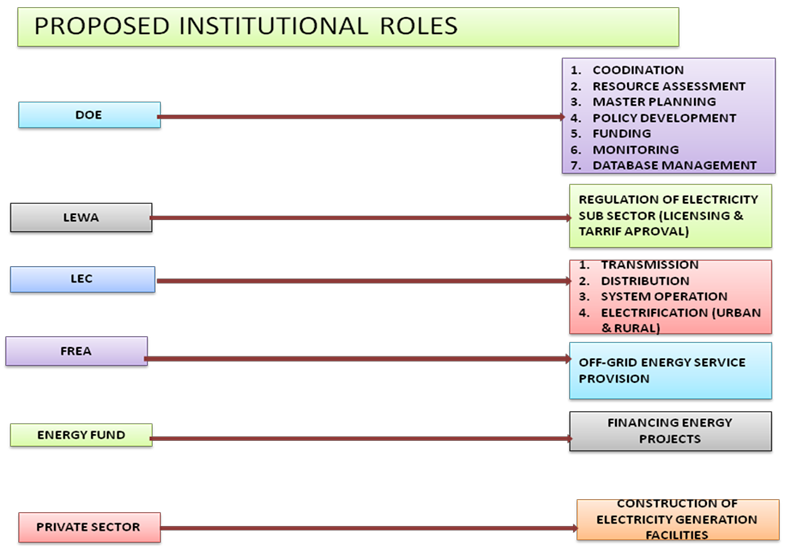


Figure 10: Roles and mandates of Energy Policy and Strategy Implementation Institutions

***Source: Lesotho National Energy Policy document***

# CHAPTER 9: Annexes

**Annex 1: Terms of Reference**

**Annex 2: Stakeholder consultations report**

**Annex 3: References**

1. A Vision Statement by Ban Ki-moon Secretary-General of the United Nations, Sustainable Energy for all, November 2011, <http://www.un.org/wcm/webdav/site/sustainableenergyforall/shared/Documents/SG_Sustainable_Energy_for_All_vision_final_clean.pdf> [↑](#footnote-ref-1)
2. Lesotho Renewable Energy Potential: RECP 2016 [↑](#footnote-ref-2)
3. 3 SADC Regional Energy Access Strategy and Action Plan: March 2010 [↑](#footnote-ref-3)