LESOTHO POWER GENERATION MASTER PLAN

PROJECT # LEC/GEN/1-2009

FINAL MILESTONES REPORT

VOLUME 3

ECONOMICAL REPORT

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1. INTRODUCTION

1.1 Introduction to study

The purpose of this report is to provide an economic evaluation to assess various potential project locations in Lesotho against one another. Each power generation option is assessed from an economic perspective, utilising a specific economic evaluation framework consisting of predetermined economic criteria.

The following serve as the objectives for the economic analysis:

- Provide a contextual macro-economic review of the Lesotho economy;
- Explore the economic dynamics of the Lesotho energy sector and its relationships with national economic and sector growth;
- Utilise the outcomes of the technical assessments as inputs into the economic analysis;
- Determine and allocate weightings various quantitative and qualitative economic indicators to be used to assess power projects against one another;
- Rank hydro-power, wind and solar projects against one another based on their potential economic relevance and implications on the local economy; and
- Provide input into potential funding available for power projects.

1.2 METHODOLOGY

The methodology used in this study is described in Table 1 below.

Purpose		Description
1	Data collection and review	• Collected and organised technical assessments for each power project. A key constraint experienced was the lack of provision of project specific information on operating and capital expenditure. Thus assumptions were made based on the limited information provided by the client. • Obtained and reviewed relevant strategy, policy and research documents to inform conceptualisation of indicators. • Acquired and analysed economic and socio-economic data. Constraints were encountered in obtaining region specific data • Indicators for the project assessment and evaluation were identified and selected based on pertinent economic theory and their relevance to the Lesotho context.
2	Design framework and populate indicators	• A dynamic framework was developed electronically (Microsoft Excel) and was populated with the selected indicators • Indicators used are described in Table 1.2 below.
3	Weighting of	• Weightings were allocated to each indicator • The system of weighting accounts for critical flaws and is utilised to

	Purpose	Description
	Indicators	ensure that key priorities from an economic perspective are prioritised when assessing projects against one another.
4	Undertake calculations and measurement ratings	• A numerical rating system was designed to ensure that both quantitative and qualitative results for each project could be populated into the model. For example a value of '1' indicated complete insignificance and '10' highly significant. • Due to a lack of project specific operating and capital expenditure data no Input/Output (I/O) modelling was undertaken.
5	Determine total scores	• The framework calculated final scores for each of the analysed projects based on their rankings and criteria weightings.
6	Rank power generation projects	• A total of 22 projects (including hydro, solar and wind) were analysed in the model, and ranked

Table 1: Economic assessment methodology

The economic indicators that are used in this study to rate projects in terms of an economic perspective are contained in Table 2 below.

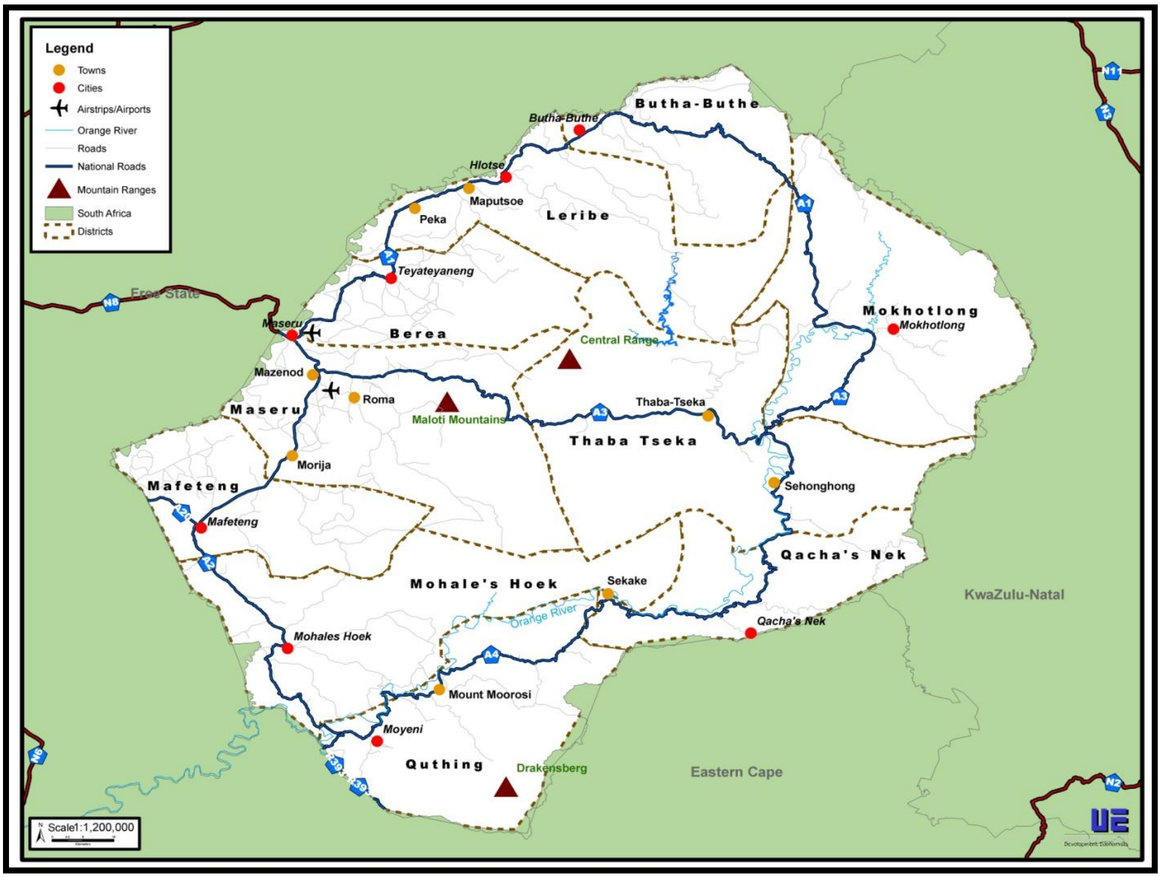
Economic Indicators	Economic Rational	Description
1) Proximity to economic nodes	Comparative advantage/ disadvantage	• Site's proximity to existing urban and industrial nodes. • Provide for opportunities to create linkages with existing business within the identified locality as well as share benefits associated with established infrastructure provision. • Comparative advantage assesses an area's potential to produce an output at a lower opportunity cost in comparison to another area. • The potential of an industry to have a cluster formed around it depends on the number of potential forward and backward linkages of that industry, as well as the viability of the businesses with which it can form linkages.
2) Proximity to communities	Comparative advantage/ disadvantage	• From a supply perspective labour availability is noted as being a key economic production function in assessing a location's efficiency and/or cost effectiveness in producing a good or service. • Investment within an extremely remote and rural area results in unwillingness of workers to relocate and does not provide a stable community environment from which to source new labour on a regular basis or when required.

Economic Indicators	Economic Rational	Description
3) Skills availability	Comparative advantage/ disadvantage	• Availability of the labour as well as the nature and extent of the skills base are important location factors for any industrial development.
4) Economic 'spin-offs'	Economic multiplier effect	• Multipliers assess the effect of changes in the elements that are exogenous to the economy. An exogenous (final demand) change refers to an increase/decrease in for example, consumption of final goods and services, exports, fixed investment in the study area or imports. The effect of such changes are measured in: o Output of the sectors in the local economy o Income earned by households and thus local buying power o Employment (in physical terms) that is expected to be generated or lost because of changed outputs. • Certain forms of development, depending on their value chain position and linkages with other industries have the potential to create significant economic benefits and effects within a given location.
5) Employment creation/ output ratio	Economic sustainability and intensity	• Labour intensity depends on factors such as the technology used in production, which can be measured with the labour intensity ratio.
6) Employment creation potential	Economic sustainability and intensity	• The development of renewable energy projects has the potential to create both short and long term employment positions directly and indirectly.
7) Skills development potential	Socio-economic growth	• Certain projects given their specific construction and operational intricacies will have the potential to up-skill the local working population more than others. • Skills development is recognised as a significant contributing factor towards regional economic growth.
8) Export potential	International competitiveness	• A high export rate is an indication of established market channels and the effective utilisation of markets external to the region or country. A sector that is export-orientated also has a bigger potential market, and due to its greater market diversity, is less vulnerable to adverse conditions that may influence either the domestic or the international market at a certain point in time.
9) Resource usage optimisation	Opportunity cost	• The definition of opportunity cost in this context is the income foregone by not using a resource or asset in its next best alternative. • Each project will need to be assessed based on its opportunity cost i.e. the potential benefit associated with implementing an alternative on the same site

Economic Indicators	Economic Rational	Description
		as the proposed development.
10) Cost of production (kV/OPEX)	Financial/ economic efficiency	• This specific indictor will consider from an efficiency perspective the ongoing annual operational expenditure that will be required to operate the new project in relation to the power capacity that it can contribute to the national grid.
11) Recapitalisation potential	Financial/ economic efficiency	• It is noted that initial capital expenditure to develop a new power generation facility is very high in relation to operational costing thereafter. As such, the recapitalisation ratio i.e. the annual return on investment relative to initial investment, will be compared from project to project.
12) Tourism potential/ linkages	Regional economic growth/ diversification	• As an ever expanding and growing sector, tourism is seen as a driver of economic development. Certain power projects are recognised for their ability to impact positively on the tourism sector through the development of various tourism events and permanent tourist accommodation and facilities.
13) SMME development potential/linkages	Regional economic growth/ diversification	• It is important to involve and uplift the SMME sector through enhancing the capacity of local entrepreneurs by establishing support measures and incentives to promote participation. This suggests that appropriate technology transfer needs to place in an environment conducive for the successful establishment of SMMEs. • SMMEs provide economic services in the form of employment creation, often with benefits comparable to those associated with employment from large industries. The potential for SMME creation and the presence of government assistance for small business as it relates to these projects will be determined. • When a subcontracting firm or network is established in an economy, the structure of the economy is broadened, since existing linkages are utilised and new linkages are created. The establishment of a subcontracting network in an economy can inter alia, initiate the creation of additional employment opportunities, strengthening of the industrial base as well as increase national production of goods and services.

A weighting system will be used for each indicator and all indicators will be rated per project based on available data and best practise experience.

1.3 Study area



Map 1: Map of study area

Source: Urban-Econ Eastern Cape

The Kingdom of Lesotho can be described briefly as a land-locked mountainous country, wholly bordered by the Republic of South Africa. Its settlement pattern is predominantly rural with the urban population mainly centred around the capital city of Maseru. The population is 1,876,633 people and a high percentage of this is made up of individuals living and working outside the country within South Africa.

In terms of political boundaries, Lesotho is divided into 10 administrative districts, each with its own capital. The districts are further subdivided into 80 constituencies and 129 local community councils.

The study area was defined as all the juristic districts that make up the Kingdom of Lesotho. The power generation projects identified in Lesotho were placed in context by analysing the economic and socio-economic situation in the relevant district. In the study the analysis is taken down to a district level where data was available.

The 10 district councils are as follows:

- Berea
- Botha Bothe
- Mohale's Hoek
- Quthing

- Leribe
- Maseru
- Mafeteng
- Qacha's Nek
- Mokhotlong
- Thaba Tseka

Its main economic sectors are manufacturing, government services and business services. Its manufacturing sector has grown significantly over the last ten years due to increase in foreign investment within the textile industry. This is due primarily to the Africa Growth and Opportunity Act preferential trade agreement (AGOA) between Africa and the United States. Contributors to the Lesotho government revenue are South African Customs Union (SACU) tariff revenue and royalty payments through Lesotho Highlands Water Transfer Scheme.

The overall characteristics of the Lesotho economy are of a small growing economy, highly reliant on certain sectors. The socio-economic profile presented in the next Section of this report identifies Lesotho as a country with problems relating to lack of service provision due to lack of government revenue to fund extension of public services such as clinics and schools. The countryside has a low population density which makes accessing some communities difficult.

The low levels of socio-economic and economic development places an impetus on the Government of Lesotho (GoL) to identify areas to diversify its economy, earn foreign currency, improve exports and increase government revenue to fund service provision. The energy industry is a sector that is experiencing a dramatic changes and growth internationally and in neighbouring countries such as South Africa. The need to promote Lesotho as a destination for energy generation investment is required.

The implications of the economic and socio-economic characteristics will be explored in more detail in Section 2.

1.4 The energy sector in Lesotho

Lesotho had a peak demand level of 95MW in 2006, and was able to locally supply 74.4MW of this through internal generation (NEMP, 2007). There has not been a fundamental change in the demand and supply situation since this plan was approved, which means that Lesotho is at present a net importer of electricity, which accounts for approximately 4% of its GDP (NEMP, 2007). It is envisaged that an increase in electricity generating capacity arising from the implementation of various projects assessed in this document could allow Lesotho to become a net exporter of electricity, that being the intention of the Lesotho Government (GoL). (Bureau of Statistics, 2009)

Electricity is a key input into the manufacturing sector, which has been growing with the increase in foreign direct investment. Thus in order to improve the competitive position of Lesotho as a destination for investment, the generation of electricity needs to considered.

Before 2000 Lesotho imported all its electricity from South Africa. The development of the Muela power plant[1] as part of the Lesotho Highlands Water Project has contributed to domestic generation of electricity.

1.5 Section outline

An outline of the Sections of this report is provided below:

Section 2: Section 2 profiles the Kingdom of Lesotho in terms of its bio-physical and environmental characteristics in as far as these influence investments in power generation. It also profiles the country in terms of its socio-economic and economic characteristics. Information is provided to a district level as far as possible.

Section 3: Section 3 describes the economic indicators used in the decision making framework.

Section 4: Section 4 provides the weightings of indicators and the outcomes of the framework assessment of each power generation project with its consequent ranking.

2. STATUS QUO PROFILE

This Section provides an analysis of the socio-economic, economic and general bio-physical characteristics of the Kingdom of Lesotho and where possible includes an analysis up to district level. Information used has been the latest where possible or that which was available at the time of writing the report. Data sources include:

- 2009 Statistical Yearbook, Kingdom of Lesotho Bureau of Statistics;
- Statistical release 2009, Kingdom of Lesotho Bureau of Statistics, 2011;
- Census 2006 1996 and1986, Kingdom of Lesotho Bureau of Statistics; and
- Other statistical releases as cited in Appendix 1: List of references.

The status quo profile provides an outline of the key activities and characteristics of the area to thereby inform economic indicators around economic potential, opportunity cost, comparative and competitive advantages, agriculture, manufacturing and tourism.

2.1 Biophysical profile

The Kingdom of Lesotho is entirely surrounded by South Africa, and has a land surface area of 30,355 km^{2}and an altitude range of between 1 388-3 482 meters above sea level. Lesotho has a temperate climate, with hot summers and cold winters. The mean summer temperature is approximately 25°C and the mean winter temperature is approximately 15°C.

[1] Future references to a or the 'plant' in this report relate to power generation plants and may be used interchangeably with 'facility' and 'project'.

The average annual precipitation varies between about 600 millimetres in the lowland valleys to about 1 200 millimetres in areas of the northern and eastern escarpment bordering South Africa. The annual mean precipitation for the country is between 700 and 800 millimetres. The majority of the rain falls in the form of summer thunderstorms. 85% of the annual precipitation falls between the months of October and April.

The winters between May and September are usually relatively dry. Snow is common between May and September and the higher peaks can experience snowfall year-round. The amounts of rainfall vary considerably which results in periodic droughts. The districts that receive the majority of rainfall are Botha-Bothe, Quthing, Qacha's Nek They each receive 11% of the rainfall in Lesotho. The district of Thaba-Tseka receives the least rainfall (8%) (Bureau of Statistics 2009a).

2.1.1 Agro-ecological zones

Lesotho has four physiographic regions based on elevation and agro-climate, namely the Lowlands, Foothills, Mountains, and the Senqu River Valley, as shown in Appendix 1: Additional maps. In terms of their potential for agricultural activity as well as their climatic and ecological characteristics it can be seen that:

Lowlands: account for 17% of the country's area (5 160 km^2) and have an elevation below 1 800m. They are characterised by relatively high rainfall and a soil type which allows for the cultivation of maize, sorghum, beans, winter wheat and vegetables.

Foothills account for 15% of the country's area (4 553 km^2) and have an elevation between 1 800m and 2 000m. Lower rainfall is experienced in this area as compared to the lowland zone. The loose sandy topsoil is easily eroded by wind and rainwater due to over-grazing. Maize, sorghum and summer peas are grown in this zone.

Mountains account for 59% of the country's area (17 910 km^2) and have an elevation above 2 000m. They are characterised by very cold winters and are the least densely populated portion of the country. Little to no productive agriculture takes place, with limited subsistence activity encompassing the growing of wheat and peas, a well as diminutive livestock holdings.

Senqu River Valley accounts for 9% of the country's area (2 732 km^2) and has an elevation between 1 000m and 2 000m. The valley is characterised by a low rainfall regime especially in the south-western portion and has rich soil along the banks of the Senqu River. Crops such as wheat and maize are grown in this valley in winter. The majority of the valley floor is cultivated while the valley sides are utilised for grazing. (Bureau of Statistics 2009a)

2.1.2 Current land use

This section shall provide a brief high level discussion on current land uses throughout the country.

- **Agriculture**- Many areas do not have a climate or topography suitable for carrying large numbers of livestock or crop production. As such agricultural land is largely used for activities of a subsistence nature. The majority of the nation's available land is utilised for livestock production, with 65% of the mountain zone dedicated to this activity. Crop cultivation has a strong presence in the lowlands. Less than 1% of the country (34 685 ha), is under forest cover (indigenous and afforested).
- **Environmental conservation zones**- There are only two nature reserves in Lesotho: the Sehlabathebe Wildlife Sanctuary and National Park and the Masitise Nature Reserve. They cover a combined 7 680 ha. (<1% of the country). This is below the 10% recommended as the minimum by the IUCN Bilateral negotiations between the South African and Lesotho governments to develop cross boundary conservation areas. This has resulted in the establishment of the Maloti Drakensberg Conservation Programme whose transborder conservation area follows the Maloti mountains in Qacha' Nek and Thaba Tseka.
- **Built-up urban settlements**- There are a concentration of industrial and residential land uses in the districts of Leribe, Maseru and Berea. These areas are also the most urbanised in Lesotho. Existing activities include government and commercial offices in Maseru and manufacturing firms, many of which are foreign owned.

These areas offer established value chains and an existing network of firms in the same sector, thus cost advantages are experienced. As a result of a high concentration of activity, Lesotho has developed agglomeration advantages in the manufacturing and clothing textile sector in these districts

- **Mining**- mining only accounts for a small percentage of the total land use.

2.1.3 Potential land uses

The Population Census of 1996 identifies potential for agriculture and other economic activities in the following areas:

Lowlands:

- High potential for livestock and crop production; and
- Urban areas show agglomeration advantages around government services sector and manufacturing.

Foothills:

- Limited agricultural potential

Mountains:

- High tourism potential; and
- Possible high impact project around transboundary conservation area.

Senqu River Valley:

- High tourism potential.

2.1.4 Key implications of biophysical profile

The biophysical profile gives an indication of possible economic spinoffs related to the establishment of power generation facilities, based on the country's natural endowments.

- Economic systems interact and are dependent on natural environmental systems. As such the economic advantage or disadvantage associated with each site is impacted by the biophysical characteristics of the country

As a rural country with a population that is largely dependent on agriculture for its livelihoods, **agro-ecological zones** provide information on the nature and extent of agriculture currently taking place

- Implications for the positioning and approval of a power generation project include aspects of resource utilisation and opportunity cost;
- Areas that offer prime agricultural land should not be used for other investment purposes, unless it can be proved through relevant studies that the economic and social consequences of such investment would lead to a net gain for the Kingdom of Lesotho (Pareto optimality). Areas that are already degraded or have limited potential for other land uses might be attractive sites for investment; and
- The opportunity cost of using land in the mountainous zone for a power generation plant will be lower than using fertile land in the Senqu River Valley or the Lowlands, where agriculture is the primary contributor to the economy. There is also little potential to expand agriculture in areas that have latent characteristics that do not encourage productive agriculture.

Regarding land use:

- The Transfrontier Park heralds significant high-impact tourism potential. As such due consideration of the park's proposed and planned boundaries will be made when assessing site locality;
- Land use in terms of ecologically sensitive areas (as shown in Appendix 1: additional maps) will also be considered. It is recognised that a significant amount of tourism activity in Lesotho is founded on the country's biophysical attributes, and as such the location assessment of projects will reflect this;
- It would be difficult to encourage manufacturing firms to relocate to more rural centres in Lesotho based on non-economic factors. With the right incentives however, firms could be encouraged to relocate; and
- Textile firms in particular are characterised as highly footloose. Footloose refers informally to the ease with which a firm can relocate. Firms would be encouraged to relocate within Lesotho if accessibility was improved and if there was further development of economic nodes and an availability of labour.

2.2 Socio-economic profile

This section considers the factors that influence the socio-economic profile of Lesotho. The characteristics of an area determine its present investment climate, and also have a bearing on its suitability for various forms of economic activity in the future. The main socio-economic factors that relate to the investment of a power generation plant would consider its effect on multidimensional measures of development as seen through:

- Population size and density;
- Skills levels;
- Labour availability;
- Proximity to areas with amenities;
- Size of the potential workforce; and
- Health issues i.e. HIV/ AIDS prevalence.

The establishment of most industrial developments will have a positive effect on the labour market as jobs will be created in the long and short term. This section moves on from such an assumption, and considers how employability of the workforce at present, and how this relates to the proposed investment.

2.2.1 Demographics

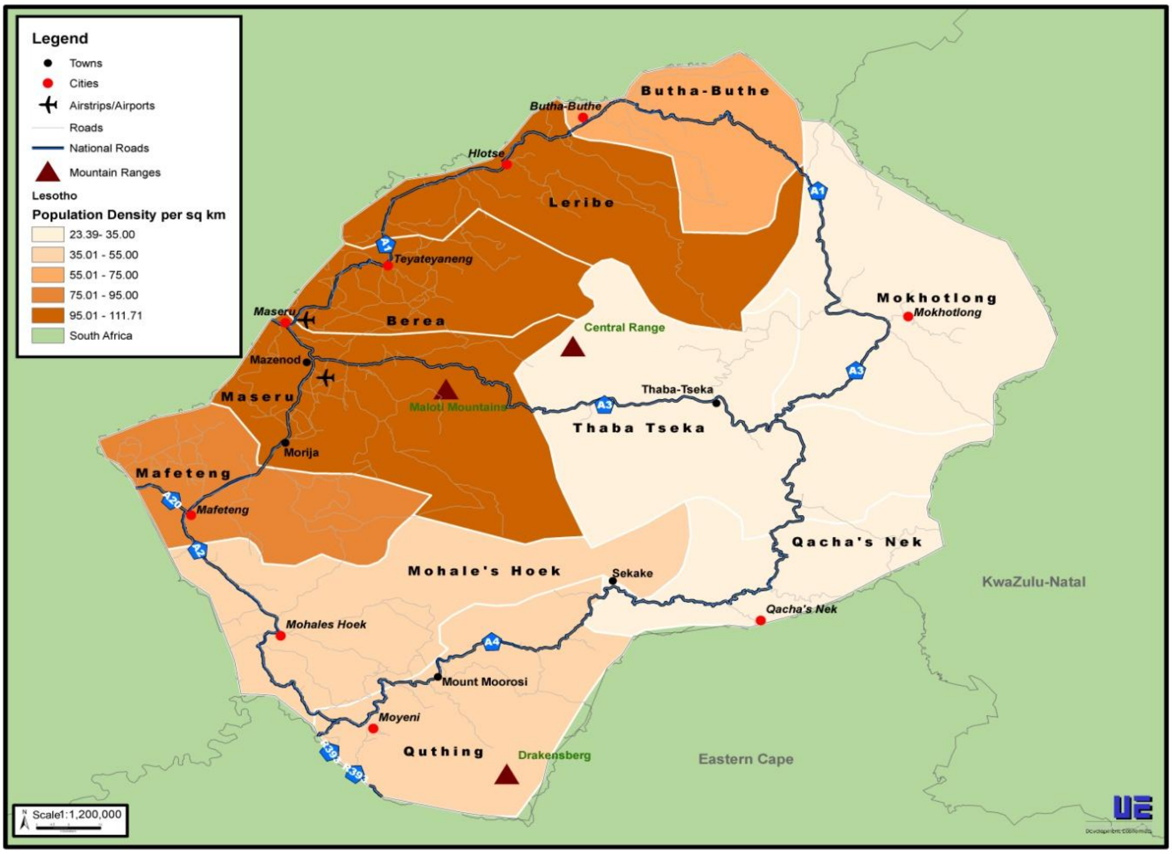
The Kingdom of Lesotho had a de jure population of 1,876,633 people in 2006 (BOS, Census 2006). The census makes a distinction between all usual residents of the country, which is known as the de jure population and all persons present in the country which they classify as the de facto population. The de facto population has always been significantly lower than the de jure population because of migrant Basotho workers in South Africa. The de facto population of Lesotho in 1996 was 1,598,000 compared to the de jure population of 1,862,000 in the same year. Males constituted 48.6% of the total population, whilst females represent 51.4%. Men make up the majority of migrant labourers.

District	Population	% Contribution to national population	Area (Km^2)	Population density (people per Km^2)
Botha Bothe	110,320	5.9%	1,871.81	59
Leribe	293,369	15.6%	3,095.80	95
Berea	250,006	13.3%	1,921.43	130
Maseru	431,998	23.0%	3,858.50	112
Mafeteng	192,621	10.3%	2,141.88	90
Mohale's Hoek	176,928	9.4%	3,612.04	49
Quthing	124,048	6.6%	3,030.03	41
Qacha's Nek	69,749	3.7%	1,934.08	36
Mokhotlong	97,713	5.2%	1,934.08	51
Thaba Tseka	129,881	6.9%	4,998.43	26
Lesotho	1,876,633		28,398.08	66

Source: Bureau of Statistics, 2006

Table 2: Population densities per district

The population distribution in Lesotho is determined by ecological, economic and administrative factors and is characterised by rural settlement patterns, low population densities spread across river valleys and mountain ranges. Table 2 provides the population density and size per district in 2006, which is also represented in Map 2: Population density per district.



Source: Urban-Econ, 2011

Map 2: Population density per district

The four most populous districts are Maseru, Leribe, Berea and Mafeteng which together hold about 62.2 % of the total population, a slight increase from 61.8 % in 1996.

The country has a small urban population, with the urban population of Lesotho in the 2006 census representing 22.8 % of the total, compared with 16.9 % in 1996. This translates to an increase of about 36 % in the urban population during this period. (Bureau of Statistics, 2006). This follows a trend that is evident in other developing countries whereby the population is becoming increasingly urbanised.

Maseru is the country's political and administrative capital and is the most populous district with approximately one quarter of the population. It also has the most urbanised district population (46%).

The district of Thaba Tseka has the highest proportion of rural population in Lesotho (95%).

2.2.2 *Population dynamics*

The **population growth rate** in urban areas was 3.7% between 1996 and 2006 compared to 0.7% in rural areas. Table 3 shows the population growth rate for the period 1996-2006 per district.

According to the Bureau of Statistics (2009b) the annual growth rate for the period 1976 -1986 was 2.8 percent. A sharp decline was experienced thereafter to 1.5 percent from 1986-1996.The annual population growth rate declined further to approximately 0.1 percent for the period 1996-2006.

Contributors to the low population growth rate experienced during the period 1996-2006 include; changes in fertility, mortality and migration as well as the HIV/AIDS pandemic. The reduction in population growth rate could be in part due to the high prevalence of HIV/Aids in Lesotho. The prevalence rate in adults aged 15-49 has increased from 4% in 1993 to 30% in 2003 (Bureau of Statistics, 2009a). According to the World Bank this is among one of the highest rates in the world (IFAD, 2006).

HIV/AIDS is most prevalent in urban areas, (Bureau of Statistics, 2009) which may impact on the potential productivity of the workforce, depending on access to anti-retroviral medication. In urban areas however there is better access to health care and medicine and thus this aspect would be mitigated.

Since 1996 the districts that have experienced an increase in their population size include Berea, Maseru and Mokhotlong. Berea and Maseru are both urban districts and the increase in population growth follows the trend of increased urbanisation of the Lesotho population. There would be greater labour availability in areas that experience positive growth rates.

District	Growth rates (1996-2006)
Botha Bothe	0.0%
Leribe	-0.3%
Berea	0.3%
Maseru	0.9%
Mafeteng	-1.0%
Mohale's Hoek	-0.5%
Quthing	-0.3%
Qacha's Nek	-0.4%
Mokhotlong	1.2%
Thaba Tseka	0.1%
Lesotho	0.1%

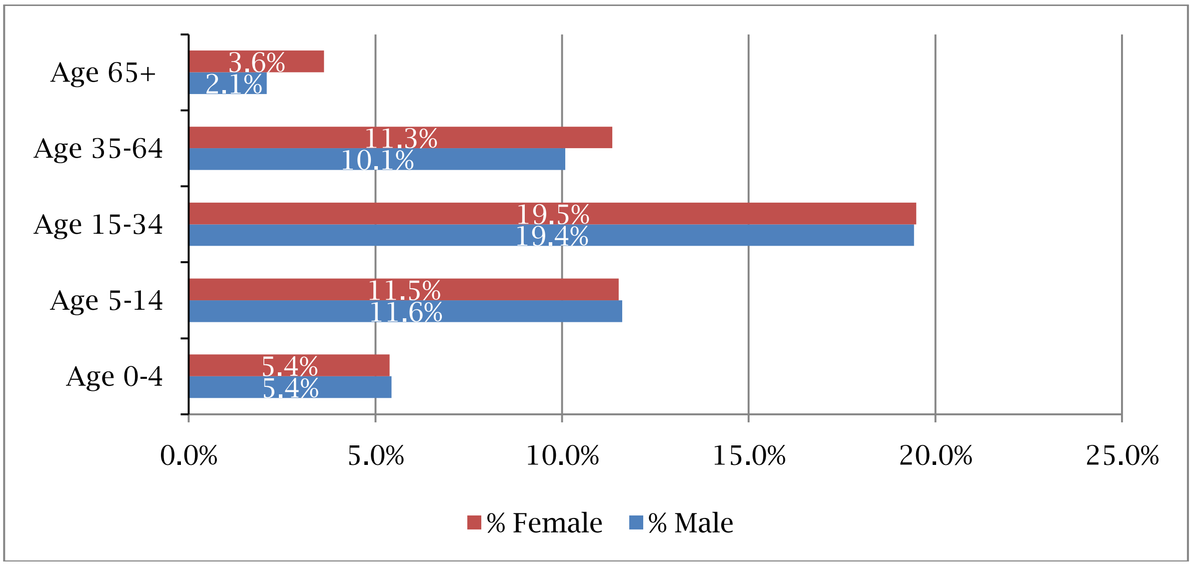
Source: Bureau of Statistics, 2006

Table 3: District population growth rate (1996-2006)

Figure 1 shows the **age and gender structure** of the population, which is an important demographic aspect indicative of the potential size of the labour force.

Findings from Figure 1 show that:

- The potential labour force (i.e. the proportion of the population between the ages of 15 and 64) comprises 60% of the population;
- Lesotho has a youthful population with almost 40% or citizens aged between 15-34. This age cohort is often associate with entrepreneurial activity;
- The 35-64 age cohort which is often associate with experienced and skilled employees is relatively small;
- 34% is under the age of 15 years. A population pyramid with a large base of young people is a positive sign for a growing economy; and
- Presently, there is a relatively low dependency ratio in Lesotho. The dependency ratio, is the ratio of economically active individuals relative to those aged younger than 15 and older than 65, For every one dependent there are 1.5 economically active individuals in Lesotho.



Source: Bureau of Statistics, 2006

Figure 1: Population Structure (2006)

2.2.3 Level of education

A key dimension that directly influences the potential employability of community members is their level of education. The level of education within a region impacts on many factors, including:

- The productive efficiency of investments into human development;
- Employment potential;
- The gender gap;
- Productivity; and
- Income levels.

Education is therefore acknowledged as being inextricably linked to the economic development of an area. Education levels in Lesotho are low, with the education system focusing on the provision of primary education. The overall illiteracy rate in Lesotho was 53% in 1996 (Bureau of Statistics, 1996). Table 4 shows the education attainment levels through time and Table 5 shows higher education enrolments in 2006.

	No Education	Primary	Secondary	Post Secondary	Other
1986 Census	27%	66%	6%	1%	0%
1996 Census	22%	59%	16%	2%	2%

Source: Bureau of Statistics, 1996

Table 4: Highest individual education attainment levels 1996, 1986

There are 1,333 primary schools and 224 secondary schools in Lesotho. The national school to student ratio is 1:314 for primary schools and 1:362 for secondary schools. Highly populated districts such as Berea, Leribe and Maseru have high school to student ratios of 1:469, 1:391 and 1:377 respectively. Teacher student ratios were also highest in these districts. Rural areas such as Thaba-Tseka and Mokhotlong had the lowest school to student ratios and lowest teacher student ratios.

	Enrolment Total 2006	Change between 2000 and 2006
Technical, Vocational	2,597	5.7%
University	6,726	15.4%

Source: Bureau of statistics 2009a.

Table 5: Enrolments in higher education for 2006

2006 Census data on education attainment was not available. Furthermore no district information on education or enrolments was available.

The majority of the population (59%) have a minimum of primary school education levels allowing them to possibly work in unskilled professions. A very small percentage of the population have post-secondary qualifications.

Traditionally, more girls attended school than boys in the rural areas, as boys were tasked with taking care of animals. The gap has been fairly constant over the last ten years in secondary schools with the share of girls varying between 55% and 60% of the enrolments and that of boys between 40% and 45%. A positive development is seen in how the number and percentage of boys enrolling into schools has increased since 2004.

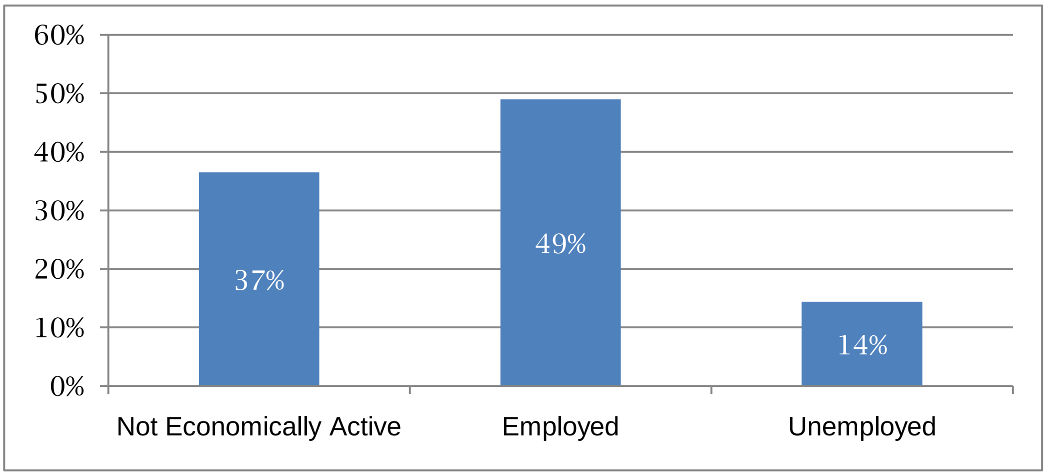
An increased focus on secondary and university education is evident in the increased enrolment figures for university (15.4%), technical (5.7%) and secondary (4.4%) school between 2000 and 2006.

2.2.4 Employment

The **employment status** of the working age population is shown in Figure 2.2. Economically active persons refer to individuals either currently employed or looking for employment (unemployed). The not economically active segment of the population includes people those who choose not to work, students, pensioners, disabled, infirm, scholars, homemakers and those who have given up searching for employment.

Unemployment is very low because many individuals fall into the not economically active employment status as they reside in rural areas and they are not actively searching for employment as there are limited employment opportunities.

The unemployment rate is the highest in Quthing at 27.1% and the lowest in Qacha's Nek at 17.5%. Mokhotlong and Botha-Bothe have the highest percentage of not economically active men in Lesotho.

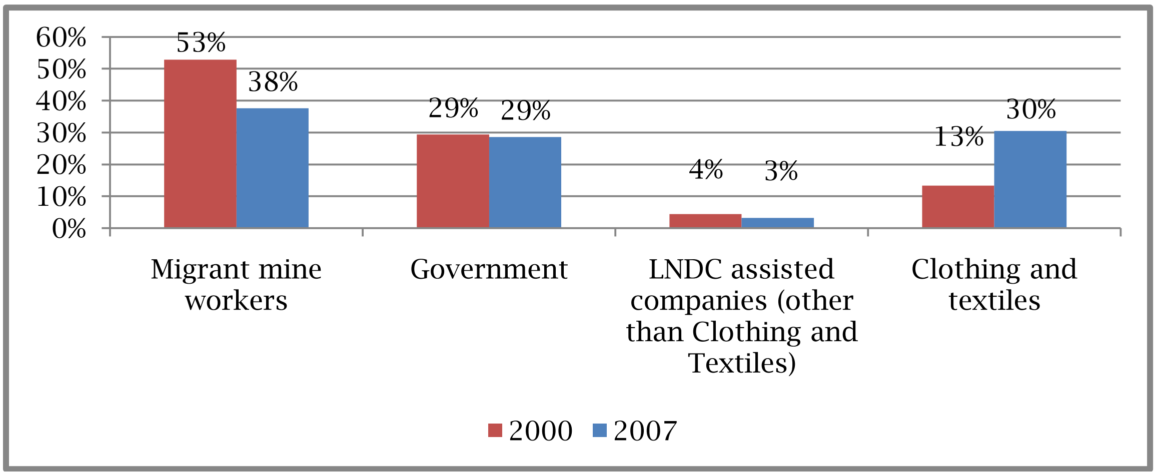


Source: Bureau of Statistics 2009a.

Figure 2: Employment status

Figure 2.3 shows the formal employment per main employer and Figure 2.4 shows the percentage employment per sector for each district. These two figures show **employment per sector**.

Formal employment is defined as "work for another person or enterprise as a permanent employee" (Chen and Hamori, 2009).



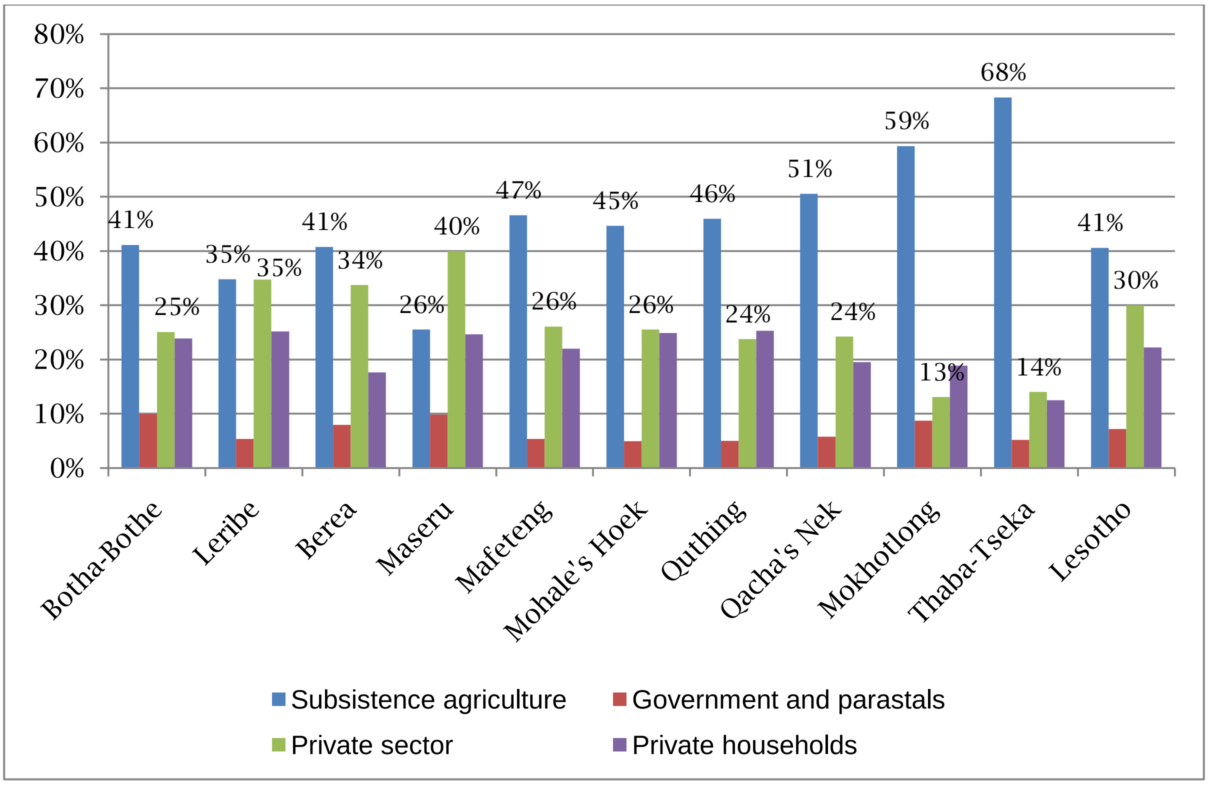
Source: Bureau of Statistics 2009a

Figure 3: Split of employment between main employers

Informal employment is defined as “all jobs in informal sector enterprises or all persons who, during a given reference period, were employed in at least one informal sector enterprise, irrespective of their status in employment and whether it was their main or a secondary job.” (OECD, 2008). Informal jobs refer to work outside the regulatory framework as they are not subject to labour legislation, social protection, taxes or employment benefits (OECD, 2008). Most informal employment often falls within the trade, agriculture and construction sectors of economic activity.

The number of Lesotho nationals employed as migrant workers has decreased since 1999 when it totalled 80,445 to 53,467 in 2007 due to retrenchment in South African mines and the decline of the gold industry (Bureau of Statistics 2009a). Mine workers’ remittances alone contributed 24.2% of the Gross National Product in 1996.

The majority of migrant workers are working in South Africa, 77% of who are male. The large number of migrant men has been linked to decreased agricultural productivity. In 1996 census it was recorded that 128,131 Lesotho citizens lived outside the country.



Source: Bureau of Statistics 2009a

Figure 4: Regional employment per sector

The private sector is generally underdeveloped and concentrated mainly on the clothing and textiles sectors. Most of the employment is centred around semi-urban areas which act as service centres. The private sector is the second largest employer, with Maseru hosting the largest proportion of this.

The informal employment sector is large as many people rely on subsistence farming and informal trading for their livelihoods. The largest proportion (41%) of the population is employed in the subsistence farming sector. Of all the districts, Thaba Tseka has the highest percentage of subsistence agriculture employment.

The government and parastatals sector employs the smallest proportion (7%) of the population by sector is the largest main employer of the population (29%)

2.2.5 Poverty and households

According to the 1995/1996 agricultural statistics only 10% of total land area is arable, even though the majority of rural households are based on subsistence agriculture. A threat to these livelihoods is the encroachment of urban areas which is resulting in a loss of agricultural land and higher population densities on arable land. The agriculture sector's output has also declined over the years due to soil erosion and droughts (Bureau of Statistics, 1996).

29% of the population in 2003 were found to be 'food-poor' compared to 37% in 1994/95 meaning they could not maintain a basic standard of living (2002/2003 Household Budget Survey).

Lesotho has a traditional system of land tenure where all the land is owned by the people as a whole with the administration being the responsibility of chiefs on behalf of the King. As such, all agricultural land is communally owned and traditional titles cannot be mortgaged, transferred or sold (Bureau of Statistics, 1996).

2.2.6 Key implications of socio-economic profile

From the country's **demographics,** it may be assumed that a large proportion of the labour force will originate from the four districts of Maseru, Leribe, Berea and Mafeteng as they are the most densely populated regions.

- The country is experiencing rapid urbanisation of its population. This places more demands on urban centres. Urban areas provide better infrastructure such as road networks, thereby allowing for greater accessibility of labour. A power generation investment would thus be optimally located within close proximity of larger human settlements or in areas of higher population density; and
- The establishment of a power generation facility would require labour during the construction and operation phases. The supply of labour will originate from urban areas/areas in close proximity to urban areas.

In terms of **population dynamics** Lesotho has a low population growth rate, impaired by reduced life expectancy and increasing infant mortality

- Urban areas experienced positive growth and therefore, there is an increasing need for energy in these growing settlements; and

- The fact that there is a large youthful population and a small middle-age cohort means interventions linked to the construction and operation of power plants that empower young individuals will have positive economic benefits.

Low levels of **education** are prevalent in Lesotho therefore there is a lack of skilled labour which would be a required component for an energy sector investment. Based on technical reports referred to in Section 3, approximately a third of positions in an energy generation project are skilled and another third are semi-skilled (Agama Energy, 2003).

- A direct effect would be that instead of employing local inhabitants, foreigners with the necessary skills might be employed into these positions. The local population would therefore forfeit these opportunities and rather than uplifting the lives of the local inhabitants, foreigners would reap the benefits; and
- Given the education profile of the country, it is likely (though not necessarily desirable) that the small proportion of skilled labour would originate from the urban areas rather than rural communities.

Due to the high numbers of people that are not economically inactive and unemployed, ventures that promote **employment** would be advantageous for Lesotho.

- A preference for projects that are labour intensive is thus alluded to in the assessment of projects;
- Employment would need to offer the potential for quality employment and allow employees to improve their skill levels;
- Increased employment creation would have economic spinoffs in terms of promoting the trade and construction sectors as well as impacting on household income levels; and
- The introduction of diversified economic activities development would assist in increasing opportunities for employment and potentially offer higher wage earnings than subsistence agriculture.

A large number of households in Lesotho especially in the rural areas are afflicted by **household poverty** and survive through marginal agricultural activities on over grazed and eroded communal lands.

- Any project that is established would need to consider the effect of using land that would otherwise be used by households for agriculture;
- Projects would ideally also encourage the establishment of formal sector employers in rural areas that would be in a position to diversify sources of household income and assist in circulating/ injecting money into these regions;
- The land tenure system in Lesotho is seen by some as a serious impediment to economic growth; and
- The urban context and increased income disparity of urban settlements is associated with higher levels of crime. Thus an investment, in the energy generation sector would need to consider the impact on the levels of social vices within a community. Mitigation measures would be around social

outreach programmes targeted at youth and the unemployed as well as increased government investment in law enforcement.

2.3 Economic profile

This section will provide a broad overview of the Lesotho's economy's main characteristics, and trends by which it can be characterised. This is done to contextualise he economic assessment indicators developed in the next chapter. The choice and weighting of economic indicators is informed by salient features identified in this section.

2.3.1 Gross domestic product

The economic performance of a country is usually evaluated by means of the Gross Domestic Product (GDP), which is a measure of the value of final goods and services produced within its geographical area. Table 6 illustrates changes in GDP from 1995 to 2009.

Year	Constant price (Maloti) millions	GDP growth rates
1995	6,124	2.1
2000	7,105	5.1
2005	8,170	2.4
2009	9,640	3.0

Source: Bureau of Statistics 2009b

Table 6: Gross Domestic Product (1995-2009)

Improving the national GDP growth rate is an important consideration as it is associated with increased levels of employment and per capita incomes it can be seen that he GGP has been growing at a steady rate through the years

2.3.2 Trade

Lesotho is a member of the Southern African Customs Union (SACU). The other members include South Africa, Botswana, Namibia and Swaziland. Prior to 2000, 90% or more of imports came from South Africa however, since 2000; a significant share of imports originates from Asia. This is mainly textiles which are used as inputs by the clothing industry.

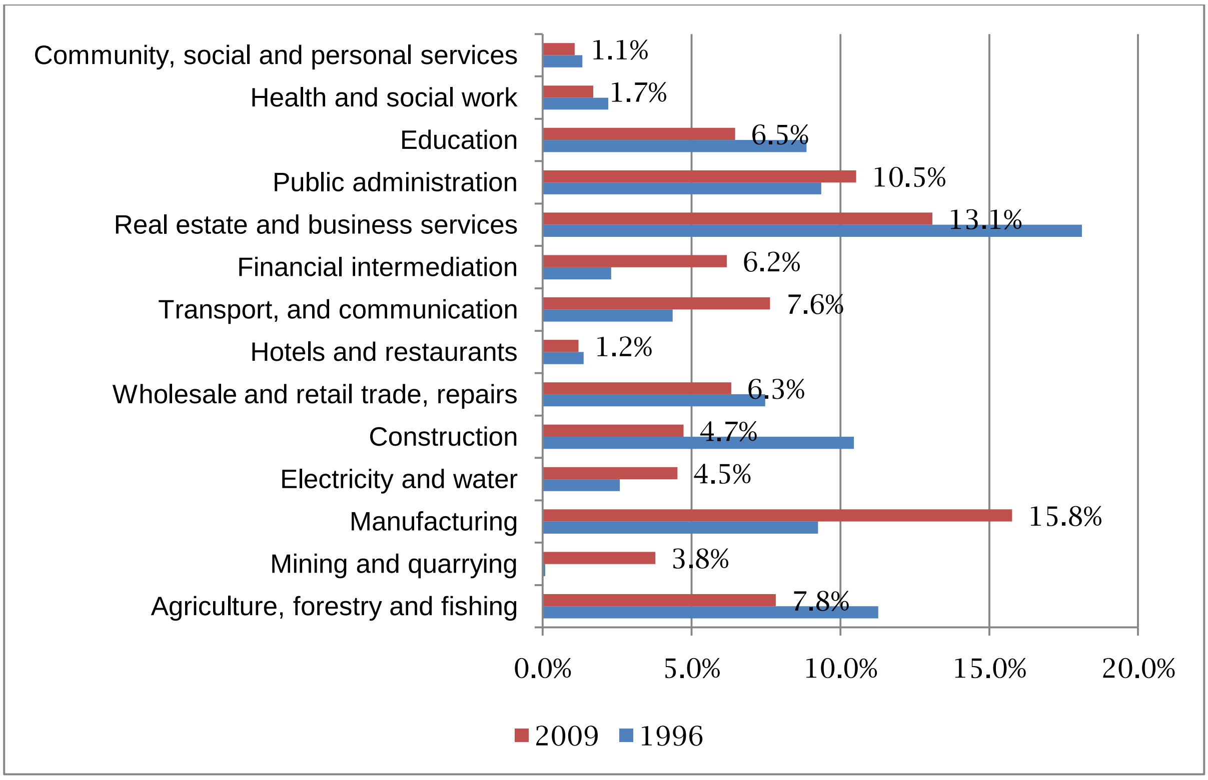
The commodities which dominate the exports of goods are clothing, diamonds; there is a significant deficit in the trade of goods. For the period 1998 to 2007, imports significantly exceeded exports. The gap has narrowed due to the growth of exports of clothing and more recently (during the period 2004 to 2007) diamonds. Television sets, and footwear (Bureau of Statistics, 2009).

2.3.3 Sector profiles

The sector profile illustrates the contribution of each sector in the economy to GDP. Figure 2.5 illustrates the contribution of each sector to GDP for 2006 and 2009, and from it can be seen that:

- The largest contributor (15.8%) to GDP was manufacturing, translating to M1.52 billion, followed by real estate and business services contributing (13.1%) or M 1.26 billion;
- Public administration was a large contributor to the economy but is not considered an economically productive sector, and thus is not analysed in this report;
- The contribution of electricity and water increased from M 65 million in 1996 to M437 million in 2009. This increase can be attributed to the delivery of water from the Lesotho Highlands Water Project and the electricity generation of the Muela power plant. This project in addition had a significant impact on the contribution of the construction sector to GDP. The construction sector's share of national output has however decreased with the completion of the construction phase of this project; and
- The contribution of mining increased from M6 million in 1996 to M202 million, partly % due to the opening of two diamond mines in 2004 and 2005. This translates to an increase of 38%.

(Bureau of Statistics 2009a).



Source: Bureau of Statistics 2009b

Figure 5: Contribution (%) of each sector to GDP in 1996 and 2009

It is evident that Lesotho's economy is based on manufacturing, real estate and business services and the government sector. Manufacturing, agriculture, tourism and electricity are analysed further in the section below. These were identified based on their relevance to this report.

2.3.4 *Manufacturing*

Manufacturing is the foremost sector within Lesotho’s economy in terms of contribution to GDP. Important subsectors in the manufacturing sector include textiles, clothing and leather industries and food and beverages.

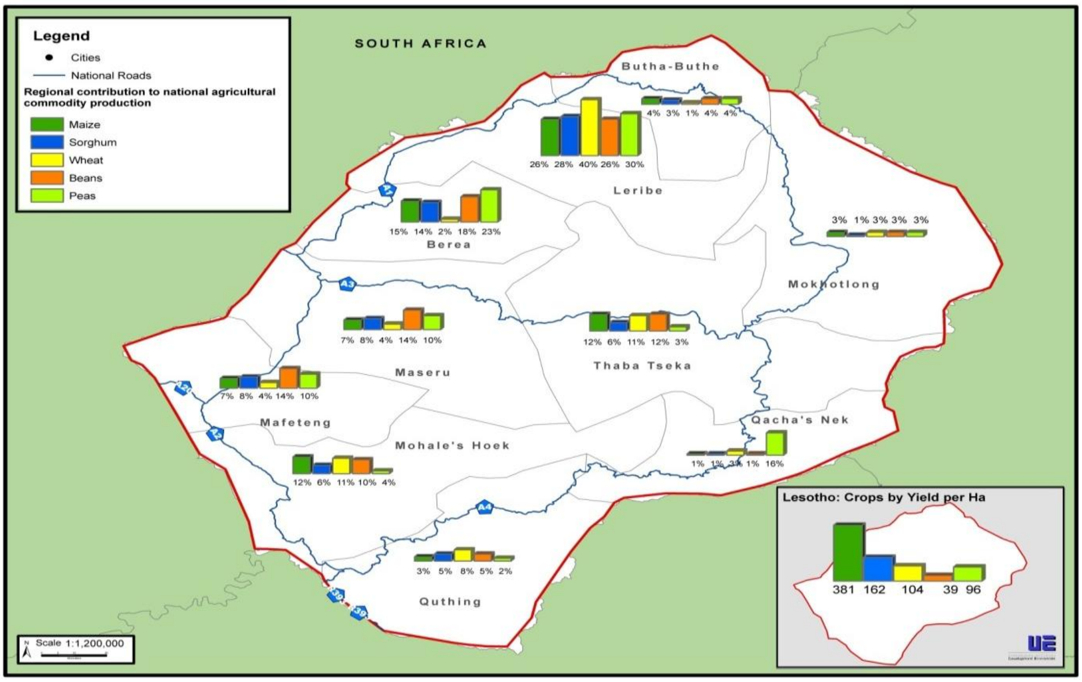
The growth rate of the manufacturing sector has been slowing down since 2001 and in 2005; earnings also declined. This occurred again in 2006 (Bureau of Statistics, Performance of Manufacturing sector: 2007)

2.3.5 *Agriculture*

A large majority of households in Lesotho gain their livelihoods from subsistence farming. Given that Lesotho is rural in nature, farms occupy large portions of the rural land.

Crop Agriculture

The major crops in Lesotho are maize, sorghum, wheat, beans and peas. Map 2.2 shows the production contribution to national production (in tonnes) for the major crops produced per district.



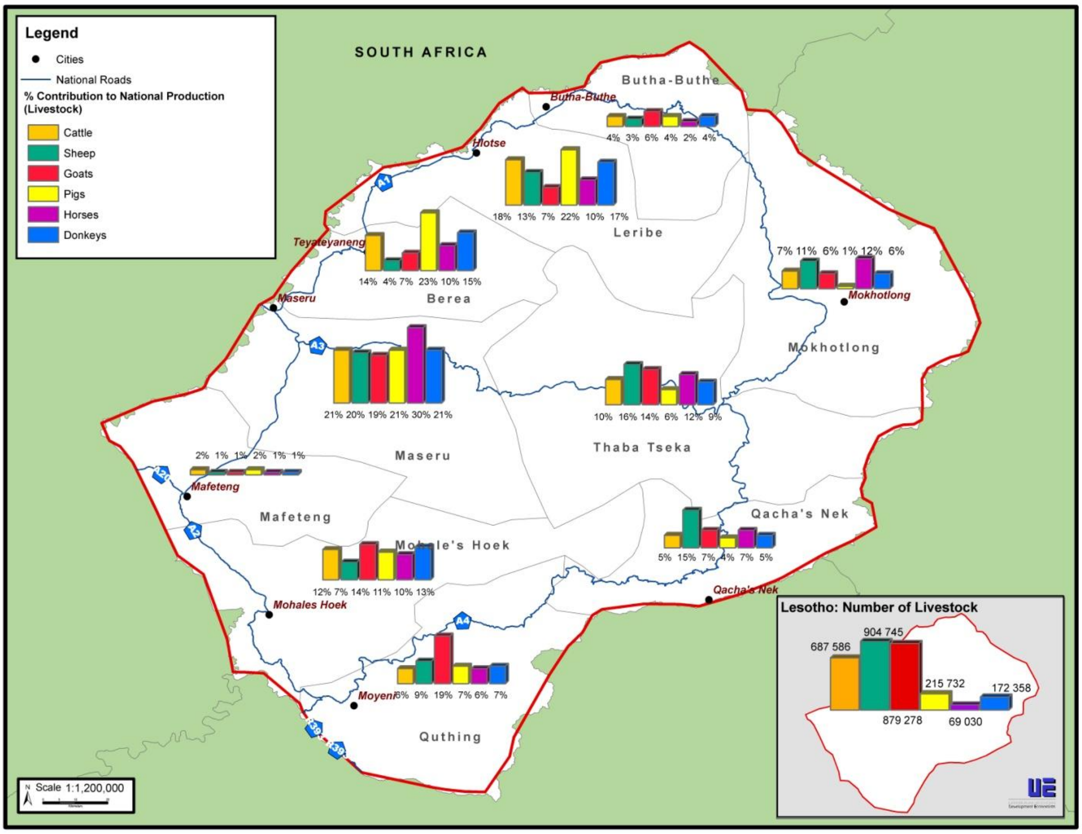
Source: Bureau of Statistics, 2009. Urban-Econ, 2011

Map 3: Regional contribution to national production of major agricultural commodities

Maize being the staple food of Lesotho is the most important crop, and therefore occupies 60-65% of the planted area. At 72 636 tonnes, maize production is the highest when compared to other crops. Despite declining in its contribution to GDP, agriculture remains the third most important productive economic sector in Lesotho in terms of GDP contribution. Agriculture is significant as a source of employment (formal and informal) and includes horticulture and high value products primarily for the export market. Crop production has fallen in terms of tonnes produced every year since 1999/2000, often resulting from drought (such as in 2003/04).

Livestock

Domestic animals are very important as they provide food and non-food products, both for own consumption and for trade. The largest proportion of national stock of livestock is found in the Maseru district. Map 3.2 illustrates livestock holdings per district (Bureau of Statistics 2009a).



Source: Bureau of Statistics, 2009, Urban-Econ, 2011

2.3.6 *Tourism*

The tourism sector is seen as a vital sector for development in Lesotho. In 2003 Lesotho had 300,500 visitors, with 87% of these visitors coming from South Africa. The sector is however subject to fluctuations in visitor numbers, with 318 458 visitors in 2006 and 261 107 in 2007. The largest proportion of visitors' purpose of stay is holiday (36%) followed by business (15%).

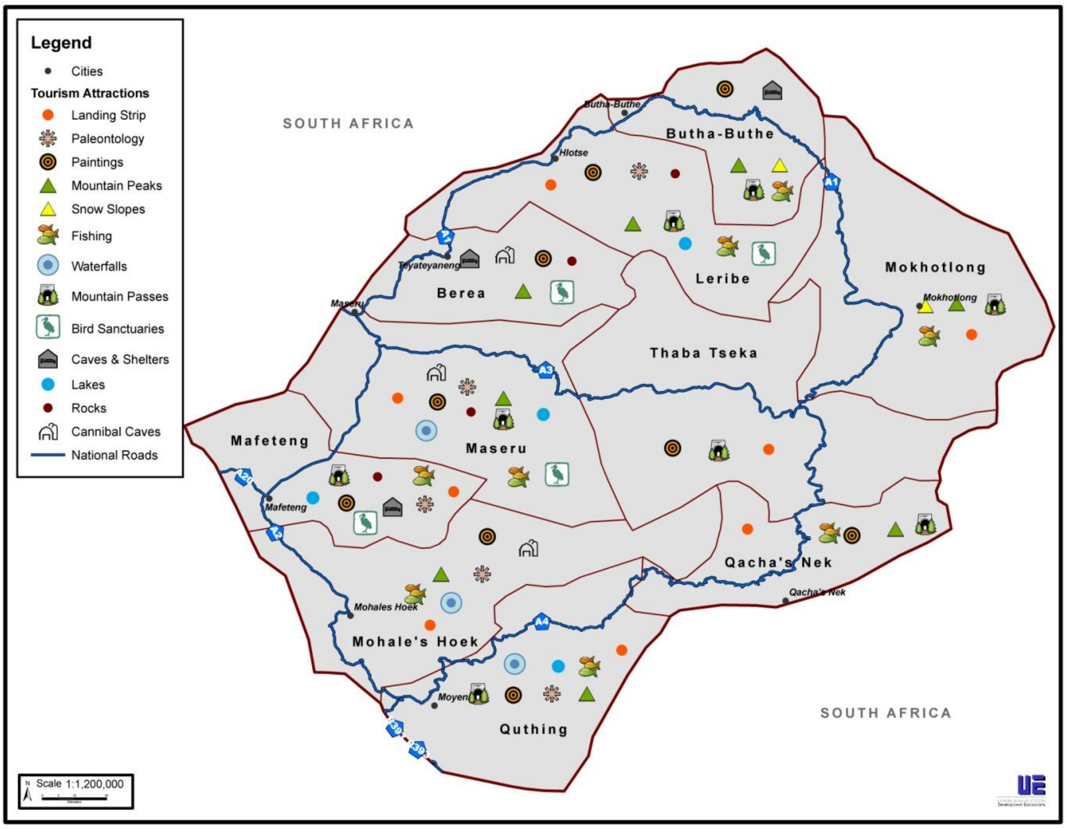
Approximately 95% of all visitors enter Lesotho by road via one of the many border posts around the country. The major border posts are Maseru Bridge, Maputsoe and Caledonspoort. These three border posts account for the entry of approximately 80% of all visitors to Lesotho (Bureau of statistics 2009).

The tourism sector has started to benefit from the LHWP (Lesotho Highlands Water Project) and tourism facilitates are being continually developed. Maseru is the most developed area for tourism and the Highlands are the main tourist attraction, with pony trekking a popular tourist activity.

Popular tourist attractions and activities are listed below and are shown on map 2.4:

- Pony trekking;
- Experience of Basotho lifestyle and culture;
- Adventure tourism- 4x4 trekking, Snow skiing, Quad biking, sailing on Katse dam;
- Nature based tourism: hiking, horse riding, bird watching, visit to botanical gardens, abseiling; and
- Sani Pass and the Maloti/Drakensberg mountains.

Source: Bureau of



Statistics, 2008

Map 4: Tourist attractions per district

2.3.7 *Electricity and utilities*

Lesotho has generated electricity on a large scale since the opening and commencement of operation of the ‘Muela plant in 2000. ‘Muela was constructed as part of the LHWP. Prior to 2000, the Lesotho Electricity Company (LEC) imported all electricity from South Africa Now only a small proportion is imported, which this takes place mainly in winter. Sales of electricity have increased substantially over the period 2004 to 2007.

Water could be said to be Lesotho's most important natural resource. Dams and tunnels have been created to enable Lesotho to sell water to South Africa through the LHWP (LHDA, 2005).

The LHWP is a significant contributor to GDP directly and indirectly, as well as having created road infrastructure and construction employment. The LHWP has had a significant impact on Lesotho's economy in terms of jobs created and skills acquired (within and outside the construction sector) (LHDA, 2005).

2.3.8 Main Implications of economic profile

Growth in the **GDP** of a poor country such as Lesotho should ideally be labour intensive and promote local employment, economic spinoffs, be environmentally sustainable and based on long term advantages.

- Investment projects that facilitate GDP growth that leads to equitable growth in household incomes and a reduction in income disparities will be prioritised.

The establishment of a power generation facility would bring about a diversification and increase in export earnings. Thus it would have a positive effect on the country's **trade** balance.

The contribution of **manufacturing** to national GDP has increased by 7.5% over the period 1996 to 2009. Foreign companies are attracted to Lesotho as a means to access preferential trade agreements;

- It is positive for a country with a low skills level to have a manufacturing base. The establishment of the energy investment will create the opportunity for the local population to become up skilled;
- Construction (in the short term) along with manufacturing and utilities are likely to experience the most significant changes as a result of any energy investment in Lesotho; and
- It is worthwhile to explore the possibility of using investments into renewable energy generation capacity in Lesotho to leverage the establishment of RE related manufacturing.

Areas of low potential and low actual output of **agricultural** products could look to the development of the power generation sectors as a form of diversification. Areas with high productivity in agriculture may not be as appropriate for these projects.

- The location of a power generation site must also consider the effect on subsistence agriculturalists a negative impact on their potential to produce crops or livestock would be felt severely in these communities.

The essentially rural landscape and lifestyle of the Basotho is a **tourism** attraction in itself. Many visitors travel expressly to experience the rural lifestyle in the form of pony trekking stations and hiking. The visual impact of the rural setting is an important component of what they experience.

- A power generation facility inappropriately located would negatively impact on the experience of tourists. Thus, when selecting locations, areas that have minimal or limited scenic beauty or tourism potential would be better placed to have power generation plants located there;
- The establishment of the power generation facility may positively or negatively affect the value and quality of tourism activity in the immediate and general vicinity. Tourists maybe willing to pay a tariff to view wind or solar plants or might spend more time in the area which would mean increased nights and increased tourist expenditure as a result of the establishment;
- If wind turbines affect bird population this could negatively affect niche tourism around birding;
- The power generation facility may also create tourism by attracting people to visit the area who will subsequently embark on other activities. This would allow for the development of SMMEs and greater participation in tourism sector by these/ such entities; and
- Electricity generation could assist in electrification projects in rural areas, thus connecting tourism providers in remote locations and allowing them to offer services to visitors.

Further investment in the **electricity and utilities** sector will bring about economic diversification in the local economy which bodes well for regional growth both from an economic and socio-economic perspective.

- Further investment in utilities sector would allow Lesotho to achieve self sufficiency in terms of energy generation and to develop energy generation into an export sector; and
- The establishment of other forms of electricity generation will diversify the sector and allow more regions in Lesotho to experience the benefits of this sector.

2.4 Precis

The baseline data on Lesotho was expressed in terms of bio-physical, socio-economic and economic profiles. Key indicators of each were discussed and findings drawn for the country and districts. Further the implications of the power generation projects on these indicators were discussed. The information contained in this Section forms baseline data for the analysis in Sections 3 and 4.

3. ECONOMIC INDICATORS

This Section provides detailed discussions on the economic indicators upon which the assessment of various projects will be undertaken. Appropriate evaluation criteria are used based on discussions with the project team, the client’s input and Urban-Econ’s prior experience in projects of such a nature.

This Section follows on from the previous Section as it is informed by the results of the contextualisation of the Lesotho economy undertaken. The indicators are then conceptualised and aligned with the GoL's development priorities in accordance with the broader project purpose as presented in the introductory Section of this report.

From this chapter's outcomes, it will be possible to undertake measurements and calculations to determine project specific scores and ratings in the Section to follow. The economic indicators are conceptualised on a strategic level and do not account for the undertaking of detailed economic or financial demand feasibility assessments. It is assumed that detailed feasibility assessments will be undertaken at a later stage by potential investment partners.

The indicators will however, allow for analyses of various aspects of the projects such as estimated direct, indirect and induced economic impacts, as articulated through different aspects. An example of a direct effect would be the value of the construction cost of the plants. An indirect impact can be seen in extra sales for companies involved in the supply chain of inputs necessary for the operation of the plant such as catering businesses. Induced impacts are knock-on effects in the national economy as a result of increased spending of wages and salaries paid to employees of the power plant. The aspects to be considered in this Section are presented in Table 7.

	Economic Indicators	Economic Rational
1	**Proximity to economic nodes**	• Location assessment • Clustering/ agglomeration advantages
2	**Proximity to communities**	• Comparative advantage/ disadvantage • Economic sustainability
3	**Skills availability**	• Comparative advantage/disadvantage • Socio-economic integration
4	**Economic 'spin-offs'**	• Economic multiplier effect • Value chain linkages
5	**Employment creation potential**	• Economic sustainability • Labour intensity • Multi-factor productivity
6	**SMME development potential and linkages**	• Regional economic growth • Value chain linkages
7	**Skills development potential**	• Socio-economic growth • Socio-economic integration
8	**Export potential**	• International competitiveness • Regional integration
9	**Resource usage optimisation**	• Opportunity cost • Multi-factor productivity
10	**Cost of production**	• Financial/economic efficiency • Competitive advantage
11	**Recapitalisation potential**	• Financial/economic efficiency • Competitive advantage

	Economic Indicators	Economic Rational
12	**Tourism potential and linkages**	• Regional economic growth • Value chain linkages

Table 7: Indicators to be used for economic assessment and evaluation

As can be seen in Table 3.1, each of the indicators is included as it is justified and rationalised by various economic principles that pertain to investment assessments and evaluations of this nature. A section within this Section will be dedicated to each of the above indicators with the following Section structure being applied:

I). Each of these sections will start with a brief **explanation of the indicator**, and how each particular indicator will be further broken down into sub-indicators. These sub-indicators will allow detailed assessment of each factor in question;

II). The second part of the discussion for each indicator will look at **background information** that provides the theoretical, policy and strategic underpinnings from which the indicator is conceptualised. It is in this section that the reason to include the indicator is justified. Further explanation of the sub-indicators is provided through case studies and references to relevant prior research undertaken by Urban-Econ EC and other institutes as well; and

III). The final part of the discussions for each indicator is the **application to economic assessment.** This looks at how the assessment of the power generation projects will be carried out in terms of that specific indicator. Reference to specific reports, data sources and scoring methods is made in this part. The rating or scoring convention that will be applied for each indicator is then presented in tabular format.

Positive economic consequences are indicated with plus signs (+). The maximum anticipated level of benefit associated with each project per indicator (and sub-indicator) is represented by the number of plus plus signs. Similarly, negative economic consequences associated with a project are indicated by minus (-) signs.

3.1 Proximity to economic nodes

Explanation of indicator

This indicator looks at the ability of a power plant to boost and expand the level and scope of economic activity currently taking place in an area, based on its geographic proximity to urban and industrial nodes. This indicator will then be informed by a location assessment of energy projects (refer to Section 4).

Table 8 looks at the informants that will allow the assessment of this indicator.

Proximity to economic nodes	Proximity benefit from power plant		
	Low	Medium	High
Distance to economic node	>20km	1-20km	Within economic node
Level of economic activity in area	Low activity	Moderate level of activity	High level of activity
Level of economic growth in area	Low growth area	Average historic and forecasted growth	High experienced and projected growth

Table 8: Proximity to economic nodes

Background information

Proximity to economic nodes is important in so far as it can facilitate in the creation and strengthening of linkages with and between existing industries. These may accrue from benefits associated with infrastructure provision, agglomeration advantages and clustering of economic activity.

Benefits from infrastructure provision would include security of electricity supply as this applies to industrial, commercial and service activities and their production lines, motive power needs and other energy requirements. If a plant is within a short **distance to an economic node**, there will be infrastructural spinoff benefits that various industries will be able to take advantage of.

Agglomeration advantages based on lower costs may alter and augment the comparative and competitive advantages that one area has over another in the production of specific goods and services. **The level of economic activity** in an area is a direct function of the possibilities for agglomeration that are associated with the establishment of power plants.

The establishment of a power generation facility has the potential to contribute positively towards gross fixed capital formation and accumulation, which are in-turn key conditions needed for clustering of economic activity. **The level of economic growth in an area** sets the tone for the rate at which capital formation and thus clustering take place (DANIDA, 2002).

The degrees of infrastructure provision, agglomeration and clustering as discussed in this section will all be influenced by the proximity of the power generation facility to areas in Lesotho with the following forms of economic activity:

- Medium-to-large-scale industries including manufacturing, textiles, mining (including quarrying) and construction;
- Small-scale industries include agro-processing, carpentry, metal works, brick-making and sewing; and
- Commercial sector activities including wholesalers, retailers, hotels, restaurants and other business services.

(Energy policy, 2003)

The distance to an economic node, the level of activity within that node and its recent and projected growth, all affect the benefit that can be gained from a power plant through the above forms of activity. These factors have a bearing on the presence of an enabling infrastructure environment in which various medium scale, small scale and commercial industries and activities can thrive.

Application to economic assessment

The National Electrification Master Plan for Lesotho (NEMP, 2007) classifies activity nodes in the country based on the following categories:

- Cities;
- New industrial towns;
- Existing industrial towns; and
- Institutional towns.

These are listed in order of descending economic importance, and will be used as a baseline from which the level of economic importance of each area will be assessed

The distance from the power plant to the nearest economic node will have an impact on the radius within which businesses may form clusters of similar activity and benefit from agglomeration activities. Electricity plants situated within towns will then be a source of more **positive proximity benefits** and impacts on a regional economy than those located far from any urban or industrial nodes of significance.

The level of economic activity presently defining each economic node will also then have an impact on the benefit that can be derived from close proximity. The total economic effect (as seen through direct, indirect and induced implications, particularly changes in GDP and on government tax revenue) of a plant situated in a big industrial city might then be greater than that of a plant situated in a small institutional town.

Table 9 then shows the rating that will be applied in the assessment of the impact of the proximity to economic nodes of each plant. The distance to an economic node has a higher weighting than the level of economic activity and a node's growth trends, as these last two sub-indicators are linked to each other. Additionally, **this indicator is primarily connected with the locational assessment of different investment alternatives from a spatial perspective**.

In the assessment of various projects, the distance to an economic node is measured through use of GIS techniques. The level of economic activity currently taking place in an area is assessed based on settlement profiles contained in the National Electrification Master Plan for Lesotho (2007). Growth in each of the nodes is assessed based on recent historic trends, as well as the node's predicted growth trajectory.

Proximity to economic nodes	Proximity benefit from power plant		
	Low	Medium	High
Distance to economic node	++	+++	++++
Level of economic activity in area	+	++	+++
Level of economic growth in area	+	++	+++

Table 9: Rating of proximity to economic nodes

Box 1: Transport infrastructure

Infrastructure provision influences the levels of attractiveness for private investment. It also has consequences on business costs and functioning by increasing or decreasing logistics costs and the productivity of a workforce (including the time and cost travelling)

Roads and railway networks affect the cost of transport for business and households and increase construction costs if roads need to be built in order to access a development site. The road network in Lesotho is basic with often only one tarred national road linking rural districts and towns together and acting as the main corridor for movement between areas.

The table below provides the percentage of national paved and unpaved roads per district. The majority of the country's tarred roads are in Maseru district (22%). The area with the lowest number of tarred roads was the rural district of Thaba Tseka, where only 4 roads are tarred. Mokhoteng and Quthing have the least number of roads, whilst Botha-Bothe, Maseru, Berea and Leribe have the highest number of roads and a high percentage of paved roads. Thus accessibility in rural districts is poor.

Percentage contribution to national paved and unpaved road network (2006)

District	% of Lesotho's Paved Roads	% of Lesotho's Paved Unpaved Roads
Botha Bothe	8%	8%
Leribe	17%	4%
Berea	13%	10%
Maseru	22%	5%
Mafeteng	13%	9%
Mohale's Hoek	6%	7%
Quthing	9%	1%
Qacha's Nek	5%	17%
Mokhotlong	6%	2%
Thaba-Tseka	0%	27%
Lesotho	100%	100%

Source: Bureau of Statistics, 2009

Existing well developed road network exists in a few districts. These districts would be well placed to encourage further investment.

In terms of an energy generation investment, accessibility for construction machinery and labour access needs to be considered. This would impact on transportation costs and risks. Areas that would potentially offer lower transportation costs would be in Berea, Maseru, Leribe, Mafeteng.

Box 2: Settlement hierarchy

The settlement hierarchy that is used in the project assessment is seen in the Table below. Settlements are classified based on their size. Apart from spatial etent, the current level of ecomomic activity as well as future and historic growth rates are also considered.

Size Classification	Settlement	Level of economic activity	Growth
City	Maseru	High	Medium
New industrial town	Hlotse Maputsoe,	Medium	High
Existing industrial town	Buthe Buthe Qacha's Nek Moyeni Quthing Mohale's hoek Teyateyaneng Mafeteng	Medium	Low
Institutional town	Mokhotlong Mazenod Morija Roma	Low	Medium
Middle sized settlement	Selake Mt Morosi Peka	Low	Low
Small settlement		Very low	Very low

(NEMP, 2007)

3.2 Proximity to communities

Explanation of indicator

This indicator examines the supply side of ‘soft’ factors that influence the impact of an investment injection into a local economy. Proximity to communities also impacts on the level of social infrastructure that will currently be available, and that which will need to be put in place for the generation facility to function optimally. These factors create the institutional environment in which the power plant will have an impact.

This indicator will be assessed based on the distance of the generation facility to the nearest community, and the availability of social infrastructure in the nearest settlement, as displayed in

Table 10. These two sub-indicators are important in their ability to gauge the ability of a plant to attract labour to meet its production requirements.

Proximity to communities	Benefit from power plant		
	Low	Medium	High
Distance to nearest settlement	>20km	1-20km	Within settlement
Level of social infrastructure in area	Low level of provision	Medium activity/growth	High level of social infrastructure

Table 10: Impact of proximity to communities

Background information

The total impact emanating from the establishment of a plant will be felt not just in terms of changes in the local economy, but also on the local community. This is an important indicator as one of the energy policy goals set out in the Energy Action Plan for the Kingdom of Lesotho (2003) is to contribute “towards the improvement of livelihoods”. It is intuitive that the most direct impact on the community will be felt by the labour force of the plant, and this indicator looks at the ability of a community in which a plant is built to attract suitable labour.

As such, changes in the local society may be assessed in terms of the labour market, and the built environment of social infrastructure upon which the production of goods and services is predicated. The production of goods and services is based on capital, entrepreneurship, land and labour as important factors of production. This indicator looks at the comparative advantage that each community or area has over another in producing a suitable mix based on the labour market and its associated built environment of social infrastructure.

The interaction between the labour market, the local community and the impact of a physical investment is seen in the following list of factors:

- Provision of public and private facilities, utilities and entertainment;
- Residential environment and living costs;
- Employment and income;

- Personal growth opportunities;
- Variety and quality of education facilities;
- Health service provision e.g. hospitals;
- Crime, safety and security;
- Travelling distance and time; and
- Modes of transport available and accessibility.

(UNFPA, 2007)

It can be seen that these quality of life indicators are captured in the two elements to be assessed in Table 3.4

The **distance to the nearest settlement** determines the impact of the generation facility on labour drawn from the local community, and the broader community near the plant.

The **level of social infrastructure** impacts upon the ability of a community to sustain a conducive environment in which economic activity is undertaken. Based on Sen's capabilities approach, investment into renewable energies has been found to improve the endowment capability and achievement functioning sets of communities (Gonzalez, Aristizábal and Diaz, 2008). Therefore the closer a plant is to a community, the more the positive impacts are.

Application to economic assessment

The ability of a plant to acquire and retain a high quality human resource complement will have a bearing on its long-term functioning, and thus overall economic impact. The importance of the distance to the nearest settlement is seen in how investment within an extremely remote and rural area results in unwillingness of potential workers to relocate. This impacts on he presence of a stable community environment from which to source new labour on a regular basis or when required. Conversely, investment within a settlement that is prioritised and highly ranked in various national planning documents will be more likely to lead to multiple positive outcomes on the working experience of those involved. For this reason, community classifications contained in the National Electrification Master Plan for Lesotho (2007) will be used and are presented as follows:

- District headquarters;
- Service settlements;
- Medium settlements;
- Small settlements;
- Commuter settlements; and
- Special cases.

The level of social infrastructure in an area has a bearing on the ability of a power generation plant to draw in critical skilled people from elsewhere to travel and relocate there. The magnitude of power generation contained in the technical reports reviewed indicates that the potential projects will be small to medium scale facilities. This means the ability of a rural community to respond fully to a generation facility located far from any major settlements will be diminished.

The level of social infrastructure in an area will be assessed based on the availability of educational and health facilities and other variables as discussed in the National Electrification Master Plan for Lesotho (2007).

Another key determinant linked to this indicator is the ability of a project to link up with the Rural Electrification Program for Lesotho. The rural electrification program seeks to increase the number of households in Lesotho with access to electricity. It prioritises larger settlements for connection above smaller connection. The construction of a power plant in a community will reduce the cost of electrification in such an area. As such, the construction of a power plant in a large community will have achieved a dual objective of promoting rural electrification.

The maximum possible rating of projects based on their proximity to communities will then be applied as presented in Table 11. Projects that are within settlements that already have a high level of social infrastructure provision will be able to score a maximum amount in terms of benefits from the power plant. Such a plant is adjudged as having the prerequisites to attract and retain a productive labour force for the optimal functioning of the plant. As the distance from settlements increases and the level of social infrastructure within it decreases, the benefits accruing decrease. Such a location for a plant would incur inordinate costs in attracting labour.

Proximity to communities	Benefit from power plant		
	Low	Medium	High
Distance to nearest settlement	++	+++	+++++
Level of social infrastructure in area	++	+++	+++++

Table 11: Rating of proximity to communities

3.3 Skills availability

Explanation of indicator

The ability of a power generation facility to function optimally is dependent on the key economic production function of skills availability, which in turn determines the supply of labour. This indicator considers the availability of the labour as well as the nature and extent of the skills base as important location factors for any industrial development, particularly one as specialised as a renewable energy project.

In order to assess the skills availability that will apply to each project, the education levels in each area will be examined, as will the skills intensity mix of each project, as set out in Table 12. This will allow economic assessment based on project-specific attributes as well as spatial factors.

Sub-indicators	Availability of skills		
	Low	Medium	High
Education levels in area	Population has low level of education and workforce is unskilled	Population has moderate levels of educational attainment and workforce is semi-skilled	Population is well educated and workforce is highly skilled
Skills intensity of project	Reliant on highly skilled staff	Has an even split between un-; semi-; and highly skilled labour needs	Uses high percentage of unskilled labour

Table 12: Skills availability

Background information

It is important to consider not just broad supply of labour as indicated through demographic information on population and unemployment, but to also consider if the potential labour pool is appropriately qualified, suitably experienced and readily obtainable for its intended purposes. These influences play a crucial role in determining how viable, feasible and financially attractive one investment choice may be over another.

Education levels that prevail in the area surrounding the site give a high-level indication of the aptitude of local residents which in turn would have a bearing on their on-the-job efficiency and effectiveness.

An area with low education levels will not be able to fully benefit from skills uptake opportunities, as the residents of the area may not be able to fully capitalise on employment opportunities arising. As education levels increase, a larger percentage of the population will be able to take up employment opportunities. In areas with high education levels, skilled staff might fill up industry specific, engineering, technical, craft and general management employment positions with more ease (ETA, 2002)

The **skills intensity involved in each project** will also be assessed as the number of employees employed per skill level has a bearing on the skills availability. If a plant employs a high percentage of semi-skilled employees, then given the socio-economic characteristics of Lesotho discussed in the previous chapter, one can assume that skills availability will be better than with a plant that employs a high percentage of highly skilled workers.

Application to economic assessment

Education levels will be assessed based on district-level information. This will be done through use of information from the Lesotho Education Plan (Ministry of Education and Training, 2005) and based on the ratings seen in Table 3.7. Employment trends through time will also be used as a supplementary indication of workforce skill levels.

The skills intensity of the various projects will be based on the project specific technical reports as well research undertaken into skills requirements for different renewable energy options (Agama Energy, 2003). From the study into the employment potential of different renewable energy options, the following skill intensity sets were observed:

Wind power:

- 31% of jobs at a skilled professional level such as structural engineers, meteorologists and surveyors;
- 37% of jobs in semi-skilled manufacturing levels such as metal workers and mechanics; and
- 32% in unskilled jobs such as road-works, foundation laying and fencing.

Hydro:

- 38% of jobs in skilled professional levels such as mechanical engineering, environmental assessment, R&D and consultancy;
- 29% of jobs in semi-skilled jobs such as manufacturing and heavy engineering craftsmen; and
- 33% of jobs in unskilled levels.

Solar:

- 36% in skilled professional levels such as architecture and system design jobs;
- 43% in semi skilled jobs such as plumbing, roofers, electricians and sheet metal workers; and
- 21% in unskilled jobs such as bench work.

Table 13 then shows the rating that will be applied in the assessment of skills availability for each project.

Sub-indicators	Availability of skills		
	Low	Medium	High
Education levels in area	++	+++	+++++
Skills intensity of project	++	+++	+++++

Table 13: Rating of skills availability

Box 3: Education

Data on employment and labour force participation was used to create a proxy indicator of education per district, and this is shown in the Table below

District	Weighted employment/ labour force participation rating	Rating
Botha	50.2	0
Leribe	51.0	1
Berea	55.4	3
Maseru	55.1	5*
Mafeteng	53.0	2
Mohale's hoek	53.8	2
Quthing	49.1	0
Qacha's Nek	58.2	4
Mokhotlong	60.0	3
Thaba Tseka	55.9	3

(Bureau of Statistics, 2009a)

*Based on presence of University of Lesotho

3.4 Economic spinoffs

Explanation of indicator

Economic spinoffs in this context may be defined as any external changes in the local economy that have either a positive or negative effect on economic activity in that area. These can take the form of new investments in the area such as the establishment of improved transport facilities, the construction of housing, the upgrading of businesses and the expansion of existing production capacity.

Economic spinoffs or multipliers assess the effect of elements that are introduced into the economy and may take the form of changes in the consumption of final goods and services and the level of fixed investment in the study area. The effect of such changes in this section will be measured through the elements contained and described in Table 3.8. Examples of possible spinoffs from the construction of a power plant are also provided in Table 14.

		Economic spinoff sub-indicators		
		Sectoral output	Household income	Employment
Effect	Positive	Leads to economy-wide increases in the value of total sectoral output	Investment leads to sustained and tangible increases in the income earned by households and thus their buying power	An upward trend in the employment levels attributable to the construction and operation of a power plant is observed
	Negative	Results in an aggregated decline in the output of the constituent sectors of the Lesotho economy	A deterioration in the income-earning and generation potential of households and individuals arises from the establishment of a power plant	Power plant leads to cannibalisation of labour market through technology and productivity driven employment losses

Table 14: Economic spinoffs

Background information

Certain forms of development, depending on their value chain position and linkages with other industries have the potential to create significant economic benefits and effects within a given location. This indicator thus seeks to assess each project based on the potential economic developmental spinoffs associated with its undertaking.

Table 14 provides an introduction to how the sub-indicators will be assessed, and the reason for their selection as measures of economic spinoffs is as follows:

Economic spinoffs expressed through sectoral output relate to the production of goods and services in the Lesotho economy. In the context of this economic assessment, changes in sectoral output might be seen through the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of an investment. It is therefore the value of all additional or lost business turnovers that are generated as a result of the investment and/or change in the economy.

Household incomes are also affected by economic spinoffs from an investment, and in this case refer to a broad measure of the full income effect or value added within the economy. This measure essentially reflects the sum of wage incomes generated as a result of an investment in the economy and considers its effect on the earning capacity and spending power of Basotho residents as felt through the welfare effect (Parkin and Bade, 2005).

Economic spinoffs filter through to **employment** as reflected in the number of employment opportunities created or lost result from an exogenous change in the economy. In this, sense a job-year is defined as one person employed for one year. This is the most popular measure of economic effects because it is easier to comprehend than large, abstract monetary values. Job-year counts however do have a significant limitation in that they do not necessary reflect the quality of employment opportunities. It is for this reason that the other two sub-indicators (sectoral output and household income) are discussed in this section.

The effect of economic spinoffs can be both positive and negative as presented in Table 14. Where in most cases positive effects would be expected to result from investments into an economy, the possibility of negative effects is seen in the following examples:

- An investment into renewable energy may lead to a reduced demand for fossil fuels and thus result in a decline of the mining sector, and have negative implications on sectoral output;
- Leading on from the previous example, a contraction of the mining sector as a result of investment into RE may lead to employment losses and subsequently a fall in household incomes; and
- An investment into capital intensive technologies used in RE electricity generation may make the need for a large labour force redundant, and have negative results on employment. This may be exacerbated by the employment potential realised in one RE option being filled by already employed and scarce, skilled workers that simply shift to the new employment that is created.

(NCPA, 2009)

Application to economic assessment

The economic spinoffs of various renewable energy options identified in Lesotho will be assessed as shown in Table 15.

		Economic spinoff sub-indicators		
		Sectoral output	Household income	Employment
Effe	Positive	++++	+++	+++
	Negative	- - - -	- - -	- - -

Table 15: Project rating in terms of economic spinoffs

As seen in Table 15, projects will be rated on their ability to lead to either positive or negative effects on the local and national economy. It is anticipated that investments associated with all the projects will lead to positive effects on sectoral output, household income and employment of varying magnitude. Although the likelihood of negative effects resulting from an investment in Lesotho is small, this possibility is still considered in order to provide an objective assessment of the effect of each project.

Multipliers in sectoral output will be estimated based on past experience in forecasting economic impact assessments of renewable energy projects and small to medium scale construction investments, and draw on theoretical frameworks that apply to:

- Capital expenditure (CAPEX) injections into (and potential leakages from) regional and national economies;
- Input/output analyses looking at industries and how they may be affected by the operating expenditures (OPEX) of the plants;
- Intersectoral correlations and linkages that are based on the structure of the Lesotho economy and determine the ability of secondary activities to ‘latch on’ to the benefits from the total power plant investment; and
- Intrasectoral value chains such as these may allow for the creation of new industries and the expansion of existing ones.

Changes in employment and on household incomes will be predicted based on forecasts of expenditure and employment from the respective projects, and the resulting direct, indirect and induced effects on the Lesotho labour market of these forecasts. Where applicable, baseline data will be used to determine the full consequences of the changes in employment and household incomes.

3.5 Employment creation potential

Explanation of indicator

The employment creation potential indicator looks at how many people are employed in the production of a standard unit of output. In this instance the unit of output used shall be one Megawatt of electricity as this allows easy comparison across the different generation types. This indicator will consider the impact on the labour market and on overall and local employment levels as a result of the construction and operation of the power generation projects.

This indicator will thus look at the potential of each project to create employment both as absolute values and also in terms of labour and capital intensity. The potential to create employment from each power generation project will be assessed based on the criteria contained in Table 16 and explained thereafter.

Sub-indicators	Employment creation/ output ratio		
	Low	Medium	High
Construction phase labour intensity	1-5 jobs/MW	6-10 jobs/MW	11+ jobs/MW
Operating phase labour intensity	1-3 jobs/MW	4-8 jobs/MW	9+ jobs/MW
Number of construction jobs	<75	75-150	>150
Number of operational jobs	<2	2-4	>4

Table 16: Employment creation

Background information

Wide ranging employment creation will take place during the construction, installation and operation of renewable energy projects. Direct and indirect employment from the construction and operation of a renewable energy plant is generally found throughout the extent of the product and service value chain.

The Lesotho Highlands Water Renewable Energy Project resulted in a significant employment creation impact for Lesotho. Although, this case study is not directly comparable given its magnitude and stature, it serves as an example for what this indicator is concerned with. In that project, approximately 16 000 Basotho secured employment on major construction and infrastructure contracts, which surpassed expectations with approximately 40% of this labour originating from the highlands area (LHDA, 2005).

This indicator looks at the labour intensity associated with the production output of each of the facilities to be assessed. The employment creation/output ratio in this case is important given the findings of the preceding contextual Section which outlined the high levels of unemployment in Lesotho. The creation of employment is prioritised in national planning documents such as the Poverty Reduction Strategy (2004) and the Vision 2020 (2004), and as such it is important that this agenda be reflected in the evaluation of various electricity generation options.

Construction phase labour intensity looks at the number of people employed per installed megawatt capacity. **Operating phase labour intensity** looks at the number of people employed in the daily operation of the completed plant per installed capacity. This indicator then considers not only how many people are employed in absolute terms as seen in the **number of construction jobs** and the **number of operational jobs**, but relates this to the quantity of production attributable to each.

Labour intensive means of production and construction are thus prioritised in this indicator over capital intensive technologies. The employment creation/output ratio then considers labour intensity not as a measure of substitutable multi-factor productivity but rather as a precursor for sustainability and an improved labour force participation rate (Samuelson and Nordhaus, 2004).

Given its GDP per capita, Lesotho is categorised as a labour surplus (or capital shy) country and as such it is desirable for it to pursue a growth path that is labour intensive in its production mix emphasis. Lewisian theory dictates that investments with a high employment: output ratio will lead to an increase in the real wage as a result of an expansion of labour intensive sectors, leading the country to a position were its economy may 'take off' into sustained growth (Lewis, 1954).

Application to economic assessment

The decision to consider high labour intensity as a desirable characteristic is in line with the United Nations Environmental Programme's Green Jobs Model (UNEP, 2008). Under this model, the stimulation of employment growth through renewable energy projects is paramount above considerations of the average product of labour in the interests of sustainability. One of the main findings of research in South Africa by AGAMA Energy is that renewable energy technologies offer quantifiable potential for creating and sustaining new and decentralised employment in Southern Africa (2003).

The labour intensity associated with different project stages (construction and operation) differs from project to project, with variables including:

- The size of the plant (because of technical specifications and other factors);
- Installed capacity (economies of scale may be present);
- Site specific determinants (e.g. clearing the ground of vegetation, grid and transport network connectivity);
- The technology to be implemented in the specific plant (different applications and methodologies may be adopted); and
- Local content associated with the project (use of imported components and expatriate labour).

Renewable energy type	Construction phase labour intensity	Operational phase labour intensity
Solar PV	25[a]; 7.14[d]	0.8[a]; 0.12[d]
Wind	5[b]; 2.57[d]	0.27[b]; 0.08[d]
Hydro	21.5[c]; 11.76[d]	0.78[c]; 0.19[d]

Table 17: Selected labour intensities

Sources: [a=] US DOE, 2009; [b=] US DOE, 2008; [c=] Aurecon, 2010; [d=]EPRI, 2001.

The impact of these variables on labour intensity is recognised and Table 17 shows some indicative labour intensity rates from various documents. These will guide and direct the assessments of employment creation potential to be undertaken. Information in the project technical reports will also be consulted in this regard.

Based on the technical reports provided, there is a high probability that construction, installation and operation of the renewable energy projects will provide opportunities for local employment creation. In the short term however there is a low probability that manufacturing, service and development industry activities will take place in Lesotho, and so employment linked to these activities are not expected to be created from the investments being assessed.

The rating of projects will be undertaken as is presented in

Table 18. Projects that have a higher employment per megawatt ratio will score highly. Construction phase employment and operating phase employment will be rated as being of equal importance. This is because although construction phase employment is often of a temporary nature, they typically absorb a higher number of people per megawatt. In addition, they allow for the acquisition of essential skills and experience in otherwise unskilled workers. These skills may be transferable and of benefit in projects that are not strictly within the realm of Renewable energy technologies.

Sub-indicators	Employment creation/ output ratio		
	Low	Medium	High
Construction phase labour intensity		+	++
Operating phase labour intensity		+	++
Number of construction jobs	+	++	+++
Number of operational jobs	+	++	+++

Table 18: Employment creation rating

Likewise, operational phase employment is rated equally with construction phase employment as it is recognised that renewable energy generation plants generally do not employ large workforces per megawatt in their daily operations. This point is especially true in Lesotho, where it may be assumed that some of the employment created might initially only be filled by expatriates and not directly benefit local employment. Despite the smaller numbers associated with operational employment in comparison to construction employment, they provide employment over longer periods of time.

The actual rating of projects will be undertaken based on information contained in the technical reports, and sector wide research drawn from various studies into the employment consequences of various renewable energy generation options.

Projects will receive high ratings in cases where it is easy (low financial, technical and legal barriers) for SMMEs to become participants in the energy plant value chain. Projects will receive low ratings in cases where only a few SMMEs would be able to develop, and opportunities for such development are limited (individually and collectively.

3.6 SMME development potential and linkages

Explanation of indicator

This indicator considers the possibilities for positive benefits to accrue to local micro, small and medium sized businesses as a result of the establishment of various facilities throughout the country. These may take the form of outsourcing of services, contractual agreements for the provision of ancillary support measures and technology transfer.

Tapping into SMME development potential and the subsequent forging of linkages is vital as it allows them access to and participation in a greater share of the economic pie. This facilitates sustainable grass-roots development by creating and strengthening linkages through employment, production and value addition. SMME development potential will then be assessed based on the criteria contained in the table below:

Sub-indicators	SMME development potential		
	Low	Moderate	Large
Ease of entry into value chain processes	High level of technical competence & capital intensity required	Moderate levels of technology requirements	Low barriers to entry for service providers
Proximity to economic nodes & communities	Low proximity to community	Close to community but far from economic node	High proximity to economic node
Alignment of project with economic structure	Project has limited opportunities to link up with current economic structure	Has some opportunities to link up with current economic structure & projected growth patterns	Is fully aligned with current district economic structure & projected growth patterns

Table 19: SMME development potential

Background information

The criteria used above are based on an interpretation of core issues identified as influencing SMME development in Lesotho (SMME White Paper, 2003; State of Small enterprise in Lesotho, 2008). It is only through the existence of a supporting and enabling economic environment that the emergence of new SMMEs and sustenance of existing SMMEs may be engendered. The factors discussed in this section are some of the variables that determine the suitability of an investment to the local economic environment.

Ease of entry into value chain processes relates to the possibility of local businesses to benefit through the operation of the facility in a direct way. An example of this may be in the form of procurement practices that favour the selection of local SMMEs in the supply, installation and maintenance of factors of production through partnerships.

The alignment of the project with the economic structure relates to the ability of a facility to create synergies with already existing activity or provide opportunities for the enhancement of different forms of economic activity indirectly. Only if these are aligned may SMMEs exploit linkage opportunities that exist. An example of this would be the possibility for a facility to have spin-offs in the form of tourism activity run by an SMME

A project that does not align well with the prevailing economic activity would place a high opportunity cost burden on the country and will have a negative consequence on the potential opportunities for SMME. If a facility is established in an area with high agricultural potential, the opportunity cost of alternative uses for the land will be considerable, and the project can be deigned as having a negative consequence on the local SMME environment when compared to a project established on land of little economic or financial value.

A project that is close to economic nodes and communities will have a larger resident population surrounding its construction and daily operation, which becomes a de facto potential market for various SMMEs. If a power plant is established in a large settlement, injections into the immediate local economy will be significant, and thus provide avenues for SMME growth. Conversely if a power plant is established in a remote area, SMMEs that derive their business from it will be limited in terms of the range of market influence. In addition to this, start-up costs will be expected to be lower in large economic nodes than in smaller nodes because of the presence of an enabling environment for private enterprise.

Proximity to economic nodes thus provides opportunities for the local SMME environment to be enhanced through induced effects in the regional economy. An example of this may be seen in the establishment of dry-cleaning service companies based on the need for laundry services for employees of a plant. This is more likely to be undertaken in areas high up on the settlement hierarchy than in marginalised locations.

Application to economic assessment

SMME development potential and linkages as articulated in the above paragraphs will be rated as follows:

Sub-indicators	SMME development potential		
	Low	Moderate	Large
Ease of entry into existing value chain processes	+	++	+++
Proximity to economic nodes & communities	+	++	+++
Alignment of project with economic structure	++	+++	++++

Table 20: Rating of SMME development potential

Ease of entry into existing value chain processes will be assessed based on the labour intensity of each project as discussed in section 3.5 of this chapter.

Proximity to economic nodes & communities will be assessed based on the rating undertaken in sections 3.1 and 3.2 of this chapter.

Alignment of projects with economic structure will be based on assessments of the local and regional economies in which projects will be situated as discussed in section 2.3 of this report.

3.7 Skills development potential

Explanation of indicator

This indicator will consider the possibility for the local population to become up-skilled as a result of the construction and operation of the facilities. This may take the form of on-the-job training, education, formal certification and accreditation that would not otherwise have occurred had the facility not been built and run in that specific area.

Skills development potential of the different facilities will be assessed based on criteria contained in the following table, and explained afterwards.

Determinant of skills development potential	Effect		
	Low	Moderate	Large
Number of people to be employed in project	0-15	16-49	50+
Skills intensity of project	Reliant on highly skilled staff	Uses a high percentage of unskilled labour in relation to highly skilled labour	Has an even split between un-; semi-; and highly skilled labour needs

Table 21: Skills development potential

Background information

The discussion on the **skills intensity** of each project provided in section 3.3 of this Section applies to this section, with the following qualifications to be made:

The number of employees per skill level is a predeterminant of the amount of skills transfer that can take place within a work environment. A work environment characterised by a high percentage of unskilled staff creates a situation with a low propensity of skills transfer and the training burden placed on highly skilled staff may be untenable. Similarly, a high reliance on unskilled staff provides an indication of the production methods utilised, which in this case would not allow for a high value-added content of labour, as characteristic of an unskilled workforce.

A work environment with a heavy reliance on skilled staff would fare worse than the above example, as the opportunities for unskilled staff to be up-skilled would be limited. In such instances, glass ceilings in the skills thresholds would characterise the technology in place.

A work environment with an even split of unskilled, semi skilled and highly skilled labour best provides opportunities for skills development. In such an environment, opportunities for mentoring, training and up-skilling in daily tasks, as well as in certifiable standards present themselves abundantly.

This arises because of the effects of Henderson's law (1974) in skills development which are experienced through:

- Labour efficiency;
- Technology learning curves;
- Network effects; and
- Shared experience effects.

The **number of people to be employed** per project also has an effect on the potential for skills development. The absolute number of people to be employed in the construction and operation of a facility is an intrinsic determinant of the subsequent skills development that can take place for each of the projects to be assessed. Even if a certain energy type provides greater opportunities for skills development, if the total number of people to be employed is low then the scope for this to happen effectively diminishes.

Application to assessment

The assessment of skills development potential will be undertaken as per the rating provided in

Table 22 and will correspond with the descriptions introduced in Table 21.

Projects which approximate towards an even split of skills intensities and employ a high number of people will be able to score the highest possible amount. As the total number of people employed and the skills intensity change, the maximum possible score that each project will be able to get will reduce.

Determinant of skills development potential	Effect		
	Low	Moderate	Large
Number of people to be employed in project	++	+++	+++++
Skills intensity of project	++	+++	+++++

Table 22: Rating of skills development potential

3.8 Export potential

Explanation of indicator

According to the National Energy Master Plan (2007) Lesotho had a peak demand level of 95MW in 2006, and was able to locally supply 74.4MW of this through internal generation. There has not been a fundamental change in the demand and supply situation since this plan was approved, meaning that Lesotho is at present a net importer of electricity, which accounts for approximately 4% of its GDP (NEMP, 2007). It is envisaged that an increase in electricity generating capacity arising from the implementation of various projects assessed in this document could allow Lesotho to become a net exporter of electricity.

This indicator looks at the potential for the individual projects to generate export revenue for the Lesotho government through the export of electricity and allied revenue from the sale of tradeables linked to the generation of electricity. The export potential of potential projects shall be assessed as per the contents of the following table.

Determinant of export potential	Potential export benefit		
	Low	Medium	High
Consideration of grid wide connectivity	No planning made	Facility to be connected to grid	Detailed information
Generation capacity	0-4 MW	5-14MW	>15MW
Applicable feed-in tariff	Lowest	Median	Highest
CDM rating/score	UNFCC guidelines	UNFCC guidelines	UNFCC guidelines

Table 23: Determinants of export potential

Background information

The GoL has asserted its intention to become a net exporter of electricity, as seen in research into the establishment of a pump storage scheme to export electricity to the Southern Africa Power Pool that, when built, will transform Lesotho to a net exporter of electricity within the Southern Africa Power Pool (SAPP) (ADB, 2008).

A first step in the assessment of export potential is to find out if technical consideration has been made in terms of the planning and requirements analysis for the introduction of electricity into the wider electricity grid (SAPP, 2004). **Consideration of grid-wide connectivity** in the context of export potential looks at whether information in this regard has been supplied in the technical reports for each project.

Generation capacity as a sub-indicator works from the premise that the more the installed capacity of each plant, the greater it's potential to export electricity.

Lesotho is a member of the SAPP, which is a regional electricity trading mechanism that allows for the sale and purchase of electricity across national borders. Within the SAPP, South Africa is the largest demand market, and also has the highest demand for renewable energy. As the de facto primary market for exports, South Africa's Integrated Resource Plan (IRP) is seen as a pivotal document in the determination of the **applicable feed in tariff**. A Feed in Tariff (FIT) is the amount of revenue that can be received per unit of electricity output that is exported onto a grid system.

The fourth determinant of export potential as set out in the table is the **Clean Development Mechanism** (CDM) rating or score of each project. The CDM seeks to promote sustainable energy generation practices through the introduction of markets for the trade of instruments such as emissions rebates, mitigation finance, carbon credits and adaptation finance (IPCC, 2011).

Application to economic assessment

Grid wide connectivity in this case would be contained in the technical reports of the projects to be assessed, and be included as geo-spatial and technical information. This may include whether the project will be on or off the national grid, and practical implementation considerations such as distance to the nearest transformer.

Generation capacity in this case will be taken as having a bearing on the amount of electricity that may be exported. Projects with higher generation capacity thus have a higher export capacity than those with lower generation capacities.

As Lesotho does not have a **feed in tariff** of its own at present, the South African tariff policy will be taken as a relevant guide. This is based on the Lesotho Energy Action Plan (2003) which states the nation's commitment to exploit possibilities for electricity trade with Southern Africa through the SAPP. This is to be supplemented by the securing of regional multi- or bilateral Power Purchase Agreements and the harmonising of Lesotho's regulatory frameworks with those of other SAPP operating partners.

South Africa's integrated resource plan supports a technology split skewed in favour of wind then hydro, then solar. This is reflected in the tariff policy, as well as the quantities of various RE electricity to be accommodated in the IRP (Dewey & Leboeuf, 2010).

The **CDM rating** and **score** relates to the carbon credits that can be exchanged, sold or traded in exchange for the production of energy through the use of renewable resource such as solar, wind and hydro. These represent a revenue stream that is classified as exports linked to the generation of electricity in Lesotho.

Under the scoring system developed by the United Nations Framework Convention on Climate Change (UNFCCC), wind and solar power generation have larger potential for export revenue creation than hydro (2008). A project can generate more export revenue if it has a larger generation capacity than a smaller project of similar energy type.

Export potential deterkinants as articulated in the above paragraphs will be rated as presented in Table 24.

Determinant of export potential	Effect		
	Low	Medium	High
Consideration of grid wide connectivity		+	++
Generation capacity	+	++	+++
Applicable feed-in tariff	+	++	+++
CDM rating/score		+	++

Table 24: Rating of export potential

3.9 Resource usage optimisation

Explanation of indicator

This indicator will consider the opportunity cost of establishing plants. Opportunity cost is the income foregone by not using a resource or asset in its next best alternative. Each project will need to be assessed on its opportunity cost i.e. the benefit associated with implementing an alternative on the same site instead of the proposed investment. This indicator will be assessed based on the existing land use and the potential land use as displayed in

Table 25.

An example of this may be illustrated as follows: if specific land is currently used for agriculture and is earmarked for the construction of a solar power generation facility, the construction of this facility may lead to the termination of agricultural production. This would result in a loss of income and capital to the region and in turn brings about a negative economic consequence. This loss of income from the cessation of agricultural activities represents the opportunity cost.

However, it must be remembered that the construction and operation of the new solar facility will most probably create a positive economic consequence. Resource usage optimisation is concerned with assessing if the net positive economic consequence from the introduction of the new electricity plant will be greater than the loss in economic value from the abortion of farming production.

If the revenue to be earned from the electricity facility is greater than that which would otherwise be earned from agriculture, the associated opportunity cost of that investment is deemed to be low. Conversely, if the economic consequence from the electricity plant is smaller than that which is derived from agriculture, the opportunity cost of the investment is deemed to be high. Although these two examples are both extreme cases, this assessment will evaluate optimal resource usage in the area around which planned investments would be situated

Determinant of Resource usage optimisation	Opportunity Cost		
	High	Medium	Low
Existing land use	Land is currently used extensively for various economic activities.	Land is currently used but, not optimally.	Land is currently not being used at all
Potential land use	There is potential for the land to be used extensively for various economic activities	There is potential to use the land.	Potential for land use is limited i.e. the land is of low value.

Table 25: Determinants of resource usage optimisation

This example applies both to land which is currently being utilised (as above) as well as to land which lies vacant but yet has the potential for developments of a different kind. For example, a certain piece of land may be earmarked for industrial development in future but a decision is taken to construct a power generation facility in its place. The loss in potential income and resultant economic consequence from not engaging in industrial operations represents the opportunity cost forgone.

Background information

The first determinant of resource usage potential as set out in Table 25 is the **existing land use.** The existing land use considers the current activity that is taking place at the site and in surrounding areas. If a plant is constructed in an area where activities are currently taking place, these activities might need to be relocated or discontinued and this will have negative economic consequences.

The economic consequences generated from the plant must be greater than that which is generated from the current activity taking place on the land for it to have a net positive effect.

Previous investment on the land may not potentially be utilised for the new investment. In this case the initial investment on the land becomes sunk. This contributes to a higher opportunity cost.

As part of this indicator we also consider land which is not used for any economic activity at present. If little or no activity is taking place on the land at present, there is the potential to use that land for future activities. **Potential land use** refers to the future activities that could possibly occur on the land. The land could have the potential for redevelopment because it is currently not employed at its highest and best use. This will create future income streams and bring investment to the area and its surrounds in the short and long term.

In the case of this analysis, a low opportunity cost occurs when a specific site carries little potential for any other investment apart from a new power facility. A high opportunity cost would apply if untapped potential was inhibited from being developed as a result of the new power generation facility development.

As per the contextual chapter, the following opportunities and existing economic land uses will be considered: agriculture, minerals, industrial development and residential development. The implications of these land uses on the opportunity cost of the investment under consideration will be considered under the application to economic assessment.

Application to economic assessment

The maximum possible rating based on the determinant of resource usage optimisation will then be applied as presented in

Table 26. In terms of rating the projects, it is more desirable for the project to have a low opportunity cost as this would mean that net positive economic effects are expected in the area.

If the opportunity cost for existing land use is low this suggests that it is preferable to construct and operate the power generation facility in that area /project site. In the rating of projects it is then assumed that this area is currently not being used optimally and therefore a power generation facility may be constructed and results in a net positive economic effects on overall resource utilisation.

Determinant of Resource usage optimisation	Opportunity Cost		
	High	Medium	Low
Existing land use	++	+++	+++++
Potential land use	++	+++	+++++

Table 26: Rating of Resource usage optimisation

In the case where the land is currently used for various activities such as mining or agriculture, the opportunity cost would be high as the construction of the power facility may interfere with the current use of the land, depending on which economic activity would create a greater economic effect.

If little or no activity is taking place on the land at present, there is the potential to use that land for future activities such as industrial or residential development. This must however then be evaluated against the potential land use i.e. the construction of a plant will have a low opportunity cost if the economic consequence generated from the plant is greater than that which can be generated from an alternate potential investment/

3.10 Cost of production

Explanation of indicator

Economic assessments and evaluations are founded on the premise of efficient and optimal allocations of scarce resources across alternate investment choices. This indicator will look at the cost of producing electricity in each of the generation options reviewed so as to find that which will provide an affordable production mix for the Lesotho government and any other investors that may be involved in the respective projects.

This indicator will consider from an efficiency perspective the initial capital and ongoing annual operational expenditure that will be required for the new projects to function. This is considered in relation to the power capacity that they can contribute to the national grid.

The cost of production shall be assessed based on the two factors contained in Table 27. It is recognised that there are multiple means by which the cost of production may be calculated such as the levelised cost of production (CAMCO, 2010). The two selected sub-indicators were selected based on the information made available in the technical reports for each of the generation options. Although simplistic in nature, these two sub-indicators allow for comparison and contrast across the different generation options and are intuitive in nature for the readership at which this report is targeted.

Cost of production	Affordability		
	Low	Medium	High
OPEX/ MW	>4	2-4	<2
CAPEX/MW	Insufficient information to populate indicator	Insufficient information to populate indicator	Insufficient information to populate indicator

Table 27: Cost of production

Background information

It can be seen that this indicator is concerned primarily with affordability and efficiency from a financial perspective. The GoL has several energy related goals, two of which are:

- "Producing sustainable electric power at affordable cost using renewable energy resources" with a vision of exporting excess produced capacity; and
- To see "Household access to electricity increased from 16% in 2007 to 40% at the national level by 2020".

(ADB, 2008).

As such the cost burden of increased electricity production for export and the resulting grid extension must come at a sustainable cost to the GoL

The **CAPEX/MW** sub-indicator will consider the ratio between the capital expenditure for the initial investment and its installed capacity. This will provide an indication of the average fixed cost of production (Parkin and Bade, 2005). This sub-indicator thus looks at the cost of construction of each plant in relation to the amount of output it will be rated as being able to produce.

The **OPEX/MW** sub-indicator will consider the ratio between the ongoing operational costs of running the plant and its installed capacity. This will provide an indication of the average variable cost of production, which is the distinguishable cost associated with producing one unit of output. (Parkin and

Bade, 2005). This sub-indicator thus looks at how expensive or cheap it is to run each of the plants

The two sub-indicators will allow the creation of a holistic picture with regards to the total cost of production, which is based on both the average fixed costs and the marginal variable costs and allows for cost minimisation (Fryer, 2006).

The assessment above is based on several assumptions including constant returns to scale, and imperfect rates of technical substitution in technology (Eaton and Dekle, 1999). It is also assumed that the capital expenditure figures will account for miscellaneous list items such as consultancy services, grid connection, and site costs including erection and foundation. It is similarly assumed that the operational expenditure figures will account for variables such as changes in the prices of spares, tools, training and labour.

Application to economic assessment

Although it is recognised that other measures of output exist such as MwH and peak power, for ease of calculations, the installed capacity in MW will be used in the rating of different projects.

The use of OPEX/MW and CAPEX/MW will take away the need to account for plant size in the cost of production. This will be accounted for in the calculations, and will also allow a balanced evaluation of large and small sized projects, taking into cognisance the GoL's stated desire to develop both micro- and mega scale electricity generation capacity in the future (NEMP, 2007).

The rating to be used is presented in Table 28, whereby the average fixed and variable costs of production are weighted equally. This is in recognition of the fact that the affordability of the initial investment outlay needs to be considered also in the context of the concomitant recurring cost of production and sustainability to be associated with each project. By this convention, a project that is expensive to build and cheap to run will be equally assessed along with one which is cheap to build and expensive to run. Although in-depth methods of weighting these two costing categories exist, the scope of this project does not allow for the implementation of these.

Cost of production	Affordability		
	Low	Medium	High
OPEX/ MW	++	+++	+++++
CAPEX/MW	++	+++	+++++

Table 28: Cost of production rating

Box 4: Cost of wind energy production

Financial information regarding to capital and operational costs was provided for hydro-electric and solar power projects. No financial information was provided in the technical assessment reports for win projects.

The information contained in this box is based on industry wide financial trends on the cost of establishment and the cost of running power plants, based on their size. Where possible, these figures have been aligned with the technical information provided in the wind reports .

Capex
USD 1 915 000/MW
Turbine price of USD 1360 000/MW in 2008

Opex
<5mw = USD 40/MWh
5-20mw = USD 33/MWh
20-50mw = USD 24/MWh
>50mw = USD 19/MWh

(DOE, 2009)

3.11 Recapitalisation potential

Explanation of indicator

It is noted that initial capital expenditure to develop a new power generation facility is significant in relation to operational costing thereafter. As such the recapitalisation ratio i.e. the annual return on investment relative to initial investment will be compared from project to project.

The previous indicator looked at the running and initial cost per unit of output (megawatt). This indicator looks at the rate of return of the investments assessed in the previous indicators. Therefore where the previous indicator considered variable and fixed only costs, this indicator considers total costs, and how this compares with revenue streams associated with each of the individual projects. It is assumed that the revenue attributable to each project will be linked to its installed capacity and thus its expected output. Recapitalisation potential is thus intrinsically linked to and based on, yet clearly distinguishable from the cost of production (Firer and Ross, 2003). Table 29 shows the sub-indicator that will be used to assess recapitalisation potential.

Rate of return	Recapitalisation potential		
	Low	Medium	High
MIRR	<9%	12%	>15%

Table 29: Recapitalisation potential

Background information

Electricity generation projects involve significant capital outlays. This is especially true in countries such as Lesotho where the GDP is low, and financial resource constraints often mean tough decisions between alternate projects with different payoffs horizons and characteristics. Projects of this nature are often financed through public debt and with an estimated budget deficit of 10.8% in 2011/12 (The Economist, 2010), it is prudent for the GoL to prioritise those projects that ensure a sustainable financial position for the country going into the future.

The Modified Internal Rate of Return (MIRR) is one recognised measure of recapitalisation potential. It looks at the cost of capital and discounts expected cash flows from each project. The modified internal rate of return is a financial measure of an investment's attractiveness and assesses how working capital is managed. It is an indicator of the efficiency, quality or yield on an investment and an investment is considered desirable if it has a higher positive MIRR than another project (Firer and Ross, 2003).

This indicator thus looks at how quickly each of the projects will pay back on the original financial investment sunk into it. The indicator also looks at the revenue generation capacity of each of the projects over their useful lifetimes. MIRR then rates those projects that allow expedient payback of debt, and are associated with healthy cash flow positions during their useful economic lives.

Application to economic assessment

Information provided for each of the projects will be assessed so that a standardised means of assessing the MIRR can be adopted. The detail level in each of the technical reports differs, and as such, capital and operational budgeting information is not directly comparable across all the projects being evaluated. Despite these limitations, the following concepts and principles will guide the assessment of recapitalisation potential in this indicator:

- Positive net present values for each of the projects as it is assumed that the recurrent cost of generation will in each case be smaller than electricity revenues and sufficiently offset by operating margins;
- Full cost recovery;
- Predictable revenue streams from connection fees, sales of electricity to new customers and sustained existing demand;
- Discount rates and annuity factors based on prevailing interest trends and projections; and
- Sensitivity analyses having been carried out and reflected in the information provided to Urban-Econ EC e.g. stress tests for outlay overruns, incremental budgeting.

Recapitalisation potential as articulated in the above paragraphs will be rated as presented in Table 30.

Rate of return	Recapitalisation potential		
	Low	Medium	High
MIRR	++	+++	+++++

Table 30: Recapitalisation potential rating

3.12 Tourism potential and linkages

Explanation of indicator

This indicator will consider the impact on the tourism sector as a result of the construction and operation of the facilities. Changes in tourism potential and linkages pertaining to each facility will be assessed based on the criteria contained in

Table 31. It can be seen from

Table 31 that a plant may have both negative and positive impacts on the tourism potential and linkages in an area. This then means that projects may be rated with a negative score in this indicator.

Impact		Tourism potential and linkages of each project	
		Impact on existing tourism	Impact on potential tourism
	Positive	Likely to increase the amount of tourists to the area	The establishment of the facility might bring tourists to the area.
	Negative	Likely to decrease the amount of tourists to the area	The establishment of the facility might not bring tourists to the area.

Table 31: Tourism potential and linkages

Background information

It is important to understand the impact of the construction on existing tourism, as the construction and operation of a plant may positively or negatively affect the value and quantum of tourism activity in the immediate and general vicinity. This speaks to the creation of linkages in the Lesotho tourism sector.

In the case where tourists already visit the area close to the site and view the energy facility as an attraction, they might be willing to pay a tariff to view the new establishment or might spend more time in the area (which equals increased bed nights and tourist spend as a result of its presence). Conversely it may be found in some cases that the establishment of energy generation facilities may reduce the number of tourists that come to an area or the amount of money they spend there.

The impact on potential tourism is based on the ability of a plant to create tourism. This is seen when characteristics linked to the plant attract people to visit an area that previously had no or little tourism activity. In other cases it may be found that the establishment of a plant may have negative repercussions on the future ability of an area to attract tourists, even if such activity was already limited or non-existent. The impact on potential tourism is also seen in how a plant may extend the range of tourist activities available to visitors to the area.

The selection of the above indicators is based on research into the effects on tourism linkages of renewable energy projects throughout the world, which shows:

- According to the economic impact assessment for phase I of the Lesotho Highlands Water Project (which has a hydroelectric power generation component) there has been a notable impact on tourism to mountain areas as a result of Phase IB of the Lesotho Highlands project. A total of 49 702 tourists visited the Mohale construction area from 1998 to 2003. It is expected that once construction is over and tourism facilities are in place, Phase IB area will attract more tourists (LHDA, 2005);
- Furthermore, Phase IA has had 45,716 tourists over the same period. Visitors to the project area come from the region and internationally. Among these tourists are school children from within Lesotho and neighbouring border towns in the Free State, visiting the project sites for study tours;

- The UK's first commercial wind farm at Delabole received 350,000 visitors in its first ten years of operation. A poll in Scotland showed that 80% of tourists would be interested in visiting a wind farm. Furthermore, wind farm developers are often asked to provide a visitor centre, viewing platforms and rights of way to their sites. (Renewable UK 2010);
- In several countries including Scotland, New Zealand, and the Greek Isles tourists pay to visit wind turbines and be photographed with them. Some tourists are casual observers who stop at roadside displays or interpretive centres; others pay to participate in organized tours (Renewable UK, 2010);
- Given that bird watching is one of the top attractions in Lesotho it is interesting to note that that there has been no major adverse effects on birds associated with wind farms in the UK (Renewable UK 2010); and
- It is evident from above information that a wind farm, hydro and solar plant may be perceived as a complement or an enhancement to tourism for those interested in wind technology and a way of furnishing the landscape with new architectural and heritage values.

There are also some negative impacts on tourism that may arise from renewable energy, some of which are:

- The risk of large (protected) species of birds in wetlands colliding with power lines;
- Construction of plants in areas with legally protected rare animal species or habitat (NEMP, 2007);
- In forested areas, wind power development may necessitate the clearing of trees and cutting roads;
- Approximately one square kilometre for every 20-60 megawatts (MW) generated is needed for solar power, which may pose land-use conflicts with tourism in some areas; and
- Reservoirs created by some hydropower projects inundate wildlife habitats and scenic areas that might otherwise be used for tourism.

(Brower, 1992)

Application to economic assessment

The rating of projects is based on a combination of their impact on current tourism, and their impact on potential tourism in an area as shown in Table 32. A project that has a positive impact on visitor numbers and facilitates the establishment of a new tourism market in the same area would score highly.

On the other end of the scale, a project that reduces people's willingness to visit an area and also effectively diminishes the future potential may be scored as having a negative economic effect. This may be applied to projects planned in an area that has high environmental sensitivity and recognised nature- or eco-based assets. Projects that have no impact on existing or potential tourism will score zero (0).

		Determinant of tourism potential	
		Impact on existing tourism	Impact on existing tourism
Impact	Positive	+++++	+++++
	Negative	- - - - -	- - - - -

Table 32: Rating of tourism potential

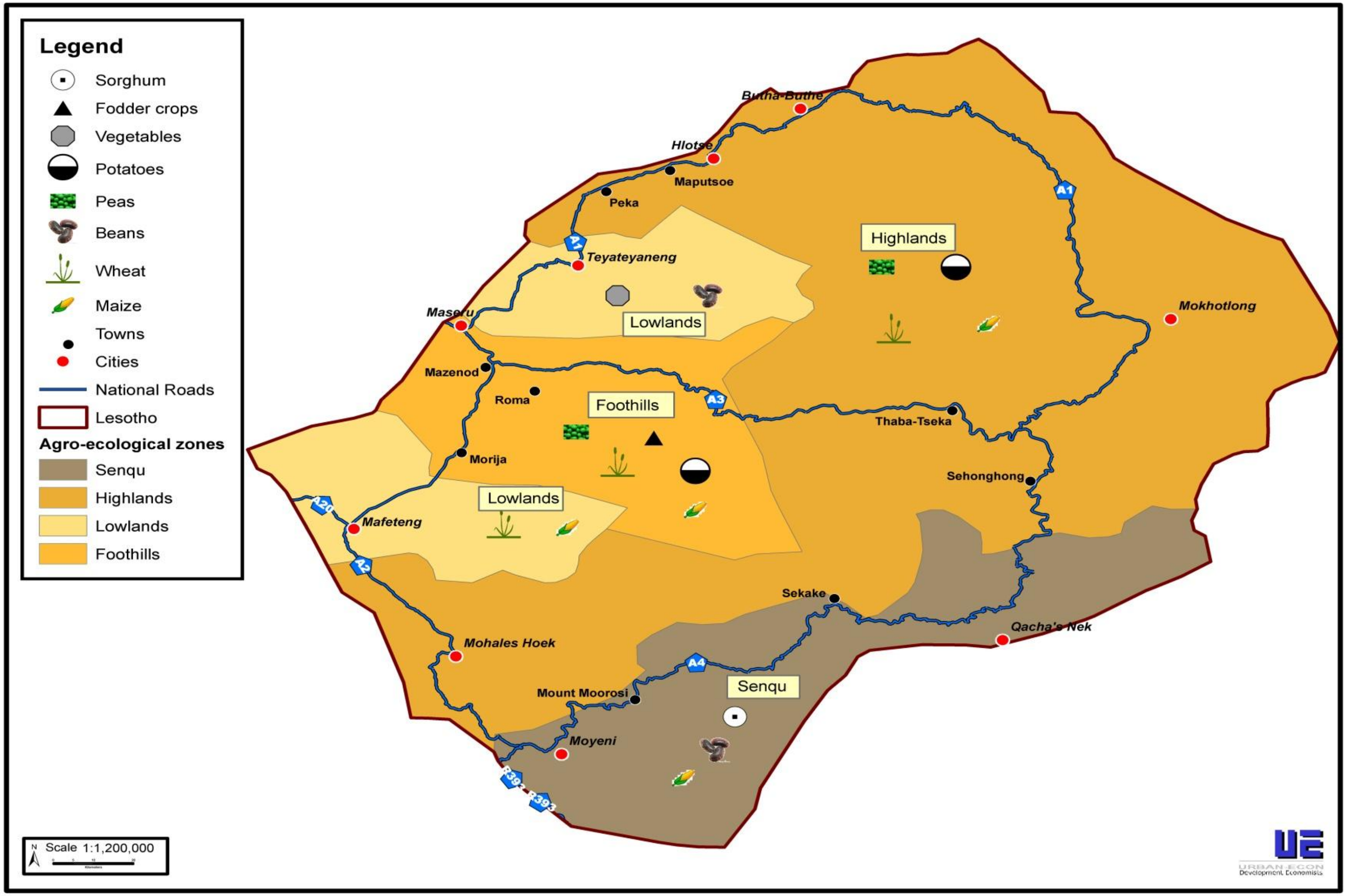
3.13 Précis

This Section has discussed the indicators that will be used to assess the economic consequences of the projects. The indicators have been developed in a context of sustainable development predicated on sound economic principles.

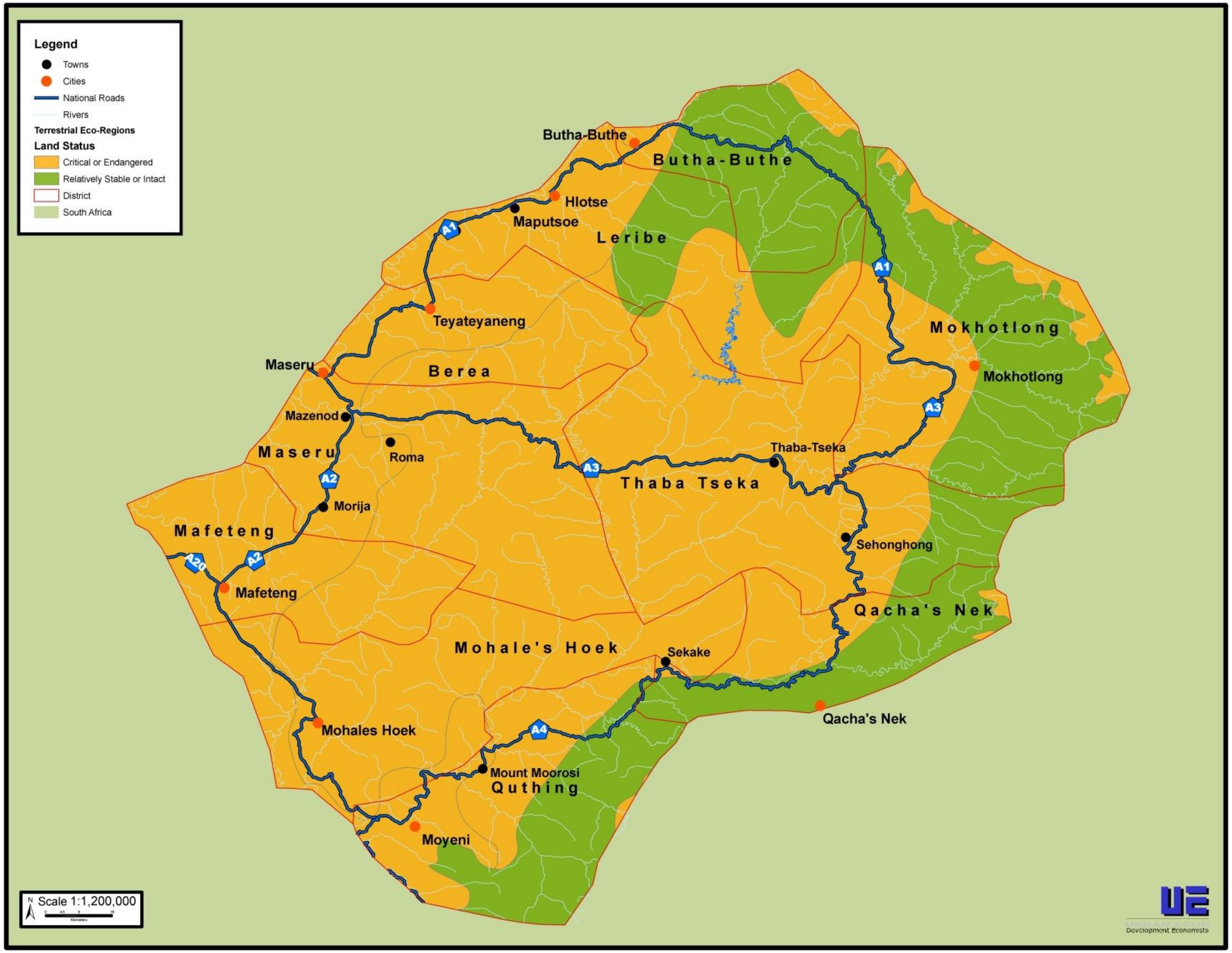
The indicators have also been developed in the context of Lesotho as a developing country. As such gaps in acquiring some information and data have been accounted for, and it is hoped that the interaction of sub-indicators selected will compensate for these shortcomings.

The next Section will then take the assessment and evaluation process a step forward by carrying out the actual rating and scoring of potential investment projects.

APPENDIX 1: ADDITIONAL MAPS



Legend
Sorghum
Fodder crops
Vegetables
Potatoes
Peas
Beans
Wheat
Maize
Towns
Cities
National Roads
Lesotho
Agro-ecological zones
Senqu
Highlands
Lowlands
Foothills
Butha-Buthe
Hlotse
Maputsoe
Peka
Teyateyaneng
Maseru
Mazenod
Roma
Morija
Mafeteng
Mohales Hoek
Mount Moorosi
Moyeni
Sekake
Qacha's Nek
Sehonghong
Thaba-Tseka
Mokhotlong
Highlands
Lowlands
Foothills
Lowlands
Senqu
A1
A2
A3
A4
A20
Scale 1:1,200,000


Legend
Towns
Cities
National Roads
Rivers
Terrestrial Eco-Regions
Land Status
Critical or Endangered
Relatively Stable or Intact
District
South Africa
Butha-Buthe
Butha-Buthe
Hlotse
Maputsoe
Leribe
Teyateyaneng
Mokhotlong
Mokhotlong
Maseru
Berea
Mazenod
Roma
Maseru
Thaba-Tseka
Thaba Tseka
Morija
Mafeteng
Sehonghong
Mafeteng
Qacha's Nek
Mohale's Hoek
Sekake
Qacha's Nek
Mohales Hoek
Mount Moorosi
Quthing
Moyeni
Scale 1:1,200,000
Development Economists

APPENDIX 2: RATING MODEL

rating model - Microsoft Excel

	A	B	C	D	E	F	G	H
1				SAMPLE PROJECT				
2				1. PROXIMITY TO ECONOMIC NODES				
3		Distance to economic node	Economic activity in area	Level of economic growth in area		*Indicator score*	Indicator weighting	**Weighted score**
4	Maximum score	4	3	3		10		
5	Project rating	4	3	3		10	5%	0.5
6								
7				2 PROXIMITY TO COMMUNITIES				
8		Distance to nearest settlement	Social infrastructure in area			*Indicator score*	Indicator weighting	**Weighted score**
9	Maximum score	5	5			10		
10	Project rating	3	4			7	5%	0.35
11								
12				3. SKILLS AVAILABILITY				
13		Education levels in area	Skills intensity of project			*Indicator score*	Indicator weighting	**Weighted score**
14	Maximum score	5	5			10		
15	Project rating	4	4			8	5%	0.4
16								
17				4 ECONOMIC SPINOFFS				
18		Sectoral output	Household Income	Employment		*Indicator score*	Indicator weighting	**Weighted score**
19	Maximum score	4	3	3		10		
20	Project rating	4	2	2		8	10%	0.8
21								
22				5. EMPLOYMENT CREATION POTENTIAL				
23		Construction labour intensity	# of construction jobs	Operational labour intensity	# of operational job:	*Indicator score*	Indicator weighting	**Weighted score**
24	Maximum score	2	3	2	3	10		
25	Project rating	2	3	2	3	10	15%	1.5
26								
27				6. SMME LINKAGE DEVELOPMENT POTENTIAL				
28		Ease of entry into value chain	Proximity to nodes & communities	Alignment with economic structure		*Indicator score*	Indicator weighting	**Weighted score**
29	Maximum score	3	3	4		10		
30	Project rating	1	3	2		6	10%	0.6
31								
32				7. SKILLS DEVELOPMENT POTENTIAL				
33		# of people to be employed	Skills intensity of each project			*Indicator score*	Indicator weighting	**Weighted score**
34	Maximum score	5	5			10		
35	Project rating	1	5			6	5%	0.3
36								
37				8. EXPORT POTENTIAL				
38		Grid wide connectivity	Generation capacity	Applicable feed-in tariff	CDM rating/score	*Indicator score*	Indicator weighting	**Weighted score**
39	Maximum score	2	4	2	2	10		
40	Project rating	1	3	2	2	8	10%	0.8
41								
42				9. RESOURCE USAGE OPTIMISATION				
43		Existing land use opportunity cos	Potential land use opportunity cost			*Indicator score*	Indicator weighting	**Weighted score**
44	Maximum score	5	5			10		
45	Project rating	5	5			10	10%	1
46								
47				10. COST OF PRODUCTION				
48		MW/CAPEX	MW/ OPEX			*Indicator score*	Indicator weighting	**Weighted score**
49	Maximum score	5	5			10		
50	Project rating	5	4			9	10%	0.9
51								
52				11. RECAPITALISATION POTENTIAL				
53		Yield Ratio rating				*Indicator score*	Indicator weighting	**Weighted score**
54	Maximum score	10				10		
55	Project rating	9				9	5%	0.45
56								
57				12. TOURISM LINKAGE POTENTIAL				
58		Impact on existing tourism	Impact on potential tourism			*Indicator score*	Indicator weighting	**Weighted score**
59	Maximum score	5	5			10		
60	Project rating	4	5			9	10%	0.9

Summary Project Table	Actual score	Maximum score
Proximity to economic nodes	0.5	0.5
Proximity to communities	0.35	0.5
Skills availability	0.4	0.5
Economic 'spin-offs'	0.8	1
Employment creation potential	1.5	0.5
SMME linkage potential	0.6	1
Skills development potential	0.3	0.5
Export potential	0.8	1
Resource usage optimisation	1	1
Cost of production (kW/OPEX)	0.9	1
Recapitalisation potential	0.45	0.5
tourism linkage	0.9	1
Total Project Rating	**8.5**	/10

Sample project (2) | Sample project | Maseru | Overall results

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