



renewable  
energy  
& energy  
efficiency  
partnership

# Botswana

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## Section 1: Energy provision

### 1.1 Main fuel sources for direct use and power generation<sup>1</sup>

The energy sector comprises both conventional and non-conventional energy sources. The former is dominated by petroleum products and coal, while the latter comprises biomass, primarily in the form of wood fuel. About 60% of annual coal production is used for electricity generation. 80 % of households mainly depend on wood fuel and to some extent Liquefied Petroleum Gas (LPG) and paraffin. Coal is mined solely at Morupole by Anglo American, mostly for the generation of electricity. The government is considering constructing a coal-fired power plant at the same coal field. LPG is steadily gaining in popularity in the low-income households because of convenience, and because of localised scarcity of wood fuel. Electricity accounts for 8 percent of total energy consumption. The types of primary energy are coal (10.3%), petroleum products (67.9%) and electricity (21.8%).

### 1.2 Degree of reliance on imported energy

There are almost no oil and gas resources in Botswana. The main energy related imports are oil and some coal. Botswana mainly relies on imports from South Africa and Zimbabwe and Zambia for electricity.

Solar photovoltaic and wind-generated electricity contribute a fraction of one percent to the total energy supply, but occupy an important position in satisfying needs in remote areas, and are promoted by the National Energy Policy. Solar and photovoltaic technologies are used in schools, for rural street lighting, and in some homes and government buildings. In 1994, 75.1% of the electricity supply in Botswana was generated in the country, and 24.9% was imported from the Southern African Power Pool (CSO, 2000).

### 1.3 Extent of connection to electricity network (households and businesses; rural and urban)

It is estimated that 47% of the population has access to electricity. The mining sector is the most important consumer segment in Botswana in terms of electricity consumption. It accounted for about 40% of Botswana Power Corporation (BPC)'s total electricity consumption. However, the current financial crisis has reduced electricity demand from the energy sector in Botswana. Electricity grids exist only in close proximity to urban areas.

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<sup>1</sup> Based on information collected from: [http://tonto.eia.doe.gov/country/country\\_energy\\_data.cfm?fips=BC](http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=BC) , [http://www.cef.org.za/presentations/06\\_RE%20AND%20EE%20IN%20BOTSWANA.ppt?b6e5cde5d2b5d180ea8ad8e99ed82263=ae7ac46baf1000a4dee9e4aae0651e5c#403,6](http://www.cef.org.za/presentations/06_RE%20AND%20EE%20IN%20BOTSWANA.ppt?b6e5cde5d2b5d180ea8ad8e99ed82263=ae7ac46baf1000a4dee9e4aae0651e5c#403,6), <http://www.sovereign-publications.com/botswana.htm>, <http://www.energyrecipies.org/reports/genericData/Africa/061129%20RECIPES%20country%20info%20Botswana.pdf>

Botswana also has interconnections with the Republic of South Africa, from which it imports electricity, and with Zimbabwe and Zambia for the interchange of power as required.

The household sector, transport, mining, government, trade, hotel and manufacturing sectors are considered as the largest energy users, especially in terms of electricity. Solar is currently used for water heating and small scale electricity generation. However, contribution of renewable energies in the energy sector is regarded as insignificant.

Botswana plans to provide electricity to 70 percent of the population by March 2009 and to the rest of its citizens by 2016.

#### **1.4 Any capacity concerns (power generation and/or transmission/distribution)**

Botswana's national electricity requirements are met through internal generation at Morupule Power Station and imports from neighbouring countries, mainly South Africa (Eskom). Currently, Morupule Power Station, with an installed capacity of 4 x 33MW coal fired, is operated as a base load station. The sent out capacity, per unit, is 29.5MW, giving a total sent out capacity of 118MW. The ratio of internal generation to imports, in terms of energy, is 30% to 70%. Currently, the system maximum demand is 488MW.

BPC is currently expanding the Morupule power station, with 400MW of generation capacity expected to be added by 2012. There is also the potential of a gas-fired station in the Kalahari by 2011. The current energy related investments and related projects should sustain growth in both the supply of electricity and revenues generated.

#### **1.5 Potential for renewable energy, energy efficiency and co-generation (i.e. any authoritative assessments)**

It seems that the main potential sources of renewable energy in Botswana include: solar, biomass especially biofuels (biogas, biodiesel and bio ethanol) and energy efficiency.

Some developments regarding renewable energy were undertaken in the 1980's, encompassing the installation of solar water heaters in housing developments.

Energy efficiency efforts started in 2000, especially in the building sector. As a result, energy efficiency building guidelines have been developed and an energy chapter was incorporated in the national building code. Wind energy applications are at present limited to water pumping with few wind pumps across the country due mainly to low average wind speeds. Wind energy resource mapping, estimation and technologies need to be continuously researched and further developed.

The government is also promoting coal treatment to improve efficiency and to reduce its environmental impact. Energy efficiency and demand side management activities have not been fully exploited in Botswana and yet there is potential in various sectors.

Potential was recognised in the following technologies: compact fluorescent lighting, passive solar design and energy management systems.

## **Section 2: Energy market**

### **2.1 Ownership (state/municipality/private/mixture) of electricity and gas utilities and other sources of energy**

Most electric power is generated thermally in installations run by the Botswana Power Corporation (BPC), a public enterprise established in 1970. BPC's mandate is to generate, transmit, distribute and supply electricity in the country. BPC operates a significant network of transmission and distribution lines to transport electricity from the power station, or point

of import to consumers. The Corporation also acts as the implementation agency of the rural electrification projects on behalf of the Government.

## **2.2 Extent of competition in power generation and energy retail**

Most of the electricity is supplied by Botswana Power Corporation, especially in urban areas. In the remainder of the country diesel generators are estimated to supply over 20 MW of energy to villages, rural schools, hospitals, police stations and prisons. In recent years, and in line with current trends in energy reforms and restructuring, the Botswana Government has made progress towards improved performance in the power sector and attracting private sector investment. In 2007, the government amended the energy supply act to facilitate the participation of IPPs in the electricity sector.

## **2.3 Structure: extent of vertical integration of generation/ transmission/ distribution/ retail.**

BCP is wholly government owned and vertically integrated.

# Section 3: Energy policy framework<sup>2</sup>

## **3.1 Existence of an explicit energy policy framework and key policies or not – what role is envisaged for sustainable energy?**

The National Energy Policy in 1996, which was revised and updated in 2004 is one of the main policy documents. The Botswana Energy Master plan is another important policy and planning document and it has undergone several phases to be transformed into its current status. Below are the two main phases that it has gone through:

- The last decade has seen extensive policy and legislative reforms as well as institutional and planning interventions aimed at promoting sustainable development, reducing environmental degradation, increasing efficiency in natural resource utilisation and reducing poverty, especially in rural areas.
- Introduction of Independent Power Producer (IPP) licence.

The Vision 2016 (1997) is also an important policy document that addresses the development of the energy sector.

## **3.2 Any current energy policy debates/developing legislation – e.g. on security of supply; energy market reform; incentives for renewable energy etc**

One of the main challenges and debates seems to be the implementation of demand side management.

## **3.3 Any specific policies or programmes to promote sustainable energy**

National programmes are in place to facilitate the sustainability of the energy sector including the Rural Electrification Program (REP) and the Rural Collective Scheme (RCS). The government policy aims to electrify 14 villages per annum and to date some 101 villages have

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<sup>2</sup> <http://unbotswana.org.bw/undp/environment1.html>, [http://www.cicenergycorp.com/project/info\\_mmamabula/](http://www.cicenergycorp.com/project/info_mmamabula/),

been electrified. The RCS aims at alleviating the problem of low uptake of electricity connection caused by the high up-front costs. Through the scheme the consumer pays 10% of the connection cost up front and the remaining 90% is repaid over a period of 10 years with interest. The energy strategy proposed a settle market reform, mainly allowing Independent Power Producers (IPPs) participation. Botswana seems to have set out medium and long term objectives in terms of sustainable energy related services. The long term goals include:

- ensure reliable energy supply
- at least cost for the economy
- sustainable use of energy sources
- promote use of locally available energy sources
- reduce reliance on imports of energy
- encourage energy conservation and saving
- diversification of energy sources
- facilitate gender equity
- improve governance in the energy sector
- improve access and affordability of energy related services
- contribute to the achievement of the Botswana's long terms vision (2016), the national development plan, and the Ministry's vision.

There is a plan to increase renewable energy consumption to 1% (of total national energy consumption) by 2016, and to integrate grid and non-grid technologies for rural electrification. There is a renewable energy based rural electrification programme (which focuses on solar PV and clean fuel for rural communities). There is also an objective in terms of Biofuels, which is to contribute to 10% of total petroleum products consumption. In terms of renewable energy, there are also efforts to develop the necessary technologies. A Biomass energy strategy is also being developed and an energy efficiency strategy. An energy audit programme has been launched for the industrial sector. An investment programme for renewable energy is also being developed.

### **3.4 Any major energy network or sustainable energy studies available**

In March 2003, the Government completed a study on options for restructuring the Electricity Supply Industry in the country. The Government's Public Enterprise Evaluation and Privatisation Agency, PEEPA, has undertaken a study to "review the existing policy and regulatory frameworks in the country's infrastructure and energy, water and communications utilities".

### **3.5 Role of government in energy policy – which departments are involved?**

The Department of Energy is responsible for the formulation, direction and coordination of the national energy policy. The Department's portfolio is to direct, co-ordinate, and formulates national energy policy and related issues. It was established in 1984 under the Minister of Minerals, Energy and Water Resources. Its overall objective is to provide, affordable, environmentally friendly and sustainable energy services in order to provide economic and social development.

### **3.6 Any government (or government funded) agencies with a specific role in sustainable energy and/or environmental protection (with an energy role)**

The Botswana Power Corporation (BPC) was established 1970 and it is responsible for the generation, transmission, distribution and supply of electricity for the country. It aims to facilitate sustainable and diversified development of the country by rendering a quality electricity energy service that is efficient, cost effective, safe and environmentally friendly.

### **3.7 Any energy planning procedure in place**

The Botswana Energy Master plan is one of the most important planning documents in the energy sector. The Vision 2016 (1997) outlined the Government's development initiatives and recognised the need to address environmental issues in order to achieve sustainable development. The policy aims at providing a least cost mix of energy supply, which reflects total life cycle costs and externalities, such as environmental damage. The distribution and supply theme is in support of the national vision (vision 2016) and the National Development Plan Nine (NDP 9) objectives.

## **Section 4: Energy regulation**

### **4.1 Is there an energy or utility regulator? When was it established?**

It seems that there is no statutory energy and/or electricity regulator. The government plays a regulatory role through the Energy Affairs Division of the Ministry of Minerals, Energy and Water Affairs by monitoring the BPC monopoly. This has proved very efficient as a means to safeguard the interests of investors and customers. BPC reports to the Ministry and generates, transmits and distributes electricity in Botswana, under the provisions of the Botswana Power Corporation Act. It seems that government approves the tariffs proposed by BPC.

### **4.2 Degree of independence of the regulator from government (legal structure, who appoints the regulator and board)**

The degree of independence can be regarded as limited as the Ministry is the same entity which develop, implement and enforce the legislation, and BPC is an organ of state.

### **4.3 Regulatory framework – legislation, duties, powers (any references to environment, sustainable energy)**

In January 2008, a new piece of legislation aimed at amending the country's Mines and Minerals Act and Electricity Supply Act received approval from the Government of Botswana's Cabinet and passed the third and final Parliamentary reading. In February 2008, these bills became law following Presidential approval and gazetting.

Environmental approvals are a prerequisite for the granting of a mining licence, an Independent Power Producer licence, and surface rights at Mmamabula, as well as the acquisition of transmission line and other necessary servitudes in Botswana.

### **4.4 Role of government departments in energy regulation (both where a regulator exists and where there is no regulator)**

The Ministry of Minerals, Energy and Water Affairs seems to be the prevalent player in the energy sector.

### **4.5 Have any regulatory barriers to sustainable energy been identified and if so what are they?**

Electricity tariffs in Botswana are the highest in the southern African region and its high tariffs have been blamed for the re-location of certain energy-intensive industries to neighbouring countries.