

Investment Incentives for Renewable Energy in Southern Africa: Case study of Zambia

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Executive Summary

Zambia has recently experienced significant growth in consumption of petroleum products. The consumption of diesel has grown by at least 30 per cent, from an average of approximately 350,000 tonnes per day in 2007 to 500,000 tonnes per day in 2010 (ERB, 2010a). This growth is mainly attributed to increased demand from mining. The electricity sector has recovered from the 2009 decline caused by the global economic crisis, as evidenced by the fact that consumption increased by 7 per cent between 2009 and 2010—from 7,279 gigawatt hours (GWh) to 7,789 GWh (ERB, 2010a).

Yet there exists huge potential for the development of renewable energy sources, including solar (thermal and photovoltaic); mini/micro-hydro; biomass (agricultural wastes, forestry waste, industrial/municipal organic wastes, energy crops and products and animal waste); geothermal, and wind.

The private sector has an increasingly important role to play in the exploitation of renewable energy, and Zambia's government offers a range of economic incentives to encourage investment. These include fiscal incentives (tax incentives that include income tax, value-added tax, and customs duty incentives), non-fiscal incentives (risk cost sharing, support of land acquisition, etc.) and a capital-smart subsidy (for projects developed under the Rural Electrification Authority).

Private sector actors in the market have reported that progress in the development of incentives, including the establishment of the Zambia Development Agency, has improved the prospects for projects. In particular, the loan guarantees extended to the Zambia Electricity Supply Corporation Limited (ZESCO) and the negotiated packages of incentives were both considered to be important. While few projects have to date been successfully developed, financed and constructed, there are a number of projects in the development pipeline and reason to be optimistic.

Estimates on the costs of the incentives are generally not available from the government. Without information on cost it is difficult to determine whether the incentives are good value for the citizens of Zambia. Further study in this area should seek to assess the costs and benefits from the use of investment incentives, while encouraging greater transparency regarding their deployment.

1.0 Definitions and Methodology

There is no one agreed definition of “investment incentives.” Thomas (2007) defines them narrowly as “a subsidy given to affect the location of investment,” while UNCTAD (2004) defines them more broadly as incentives intended to attract foreign or domestic investment using: financial incentives (such as grants and loans at concessionary rates); fiscal incentives (such as tax holidays and reduced tax rates); subsidized infrastructure or services; and concessions or exemptions from regulations and standards.

This study follows the broader definition of “investment incentives,” recognizing that the vast majority of renewable energy subsidies cannot just focus on attracting investment to a particular location, but must also provide the financial support that makes such investments viable in the first instance. In this sense, the words “investment incentive” and “subsidy” can be considered interchangeable throughout the report, to the extent that the subsidy in question can be argued to affect investment decisions.

It should be noted, however, that “investment incentives” and “subsidies” do not include measures that are intended to remove existing market distortions that are a barrier to renewable energy. For example, none of the following measures would be considered to qualify as investment incentives: the removal of fossil energy subsidies; regulation intended to remove barriers to renewable energy entering the energy market; or the use of taxation and payments to internalize positive and negative externalities. While such measures are not the focus of this report, they are identified and factored into assessments where relevant.

The main research methods used to collect data for this survey were desk-based research and semi-structured telephone or face-to-face interviews and discussions. The desk research reviewed the available literature concerning the structure and current state of Zambia’s energy sector; the laws and regulations that govern and shape the energy sector, including general measures that impact tax and investment across sectors; and other political, social or economic factors that have a bearing on investment in renewable energy.

Interviews and discussions were held with a number of stakeholders including representatives from the Zambia Electricity Supply Corporation Limited (ZESCO), the Department of Energy—Ministry of Mines, Energy and Water Development; the Office for Promoting Private Power Investment; the Development Bank of Zambia; Copperbelt Energy Corporation (CEC), a company involved in the sale, transmission, distribution of electricity; and Lunsemfwa Hydro Power Company (LHPC), a privately owned Independent Power Producer (IPP).

Interview questions were adapted to respondents and focussed on the collection of views and information relating to the main drivers and barriers for renewable energy development. Interviewees were asked to comment on the variation of national and regional conditions, including those in designated special economic zones. In addition, information was solicited on current plans and debates which might influence conditions in the future.

The study is structured to provide a factual overview of the Zambian energy sector (see Sections 3 [Overview of Zambia’s Energy Sector] and 4 [Investment Incentives for Renewable Energy]) followed by a discussion of the extent to which the existing incentives have addressed barriers to the development of renewable energy projects (see Section 5, Discussion and Analysis). The discussion and conclusion present the perspectives expressed in the desk research, the stakeholder interviews and the author’s own expert judgment.

2.0 Overview of Zambia's Energy Sector

2.1 Current Status

Zambia is a landlocked country situated in Southern Africa covering 732,614 square kilometers. The population has risen rapidly over the last decades to a reported 19.2 million in 2011 (World Bank, 2012), and fertility rates remain among the highest in the region (Central Statistical Office, 2007). The World Bank reports that economic growth has remained high, at 5.7 per cent in 2008 and 6.5 per cent in 2011. Over the same period, inflation has fallen from 12.4 per cent in 2008 to 6.4 per cent in 2011 (World Bank, 2012).

Primary energy in Zambia is derived primarily from biofuels and waste including: wood fuel (firewood and charcoal), mainly consumed by households; electricity from hydropower; and imported petroleum and oil products (International Energy Agency [IEA], 2009). The World Bank (2012) estimated that 99.7 per cent of the country's electricity was generated from hydropower in 2010, with the remainder derived primarily from oil sources. There is also significant potential for development of indigenous renewable energy resources (see Section 3.3.).

The electricity sector showed strong growth of 7 per cent from 2009 to 2010. This growth is attributed by the Energy Regulation Board (ERB) to be partially due to a recovery of the mining sector following a reduction in mining activity due to the global economic crisis in 2009 (ERB, 2010). The mining sector still accounts for nearly half of Zambia's electricity consumption (47 per cent), so the performance of the sector is especially important for electricity demand.

Consumption of petroleum products continues to increase in Zambia; the ERB reports a 6.7 per cent increase in the overall consumption of petroleum products between 2009 and 2010, driven by increases in the use of low-sulphur diesel (24.6 per cent), diesel (8.2 per cent), petrol (5.6 per cent) and kerosene (11.3 per cent). The same period saw declining consumption of some products, including heavy fuel oil (22 per cent), liquefied petroleum gas (11.9 per cent), aviation gas (12.4 per cent) and Jet-A1fuels (1.8 per cent) (ERB, 2010).

2.2 Energy Generation and Transmission

2.2.1 Electricity

Electricity accounts for approximately 10 per cent of the national energy supply, the second-largest contribution after wood fuel (Ministry of Energy and Water Development, 2008). The installed capacity of hydropower generation is 1,760 megawatts (MW) out of an estimated total of 1,860 MW. Non-hydropower generation is mainly fuelled by diesel. A summary of power generation facilities is presented in Table 1.

The majority of generation capacity (1,744 MW) is owned and operated by ZESCO, a state-owned power company. The Copperbelt Energy Corporation (CEC) owns an additional 90 MW and other private producers own a further 38 MW. Not all generation capacity is connected to the national grid; in fact, only the three major ZESCO hydropower projects (Kariba North, Kafue Gorge, and Victoria Falls) and the Mulungushi and Lunsemfwa power stations owned and operated by the Lunsemfwa Hydropower Company (LHPC) are thus connected. All other power stations transmit and distribute power to micro- or mini-grids (Ministry of Energy and Water Development, 2008).

TABLE 1. ELECTRICITY GENERATION PLANTS

	NAME OF SCHEME	INSTALLED CAPACITY (MW)
1	Kafue Gorge Power Station	990
2	Kariba North Bank Power Station	690
3	Victoria Falls Power Station	108
4	Lusiwasi Power Station	12
5	Mulungushi Power Station	28
6	Chishimba Falls Power Station	6
7	Musonda Falls Power Station	5
8	Lukulu Diesel Fuelled Generating Plant	0.5
9	Shangombo Diesel Fuelled Generating Plant	0.64
10	Kaputa Diesel Fuelled Generating Plant	0.6
11	Mwinilunga Diesel Fuelled Generating Plant	1.48
12	Kabompo Diesel Fuelled Generating Plant	0.72
13	Zambezi Diesel Fuelled Generating Plant	1.28
14	Luangwa Diesel Fuelled Generating Plant	1.28

Source: ERB, 2010b.

The transmission infrastructure in Zambia (Figure 1) is owned by ZESCO and Copperbelt Energy Corporation (CEC), a privately owned energy company. The transmission system operates at 330kV, 220kV, 88kV and 66kV. The transmission network includes cross-border connections to Namibia, Malawi and other neighbouring countries (ERB, 2010b).

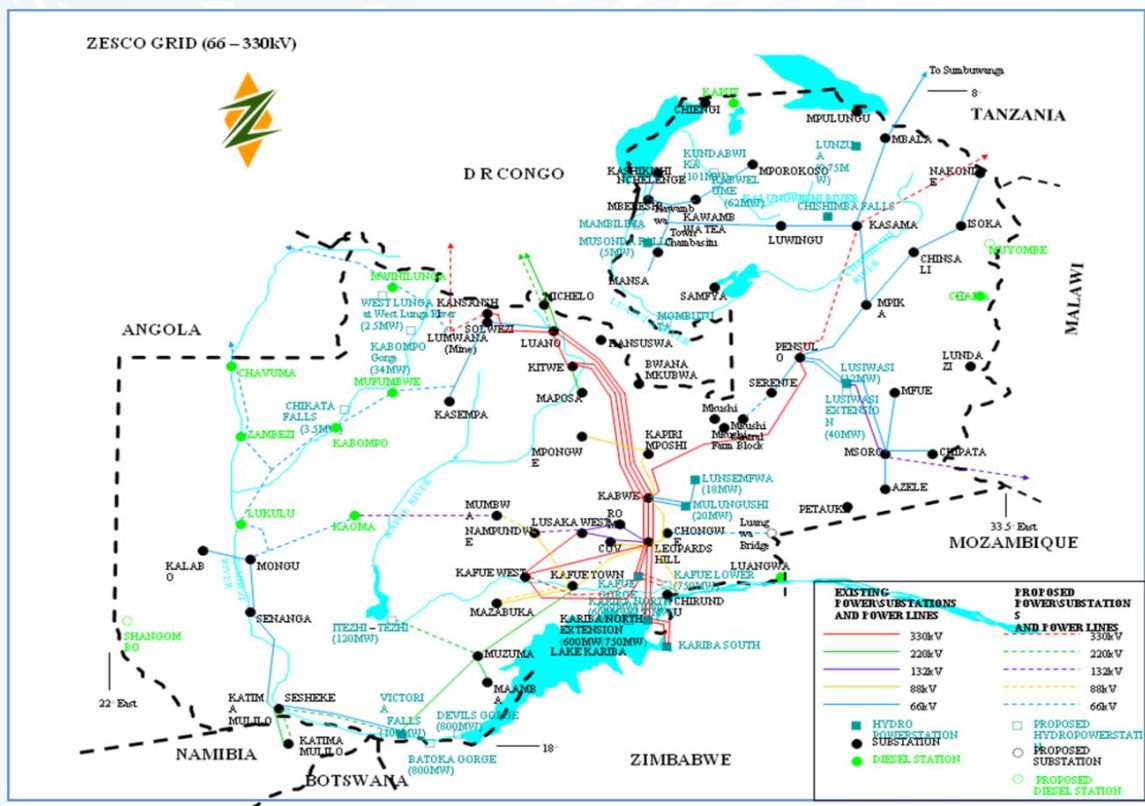


FIGURE 1. ZESCO GRID TRANSMISSION SYSTEM

Source: Ministry of Energy and Water Development, 2008.

2.1.2 Petroleum

All petroleum products are imported to Zambia through a pipeline which runs through Tanzania. The supply chain for petroleum products begins with delivery by tanker to the Tazama tank farm at Kigamboni (Dar es Salaam, Tanzania) via an undersea pipeline. Products are then transported through the 1,710 kilometre TAZAMA pipeline to the INDENI Petroleum Refinery in Ndola, Zambia. The TAZAMA pipeline and associated infrastructure is jointly owned by the Governments of Tanzania and Zambia and is designed to deliver 1.1 million metric tonnes per year (ERB, 2010b).

The INDENI Petroleum Refinery in Ndola is wholly owned by the government of Zambia. The project is a simple hydro skimming refinery with a capacity of 20,000 barrels per day (bpd). The design capacity of the refinery is 1.1 million metric tonnes per annum. In 2010, the refinery processed 583,384.87 metric tonnes, which translates to 56.8 per cent capacity utilization (ERB, 2010b).

Petroleum distribution in Zambia relies on transport by road and rail. Rail distribution costs are estimated to be considerably lower than road, at an estimated cost of US\$83 to convey 1 metric tonne of finished product from Dar es Salaam to Ndola compared to US\$180 for road transportation. However, due to the poor state of rail infrastructure, the ERB report that rail transportation of petroleum products in Zambia was only used by one company (British Petroleum) as of December 2010 due to concerns relating to the performance of rail infrastructure (ERB, 2010b).

3.0 Projected Energy Demand and Key Planned Projects

3.1 Local

National energy demand in Zambia is expected to increase significantly over the coming decades. The Power Sector Development Plan for Zambia projects that, in the base case, energy demand of 8.1 billion kWh (8.1 terawatt hours, or TWh) in fiscal 2007 will increase to 16.6 billion kWh (16.6 TWh) by fiscal 2020 and 21.6 billion kWh (21.6 TWh) in fiscal 2030. These figures indicate an average growth rate of 5.7 per cent per annum up to 2020 and 4.4 per cent up to 2030. These increases continue an established trend for increasing demand, building on a historical rate of growth in the period 1999–2007 of 4.1 per cent per annum (Department of Energy [DoE], 2010).

3.2 Regional

Zambia is a member of the Southern African Power Pool (SAPP), which promotes an increasingly integrated, interconnected electricity transmission network. Current members include Botswana, Democratic Republic of Congo, Lesotho, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe. Installed generation capacity in the SAPP is approximately 55,000 MW (Zambia Development Agency [ZDA], 2011). The largest consumer in the pool is South Africa. Overall energy consumption of the SAPP is growing by 5 per cent per annum and regional demand is likely to reach 80,000 MW per annum by 2015 (ZDA, 2011). Growth rates of electricity demand vary within the region. South Africa has a growth rate of 3 per cent per annum, and Angola has the highest growth rate (11 per cent per annum).

Planned Projects

There has been no additional generation development in Zambia since the 1970s, when the construction of the existing hydropower plants was completed. In recent years, however, practical signs of development have emerged to meet the growth in demand. The government has created an institution called the Office for Promoting Private Power Investment (OPPI) which aims to promote private power investment. Sixteen hydropower projects are currently ongoing: these are listed in Table 2. In addition, the Maamba coal-based thermal plant is also in development.

TABLE 2. STATE OF PROGRESS OF NEW HYDROPOWER DEVELOPMENT PROJECTS

NO.	PROJECT	CAPACITY (MW)	DEVELOPER	PROGRESS		RELATED DOCUMENTS
				PRE-F S	FS	
1	Kariba North Bank Extension	360	ZESCO	✓✓	✓✓	> 2x180 Kariba North Bank Extension Hydropower Station Basic Design Report, 2008 > Kariba North Bank Power Station Extension Final Feasibility Study Report, 2005
2	Mpata Gorge	543	ZRA	✓✓		> Batoka Gorge Hydro Electric Scheme Feasibility Report, 1993
3	Devil's Gorge	500				
4	Batoka Gorge	800				

5	Itezhi Tezhi	120	ZESCO / TATA	✓✓	✓✓	> Feasibility Study for Itezhi Tezhi Hydro Electric Project (2x60MW), 2007
6	Kafue Gorge Lower	750	N.Y.	✓✓	✓	> FS under Preparation by IFC > Site Selection Report for the Kafue Gorge Lower Hydroelectric Project, 2006
7	Lusiwasi Extension	50	ZESCO or Private	✓✓	✓	> FS under preparation by ZESCO > Small Hydropower Stations Rehabilitation and Upgrading Study, 1997
8	Mumbotuta Falls > Site CX	301	n/a	✓✓		> Development of Hydroelectric Power in the Luapula and Northern Areas of Zambia, 2001
9	Mambilima Falls > Site II > Site I	202 124	n/a	✓✓		
10	Kabwelume Falls	62	Lunzua Power Authority (Private)	✓✓		> Under negotiation of Implementation Agreement
11	Kundabwika Falls	101				
12	Mutinondo	40	Power Min (Private)			> Implementation Agreement to be designed in 2009
13	Luchenene	30				
14	Lunsemfwa	55	LHPC (Private)		✓	> FS to be completed by 2010
15	Mkushi	65			✓	
16	Kabompo	34	CEC/TATA	✓✓	✓	> FS ongoing by private > Small Hydropower Pre-Investment Study North-Western Province, 2000

Source: Ministry of Energy and Water Development, 2010.

3.3 Renewable Energy Resource Potential

Zambia's Renewable Energy Strategy defines renewable energy sources to include: solar (thermal and photovoltaic); mini-/micro-hydro; biomass (agricultural waste, forestry waste, industrial/municipal organic wastes, energy crops and products and animal waste); geothermal, and wind (DoE, 2010). While there is increasing interest in applications for renewable energy, the volumes of renewable generation and capacity are not yet significant at a national level. A summary of the resource potential of each technology is given below:

i) Bioenergy

The total land area of Zambia is 70 million hectares, of which 42 million hectares is estimated to be suitable for cultivation. Currently, 14 per cent of suitable land is under cultivation and just 0.25 per cent is currently being cultivated for energy production (DoE, 2010).

Overall biomass resources are estimated to be sufficient to support electricity generation of approximately 500 MW, the majority (447 MW) of which would be fuelled by agricultural waste, a further 46 MW from forest waste and 4 MW from municipal waste. A target of 100 MW of biomass generation capacity has been proposed for 2030.

A small number of plants using biomass to generate electricity are reported to be operational in Zambia. A low-pressure combustion system is employed at Nakambala sugar in Mazabuka. The system uses 400,000 tonnes of bagasse (the fibrous matter that remains after sugarcane or sorghum stalks are crushed to extract their juice) from sugar cane production to produce an average of 17 MW of electricity. A similar technology is practiced at Kafue sugar, but with a smaller output of 3 MW. ZESCO, in conjunction, with the Global Environmental Facility (GEF) also plans to install a 1 MW biomass electricity generation to meet the electricity needs of the Kaputa District (GEF, 2005). This facility will replace 440 KW of installed capacity of diesel power generation.

ii) Hydro

Various studies, including the Rural Electrification Master Plan and the Draft Renewable Energy Strategy (DoE, 2010) have revealed a huge potential for hydropower development. Hydropower resources are estimated to total 6,000 MW, of which 1,760 MW has been developed, including approximately 23.75 MW of mini-hydro projects (United Nations Conference on Trade and Development [UNCTAD], 2011). This increase in capacity is expected to come from a combination of expanding existing systems and constructing new projects.

The bulk of the hydropower capacity is provided by three large grid-connected hydropower projects: Kafue Gorge, Kariba North Bank and Victoria Falls, with smaller contributions from a number of other projects (Table 2). Development is underway on a number of smaller projects, including a 1 MW hydroelectric power plant which was commissioned at Shiwa Ngandu (Hydro World, 2012). According to the Rural Electrification Master Plan, government plans include the establishment of a number of additional off-grid hydro projects including Chavuma (15 MW), Chikata Falls (3.5 MW), West Lunga (2 MW), Mwinilunga (1.5 MW), and Chitokoloki Mission (0.15 MW). Many more projects are being developed by the private sector. Currently, only one privately owned mini-hydro project (Lunsemfwa, 40 MW) is connected to the national grid. There are currently plans to develop Kabompo Gorge (34 MW), West Lunga (3 MW), Kalungwishi (62 MW), among others (Japan International Cooperation Agency [JICA], 2008).

iii) Solar

Solar radiation levels are considered to be high in Zambia. According to the National Energy Policy, the potential energy output per unit area is approximately 5.5kWh/m²/day (Ministry of Energy and Water Development, 2008).

The National Energy Strategy reports that systems have been installed in at least 250 schools and Chief's Palaces and at 400 households under an Energy Service Company pilot project (Ministry of Energy and Water Development, 2008). The Rural Electrification Authority (REA) has a number of initiatives aimed at increasing the use of solar energy. It is currently in the process of developing a 60 kW solar mini-grid to supply a community of approximately 50 households.

iv) Wind

Wind resources are estimated to be low to fair by international standards. Countrywide data available from the Meteorological Department indicate an average wind speed of approximately 2.5 metres per second (m/s) (Ministry of Energy and Water Development, 2008). Wind resources are estimated to be sufficient in a number of areas for water pumping. However, there are some areas with average wind speeds of up to 6 m/s which may be favourable for the development of power generation (United States Agency for International Development [USAID], 2005).

v) Geothermal

Historical surveys have identified over 80 hot and mineralized springs in Zambia. A detailed study by a joint Italian-Zambian venture in the mid-1980s identified five prospective targets in Casho, Chinyunyu, Chongo, Kapisha, and Lubungu. Of these targets, the joint venture selected Kapisha on Lake Tanganyika as the site for a 220 kWh binary geothermal power plant. For various reasons, this plant was never commissioned and the project was passed to ZESCO. A possible rehabilitation program is currently under review. Recently (in 2011), a private sector exploration company began reassessing the geothermal targets and conducting geophysical surveys on those considered to be most prospective for power generation (DoE, 2010).

3.4 Role of the Private Sector

The private sector plays a significant role in a number of electricity sector activities, including the ownership and operation of generation, transmission and distribution facilities. Key private sector electricity sector actors include; Copperbelt Energy Corporation, Lunsemfwa Hydro Power Company (LHPC), Zengamina Power Company Ltd (ZPC), and North Western Energy Corporation (NWECC). The Copperbelt Energy Corporation (CEC) owns and operates high-voltage transmission and distribution systems. CEC supplies electricity to Zambia's mining companies on the Copperbelt, which account for about 40 per cent of the country's consumption. Lunsemfwa Hydro Power Company (LHPC) has an installed capacity of 49 MW comprised of two plants at Mulungushi and Lunsemfwa Power Stations with 31 MW and 18 MW respective capacity. Below are brief descriptions of some selected independent power producers.

(i) Lunsemfwa Company

Lunsemfwa Company is currently the only independent power producer in Zambia with operational hydro capacity. The original Lunsemfwa hydro power scheme was established in 1925 by the British colonial government, primarily to provide power to the zinc and cobalt mine in Kabwe town. After Zambia's independence, the company became a subsidiary of Zambia Consolidated Copper Mines (ZCCM). Lunsemfwa Hydro was later privatized, and a group of Zambians and Eskom of South Africa bought the company. Over time, Eskom sold its shares in the company and until 2011 was 100 per cent Zambia-owned. In 2011, a 51 per cent share of LHPC was sold to SN Power of Norway. The shares were sold as part of the company's expansion program to develop additional hydroelectric power schemes currently (Ministry of Energy and Water Development, 2010).

Lunsemfwa Company intends to expand capacity through the development of the Lunsemfwa/Mkushi River Project. The project is currently negotiating with financial institutions for project finance, including the Development Bank of South Africa (DBSA) and the International Finance Corporation (IFC). The process of seeking an environmental permit for the project with the Energy Regulation Board (ERB) has begun. The project includes a proposal for construction work and upgrades related to the existing substation and transmission infrastructure. ZESCO is expected to be the primary buyer of electricity from the project (ERB, 2010).

(ii) Northwestern Energy Corporation (NWECC)

Northwestern Energy Corporation (NWECC) Ltd is a Zambian company licensed by the Energy Regulation Board (ERB) to engage in the distribution and supply of electricity. It was incorporated in June 2007 and currently supplies power to Lumwana Mining Corporation's (LMC) housing complex. NWECC has a 15-year Bulk Supply Agreement (BSA) with ZESCO which was approved by the ERB in September 2008. NWECC owns distribution equipment (including transformers) to support its retail business. Electricity is purchased from ZESCO, and traded volumes have risen by 37 per cent, from 6.3 GWh in 2009 to 8.6 GWh in 2010 (ERB, 2010).

NWEC provides metering and billing services direct to end users through prepaid meters. The current charges are ZMK 475¹ per kWh (US\$.095 per kWh), which is agreed with the regulator. In the case of the LMC housing complex, the tariff is equal to the employees' utility allowance. NWEC had a total of 368 customers in January 2010, which increased to 745 in December 2010 (ERB, 2010).

(iii) CEC/TATA

A CEC-led consortium with Tata Africa Holdings was awarded the project to undertake a feasibility study and development of the Kabompo Gorge Hydro Power Station. The project area is located between Solwezi and Mwinilunga at Kabompo Gorge on Kabompo River, in the North Western Province of Zambia.

The estimated 34 MW power station project is expected to bring development opportunities to the districts around the project area and will connect into the main Zambian electricity grid through a transmission line to the nearest ZESCO substation at Lumwana. The final feasibility study for the project has been undertaken. A transmission line will be constructed to connect to the national grid at Lumwana. So far the company has submitted the Draft Implementation Agreement to the Office for Promoting Private Power Investment for further discussion. It has also completed the Draft Environmental and Social Impact Assessment that was submitted to the Environmental Council of Zambia in December 2010.

(iv) Zengamina Power Company

Zengamina Power Company Ltd (ZPC) is an off-grid power generation and supply company situated in North Western Province with an installed capacity of 750 kW. The company commenced initial operations in October 2008 with full commercial operations starting in April 2009 (ERB, 2010a).

(v) Lunzua Power Authority

Lunzua Power Authority is a subsidiary company of Olympic Milling Company. Lunzua Power Authority is a project sponsor for the Kalungwishi Project (247 MW over two sites). The company signed an implementation agreement with the government of Zambia in 2011, and has until December, 2012, to mobilize finances, complete environmental and social impact assessments, negotiate power-purchase agreements and sign a contract to build the power station (The Zambian Parliament, 2012). While the primary off-taker of the power is expected to be ZESCO, there is the possibility of supplying the power to the other private companies in Zambia as well as other countries.

3.4.1 Institutional, Industry Structure and Ownership

Institutional Arrangements

The Ministry of Mines, Energy and Water Development is the principal institution with responsibility for energy planning and policy development. ZESCO has been the implementing agency for the government for electrification projects and is responsible for generating, transmission and distribution of power. The Energy Regulation Board (ERB) is responsible for regulating the energy sector according to the Energy Regulation (Amended) Act 2003 (Energy Regulation Board, 2013).

In order to promote investment in hydro generation and transmission line infrastructure development, the Government approved a policy document in 1998 and consequently set up an Office for Promoting Private Power Investment,

¹ Zambian *kwacha*: US\$1 = ZMK 5,370 in April, 2013.

(OPPPi) in the Ministry of Energy and Water Development. The effective implementation of the National Energy Policy is greatly enhanced through the participation of all key stakeholders. The key stakeholders in the energy sector are:

i) Ministry of Mines, Energy and Water Development

As mentioned, the Ministry of Mines, Energy and Water Development is responsible for policy and planning in the energy sector.

ii) Rural Electrification Authority

The Rural Electrification Authority (REA) was established by Act of Parliament No. 20 of 2003. Its primary aim is to provide electricity infrastructure to the whole nation as mandated by government. The Rural Electrification Master Plan (REMP) (JICA, 2008) is the blueprint for executing this program. The REA is mandated with the tasks of administering and managing the Rural Electrification Fund (REF); developing and implementing the REMP; mobilizing funds to support rural electrification; encouraging private sector participation in rural electrification through provision of smart subsidies; competitive bidding and community mobilization; financing project preparation studies for rural electrification; and, recommending suitable policies to government.

iii) ZESCO

ZESCO Limited is the main electricity utility parastatal company registered under the Companies Act. It was established in 1970, and its governance has evolved over time to one defined by an arms-length relationship with government.

iv) Energy Regulation Board

The Energy Regulation Board (ERB) was established under the Energy Regulation Act of 1995 Chapter 436 of the Laws of Zambia following the issuance of Statutory Instrument Number 6 of 1997, the Energy Regulation Act (Commencement Order) of January 27th, 1997. Its role is that of balancing the needs of utilities with the needs of energy consumers. The board is responsible for ensuring that utilities earn a reasonable rate of return on their investments, one that allows the provision of a quality service at an affordable price for the consumer. In order to carry out this role, the ERB, among other functions, ensures that all energy utilities in the sector are licensed, monitors levels and structures of competition, and investigates and remedies consumer complaints.

3.4.2 Industry Structure and Ownership

There are presently five domestic players in the electricity supply industry in Zambia: ZESCO Limited, Copperbelt Energy Corporation (CEC), Lunsemfwa Hydro Power Company (LHPC), North Western Energy Company (NWEC) and Zengamina Power Limited (ZPL). ZESCO Limited is a state-owned, vertically integrated utility involved in the generation, transmission, distribution and supply of electricity throughout the country. CEC is a private company that owns part of the transmission and distribution network in the Copperbelt province. CEC purchases bulk power from ZESCO and supplies this power to the mines in the Copperbelt province. LHPC is an independent power producer (IPP) located in the Central province involved in the generation, distribution and supply of electricity. NWEC is a privately owned utility that is involved in the distribution and supply of electricity to the non-mining areas within and around the Lumwana mine area in the North Western province. ZPL is a privately owned off-grid utility that is involved in the generation, distribution and supply of electricity to the Kalene area in the North-Western province (ERB, 2010b).

The players/operators in the petroleum industry in Zambia are Tanzania–Zambia Mafuta (TAZAMA) Pipelines; Indeni Petroleum Refinery; Ndola Fuel Terminal (NFT); Oil Marketing Companies (OMCs), Transporters; and Dealers (service station operators) (ERB, 2012).

3.5 Key Legislation and Regulation

The National Energy Policy (NEP) of 1994 (revised in 2008) created new legislation aimed at increasing private sector participation and protection of consumer interests. The legislation includes: the Electricity Act (1995) amended in 2003, the Petroleum Act (1995), and the Energy Regulation Act (1995). The current legal framework for energy resource management and development is governed by various Acts of Parliament such as the following:

i) The Zambian Constitution.

ii) The Electricity Act: The amended Electricity Act No. 21 of 2003 is an Act to regulate the generation, transmission, distribution and supply of electricity and to provide for matters connected with or incidental to the foregoing.

iii) The Energy Regulation Act: The amended Energy Regulation Board Act No. 23 of 2003 establishes an Energy Regulation Board and defines its functions and powers; provides for the licensing of undertakings for the production of energy or the production or handling of certain fuels; and repeals the National Energy Council Act and the Zambia Electricity Supply Act.

iv) Petroleum Act: The amended Petroleum Act No. 13 of 1994 regulates the importation, conveyance and storage of petroleum and other inflammable oils and liquids.

v) The Rural Electrification Act: The REA Act No. 20 of 2003 establishes the Rural Electrification Authority and defines its functions; it also establishes the Rural Electrification Fund.

vi) Zambia Development Agency Act: The Zambia Development Agency Act No. 11 of 2006 aims to foster economic growth and development by promoting trade and investment in Zambia through an efficient, effective and coordinated private sector-led economic development strategy; to establish the Zambia Development Agency as a one-stop facility that will ensure, among other matters, client focus, dialogue with the private sector and create confidence in public sector support for business; to provide for the functions and powers of the agency; to attract and facilitate inward and after-care investment; to provide and facilitate support to micro and small business enterprises; to promote exports and globalization; to streamline bureaucratic procedures and requirements faced by investors; to facilitate industrial infrastructure development and local services; to promote greenfield investments through joint ventures and partnerships between local and foreign investors; to promote and encourage education and skills training so as to increase productivity in business enterprises; to encourage measures to increase Zambia's capacity to trade and enable business to participate in a competitive global environment; to ensure that the private sector takes advantage of and benefits from international and regional trade agreements; and to provide for matters connected with or incidental to the foregoing.

4.0 Investment Incentives for Renewable Energy

4.1 Government Management of Investment Incentives Programs

Over the last 10 years Zambia has initiated regulatory reforms and private sector support programs to make the country more conducive to the operations of businesses. To this effect the Zambia Development Agency (ZDA) was established in 2006 by an Act of Parliament. The Agency's mission is to further economic development through the promotion of investments and exports in Zambia. The ZDA assumed the mandates previously carried out by five former statutory bodies (ZDA, 2013). Among its mandated functions, ZDA assists in securing any permission, exemption, authorization, license, bonded status, and land required from state institutions for the establishment of businesses. Companies with ZDA licenses are entitled to tax, non-tax and facilitation of services incentives (UNCTAD, 2011).

In 1994, the National Energy Policy was launched with an objective to increase electricity access, increase the efficiency of the electricity sector and to promote private-sector involvement in the development of hydroelectricity generation schemes. In 1998 a policy document titled Framework and Package of Incentives (FPI) for hydropower generation and transmission development was approved and adopted by Cabinet (OPPPI, 2013). This resulted in the formation of the Office for Promoting Private Power Investment (OPPPI), which started operating in October 1999.

OPPPI was set up to reduce the complexity of procedures, rules and regulations usually associated with obtaining the required approvals, permits and licences for investors in the electricity sector. Its mandate includes solicitation and evaluation of proposals, negotiation and awarding of contracts, and finalization of the implementation agreement, as well as representing the interests of government and co-ordination with other government agencies (ZDA, 2013).

The OPPPI is mandated to evaluate proposals for projects, negotiation of contracts and implementing agreements and to represent the interests of government as a focal point for coordination with other government agencies. The OPPPI also acts to promote private-sector involvement in electricity generation and transmission (OPPPI, 2013).

The duties of the Rural Electrification Authority (REA) (see Section 3.4.1) include administering and managing the Rural Electrification Fund (REF); developing and implementing the REMP; mobilizing funds to support rural electrification; encouraging private-sector participation in rural electrification through provision of smart subsidies; competitive bidding and community mobilization; financing project preparation studies for rural electrification and recommending suitable policies to government (Rural Electrification Authority, 2013).

In 2011, the Zambian government amended the second schedule of the ZDA Act through the issuing of Statutory Instrument No. 15 of 2011. Through this the energy sector was declared as a priority sector, establishing the right of the energy sector to qualify for incentives provided under ZDA. Before this Amendment, only mini hydro power plants qualified for tax concessions, as opposed to major power plant projects (ZDA, 2011).

4.2 Overall Investment Incentive Framework and Landscape

As mentioned earlier, this paper adopts a broad definition of investment incentives based on UNCTAD's, which classifies investment incentives in three categories:

- Financial incentives, such as outright grants and loans at concessionary rates.
- Fiscal incentives such as tax holidays and reduced tax rates.
- Other incentives, including subsidized infrastructure or services, market preferences and regulatory concessions, including exemptions from labour or environmental standards.

Table 3 below provides an overview of the identified investment incentives. In order to provide additional information about the overall classification of the types of investment incentives available, a description of the type of subsidy created by the incentive based on the IISD's typology of subsidies is contained in Annex IV.

TABLE 3. OVERVIEW OF INVESTMENT INCENTIVES FOR RENEWABLE ENERGY IN ZAMBIA

INVESTMENT INCENTIVE TYPE	REGULATION	SCHEME	DESCRIPTION	TYPE OF SUBSIDY
Financial incentives	The REA Act No. 20 of 2003	Rural Electrification Fund	Fund aimed at enhancing development of rural electrification through grants support	Direct target for government spending
		Government-backed loan guarantees	ZESCO is able to obtain loan guarantees from government to support investment	Provision of goods or services below market value
	Statutory Instrument 15 of 2011	Rural Electrification Authority (REA) capital support	Capital support of up to 100% for mini-hydro and mini-grid projects	Government loans and loan guarantees
	FPI, 1998	OPPPI Insurance, indemnification, risk-sharing agreements	Facility to agree to reach agreement over risk sharing with potential projects	Government insurance/ indemnification
	FPI, 1998	Framework and Package of Incentives (FPI) for hydropower generation and transmission development	Overall document outlining investments	Various
Fiscal Incentives		Tax exemption and reduction on dividends	Investment incentives in the form of government revenue foregone is available at differing levels depending on amount invested, qualification as micro or small, and priority sectors.	Tax expenditures
		Tax exemption and reduction on import duty		Exemptions from excise taxes/special taxes
		Tax exemption and reduction in Value Added Tax (VAT)		Tax expenditures
		General Corporate taxes		Tax expenditures
Other incentives: Facilitation services		Technical support in access to government-owned natural resources, land, infrastructure and employment permits	The OPPPI helps developers to obtain permits and agreements; some of this support may result in preferential agreements to access government-owned assets.	Provision of goods or services below market rates
Other incentives: Project-specific incentives		Project-specific incentives	Project-specific incentives are available to be negotiated with the Zambia Development Agency (ZDA).	Various incentives negotiated on a project-by-project basis
Other incentives: Income or price support	FPI, 1998	PPA agreements	Favourable Power Purchase agreements (PPAs) may offer an incentive for generators above the market prices for electricity sales. The OPPPI has a role in negotiating PPAs (CUTS, 2003).	Regulated prices set at above-market rates
		Provision of energy services at below market value	Favourable prices for power consumers may offer an incentive for investment in other industries.	Regulated prices set at below-market rates

Source: UNCTAD, 2004.

4.2.1 Financial Incentives

i) Rural Electrification Fund

The government, through the Rural Electrification Agency, has set up a rural electrification fund aimed at enhancing development of rural electrification. The fund is mainly drawn from a 3 per cent levy on every unit of electricity consumed across all customer categories (See Table 4 for tariff according to customer category). This fund is used for development of rural electrification projects to include grid extension and construction of electricity- generation facilities.

ii) Government-backed loan guarantees

ZESCO obtains loan guarantees from the government for the development of its energy projects; however, this facility is not available to privately owned companies (UNCTAD, 2011).

iii) Rural Electrification Agency Capital support

Under the Rural Electrification Authority (REA), capital support of up to 100 per cent may be made available to a mini-hydro power project or a mini-grid power project using a renewable energy source, depending on the applicable requirements of the source of funds. The aim of the capital support is to reduce the proposed project tariff to promote community access to electricity.

iv) OPPPI Insurance, indemnification, risk-sharing agreements

The Zambian government offers, through OPPPI, risk sharing/allocation between the developer and government. Under the Implementation Agreement between OPPPI and the developer, the former promises to share the cost of risk related to droughts and geological effects. In addition, OPPPI provides support to project developers in the acquisition of water rights, facilitation and technical support in Environmental Impact Assessments.

v) Framework and Package of Incentives (FPI) for hydropower generation and transmission development

Managed by the OPPPI, the FPI for hydropower generation and transmission development includes a range of incentives specifically targets at hydropower projects.

4.2.2 Fiscal Incentives

Fiscal incentives are available according to the sum invested, the sector in which the investment is made and project-specific negotiations with the Zambia Development Agency (ZDA). The Zambia Development Agency classifies investors into five categories:

- Those who invest not less than US\$10 million.
- Those who invest not less than US\$500,000 in a priority sector or Special Multi-Facility Economic Zone (MFEZ).
- Those who invest less than US\$500,000 in a priority sector.
- Those qualifying as micro or small enterprises.
- Those investing any amount into a sector not designated as a priority sector.

Priority sectors/products include: manufacturing of copper products, processed foods and mini hydro power projects amongst others (ZDA, 2012).

i) Dividends

A withholding tax of 15 per cent is generally applied to dividends. A 0 per cent tax rate on dividends is applied for a period of five years from the first declaration of dividends for investors of over US\$10 million or US\$500,000 in a priority sector or MFEZ. Additionally, all investors are exempt from tax on dividends from farming, assembly of motor vehicles, and bicycles.

ii) Import duty

Import duty is charged on specific items and at varying rates between 0 to 40 per cent. Certain goods, including crude oil, medical supplies and fertilizers are exempt from import duty. Investors of over US\$10 million or US\$500,000 in a priority sector or MFEZ are entitled to a 0 per cent import duty on raw materials, capital goods and specialized motor vehicles for five years. Other investors in the agriculture and mining sectors are entitled to 0 per cent import duty on most capital equipment.

iii) Value Added Tax (VAT)

VAT is generally levied at a rate of 16 per cent, with the exception of a number of zero-rated goods or services. Investors of over US\$10 million or US\$500,000 in a priority sector or MFEZ are entitled to deferment of VAT. For additional categories of investors a range of measures are available that reduce the effective rate of VAT.

iv) General corporate tax

The standard rate for corporate tax is 35 per cent, although some exceptions apply. Investors of over US\$10 million or US\$500,000 in a priority sector or MFEZ pay no tax for five years from the first year profits are made; for years six through eight, only 50 per cent of profits are taxable, and for years nine to ten, only 75 per cent of profits are taxable; small or micro investors are exempt from tax for three years in urban areas and five years in rural areas (UNCTAD, 2011).

4.2.3 Other Incentives

Employment permits and facilitation services

The ZDA provides technical support to registered investors for the procurement of services needed for the success of the investment project. Support extends to land acquisition, water, electricity, transport and communication services, immigration processes and the acquisition of licenses (UNCTAD, 2011).

Investors who invest at least US\$250,000 are able to obtain employment permits for up to five expatriates. In addition, investors receive assistance in the acquisition of land utilities, immigration status and licenses.

Project-Specific Incentives

Investors of over US\$10 million are entitled to negotiate directly for additional incentives over and above what may be available under the ZDA Act (UNCTAD, 2011).

Income or Price Support

Income or price support is provided when the price paid is higher than the market rate for the goods or services. In the case of renewable energy projects, the price paid for electricity under the terms of the PPA could be set at a higher level than the market price. As an illustrative example, the PPA price agreed for the Itezhi-Tezhi Hydroelectric Project was reported to be US\$ 0.0851/kWh (African Development Bank Group, 2012) compared with retail tariffs ranging from US\$4.87-7.86/kWh (see Table 4). However, much existing generating capacity may be legacy generation capacity, having already paid back any debt. In this case, a true comparison should be made between the cost of additional renewable energy capacity with the cost of alternative generation capacity.

TABLE 4. CURRENT ZESCO TARIFF ACCORDING TO CUSTOMER CATEGORY

CUSTOMER CATEGORY	TARIFF (US\$ CENTS)
Mining	4.87
Residential	7.86
Large Power	6.76
Small Power	5.91
Commercial	7.13
Services	5.36
Exports	5.30

Source: Department of Energy–Ministry of Mines, Energy and Water Development, 2010.

5.0 Discussion and Analysis

In this section the impact of investment incentives on the renewable energy sector is considered in the context of information available from stakeholder interviews and available literature.

5.1 Stakeholder Impressions

To provide an impression of the performance and impact of investment incentives for renewable energy, a number of stakeholders were consulted through a series of semi-structured interviews. Organizations consulted include: ZESCO; the Department of Energy–Ministry of Mines, Energy and Water Development; the Office for Promoting Private Power Investment; the Development Bank of Zambia; Copperbelt Energy Corporation; and Lunsemfwa Hydro Power Company.

The overall attractiveness of the available incentives proved difficult to assess. According to the Department for Energy, the incentives provided under ZDA are inadequate to incentivize the necessary investments in renewable energy. However, both the Lunsemfwa Hydro Power Company and the Copperbelt Energy Corporation are in the process of negotiating an incentive package with the ZDA and thus were unable to state whether the available incentives were sufficient to enable their respective projects to proceed.

There was some variation of the perceived relative importance of the various types of subsidies available, in part because not all subsidies are available to all groups. ZESCO reported that the main incentive obtained was the provision of government-backed loan guarantees which provide easier access to finance. The availability of this support has enabled progress to be made on projects to upgrade existing hydropower facilities; Lusiwasi Upper (from 12 to 15 MW), Lusiwasi Lower (from 12 to 86 MW), Chishimba (from 6 to 14.8 MW), Musonda (from 5 to 10 MW), Lunzua and (from 0.75 to 15 MW). In addition, the power utility is considering developing the 2 MW Kapisya geothermal plant and a number of photovoltaic (PV) projects.

Project developers reported that the successful conclusion of negotiations on the overall package of incentives—the Investment Promotion and Protection Agreement (IPPA)—at a project-specific level is seen as a key milestone on the development timeline. A signed IPPA spells out the financial support available and allows financial appraisal of the project. A number of projects, including the Lunsemfwa Lower/Mkushi River hydro power project (180–220 MW); the Zengamina Power Company Ltd (ZPC), an off-grid generation project (750 kW); and North Western Energy Corporation (NWEC) were reported to have progressed with IPPAs. Stakeholders indicated that there has recently been increased interest in the development of renewable energy projects due to the additional incentives offered by government.

The capacity of financial institutions to finance renewable energy projects was reported to be improving. The creation of the Development Bank of Zambia (DBZ), a financial institution with a mandate to fund development projects, was seen as significant for the renewable energy sector. Recently, DBZ has been involved as fund manager in the development of Shiwa Ngandu Mini Hydro, Mpata Mini Solar Grid and a biomass electricity generation project. These three projects were funded by the United Nations Industrial Development Organization (UNIDO). DBZ is planning to train its staff in energy project appraisal to prepare the bank to fund energy projects at a concessional low-interest rate aimed at enhancing the development of the energy sector.

Further barriers to the development of successful renewable energy projects were reported to include low electricity demand in project site areas, and higher tariffs resulting from renewable energy projects. Conversely, the tariffs charged by ZESCO were considered to be below cost-recovery levels. This was viewed as hindering investment in the sector.

5.2 Estimates of the Costs and Benefits

It has not been possible to produce estimates for the total cost of the investment incentives identified in this report. The fiscal incentives described are revenue foregone by the government and as such have an associated cost. Similarly, government loan guarantees have liabilities for the government. In addition, market price support may reduce the financial stability of government-owned companies or lead to higher costs for consumers. Overall, the lack of available data on the costs of incentives inhibits the ability of decision-makers and the public to understand the costs of support policies and to form informed opinions as to whether the costs can be justified.

6.0 Conclusion and Recommendations

Zambia's energy sector is gradually moving towards a less vertically integrated electricity sector with a clear ambition to increase generation and involve the private sector in the construction of new facilities. The potential for renewable energy power generation has been promoted with the establishment of targets and the progress of a number of projects, most notably in the area of hydropower. Zambia has steadily established the infrastructure necessary to design and administer a range of investment incentives. Due to a combination of a growing economy and the increased support for energy sector projects, interest in the sector has increased.

The increased interest in investment in the energy sector, especially electricity generation, can be attributed to a number of factors including: a better policy and institutional framework; increasing demand for energy; and investment incentives administered through the Zambia Development Agency (ZDA). Recent amendments to the ZDA Act designating energy as a priority sector have created additional incentives for some investors. Apart from incentives from ZDA, support from the Rural Electrification Authority for electricity generation from renewable energy sources has also played a role in attracting investment in the sector. Additionally, the Office for Promoting Private Power Investment (OPPI) under the Ministry of Mines, Energy and Water Development has been making efforts to attract private investment in generation and transmission projects.

This study found that project developers were engaging with the incentive system and that at least a small number had been able to reach agreement on a package of incentives that would allow projects to proceed. Due to the long lead times of projects, it is difficult to make conclusions on the overall effectiveness of the incentives. Responses from those involved in the sector highlighted a mixed but generally positive opinion of the current measures.

It was not possible to analyze in detail whether the benefits expected through the investment incentives were commensurate with the costs. Additional monitoring of the use and cost of providing these incentives would enable a more open debate on whether the current systems are good value for government and the people of Zambia.

Recommendations

This study provides an exploratory assessment of investment incentives for renewable energy in Zambia. It finds that the government of Zambia is already providing a broad range of incentives to promote investment in this area. This includes a range of financial incentives, fiscal incentives, and market and price-support measures.

Although this study is not able to provide a comprehensive assessment of these incentives, it has been able to identify the following general lessons:

- **Legal clarity:** Although the government has prioritized the energy sector and qualifies projects in the sector for incentives through Statutory Instrument 15 of 2011, more still needs to be done. It was observed that the amended second schedule of the ZDA Act lacks clarity and does not include other forms of renewable energy, since it only refers to mini hydro, thermal, and solar photovoltaic (PV). It is recommended, therefore, that the Act clarify if, and how, it relates to aspects of large hydro projects, biomass combustion and gasification, concentrated solar power, geothermal, biofuels and wind.

- **Transparency and reporting:** There is currently a lack of publicly available information on the characteristics of certain incentives, how much they amount to in practice, and how widely they have been used. The Framework and Package of Incentives (FPI) for hydropower generation and transmission development, is an example. Little information is available on elements of a typical package, and the degree to which the elements of that package are at the discretion of government officials. Better information would make these incentives more accessible to investors and would also aid in determining their effectiveness.
- **Access to finance:** Accessing finance is a common challenge for renewable energy investors. Zambia has made progress, with investors noting the Development Bank of Zambia has been important in improving access to finance. Continued work in building the capacity of financial institutions to deal with renewable energy investors is important. More effort should also be placed in helping project developers apply for financing.

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