

Chapter 8

Rural Household Electrification in Lesotho



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Abstract Despite serious efforts of the Lesotho Government, Lesotho Electricity Company (LEC) and other stakeholders, the level of rural household electrification and affordability are still low. Whereas in 2015 about 72% of urban households were grid-connected, this was only true for 5.5% of rural households. Furthermore, the vast majority of rural households use fuel wood, while electricity use, where available, represents a small share of the domestic energy consumption. The LEC data shows that the average consumption per household has decreased by over 60% between 2001 and 2016 in urban households. This indicates that the bulk of new connections are to the rural poor households. This is plausible given that majority of households perceive electricity and other commercial sources of energy to be more

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expensive than the traditional biomass. Therefore, the paper discusses this existing status quo with regard to rural electrification using data from the major players such as LEC, Rural Electrification Unit and Bureau of Statistics.

Keywords Rural electrification • Affordability • Lesotho

8.1 Introduction

Rural electrification has received a substantial attention from policy-makers, donors and scholars. Its policies, which have been changing overtime, have been initiated strongly by the World Bank on the premise that rural electrification acts as a catalyst for rural development [1]. As a result, countries were encouraged to liberalise their energy markets, introduce transparent forms of regulations and attract private investment. Currently, there are special initiatives by the World Bank with regard to rural electrification in Africa. Firstly, the World Bank helps in addressing issues of serving dispersed rural energy demand and reforming power sectors. These include finding solutions for improving energy access for the excluded population and development of local delivery and financing mechanisms. Secondly, the World Bank facilitates access to cooking fuels through programs emphasising fuel-wood management, stove efficiency, charcoal efficiency and transition to modern fuels. Finally, it assists in policy reforms including opening markets, elimination of price distortions and facilitating entry of competitors in order to improve rural energy issues [2].

Like many other African countries, Lesotho has established rural electrification programmes that aim at bringing electrical power to rural and remote areas. Despite the serious efforts of the Government of Lesotho, Lesotho Electricity Company (LEC) and other stakeholders, the level of households connected to the grid is still low. In 2015, about 72% of the households in urban regions were connected to the grid while the share of households in the rural areas with access to electricity was just 5.5% [3]. Even in regions covered by the grid, not all households are connected to the grid. Furthermore, households connected to the grid are often reluctant to make use of electricity intensively, as evidenced by the declining average household consumption depicted in Fig. 8.1. As a result, a significant share of energy services is still produced by other forms of energy like traditional biomass, paraffin or diesel. Hence, if a significant share of the households connected to the grid uses it for a few purposes only, economies of scale are not fully exploited. This is evidenced by Fig. 8.1 which shows how the LEC customer base has increased by almost a factor of 10 from around 25,000 in 2001/02 to approaching 210,000 in 2016/17 although the average consumption per household decreased by over 60% during the same period (2951–1157 kWh/year). As a consequence, capital invested in the expansion of the power grid is flowing back very slowly. Thus, lacking grid coverage is not the only obstacle to a more comprehensive use of electricity in Lesotho.

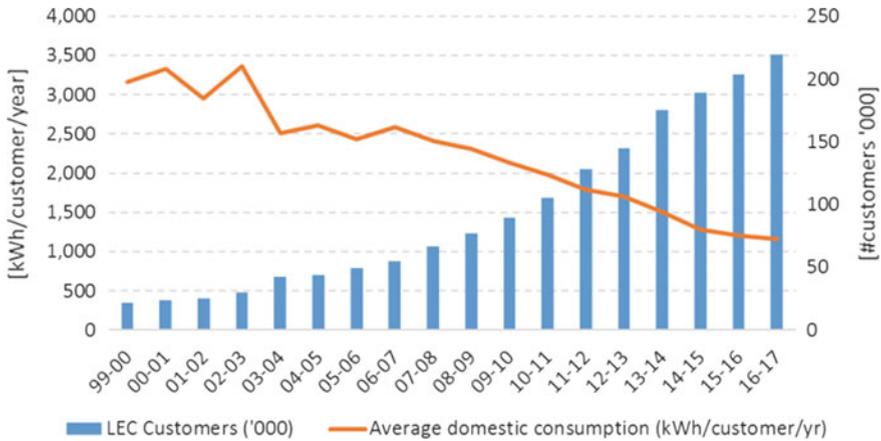


Fig. 8.1 LEC customer numbers and average consumption per domestic customer 2000–2016 [3]

The target of this paper is to discuss the existing status quo with regard to rural electrification using data from the major players such as LEC, Rural Electrification Unit (REU) and Bureau of Statistics (BoS). Whereas, data on the share of electrified households and regions are provided by official statistics, the national power provider and the regulator, solid information about the impediments for grid connection and substituting electricity for traditional energy needs is lacking. The information about these impediments is an essential prerequisite for a successful policy strategy and needs to be addressed by empirical studies.

The remainder of the paper is organized as follows. Section 8.2 includes a brief literature review on the global challenges and success factors of rural electrification. Section 8.3 discusses the status of rural electrification in Lesotho. The last section offers discussions and conclusions.

8.2 The Challenges and Success Factors of Rural Electrification

The major challenges to rural electrification, especially in developing countries, are significantly attributed to the capital costs and limited returns in the short and medium term. The investment for grid extension and off-grid schemes to reach remote and scattered households are often substantially high yet the low electricity consumption level of rural households, along with tariff policies meant to equalise the price of a kilowatt-hour between rural and urban areas, imply limited returns [4]. The World Bank also arguably postulates that the challenge with rural electrification is not necessarily with low electricity consumption but the fact that rural customers often cannot get affordable credit. As a result, this makes it hard for them

to pay the high start-up costs of improving their energy supplies, which also has implications on utility companies' returns on supplying electricity to rural areas [2].

Considering macroeconomic success factors of rural electrification, Mostert emphasises the importance of two key factors—GDP per capita and the share of population living in rural areas [5]. “It seems that once a country passes two thresholds: a national electrification rate above 50% and a per capita income higher than US\$3000 on a purchasing power parity (PPP) basis—it becomes financially feasible to implement a rural electrification program to achieve ‘100% rural electrification’ within a few years” [5, p. 18]. These factors are certainly a challenge for most African countries to meet. Furthermore, Barnes investigated successful approaches of rural electrification in both developing as well as developed countries [6]. The conclusion is that there is not a single successful approach of rural electrification, but a variety of approaches can be successful as long as a high degree of autonomy “—in which the implementing agency can pursue rural electrification as its primary objective,” is given [6, p. 344].

8.3 Current Electrification Situation in Lesotho

To address the rural electrification challenge in Lesotho, there are major interdependent issues that need to be analysed and attended to which include the following: the mountainous terrain; conducive policy environment; and change of attitudes towards cleaner energy. First, Lesotho is a mountainous country with a rough terrain and the altitude varies from 1500 to 3482 m. This geographic situation has impact on the population density and hence on access to electricity services. For example, 56% of the population is concentrated in the lowlands which cover only 17% of the total area [7]. The remaining large area covers mountain and foothills regions which are mainly rural and characterised by scattered settlement patterns. As a result, the terrain is a challenge for national grid electrification and the scattered settlements present low numbers for economic returns on the needed capital infrastructure [8]. For example, the national household electrification rate was around 35% in 2015 with the urban rate estimated at 72% while the rural was 5.5% [3].

Second, the Lesotho Government established the Rural Electrification Unit (REU) in 2004 in order to extend the grid to rural areas not serviced by the national power utility, LEC. The REU is mandated to serve rural areas and other areas which are more than 3.5 km away from the LEC transmission and distribution lines. It normally responds to the requests made through organised village schemes. It has a backlog of electricity schemes seeking services growing at a high rate. For instance, new schemes, 135, registered with the REU in 2016/17 brought the list to a total of 680 schemes. Nevertheless, only 26 schemes were served during that financial year, whereby 6818 new households were electrified at a cost of 109 million Maloti which was financed by the Lesotho Government [9].

Over and above the LEC grid extension projects, REU has implemented three grid extension pilot access projects, owned and operated by it. These are in Qholaqhoe (Butha-Bothe), Mpiti-Sekake (Qacha's Nek) and Dilli-Dilli-Sixondo (Qacha's Nek) which is connected directly to the South African grid line. Since this is a post-payment system, REU has carried out a number of household due to non-payment. In Qholaqhoe, 58 customers (out of 308) have been disconnected which represents a 16% disconnection rate while in Dilli-Dilli-Sixondo, 86 customers out of 371, which represents 23%, were disconnected. On the other hand, the operations and maintenance of all the grid projects continue to run at a loss, as seen in Table 8.1, and the deficit is covered by the government [9].

Lastly, households in Lesotho, especially those that are in rural areas, use biomass (i.e. fuel wood, agricultural residues and dung) predominantly while other intermediate fuels (i.e. coal and kerosene) and modern fuels (i.e. electricity and LPG) represent a small share of the total domestic energy consumption, as depicted in Fig. 8.2. In areas where electricity is available, it is mainly used for lighting, TV and radios rather than for cooking and heating [10]. These occur because majority of households perceive electricity and other cleaner sources of energy such as gas, solar and batteries as more expensive than traditional biomass fuels [11]. Therefore, the perceived affordability of electricity by households, particularly in rural areas, seems to be one of the main barriers to using more of electricity and other cleaner energy sources.

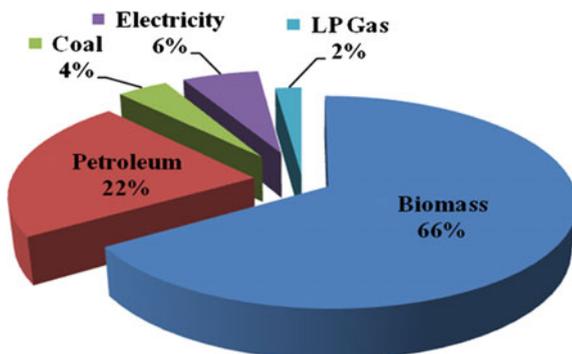
8.4 Discussion and Conclusions

Rural electrification is a complex multi-pronged challenge as it touches on many inter-related issues. In Lesotho, the majority of the population still resides in rural areas where settlements are normally scattered and in geographically difficult to reach places due to the mountainous terrain. This makes it very costly to extend the national grid to such communities with no returns on capital investment as the consumption is bound to be very low due to higher rates of unemployment in rural areas which result in electricity being unaffordable.

Table 8.1 Financial operation of the REU pilot projects [9]

Project	Bulk power purchased (M)	O&M costs	Electricity sales	Deficit (M)
Qholaqhoe/ Makhunoane	379,810.27	60,000.00	186,634.38	-253,175.89
Dilli-Dilli/ Sinxondo	236,361.50	63,600.00	215,412.83	-84,548.67
Mpiti-Sekake	1,032,085.06	96,360.00	877,422.90	-251,002.16
Total	1,648,256.83	219,960.00	1,279,490.11	-588,726.72

Fig. 8.2 Lesotho's energy consumption in 2008 [10]



On average, households connected to the grid do not use electricity in a comprehensive way. As a consequence the average consumption of grid connected households tends to drop and the utility's economic performance deteriorates. This is a general challenge of all developing countries that invest in increasing the rural electrification rate. Demand normally matures slowly (over 2–3 years and even later) as consumers wire their houses, invest in appliances and make a switch from other fuels for lighting, cooking and heating. Unfortunately, this progression is difficult to predict, making returns on investment in grid extension to poor rural people uncertain [6].

One effective solution could be to consider utilisation of Renewable Energy Technologies mini-grids instead of using the funds to extend the national grid. In this manner once the capital infrastructure has been installed, the only costs incurred are those of operations and maintenance that are less significant, which then could translate in low tariffs to the connected rural poor resulting in affordability, hence higher consumption.

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