

Addressing the Electricity Burden on Businesses in Benin

Executive Summary

Image credit: Présidence de la République du Bénin

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In the past two decades, countries in Sub-Saharan Africa (SSA) have experienced considerable increase in the number of people connected to electricity. Between 2000 and 2022, the region doubled access from [25.7% to 51.4%](#). While most research and policy actions have focused on issues relating to electricity access, businesses still face many power-related challenges. Electricity costs, consisting of user tariffs and connection fees, remain higher than in other regions. Analysis by the [World Bank](#) indicates that consumers in many African countries (for instance, US\$0.5/kWh in Liberia) pay more than double the amount paid by consumers in high-income countries like the United States (US\$0.12/kWh) and other emerging markets like India (US\$0.08/kWh). This disparity remains in a similar range for businesses, where Côte d'Ivoire and Cape Verde have an average electricity tariff of [0.233 \\$/kWh and 0.198 \\$/kWh](#), respectively, much higher than those in the United States and India, which stood at 0.151 \$/kWh and 0.129 \$/kWh respectively. Furthermore, consumers in SSA face frequent power outages and voltage fluctuations; [78%](#) of firms in the region report facing regular and lengthy outages, a rate higher than any other region globally, resulting in revenue losses. Consequently, most firms incur additional costs to mitigate these reliability issues and ensure a consistent supply of electricity using power generators,¹ voltage stabilizers, and other alternative sources of power.

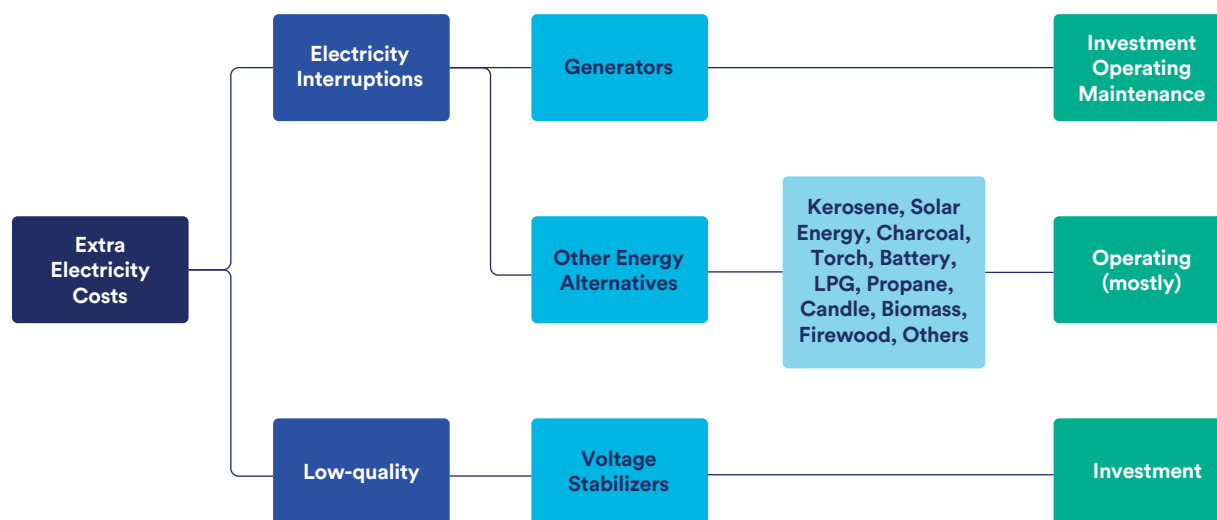
Defensive strategies, while utilized widely by businesses in a context of unreliable power supply, incur additional expenses that are often not captured in most electricity burden assessments. Using Benin as a case study, we propose a new measurement approach to assess the electricity burden that is more comprehensive than existing economic and engineering approaches. This measurement captures the extra costs induced by unreliable electricity, which is more frequent in developing countries. Our findings fill a gap in the literature by quantifying these extra costs and exploring their implications for businesses, highlighting the impact that these additional costs have on overall power affordability. We also offer insights into the broader electricity affordability challenges for businesses in SSA and provide new evidence for more targeted policies to address them.

¹ The [International Finance Corporation](#) reports that over 6.5 million generators are used in SSA comprising over 9% of total electricity in the region and over 40% of power in West Africa.

Research Focus and Methodology

This study utilizes representative business survey data² – including indicators such as electricity supply, economic characteristics of businesses, access to electricity, and usage patterns – collected in 2015 in Benin by the National Institute of Statistics and Demography. The survey included 147 firms in the formal sector and 1,177 businesses in the informal sector, but we restricted our analysis to the 1,002² firms that are connected to the electricity grid. As presented in Figure 1 below, we define *extra costs* as the additional expenses that businesses incur on top of their regular electricity bill, to improve electricity quality through defensive measures that mitigate voltage fluctuations and reduce the negative impact of power outages. We also account for expenses related to alternative energy sources such as kerosene, solar power, torchlights, batteries, liquefied petroleum gas, propane, and candles.

Figure 1: Definition of Extra Costs



This study develops a new framework for evaluating the electricity burden among businesses. In particular, the study establishes three distinct metrics to assess the financial strain related to electricity:

1. **Metric EB1:** We adapt the threshold commonly used for households' energy poverty assessments whereby consumers spending more than 10% of their income on electricity are considered energy poor. For this modified metric, a firm is considered to be facing an electricity burden if its electricity bill exceeds 10% of its revenue.
2. **Metric EB2:** This metric addresses the shortcoming of EB1 by incorporating *extra costs* resulting from measures firms take to mitigate power outages or voltage fluctuations (i.e., generators, voltage stabilizers, etc.) which are frequent in developing countries. Any business with total electricity-related expenses (bills plus *extra costs*) exceeding 10% of its revenue is classified as facing an electricity burden under EB2.

² We exclude any measures taken by businesses that were not initially connected to the grid, as they do not encounter unreliable electricity supply.

3. **Metric EB3:** This measure identifies businesses driven into an electricity burden solely by defensive costs. This group includes businesses that would not be classified as burdened under EB1 but are burdened under EB2 due to additional expenses. The metric categorizes businesses into those that are driven into the electricity burden situation by extra costs, those facing an electricity burden already under EB1, and those not burdened even after accounting for extra costs.

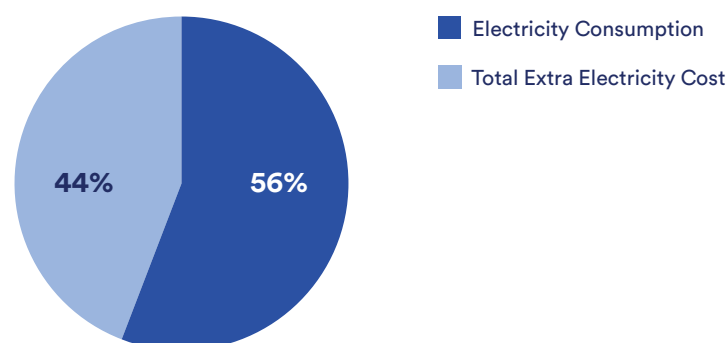
We utilize econometric analysis to assess a variety of factors influencing electricity burden status, such as economic characteristics (e.g., business size and equipment value), power supply characteristics (e.g., outage frequency and duration), and defensive strategies (e.g., generator use). This approach allows for a comprehensive view of the drivers of electricity burden under different scenarios and validates our findings with robustness checks across alternative metrics and regression models. For example, some high energy-intensive businesses, such as manufacturing and industrial processes, may have factored in high electricity consumption into their business model and should not be classified as facing an electricity burden based on the 10% threshold. Also, there is no measure commonly used to assess an electricity burden for businesses. To address this case, we (i) used 15% and 20% thresholds, (ii) controlled for the business type, distinguishing between manufacturing and service firms, and (iii) used quantile regressions with the ratios of electricity expenses (i.e., with or without additional costs) to the total revenue of businesses, to check our results for consistency.

Key Findings

1. *Extra costs represent a significant burden on firms but are not created equally.*

We find that 22% and 21% of businesses have invested in (and use) voltage stabilizers and power generators, respectively. However, there is a substantial difference in investment costs between the two defensive measures, with businesses allocating a much larger share of their investment budget for *extra costs*, 74%, to power generators, compared to 26% for voltage stabilizers. This is likely due to the substantially higher cost of acquiring and operating a power generator relative to a voltage stabilizer. Importantly, when we compare these *extra costs* to the total electricity expenditure, they represent a staggering 44%, meaning firms connected to the grid, on average, spend over a third of their total electricity expenditure on defensive measures (See Figure 2).

Figure 2: Distribution of Extra Electricity Costs and Electricity Bill (%)



2. The portion of electricity-burdened firms is undercounted when *extra costs* are excluded from the analysis.

Using Metric EB1, which focuses solely on electricity bills, shows that more than half of businesses (i.e., 55%) are burdened by the cost of power. When we factor in Metric EB2 for the *extra costs* incurred when firms adopt defensive strategies, an additional 5% of the firms are driven into an electricity burden situation (See Table 1).

Table 1: Distribution of the electricity burden status

Only electricity bill	Only electricity bill		
	Not facing electricity burden	Facing an electricity burden	Total
Not facing electricity burden	40%	5%	45%
Facing an electricity burden	0%	55%	55%
Total	40%	60%	100%

3. Vulnerability to the electricity burden situation varies depending on business type and characteristics.

Informal sector businesses, enterprises with higher-value equipment, and those managed directly by their owners or an uneducated or older managers, are more susceptible to electricity burden. In addition, businesses experiencing more frequent power blackouts and particularly at midday, firms facing voltage fluctuations, and those informed in advance about blackouts, also show a greater likelihood of facing a financial strain due to electricity costs. A similar pattern is observed for enterprises paying higher extra fees for power connection, and those utilizing power generators and voltage stabilizers.

Policy Recommendation

1. Include and address extra costs in policy design.

Conventional measures of electricity burden that focus solely on the electricity bill understate the total cost of power borne by firms. The study highlights the need for policymakers to fully account for defensive costs, which represent a significant share of the total electricity cost, as part of the electricity burden assessment. Inclusion of these costs leads to more accurate identification of financially burdened firms and enables policymakers to design strategies that address the full scope of electricity-related expenses. In Benin and other parts of SSA, such an inclusive approach would ensure the implementation of measures that effectively target affected firms, especially those in informal sectors, and enable more rapid economic development.

2. Prioritize power infrastructure and supply improvements.

Long-term solutions should focus on improving the affordability and reliability of grid electricity. For many firms, this will be more cost-effective and sustainable than relying on ad-hoc defensive measures. However, where budget constraints exist, governments might initially concentrate on strengthening infrastructure for high-impact areas. This could involve enhancing supply stability in urban and industrial regions where production-intensive businesses are located, potentially reducing the demand for defensive strategies.

3. Create targeted financial support and incentives for vulnerable businesses.

Our analysis shows that firms with specified characteristics (e.g., informal sector, home-based businesses, and enterprises managed directly by their owners or an uneducated or older managers) face heightened financial pressures from electricity costs. Policymakers should consider these characteristics in designing targeted economic incentives or support programs.

Conclusion

Unreliable and expensive electricity remains a major barrier to business viability in SSA. This study incorporates defensive strategy costs into the assessment of the total electricity burden borne by firms to paint a more complete picture of the challenges they face. The study emphasizes the need to expand power-related policies beyond electricity access and to focus on reliability and affordability challenges. Recognizing and fully accounting for all the extra costs firms expend for defensive strategies is essential if we are to design effective interventions and support mechanisms. Our analysis also highlights how effective policies ought to be sector-specific and targeted according to the type and size of the business in question.