# Impacts of switching to prepaid electricity


Photo credit: civair.co.za

## The revenue recovery challenge

**Electricity access in Sub-Saharan Africa**. Electrification rates are generally low in Sub-Saharan Africa (SSA). Expanding access is often seen as key to economic growth. However, with new electricity connections come new challenges.

**Prepaid metering: A possible solution?** Poor households may struggle to pay monthly bills. Disconnections for failure to pay are costly and may be politically infeasible. By reframing electricity as a commodity, prepaid electricity meters require that households pay in advance for the electricity they consume.

Other countries in SSA look to South Africa, which underwent a period of rapid electrification in the 1990s, for ideas on how to successfully expand the grid. South Africa has over two decades of experience with prepaid electricity and is widely seen as the global leader in prepaid electricity innovation.

**New evidence on customer responses**. The findings presented here represent the first evidence on how customers and revenue respond to prepaid metering. Researchers worked with officials in the City of Cape Town to design and implement the study.

## Study partners

- City of Cape Town
- J-PAL Africa
- J-PAL Urban Services Initiative
- IGC Energy Programme

## Study Overview

### Research questions

- How does monthly electricity use respond to prepaid metering?
- How do adjustments in consumption affect revenue?
- Which types of customers adjust their consumption when switched to prepaid metering? Why?

### Study design

Setting: Mitchells Plain, Cape Town – a low to middle income neighborhood of around 50,000 customers.

Sample: Around 2,300 residential customers initially on postpaid billing.

Intervention: Customers assigned to switch from postpaid billing to prepaid metering between November 2014 and February 2015.

### Results

Switching households to prepaid electricity:

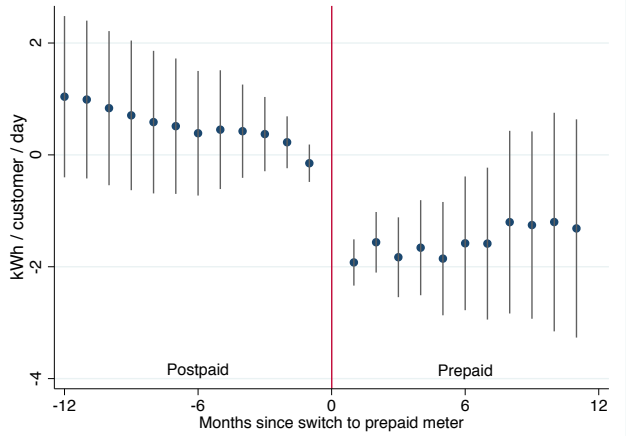
- Reduces electricity use by 11 percent or 1.3kWh per customer per day, on average.
- Improves revenue recovery for the utility, especially for households with late payment of their monthly bills.
- Lowers the cost of revenue recovery with a positive return on investment for the average customer in the study.

*Note: Findings will be updated with further analysis and additional results.*

# Main findings

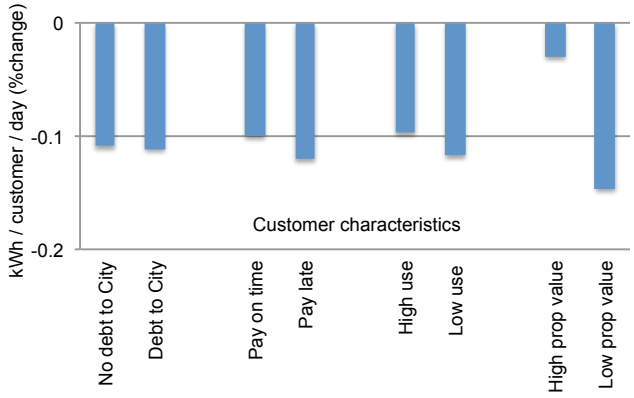
**Customers reduce electricity use by about 1.3 kWh per day**, or around 11 percent, relative to their average use of around 16 kWh / day on postpaid monthly billing. The reduction is fairly stable over time for the first year after the change to prepaid, as shown in Figure 1.

Figure 1: Switching to prepaid electricity decreases use.



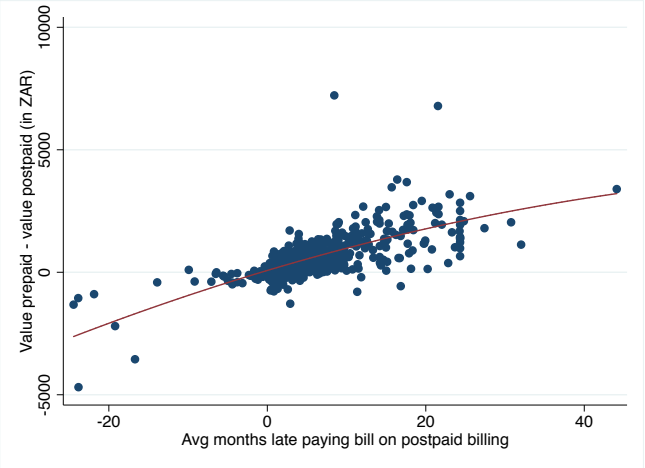

**Poorer consumers who use less electricity cut back more as a proportion of their consumption, following the switch to prepaid.** Figure 2 shows the percent change in average daily kWh per month for different types of customers. The biggest difference is by property value: low property value (poorer) customers respond the most, but they also use relatively little electricity to begin with, so their reduction translates into fewer kWh saved.

Figure 2: Changes in use by customer type.




To compare the benefits and costs of changing customers from postpaid billing to prepaid metering, we look at how the changes in consumption and late payments affect revenue. We calculate the value in today's terms – the Net Present Value – over a 5 year period, assuming that both revenue recovery systems are in place.

Figure 3: Revenue gains come from delinquent customers




As shown in Figure 3, the revenue gain in South African Rand from the switch to prepaid metering is increasing in how late the customer typically paid their monthly bill. Each dot represents a customer in the program.

**Switching customers from postpaid billing to prepaid metering increases profits for the City of Cape Town.** In other settings, the size of the increase will depend on consumption, tariffs, bill payment and the recurring costs of generating bills or maintaining the prepaid vending system.

## Methods Overview: Randomised Controlled Trials (RCTs)

An RCT is a type of impact evaluation that uses random assignment to allocate resources, run programs, or apply policies as part of the study design. Like all impact evaluations, the main purpose of an RCT is to determine whether a program has an impact, and more specifically, to quantify how large that impact is. Impact evaluations measure program effectiveness typically by comparing outcomes of those (individuals, communities, schools, etc.) who received the program against those who did not.

There are many methods of doing this, but RCTs are generally considered the most rigorous and, all else equal, produce the most accurate results.

For more information about the study or RCTs, contact the researchers or J-PAL Africa:

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