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## Impact of Self-Generation on Willingness to Pay

Electricity systems across many developing countries face tariffs set below cost recovery, typically due to social and political pressures. Utilities are often stuck, because the energy infrastructure in most frontier markets is insufficient or decrepit, and non-cost-reflective tariffs mean these utilities are chronically low on cash-flow and usually unable to attract significant private investment.

Tariff reform is usually seen as a crucial step toward making the electricity system sustainable and luring capital for further enhancements to boost quality and reliability. Yet setting optimal tariffs requires understanding consumers' willingness to pay (WTP), which to some extent serves as a measure of affordability. Self-generation of electricity has remained the most popular alternative to poor reliability in grid supply in Africa. Understanding WTP for self-generation is thus important to understanding the value consumers place on improved service delivery and demand for service improvement.

### Expensive self-generation is prevalent in Nigeria

- Approximately one in every three Nigerian homes has a diesel or petrol-powered generator<sup>1</sup> and spend between US\$0.27–0.41/kWh on self-generation.<sup>2</sup> This is far more than the current industry average tariff of \$0.09 and the latest average cost reflective tariff of US\$0.15 recently determined by the country's electricity regulator.
- Despite the expensive cost, there is more self-generation capacity (~14 GW) in Nigeria than utility-scale generation (~13 GW).
- Self-generation is expected to rise: import bills of diesel/petrol power generators in 2011 already represented a quarter of the sales value of the publicly provided electricity in the same year. This is expected to double by 2020.

### To what extent might self-generation impact Willingness to Pay?

- Self-generation results in higher WTP for grid supply reliability. Whereas an average household without self-generation would be willing to pay US\$0.14/kWh, households engaging in self-generation expressed willingness to pay US\$0.16 per kWh of improved reliability. This implies that a typical household engaging in self-generation would pay 14.3% more than a household without self-generation.
- An average household spends US\$0.34/kWh on self-generation, indicating that the WTP to pay could be higher if reliability improves.
- The WTP is influenced by both the cost of fuel and the overall cost of generation. An increase of US\$0.06 in the cost of fuel utilised per-hour for in-house generation translates to a WTP about US\$0.32 extra on top of the monthly bill.

Table 1: Self-generation and Willingness to Pay<sup>2</sup>

	WTP on top of monthly bill (US\$)	WTP per kWh (US\$)	Average Self-generation cost (US\$)
<b>Average Household</b>	6.82	0.15	-
<b>Self-generation households</b>	7.44	0.16	0.34
<b>Households without self-generation</b>	6.02	0.14	-

## Policy Implications

- Implementing more cost-reflective tariffs that are informed by true WTP, that will allow for new investments.
- Price subsidies targeted *only* at low-income and vulnerable groups, with more cost-reflective prices for those that have shown they will pay it.
- Developing blended tariffs based on location, income, and reliability, so there is a direct connection to WTP and quality of delivered service.
- Implementation of rising block tariffs, where prices are differentiated over a set block of units such that the first block unit is priced lower compared to the subsequent consumption block(s).

## Endnotes

1. National Bureau of Statistics (NBS). (2016). LSMS – Integrated Surveys on Agriculture: General Household Survey Panel 2015/16. Abuja, Nigeria.
2. Oseni, M. O. (2017). Self-Generation and Households' Willingness to Pay for Reliable Electricity Service in Nigeria. *The Energy Journal*, Vol. 38, No. 4, p. 165–194.