In May 2012, Kenyan newspapers reported that “73% of the population in the rural areas [now had] access to electricity,” with “access” defined as living within 1.2km of a low-voltage line.

The Problem

Opportunity for “Last Mile” connections?
Field experiment

In September 2013, we partnered with Kenya’s Rural Electrification Authority (REA) to identify a sample of 150 rural “transformer communities” in Western Kenya.

We followed a selection procedure to ensure that our sample is representative of “under grid” communities in rural Busia and Siaya counties.
Example of a “transformer community”

Legend
① Transformer & 600 meter radius
- Households (scaled by household size)
- Businesses
- Public facilities (e.g. schools, health)
- Electrified households
- Electrified businesses
- Electrified public facilities
Despite large investments in the rural grid, electrification rates remain low.
Half of the unconnected households in the study are “under grid.”
**Experimental design**

**Census sample**
- 150 “transformer communities” in Western Kenya in partnership with REA
- Geo-tagged universe of 12,001 unconnected HHs within 600 meters of a transformer

**Study sample**
- Randomly sampled 2,289 unconnected and 215 connected households across all 150 communities for main sample

**High subsidy**
*Price: $0*
- 25 communities
- 380 unconnected households

**Medium subsidy**
*Price: $171*
- 25 communities
- 379 unconnected households

**Low subsidy**
*Price: $284*
- 25 communities
- 380 unconnected households

**Control group**
*Price: $398*
- 75 communities
- 1150 unconnected households
Key Finding 1

1. What is the demand for grid connections?
Q1. Would you be willing to pay [AMOUNT] KSh for an electricity connection?
Q2. Imagine that you were offered an electricity connection at this price today, and you were given 6 weeks to complete the payment. Would you accept the offer?
What is the take up rate at Ksh 15,000?

A. 10%
B. 20%
C. 30%
D. 40%
E. 50%
What is the take up rate at Ksh 25,000?

A. 10%
B. 20%
C. 30%
D. 40%
E. 50%
Stated willingness to pay results

Panel A

Connection price (USD) vs Take-up (%) for Experiment, WTP, and WTP (6 wks).
1. What is the demand for grid connections?

Demand declines rapidly with price and is lower than expected by policymakers (or us).

2. Are there economies of scale in mass connections?
Figure A9—Example of a REA design drawing in a high subsidy treatment community

Notes: After receiving payment, REA designers visited each treatment community to design the local low-voltage network. The designs were then used to estimate the required materials and determine a budgeted estimates of the total construction cost. Materials (e.g. poles, electricity line, service cables) represented 65.9 percent of total installation costs. The community in this example is the same as that shown in Figure 2.
The above figures plot budgeted estimates of the average total cost (ATC) per connection per various levels of community coverage (i.e., electrification) for both sample and design communities.
1. What is the demand for grid connections?

Demand declines rapidly with price and is lower than expected by policymakers (or us).

2. Are there economies of scale in mass connections?

Using actual electrical utility cost data, strong evidence for declining average costs in the range of coverage in the sample (0-40%), up to 100% coverage in communities with designs.

3. What are the welfare implications of a mass household electrification program?
Free mass electrification case

Panel B

→ Total Cost 4.5x Consumer Surplus
→ Need welfare gains of $511 per household
1. What is the demand for grid connections?

Demand declines rapidly with price and is lower than expected by policymakers (or us).

2. Are there economies of scale in mass connections?

Using actual electrical utility cost data, strong evidence for declining average costs in the range of coverage in the sample (0-40%), up to 100% coverage in communities with designs.

3. What are the implications of a mass household electrification program?

The price that a consumer is willing to pay for an electricity connection is far less than the actual cost of connecting that consumer.
### Comprehensive socio-economic impacts of electrification

**Outcomes of interest:**

<table>
<thead>
<tr>
<th>A.</th>
<th>Children’s education</th>
<th>G.</th>
<th>Household roster</th>
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<td>B.</td>
<td>Health</td>
<td>H.</td>
<td>Land and agriculture</td>
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<td>C.</td>
<td>Political awareness</td>
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<td>D.</td>
<td>Social cohesion</td>
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<td>Markets</td>
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<td>E.</td>
<td>Household assets</td>
<td>K.</td>
<td>Time use</td>
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<td>F.</td>
<td>Employment</td>
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Thank you

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