

**Can mini-grids be an incremental
step towards a grid connection?
Is this one pathway to scaling up?**

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A BOP consumer viewpoint

- Ability to access elec in small/large amounts
- Allow for growth in consumption
- Pay only for the amount used, low upfront cost and NO monthly fixed costs
- BUT WILLING TO PAY HIGH PRICE per kWh
- ESCO: prepay/ring-fenced, cannot pay inside wire
- Compatible with standard appliance voltage
- Community/utility: grid should not be a threat.

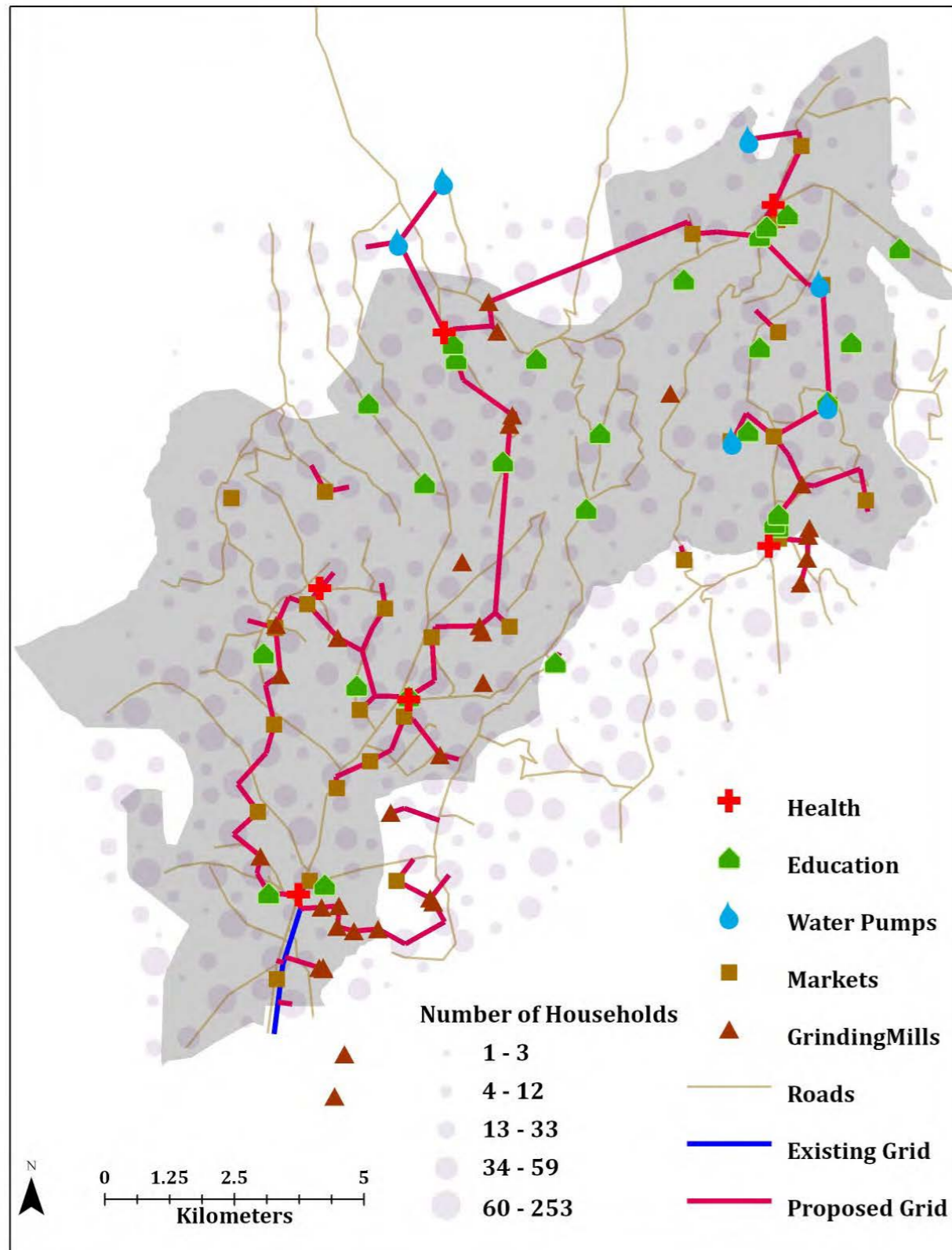
Grid, mini-grid, off-grid, portables all co-exist and **evolve**

RESULTS

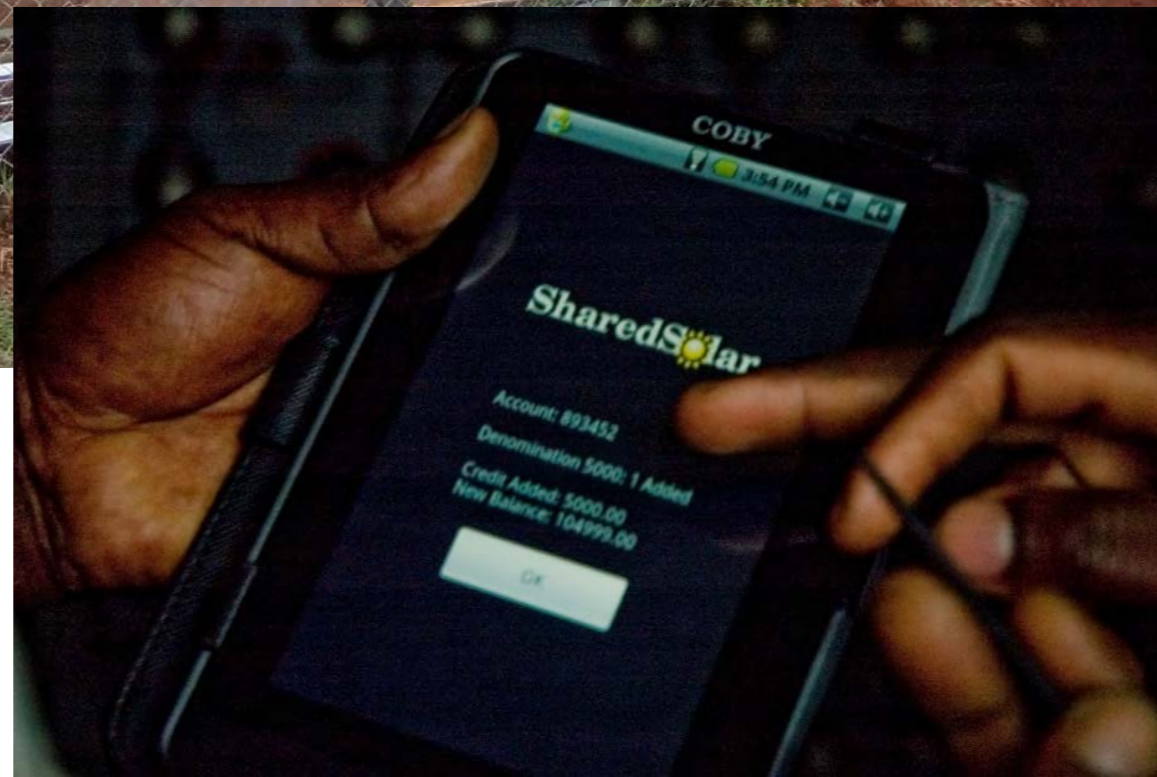
LEAST-COST ANALYSIS

Grid supply cost effective for nearly all non-household loads except some schools

Households don't drive grid but are co-incident beneficiaries

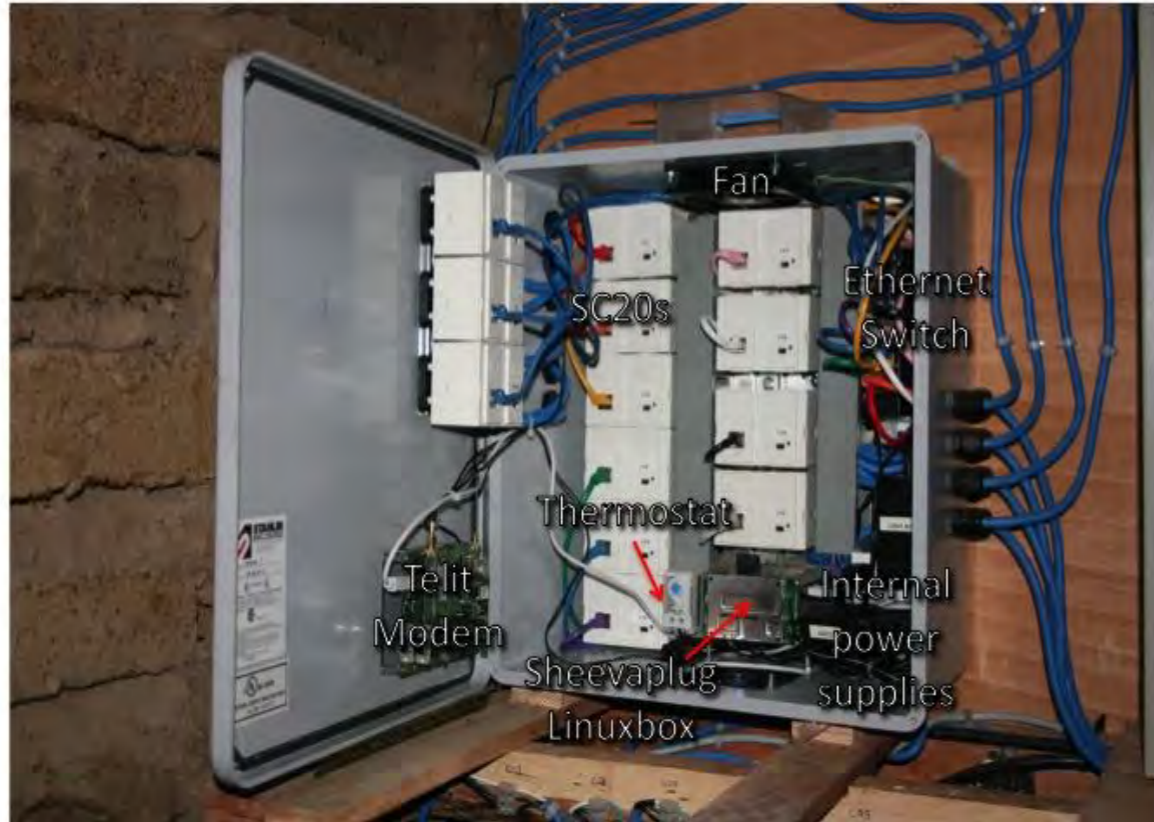


Modularity with growth in demand



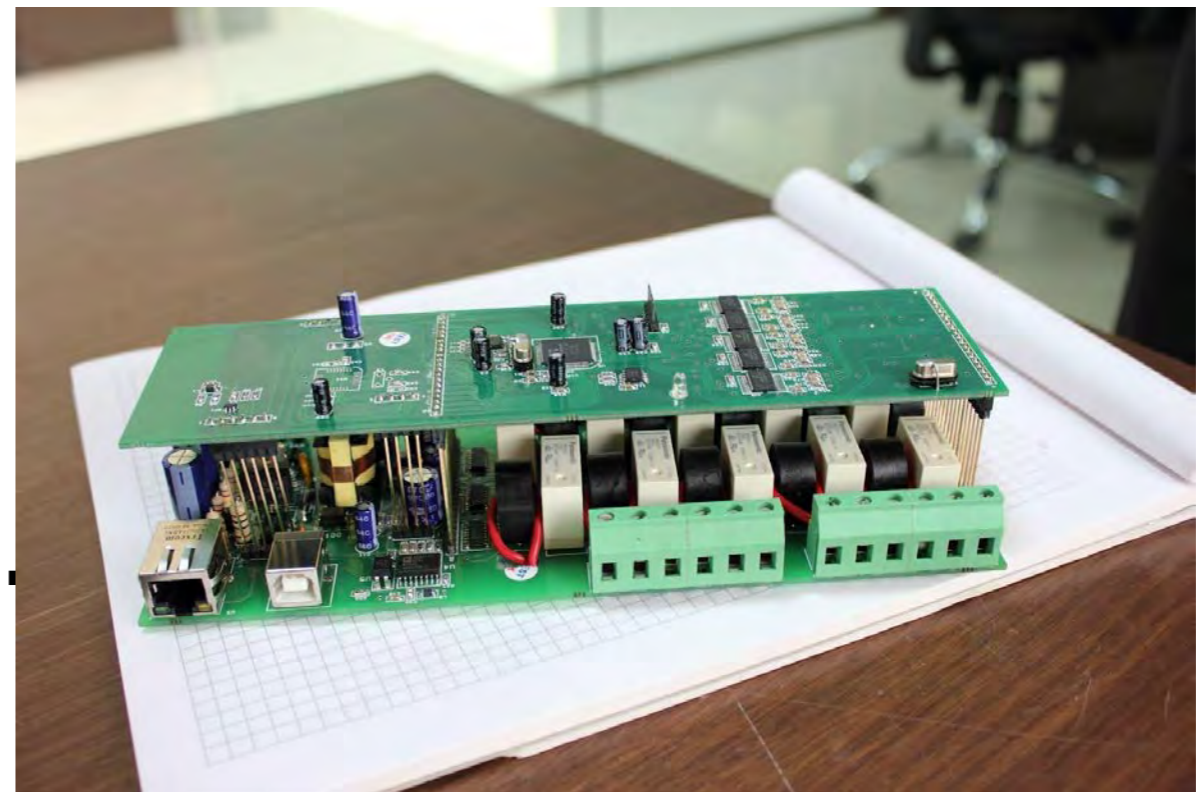
Lowering cost of smart-metering and management

Meter Enclosure



**Version 1: lab,
briefcase, \$200**

Version 2: \$80/cust

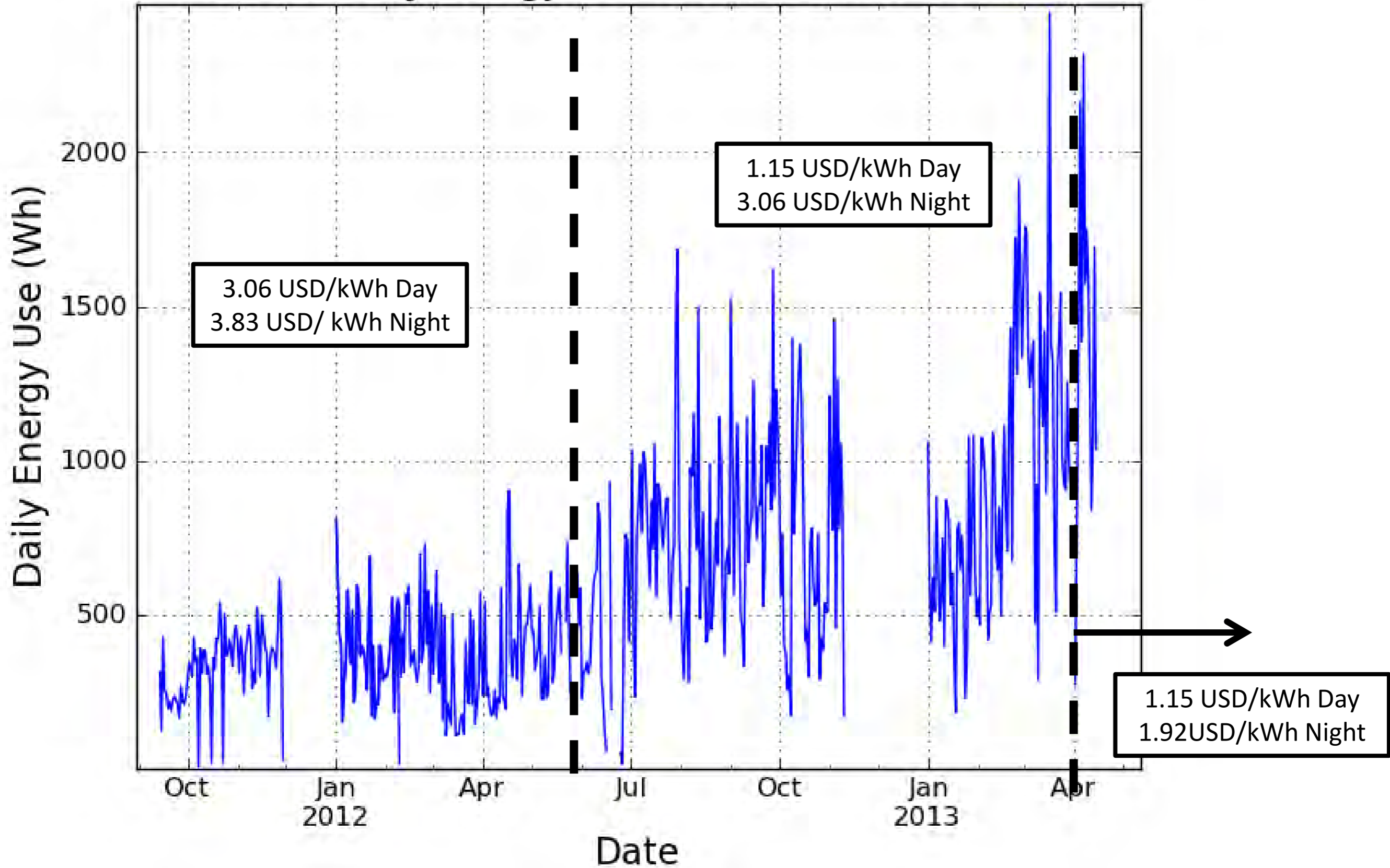


Version 3: \$40/customer (integrated)

Efficient appliance ownership

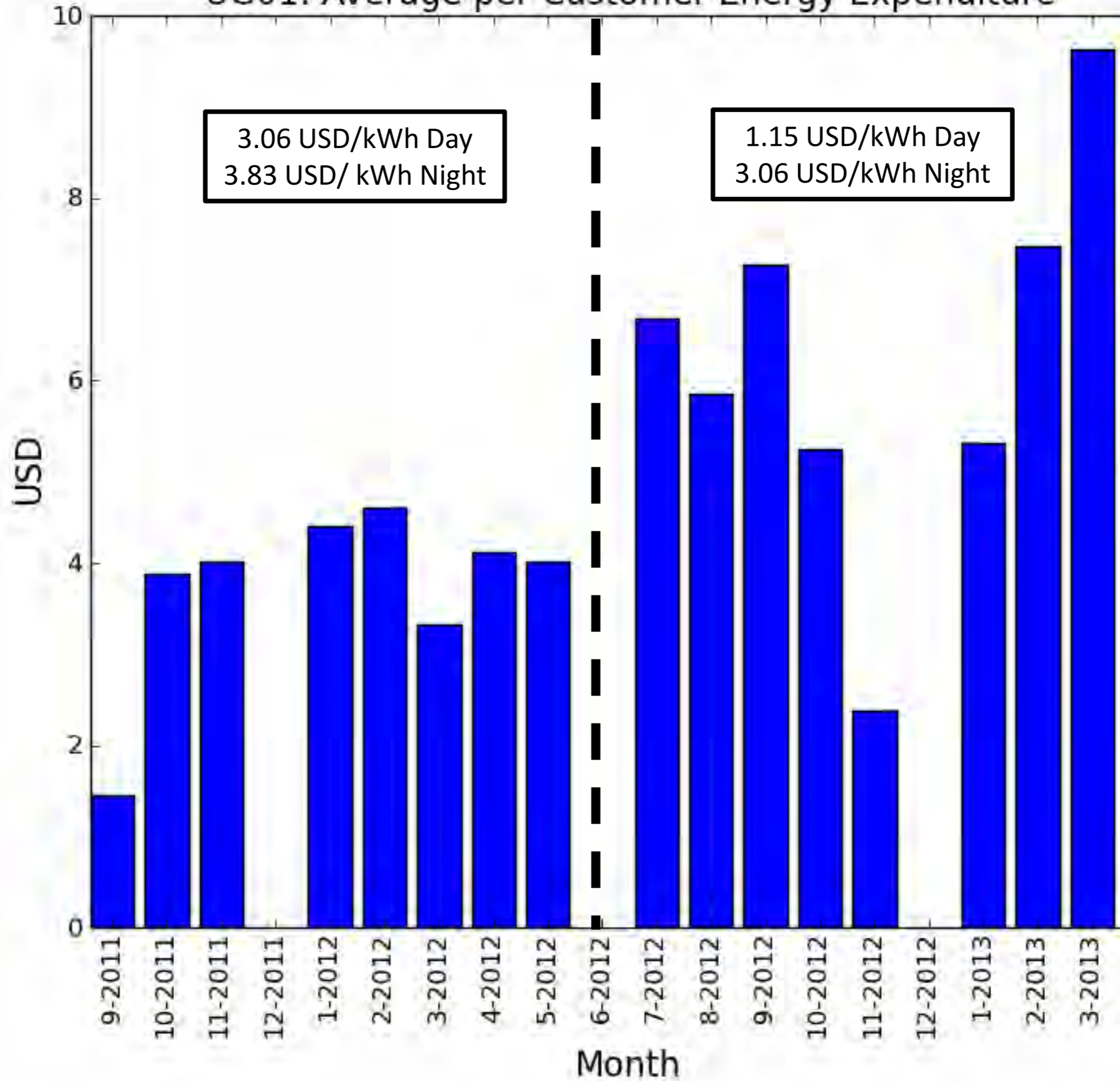


UG01: Daily Energy Use in Wh (Sum of Circuits)

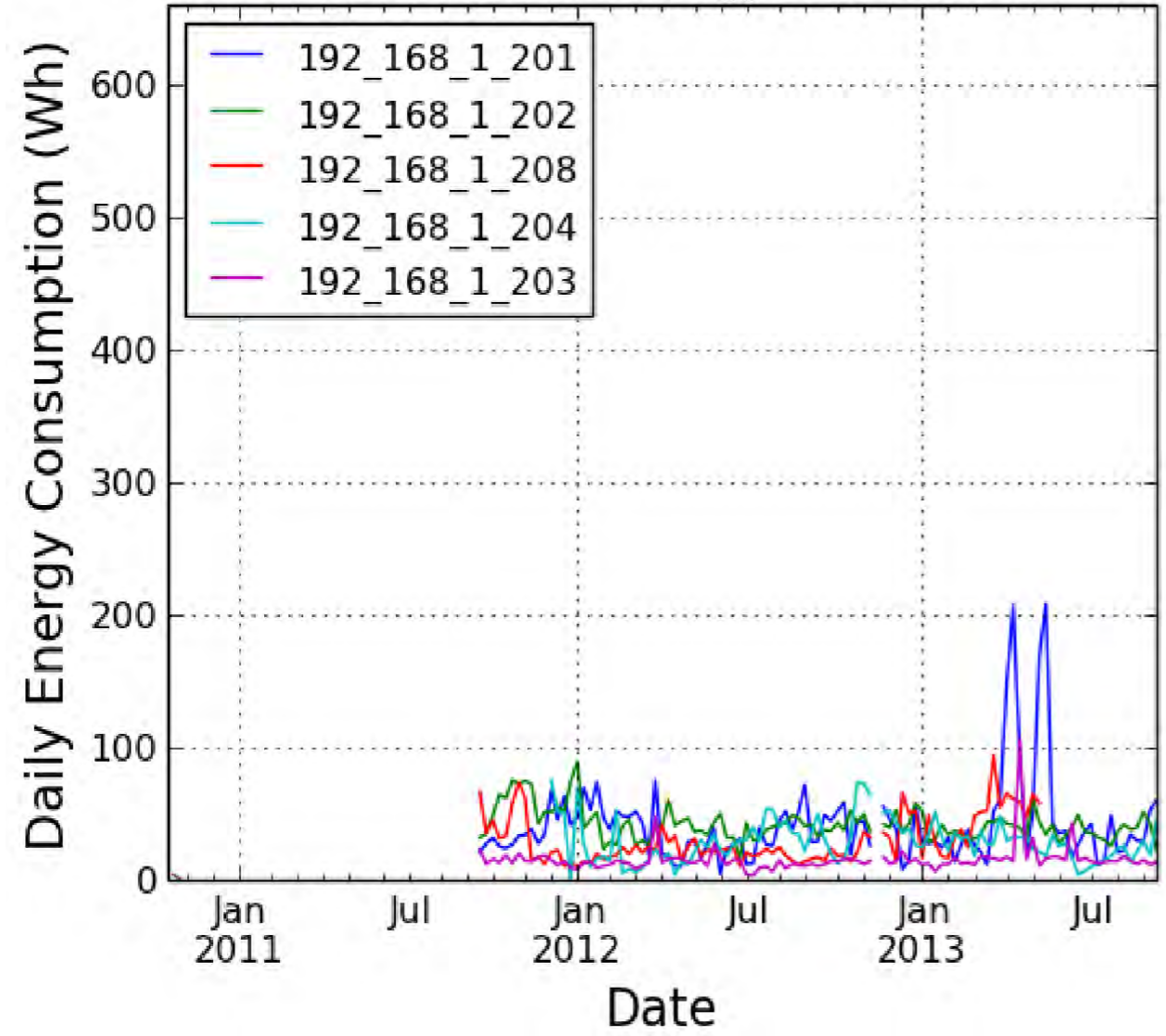


DEMAND GROWTH

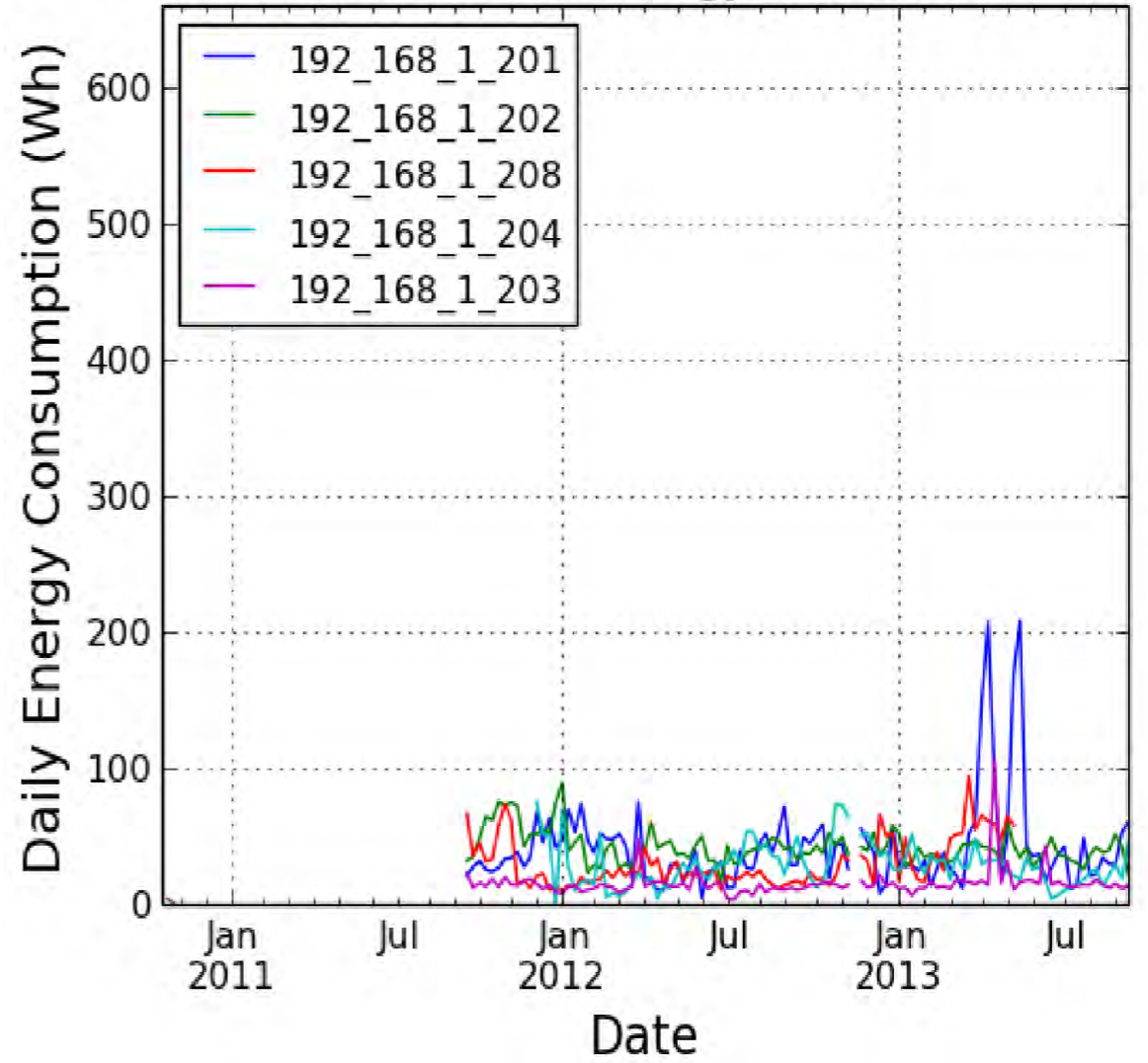
UG01: Average per Customer Energy Expenditure



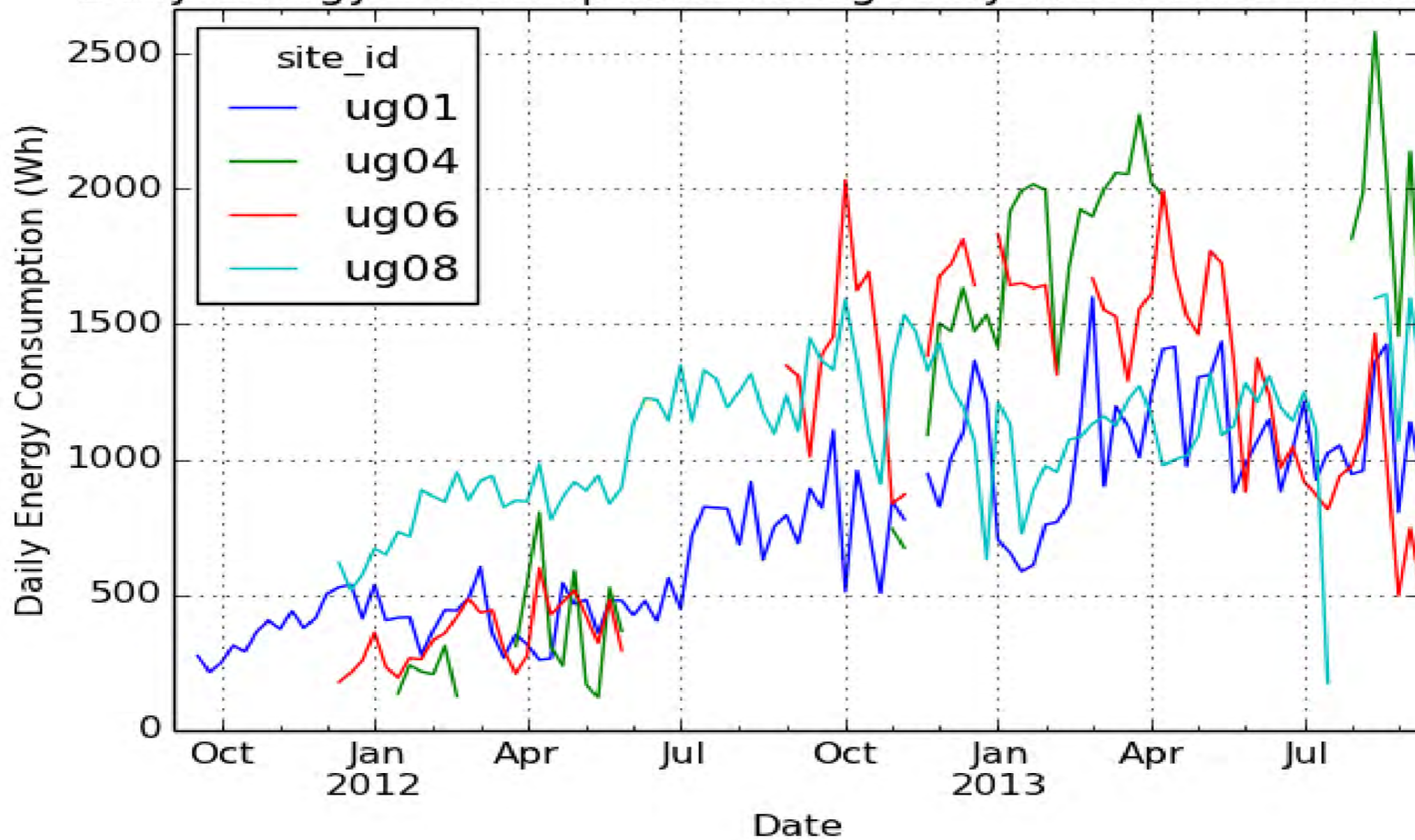
(c) UG01: Daily Energy Consumption Averaged by Week
Five Smallest Energy Consumers



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Five Smallest Energy Consumers



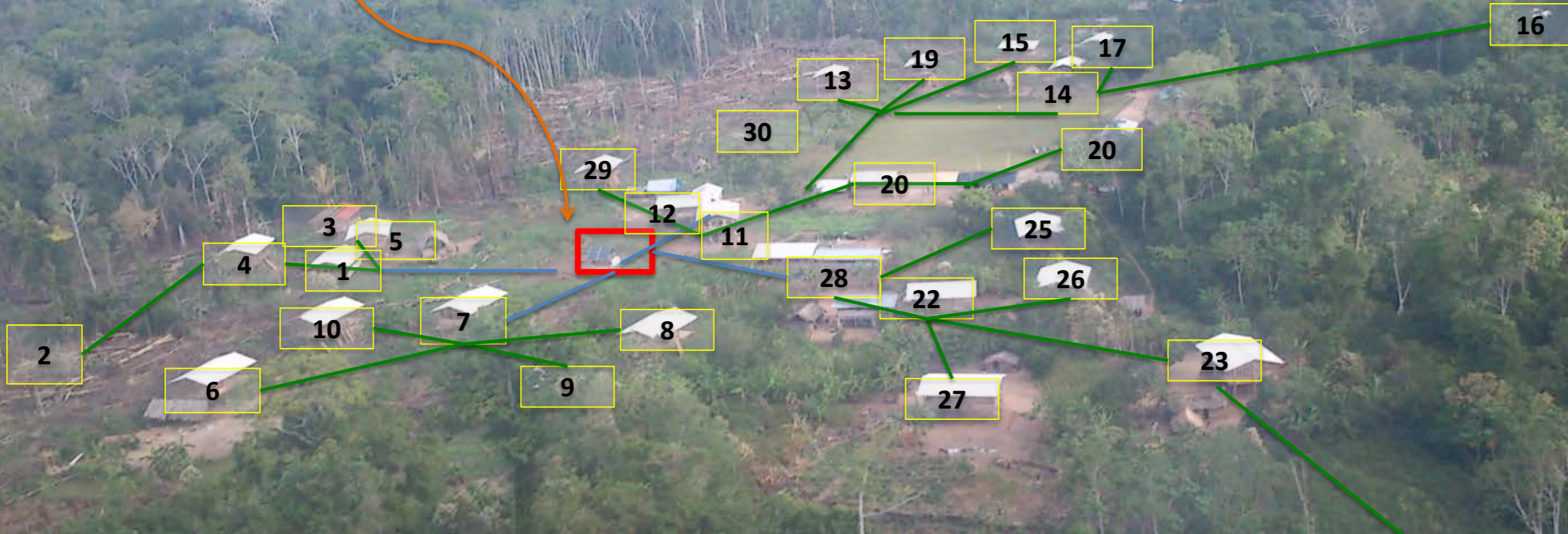
Daily Energy Consumption Averaged by Week for Select Sites



* Sites with significant data availability and more than 5 customers

PV Micro-central

SPEED OF EXECUTION

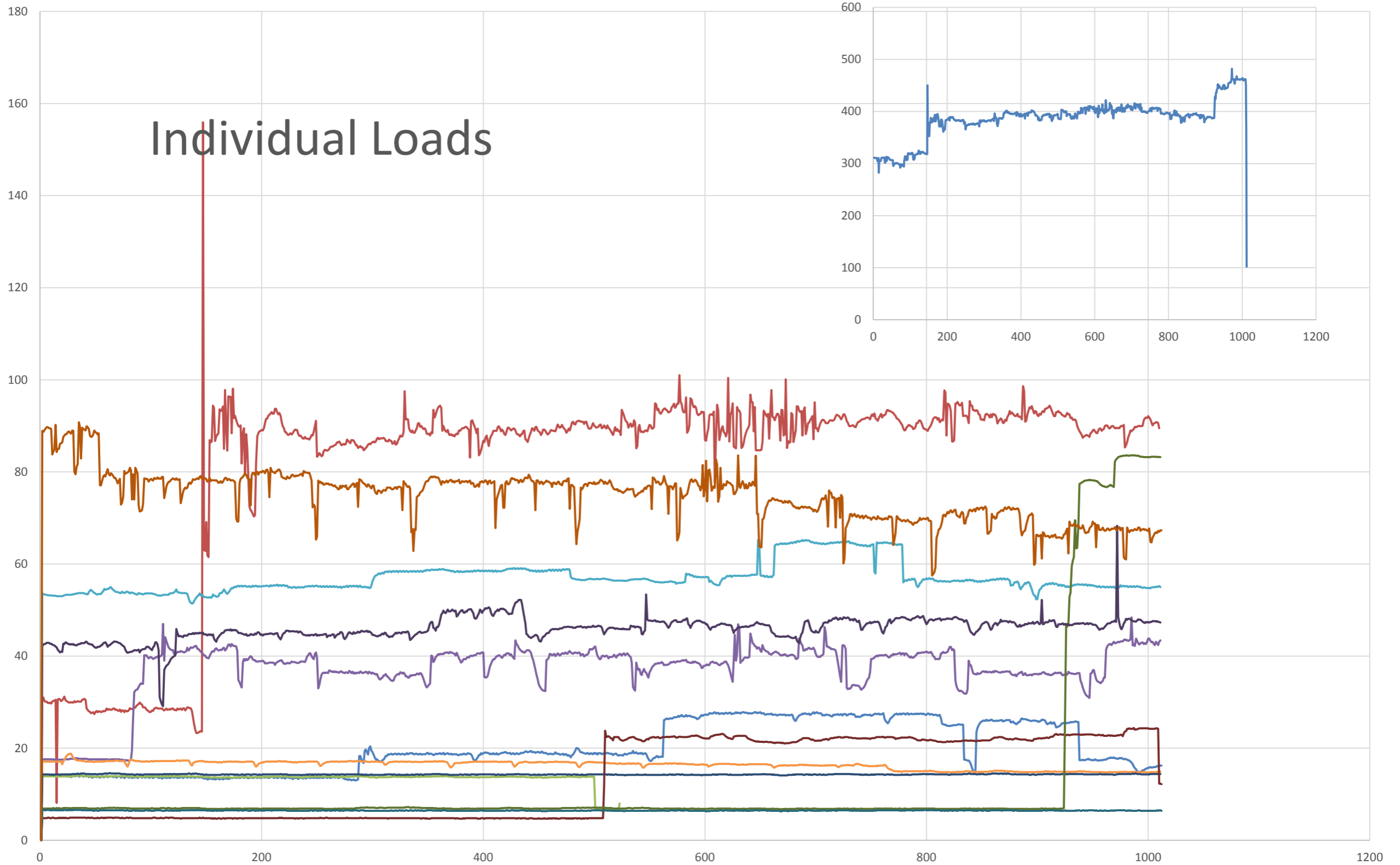


Lessons learnt

- **\$500/conn for an average cap 100W/customer**
- All customer home costs are financed thru tariff
- Tariff pays for ALL utility recurrent costs
- Utility grade connections/metering with 220V AC that can seamlessly integrate with grid
- A grid-like connection allows growth and not prejudice who/what/how much consumption
- Phenomenal growth in 3 yrs, SME, \$3 → \$10
- Residual value of connection: **\$200**
- **Is \$300/hh worth flexible grid-like demand growth?**

Inverter: Inrush current mgmt

Overall Load



Cost-reliability curve: discounts for 90% as opposed to 99%

ESP: energy shortfall probability

