Private Sector Solar Microgrids in Rural Nepal

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Gham Power: Social Enterprise with Solar-based Solutions

2 MW of Solar Deployed across 1000+ Projects

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Example Microgrids: Project Structure

- 2 villages of Harkapur (Village A) & Chyasmitar (Village B)
  - Very different characteristics in terms of productive end use (PEU)
  - Total size: 56 kW in total (Village A – 35 kW; Village B – 21 kW)
  - 55 HH's; 87 Biz's; 2 telco towers

- Funding Sources:
  - Equity investment from community and Gham Power
  - Debt financing from NMB Bank (local commercial bank)
  - Financial assistance from ADB, GSMA and DOEN foundation

- Implementation Model:
  - Both projects owned by a single SPV with community representation
  - Gham Power provides EPC + O&M services for 10 years
  - After 10 years, project ownership transferred to community

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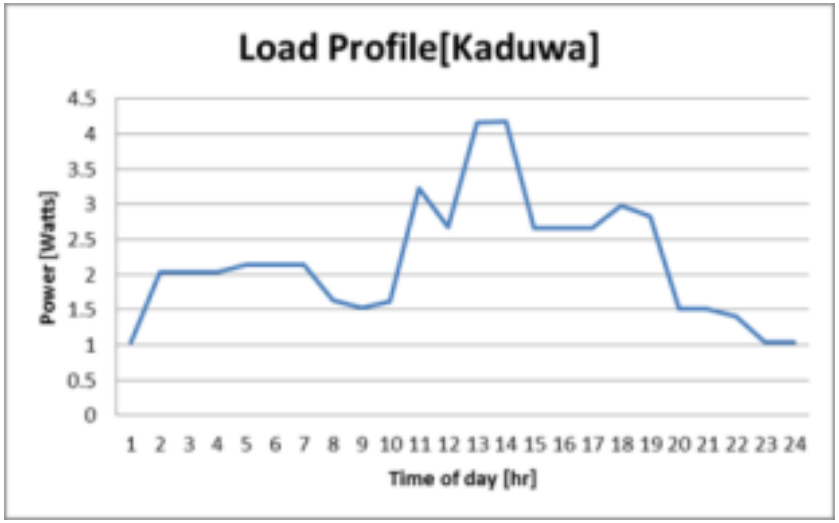
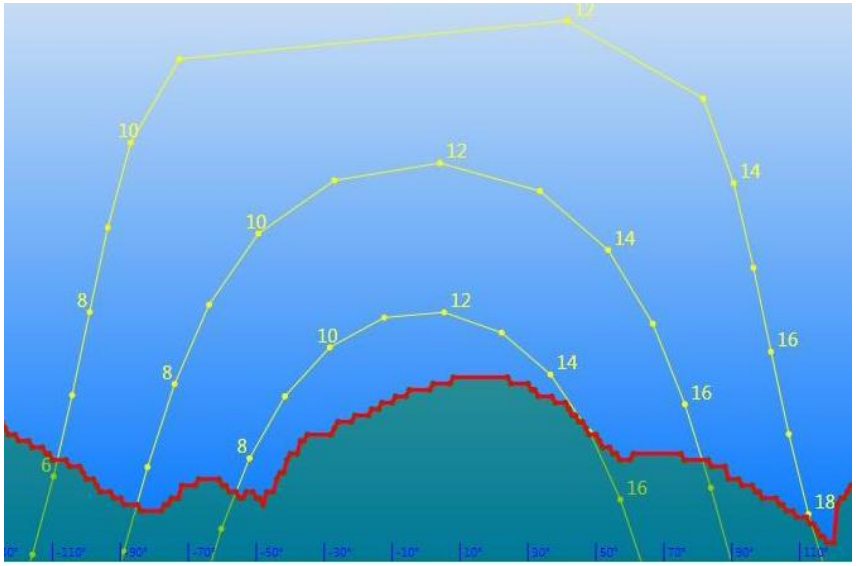
Site selection criteria

- Services necessary in target areas
- Current energy consumption
- Ability to pay for the services
- Grid extension possibilities
- Availability of road network
- Sun path/shading issues
- GPS information of the load centers





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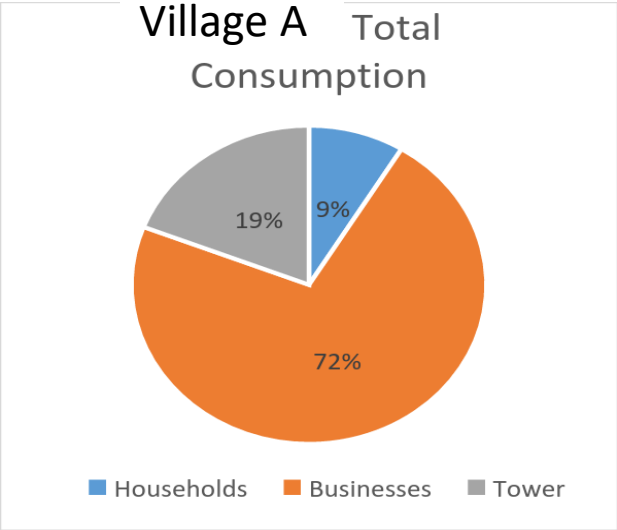
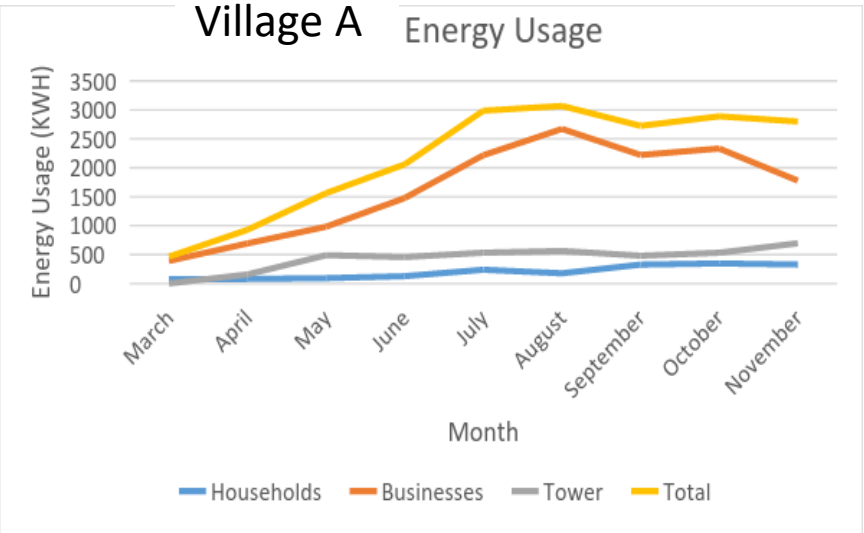
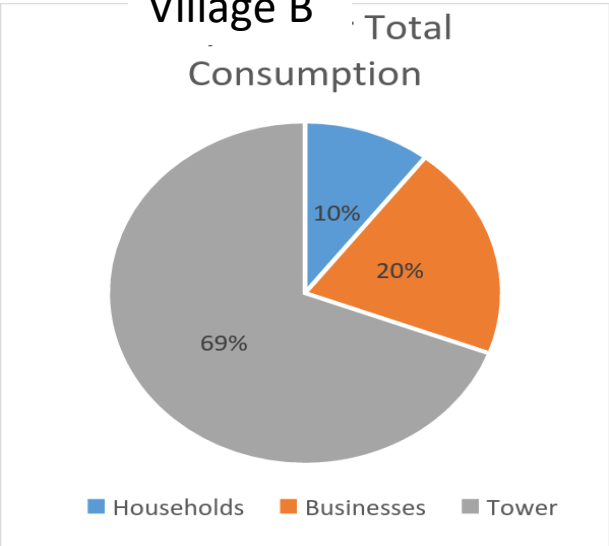
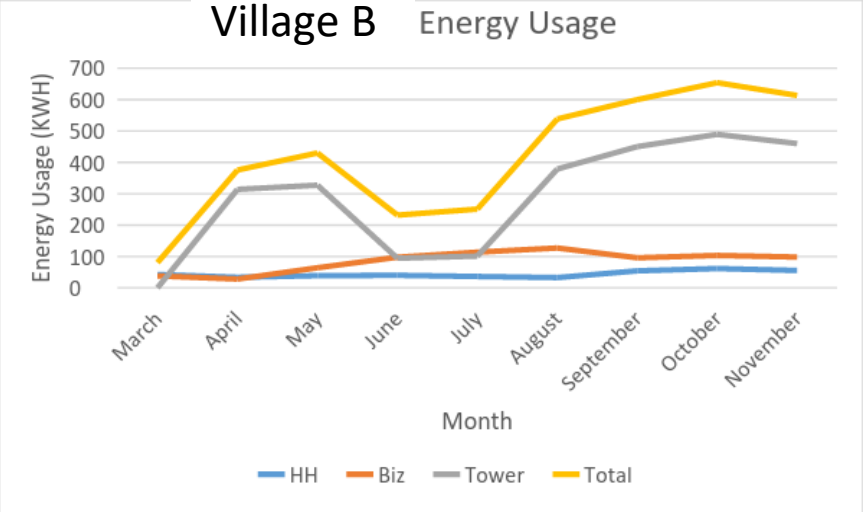
KPI's : Energy usage pattern









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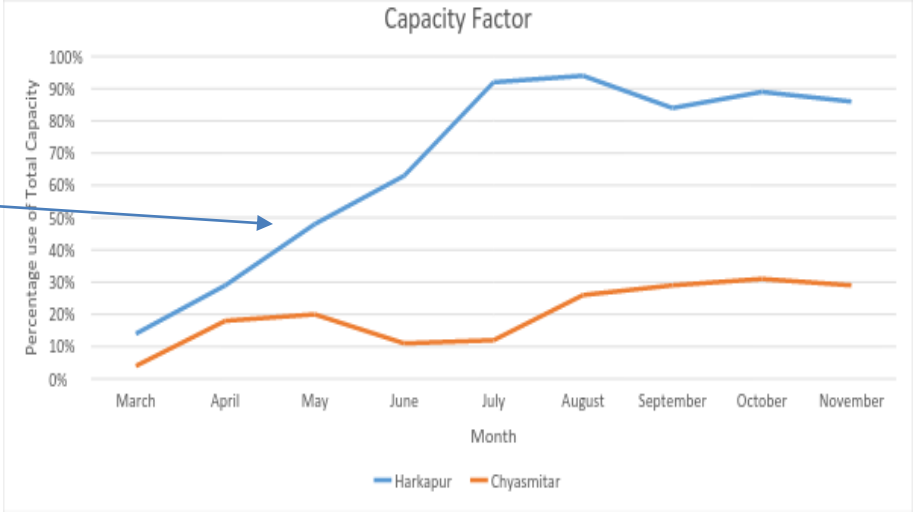
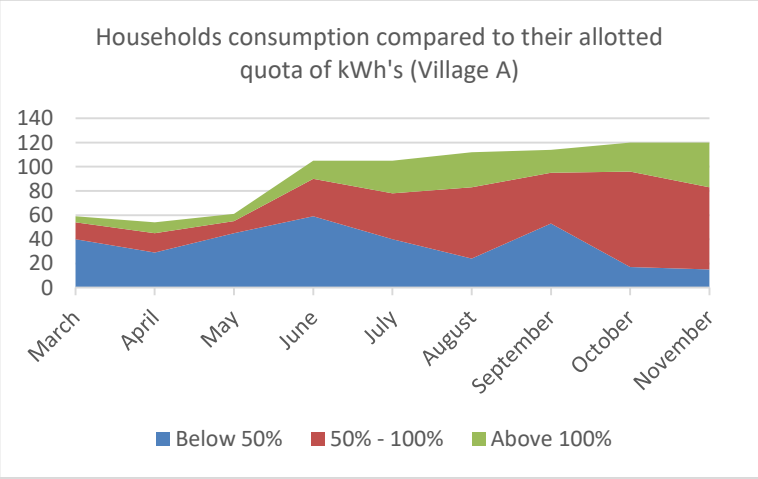
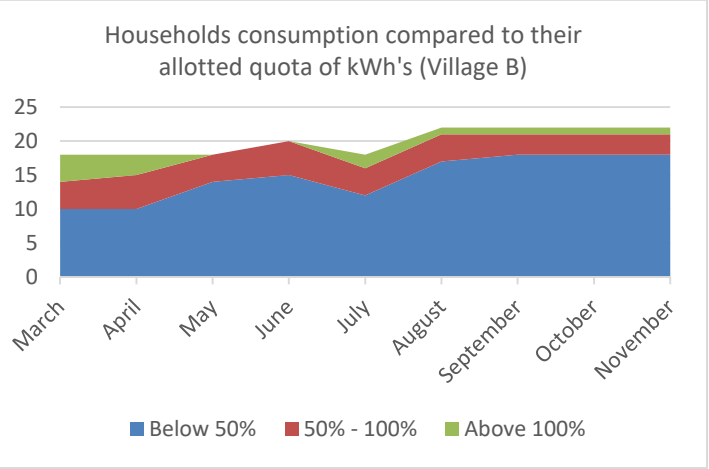
KPI's : Capacity Factor

Latent time before usage picks up

Village A – 5 months
Village B – 9 months and counting







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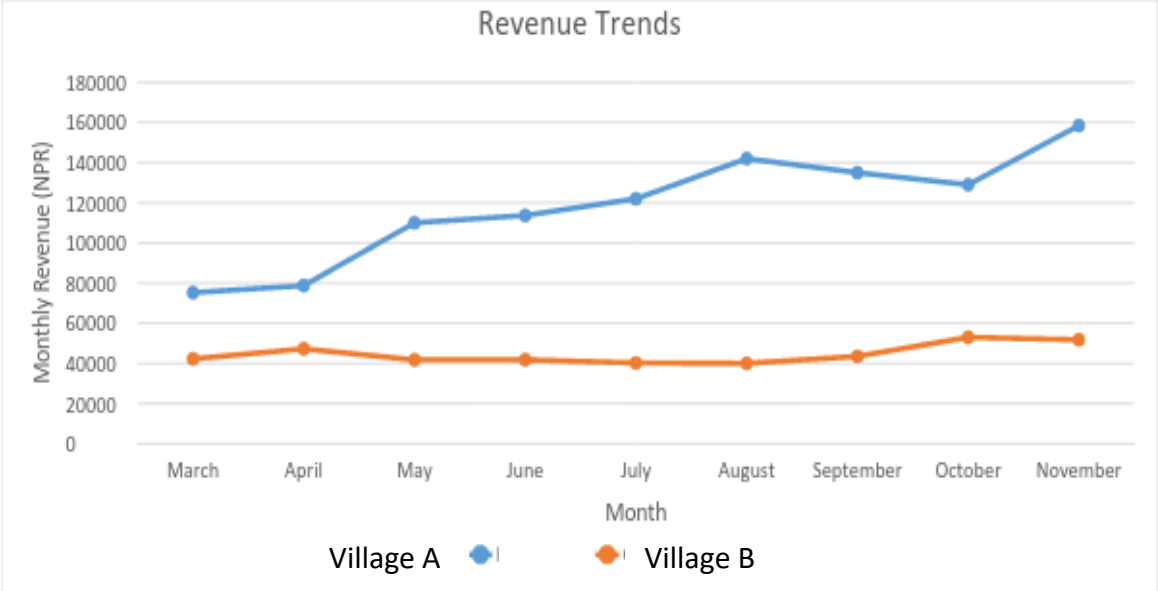
KPI's : Revenue



- IRR(10 years):Village A – 12%; Village B – 4%

- Hard to recover costs with just HH's; tower helps but businesses make the microgrid profitable

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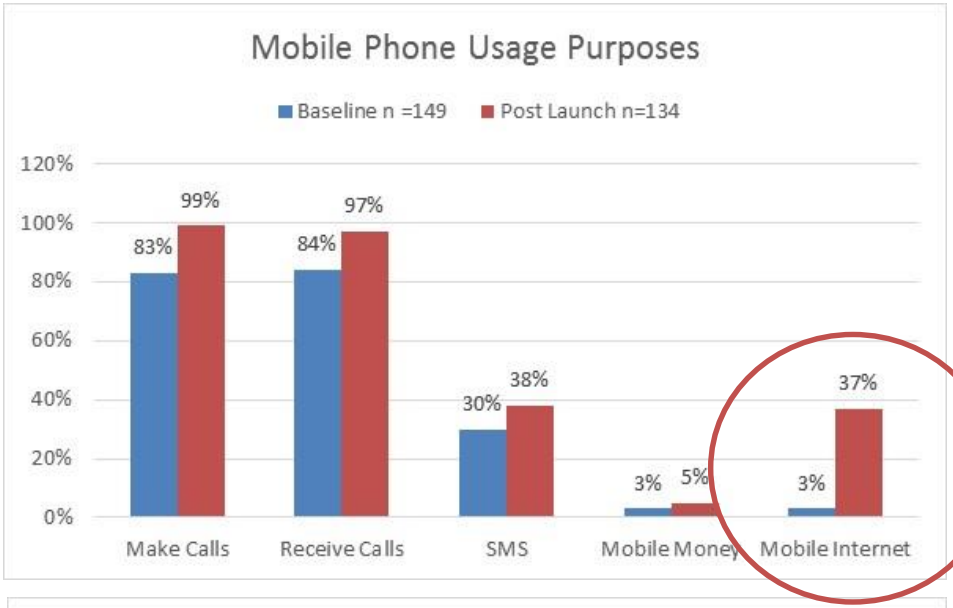
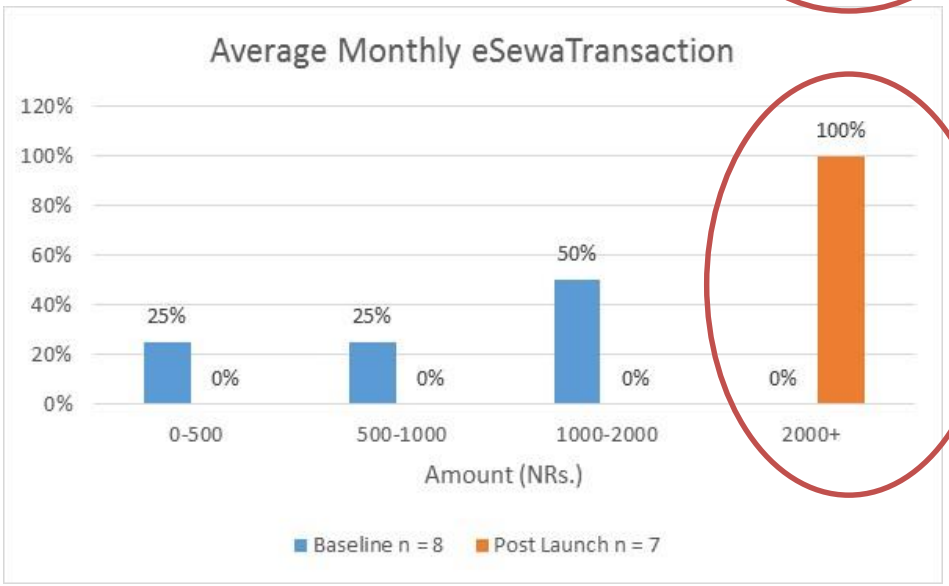
KPI's : Quality of Life



Increase in mobile internet usage 3%→37%



Increase in volume of mobile money transaction

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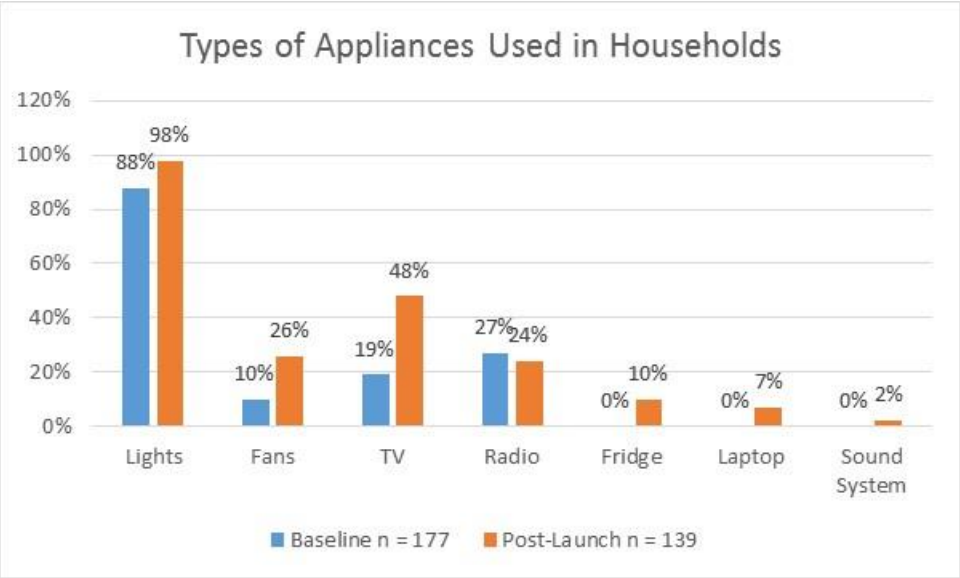
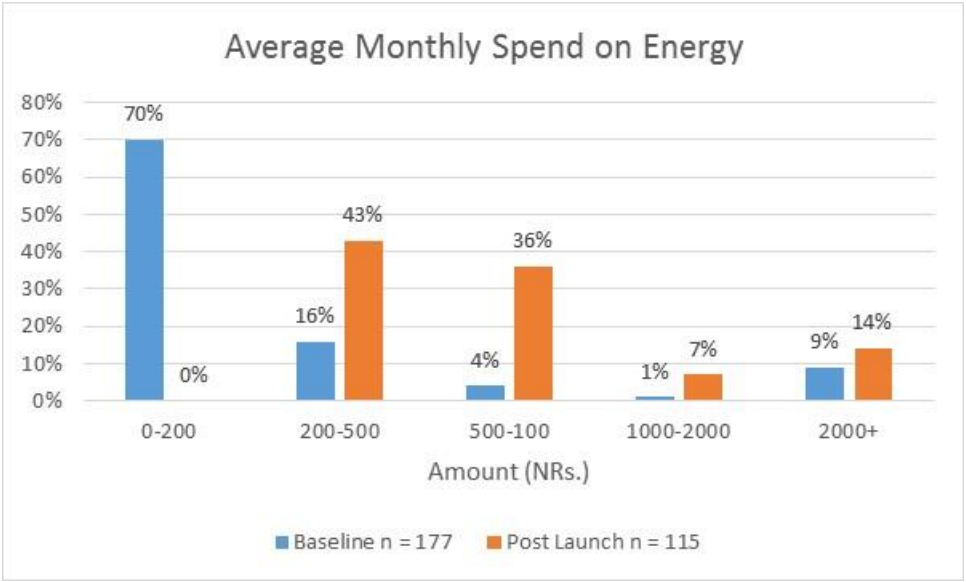
KPI's : Quality of Life



Increase in household appliances – mostly TV and Fridge



Monthly energy costs have also gone up;
Businesses generating more revenue; HH's spending on luxury

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Productive end use(PEU) loads

Grinding Mill – 1.8 kW

Computer Center – 2.5 kW

Petrol Pump – 3.5 kW

Restaurant – 2.5 kW

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Key takeaways

- Community ownership is very difficult to manage
- Developing energy infrastructure shouldn't be the only concern → developing capacity is vital
  - Chicken-egg problem: Microgrid first or PEU businesses first ?
- No cash circulating in the economy
  - Need other services – communication; banking; appliances
- Poorest of the poor will not be the initial beneficiaries
- Opportunity to scale up solar around PEU loads
  - Higher margins
  - Minimize chances to go wrong if businesses don't start as projected
  - Demand side management possible
  - No latent time for microgrid cashflow

Rural microgrid project: Future Directions

- What have we learned?
  - Need to move on from 'one-off projects' and deliver replicable models
  - Need to target specific areas – tourism routes, pilgrimage sites
  - Need to bundle multiple services to manage latent times
    - Mills, pumps, telemedicine, banking services (remittances)

- 'Bootstrapped approach' with PEU's easier to scale
  - Low project development costs
  - Can be replicated with little donor support
  - Faster payback
  - Immediate value to the users
  - Phase wise approach to microgrid development

- Further opportunity to aggregate projects together to increase capital requirements

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Thanks!

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