MICROGEN RENEWABLES GROUP

Micro Hydropower Mini-grids with Productive Use of Electricity (MHM+PUE) at Scale in Uganda

“Repercussions of rural electrification on the wider skills gaps”

Uganda currently has one of the lowest per capita electricity consumption in the world with 215 kWh per capita per year (Sub-Saharan Africa's average: 552 kWh per capita).

27 million rural Ugandans have no access to electricity

Results of Electrification- SDGs

Improved social services facilities and access

A2S and clean E to >100 homes at a lower cost than carbon fuels

A2SE to 40 productive businesses

Higher profitability, higher economic activity, diversified livelihoods

Value-Added agricultural produce

PUE linked jobs created

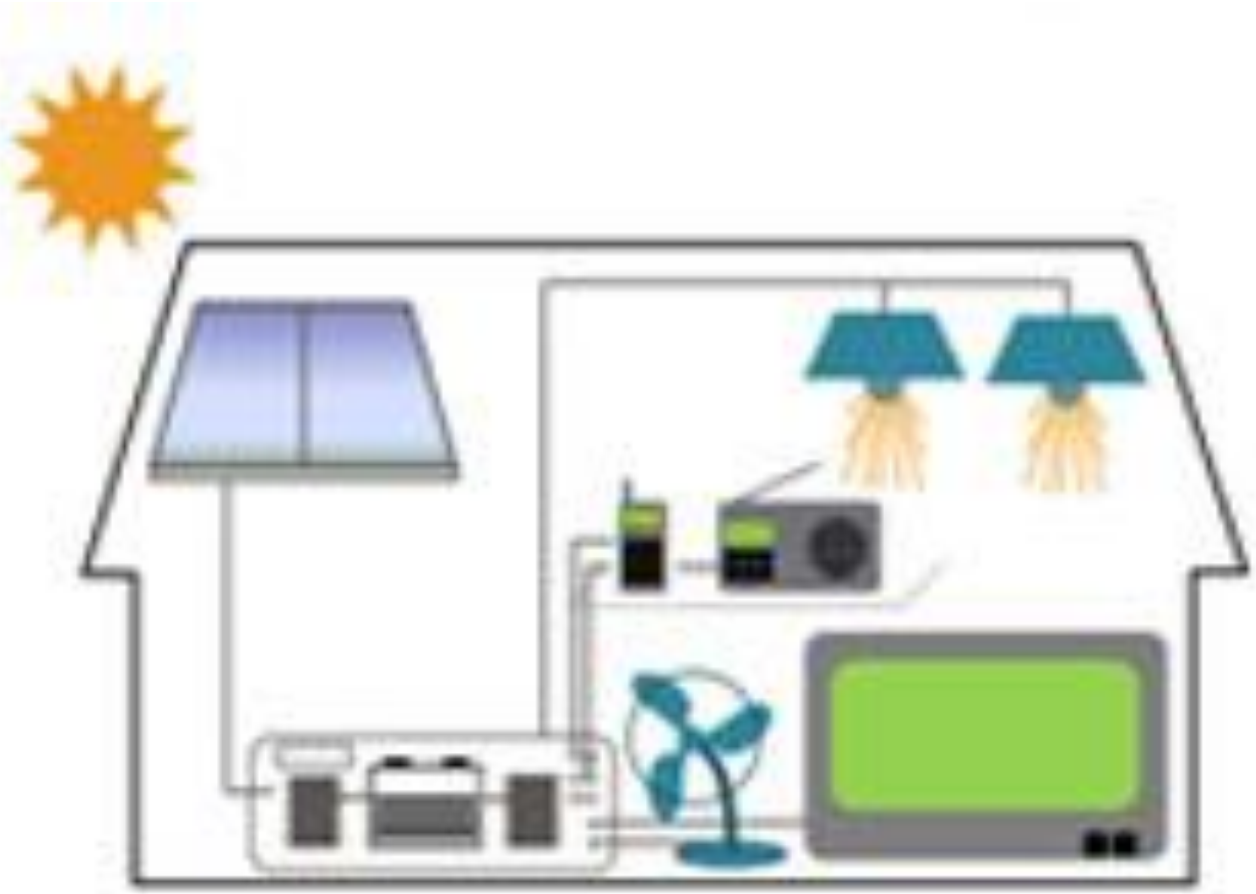
Reduced post-harvest crop wastage (quicker to market, preservation, processed)

Reduced GHG emission

Improved mobile connectivity

https://batteries.com/

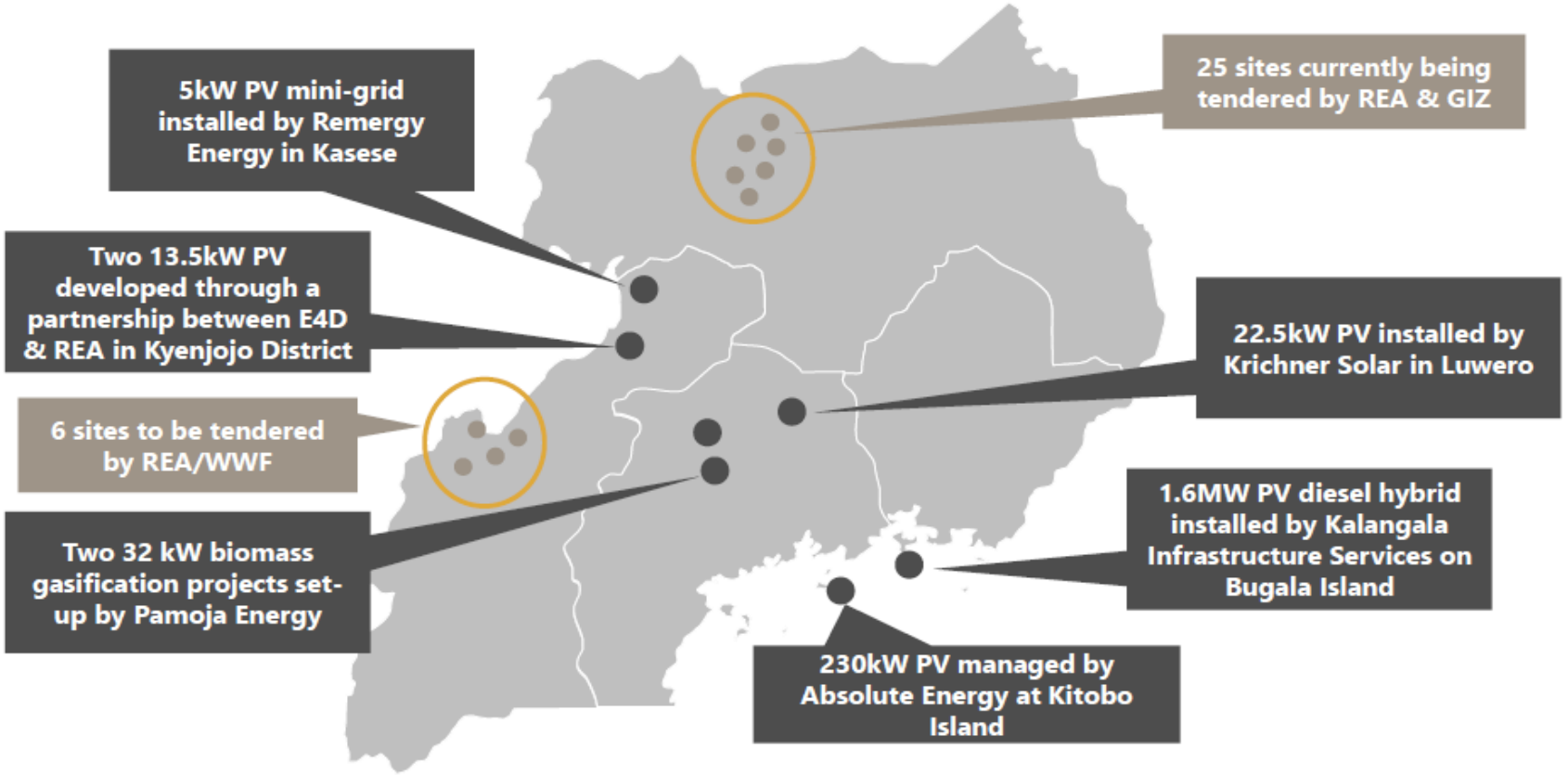
Electrification of homes with solar home-systems does not lead to economic growth



…. But a 20kW mini-grid can power:
a maize milling machine,
a commercial refrigeration unit,
electric transport,
the school,
a new telecom mast
the health centre
100 homes

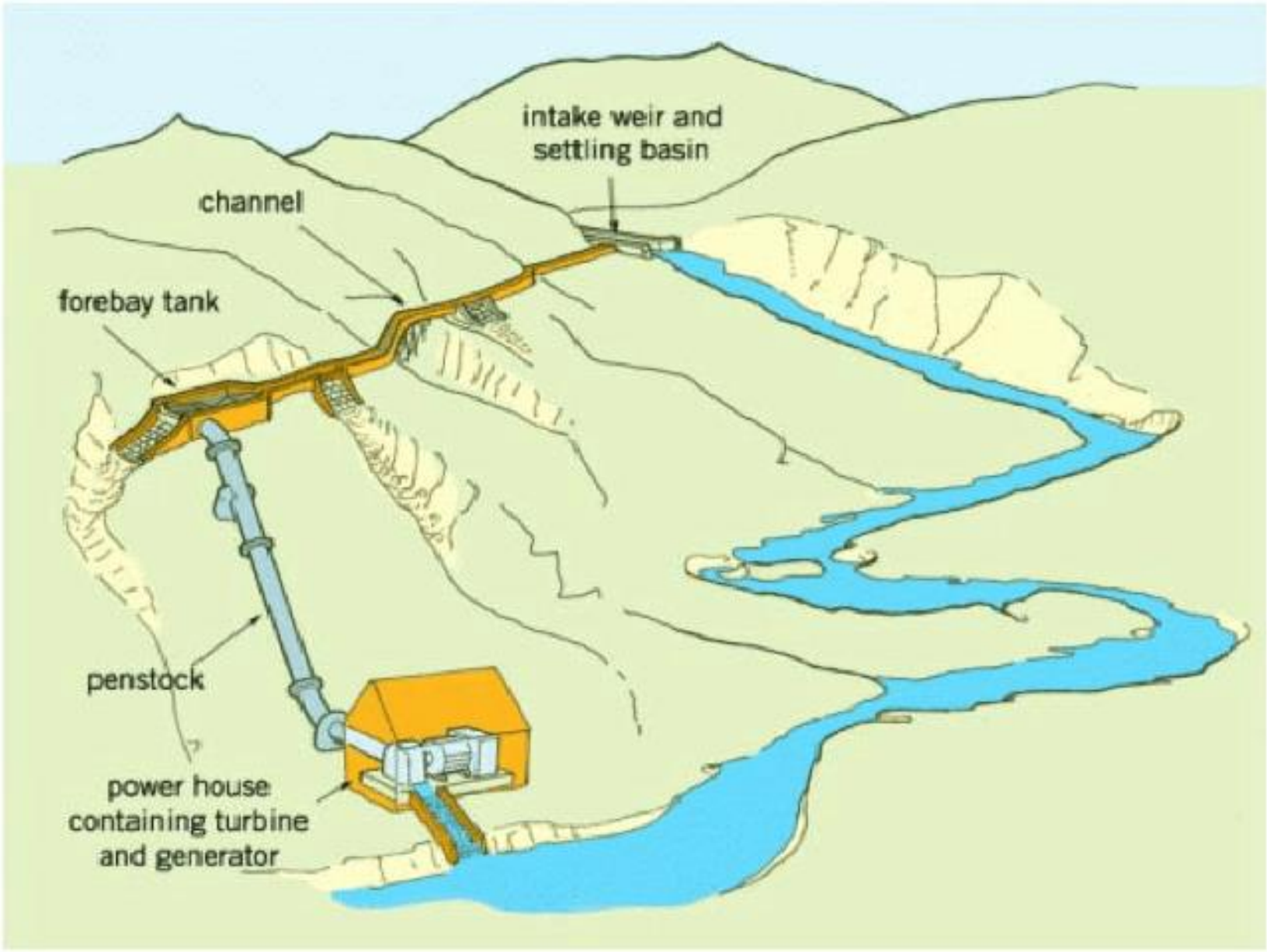
Mini-Grids in Uganda

Mini-grids: **To date, only small number of mini-grid projects installed in UG, however several sites are currently up for tender**



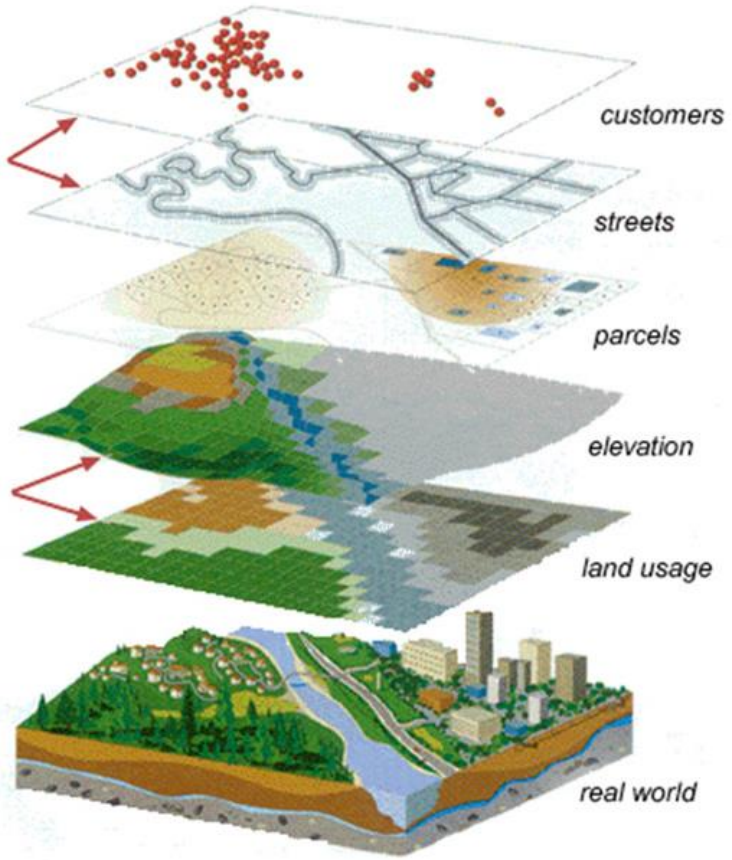
Vast majority of UG projects are solar / battery hybrid grids, with some donors considering mini-hydro pilots

Source: UOMA interviews & research supplemented by REA documents on mini-grid opportunities


intake weir and
settling basin
channel
forebay tank
penstock
power house
containing turbine
and generator

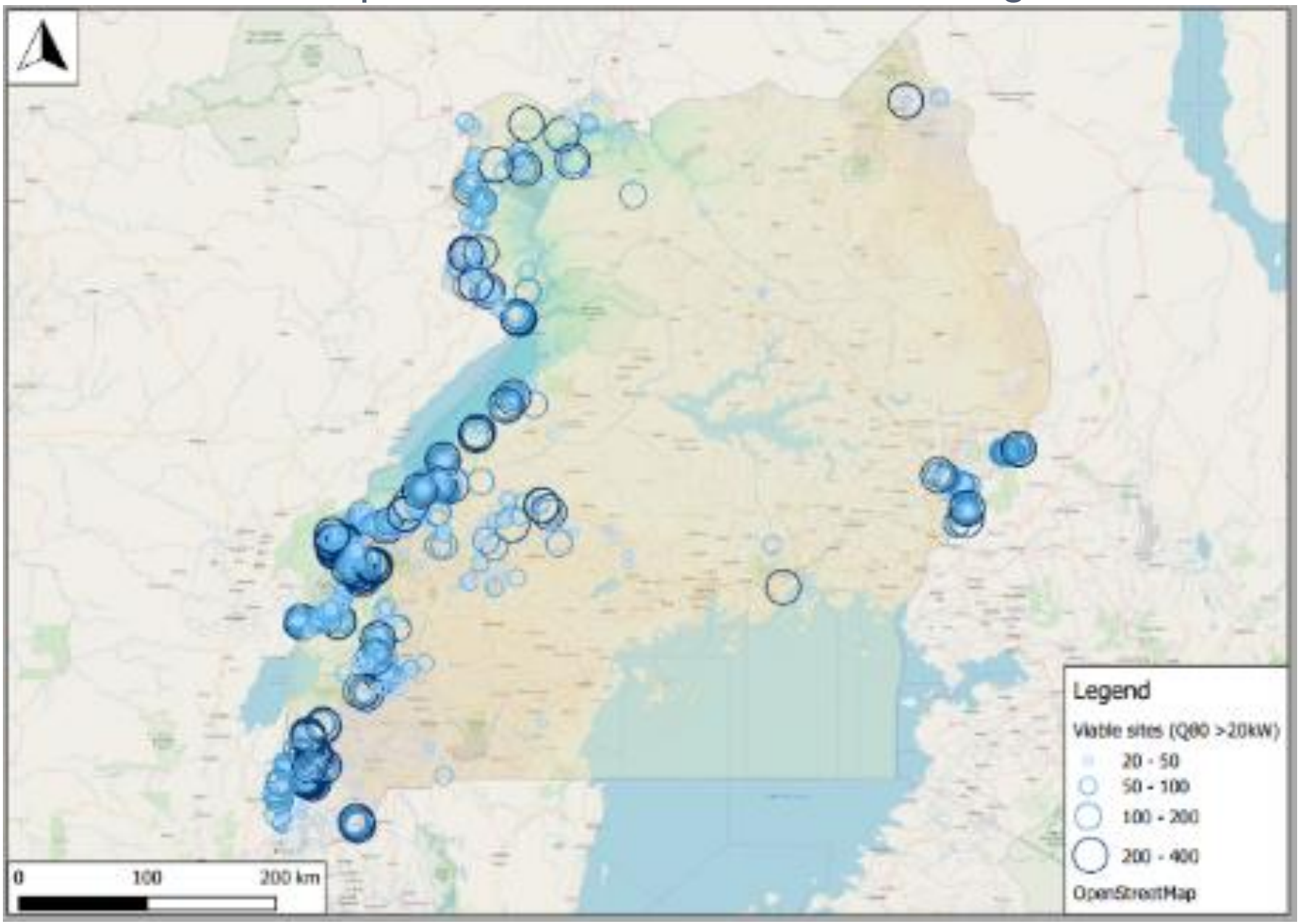
What is ISMO?

- ISMO is a Geographical Information System which considers:
  - River Flow
  - Gradient of River
  - River Bank characteristics
  - Proximity of roads, schools, trading centres, health centres etc.
  - Proximity of National Grid connectivity
  - Land owners?
  - Site of special scientific importance?
  - Existing abstraction license
  - Flood risk areas
  - Nature conservation areas



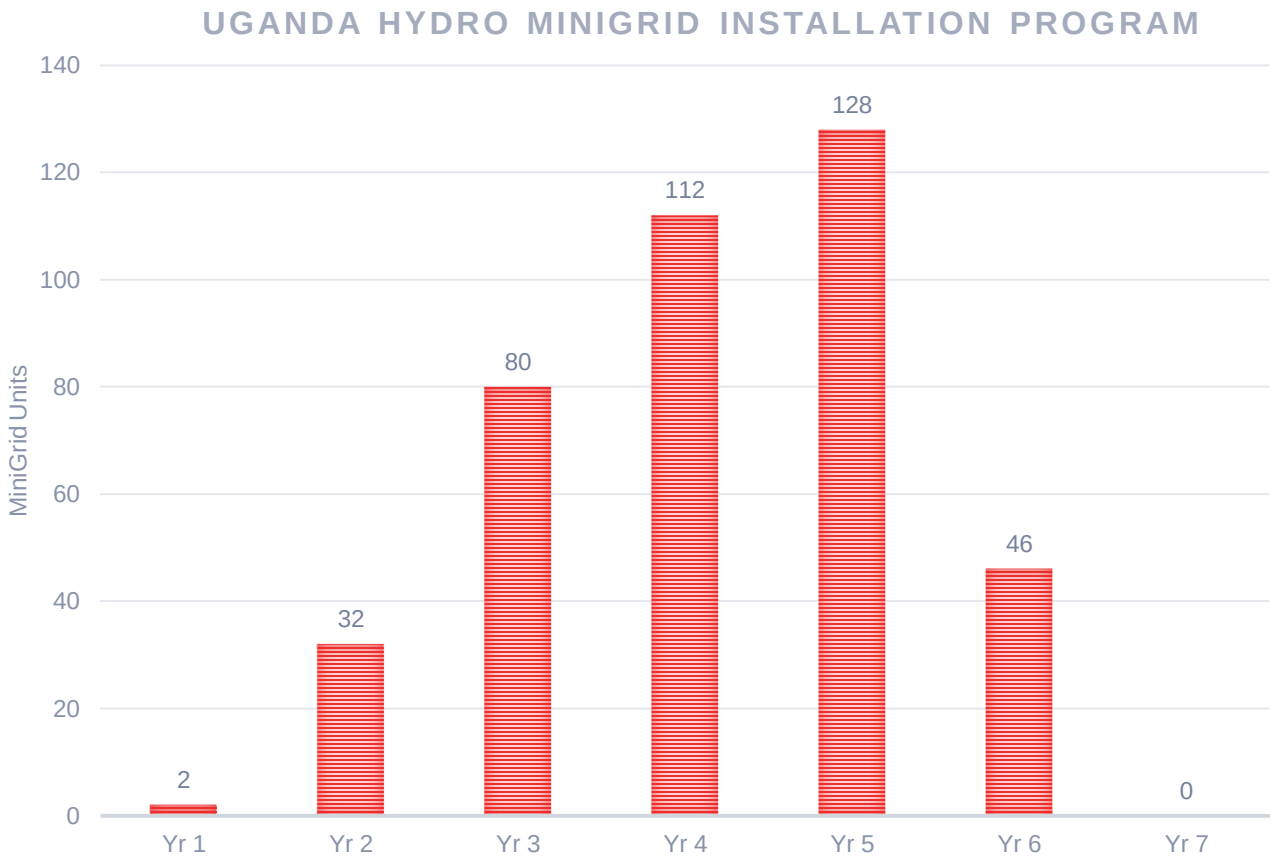
All this leads to identifying "candidate" sites with potential for development, in very large numbers

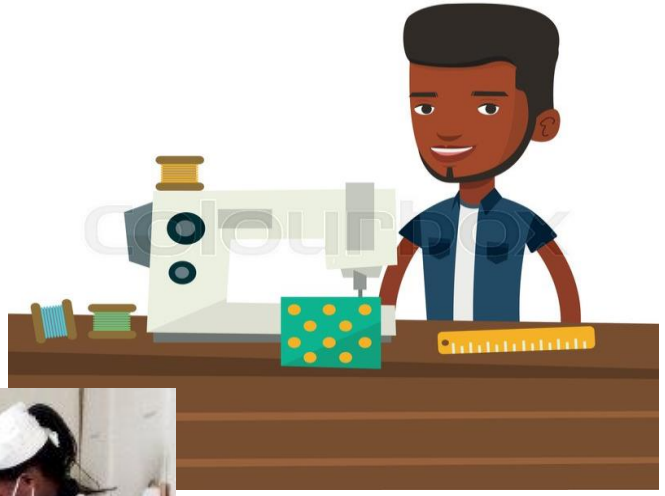
Visual Representation of MHM Sites in Uganda



Project trajectory

A total of 400 mini-grids is planned.
This will serve approximately 40,000 homes (**200,000 people is less than 10% of the 27 million who have no access to electricity)**





The Mini-Grid Industry is not yet mature

- It's growing – globally
- There are gaps in industry knowledge
- It offers massive returns (if the RISK can be taken out of the equation)
- Nobody is installing tens of mini-grids, let alone 400
- Electrical Engineers are needed, of course, but the wider impact includes many other aspects of training
- **Civil engineers need to solve the problem of flood damage, the earth being washed away**.
- Refrigeration Engineers – essential to crop processing and tourist accommodation
- Energy Efficient Buildings.
- Machinery Conversion (from diesel to electric)

Questions from the Finance Boy$ (who are vital to delivering mini-grids at scale):

- *Are there enough qualified engineers to undertake the installation work and keep the mini-grids working?*
- *Do you have the necessary training courses in place?*
- *What have you learned from other countries?*
- *How many women are you training?*
- *How are you going to close the skills gaps?*
- *Who is going to fund this training development activity?*
- *How will you know that you are doing all the right things correctly?*