

Micro Hydropower Mini-Grids in developing world countries

What is the opportunity?

Challenges that accompany Climate Change & Poverty

- Urbanisation
- Deforestation
- Population migration
- Natural Resources under strain

Poverty Alleviation

- The primary building block of poverty alleviation is “Access To Electricity” (A2E)
- National Grid extension is too slow and too costly
- Isolated mini-grids are seen as the answer
- Hydropower is ideally suited to mini-grids (24hr production, 365 days, no batteries needed, mature technology with a 50+ year life-cycle) but is stymied by the barriers of up-front costs \$100k (which are too great for the villagers, but not enough for VCs)
- New satellite-based technology removes those barriers, enabling scale for the first time in hydropower.

From space we can

- Identify the flow and the gradient of rivers (the technically feasible sites) in large numbers, quickly and inexpensively – this enables economies of scale.
- then assess those locations for environmental acceptability and economic viability (is the site in a nature reserve? is the site near a “productive user of electricity” (a commercial enterprise that would benefit from A2E?))
- There are >1300 similar sites in Uganda alone

Green Climate Fund et al.

- \$Trillions is being spent by World Bank, EU, UNDP, and national governments on A2E
- These funded projects need a 25% contribution from the private sector investors who, in return, are sheltered from costs during construction phase
- If 25% = \$10m, then 100% = \$40m
- What can we achieve with \$40m?

What can we achieve with \$40m?

- 5 years to install 400 micro hydropower mini-grids (each with homes and “productive users”)
- $20\text{kW} \times 400 = 8\text{MW}$ output
- Retail sale price of mini-grid electricity
\$0.30/kwH – gives annual returns after year 4
of \$10.29m (if we sell only $\frac{1}{2}$ of the electricity)

Each mini-grid has...

- Community-based co-operative “owners”
- Electrically-powered Agricultural Produce Processing Equipment (APPE) with which to make more money
- Locally-based service & maintenance crew (training required)
- Centrally-based system monitoring and billing