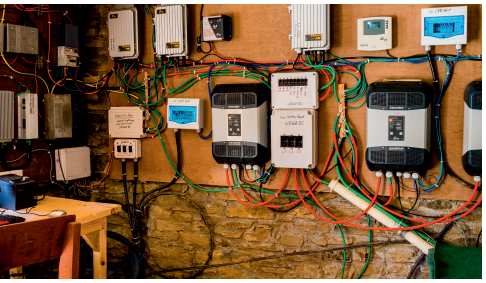
Case study
Modular Hydro-Electric Mini-Grid
Jumla District - Nepal

The challenge

Most micro-hydro-electric power plants (MHP, ~10 – ~100 kW) in remote Northwestern Himalayan Nepal are constructed to meet the future needs of communities they serve.



RIDS-Nepal

Unfortunately these communities, having never had electricity before, have not yet developed the economic vitality needed to productively utilize this much energy in the first few years, resulting in very low utilization factors of 5-10%. More importantly, the communities are not able to provide the funds needed to maintain such over-sized equipment, so the systems usually fail within a few years. A pilot pico-hydroelectric system has been constructed in the village of Moharigaun to the demonstrate feasibility of such a system that can be modularly expanded over the years to serve an evolving community's economic capabilities and power demand.

Why STUDER

Studer's reliability was essential in such a remote location, the VS-70 supports 600 VDC and specified to operate up to 3000m which is the elevation of Moharigaun. The Xtender system was easy to set up and simply works!

System components

The system contains the following components:
6x Powerspout Pelton turbines with integrated 3-phase bridge rectifiers
4x N200 Exide truck batteries in series (each 12 VDC, 200Ah)
3x Studer VS-70 charge controllers
3x Studer XTM 4000-48 inverters
1x RCC-02
1x Xcom-232i
1x BSP 500
1x Schweitzer Engineering Labs 3360 computer
1x Itron ACE9000 SSP DIN-R pre-pay electricity meters

The Solution

Two turbines feed each VS-70 charge controller at 300 VDC. 300 VDC was chosen to minimize the weight of transmission cables to the village since there is no mechanized machinery available to handle heavy spools of cable in the village. Deep cycle batteries are not needed given the continuous power generation, so readily available truck batteries were used.

The three Xtender inverters produce 3-phase power that's distributed to junction boxes placed throughout the village, demonstrating that the eventual use of 3-phase motors is feasible. The junction boxes contain Itron single-phase prepay meters, one per household, to ensure a revenue stream needed to maintain the system. The computer is used to regulate the temperature of useful loads such as hot water tanks for showers and the slurry in biogas digesters, by programmatically monitoring their bath temperatures and applying excess power when available and needed. Any excess power after that is diverted to resistive elements to heat the community center. The net result is that 100% of the available power is utilized in a variety of 'useful loads' distributed throughout the village, 24 hrs a day, 365 days a year.

The eventual goal of this pilot project is to broadly replicate the approach, so we would be happy to work with you to transfer the necessary technology.

Project outcome

Moharigaun has had continuous electricity service ever since it was commissioned in November 2018, utilizing 100% of the available power

The Company

RIDS-Nepal is a Nepali, non-profit, non-government, NGO. We operate in the remote Himalayas of NW Nepal to improve the living conditions and livelihood of people and whole village communities through long-term holistic community development projects - planned, designed and implemented jointly within their context in partnership with individuals and communities.

For more information please contact:

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