

SOLAR WATER PUMPING IN NEPAL

A SUSTAINABLE APPROACH

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DIT Foundation Travel Scholarship

- Annual student placement opportunity with Renewable World in one of their international locations
- Renewable World bring sustainable solutions to impoverished communities in remote, off-grid locations
- They use small scale renewable energy technologies such as wind, hydro, solar and biogas as well as energy infrastructure and knowledge and skills to improve the livelihood of such communities
- Renewable Worlds main aims are:
 1. Poverty alleviation,
 2. Rural livelihood development, and
 3. Addressing female (and adolescent) exclusion and discrimination



Nepal

- GDP of \$425 per capita (2010) making it one of least developed countries in the world
- One of the most deprived countries in the world. A 'low human development' country – the lowest classification assigned by the Human Development Report, 2013.
- 1 in 4 live below the poverty line (Nepal Stats)
- Inefficient aging electricity grid - up to 18 hours load shedding per day. 30% of households have no access to electricity
- Almost half households without access to piped water
- 2 million without a toilet
- Regular outbreaks of water borne diseases
- Women and children spend up to 4 hours a day walking for water



Solar Multiple Use Systems

- ❑ Nepal averages 300 sunshine days per year
- ❑ PV panels generate electricity to power a pump which lifts water to a distribution tank above the communities
- ❑ Distribution tank gravity feeds community tap stands
- ❑ Water is used for domestic use as well as micro irrigation systems
- ❑ Community manages maintains and manages a fair usage policy



Benefits of Solar MUS to Renewable World beneficiaries

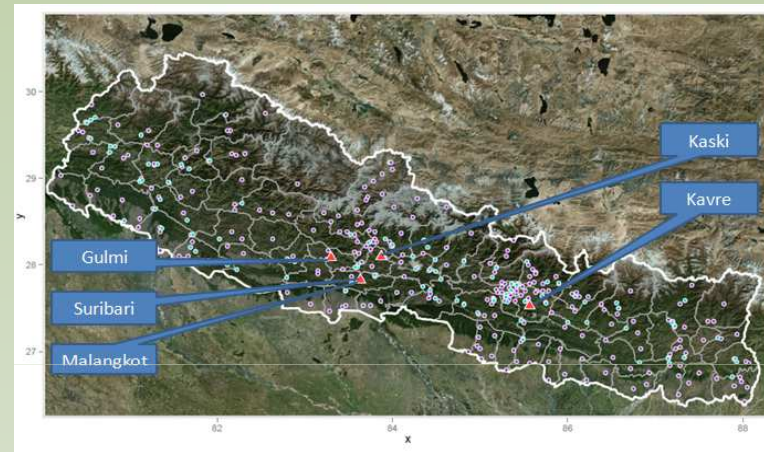
- ❑ Poverty alleviation
- ❑ A reduction in time spent collecting and carrying water
- ❑ Increase in children school attendances
- ❑ More time for income generating activities
- ❑ A reduction in injuries resulting from collection and carrying of water
- ❑ An increase in the amount of water used for personal hygiene, cooking and livestock
- ❑ Reduction in the occurrences of diarrhoea, dysentery and cholera
- ❑ Increases in the overall health of households
- ❑ More time for school and adult education
- ❑ Increase in household revenue and livelihood through greater cropping intensity and agricultural production
- ❑ Nutritional benefits
- ❑ Increased community standing of women and adolescents



RW Solar MUS project (phase 1)

Background

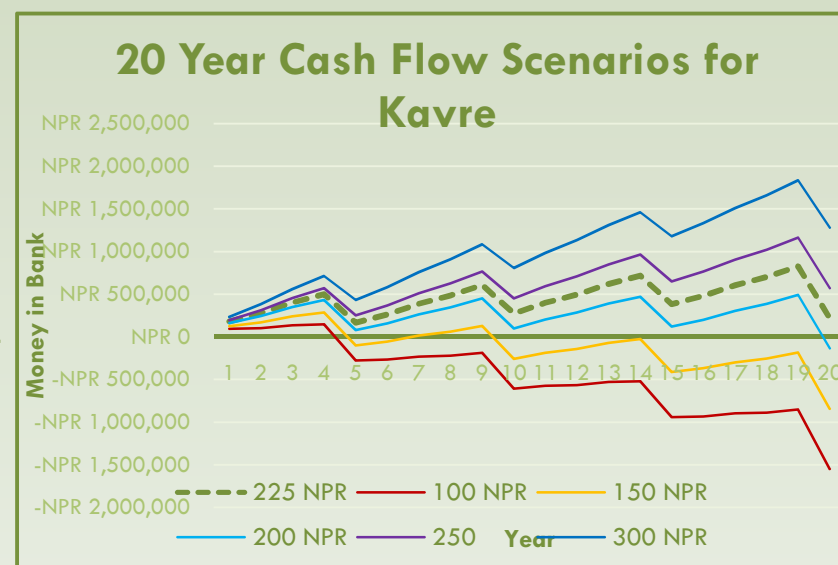
- ❑ Commissioned between Jan and April 2013
- ❑ 5 sites in 4 districts of Nepal
- ❑ Water for domestic and agricultural use
- ❑ The scheme benefits 1,369 people in 233 households across the 5 project sites as well as a school, health hub a community building and a nursery.



Renewable World Approach to Sustainable Solar MUS Systems

- Demand based provision model
- Community constitution and committee
 - Must agree in advance
- Agricultural training
 - Maximise benefits of the technology
- Mandatory tariff collection and bank account set up
- Repair and maintenance
 - Local technicians trained and subsequently employed by the committee
- Service level agreements
 - Project partner organisation
- Financial and governance training
 - Enable the committee to manage the project
- Monitoring and evaluation

Item	Cost	Number	Warranty/ Design life
	NPR		Years
PV Module	30380	9	20
Pump	211974	1	5
Drive	220892	1	5
Drive Internal Battery	490	1	2
Maintenance visit	24500		
Unscheduled Maintenance Visit	27930		



Challenges Faced

- ❑ Lightning arrestors retrofitted to all sites after 2 were burnt out following electrical storms
- ❑ Drive configuration changed when irradiance level triggers found not to be suitable
- ❑ Water hardness testing not performed. One pump damaged and broken by lime scale
- ❑ Frequency regulation. Output chokes installed on all drives to limit frequency distortion over cable length.
- ❑ Distance from pump to drive. It was found that this was too long on some sites. Control box moved to between panels and pump
- ❑ Field workers in Kavre cutting (and not repairing) over ground pipes when they wanted a drink
- ❑ Community in Malagkot dividing the pipe to fill both tanks causing a reduction in pressure and efficacy of pump.



Measuring the Benefits

89%

decrease in time taken fetching water (347 minutes per day to 38)

386%

increase in water used for personal hygiene

8 of 19

increased school attendance

100%

reported in increase in money household has available

6 of 20

reported that they now had "time to take a rest"

11 of 19

reported charges (350NPR p.a.) too cheap

17 of 20

reported increase in overall health of household





Thank you for listening!

Questions?