

# Reducing Energy Consumption in Rural Hinterland & Hilly terrain

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# Background

- Hands-on experience in running two old age homes located in Western UP & Uttarakhand
- Primarily catering to old and destitute
- Do not charge anything from inhabitants
- Funding from charity and volunteers
- Limited resources

# Characteristics of Rural hinterland & Remote hilly terrain

- Electricity reliability is a matter of concern
- Low capacity to pay
- Higher utility response time
- In case of breakdown, repairing/replacement of renewable energy equipment difficult
- Consumer education
- Safeguard from monkeys and vandalism

# Use of Solar Panels+Storage

- Solar PV generation @ 3-4 kWh per day
- 7 kW plant
- Lead Acid batteries used for storage
- Manual in-house cleaning of panels
- Electricity bills have reduced by 20% to 32%

# Roof Mounted Solar Panels



# Energy Efficiency measures

- Reduction in lighting load by use of 7 Watt LEDs
- Replacement of 80 W ceiling fan by 35 W BDCM Fan
- Use of motion sensors in few applications
- Increased use of natural light

# Use of bio-fuel for cooking applications

- Bio fuel, primarily cow dung is used partly for cooking applications
- Improvised stove used for cooking
- Reduces waste disposal
- Low smoke
- Improved aesthetics

# Use of solar water heater

- For hot water applications in bathing
- Pre-heats water by 10 degree C
- Large storage tanks for storing warm water
- Govt subsidy available
- Energy conversion efficiency more than 50%
- Especially useful in hilly region where hot water is required for 8 months in an year



# Solar Water Heaters



**Continued...**



# On going efforts...

- To use Lithium-Ion batteries in place of Lead Acid batteries, if price becomes competitive, when next replacement becomes due
- To use natural air draft for cooling of premises
- To install a small wind turbine
- Net-zero consumption: Difficult but nevertheless not unachievable

# What was learnt

- Storage batteries coupled with Smart Grid provide Symbiotic benefits for consumers as well as incumbent Public utility
- Energy efficiency played a big role in reducing power consumption and thereby reducing peak demand as well as energy consumption
- Modification in dwellings design by opening windows at suitable places so as to use natural light
- Focus on proper upkeep of batteries and solar panels is of utmost importance

# What can be replicated

- Low-cost prospective model where it can be deployed for benefit of the community centres, old age homes and orphanages in the developing countries
- Locally available energy efficient building solutions
- Rural Communities are quick to adapt

# Benefits expected

- Expected to reduce electricity consumption by about 20-32% for the consumers
- Utility to gain by reduction in peak demand
- Habit formation: Energy saving becomes a habit
- Scaling up: Easy to replicate once a successful model becomes visible

# Suggestions

- Involvement of local people: Self sufficient communities is not the sole responsibility of the Govt. nor can it be achieved without involving the interested consumers
- Economic benefits are immense of using solar+storage +energy efficiency
- Scaling-up the model will yield substantial results for the electricity distribution utilities



**Thanks**