



PRODUCTIVE USE OF RENEWABLE ENERGY

**2019 MINDANAO ENERGY
INVESTMENT FORUM
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ALICIA A. DE GUZMAN
DEPARTMENT OF ENERGY



Productive Use of RE: What for?

Increase opportunities for local entrepreneurs by modernizing production

Contribute to financial viability of electricity service infrastructure

Increase economic activity in the community

Make investment for RE electrification more attractive and reduce subsidies needed

Source: Energy Sector Management Assistance Program - World Bank



Productive Use of Energy: Other Countries



In Mexico, the government agency *Alianza* included provision of solar water pumps into their productivity improvement project for livestock farmers.

In Uganda, the *Energy for Rural Transformation* provides business development services at the grassroots level.

In Sri Lanka, a thriving market for SHS and village-hydro projects enables people to make more economically productive use of energy technologies already installed.

Examples of Small Productive Uses of Renewable Energy in the Agricultural Sector*

	Agriculture
lighting	Poultry rearing, fishing
ICT	mobile phones charging
cooling/heating	Small fridges and cold storage, dryers
machines	Power tools for carpentry, milling



Source: GIZ (2015)



WHAT HAS CHANGED ?

Biggest :

- **Dramatic decline in PV prices**

1978: \$60/Watt;

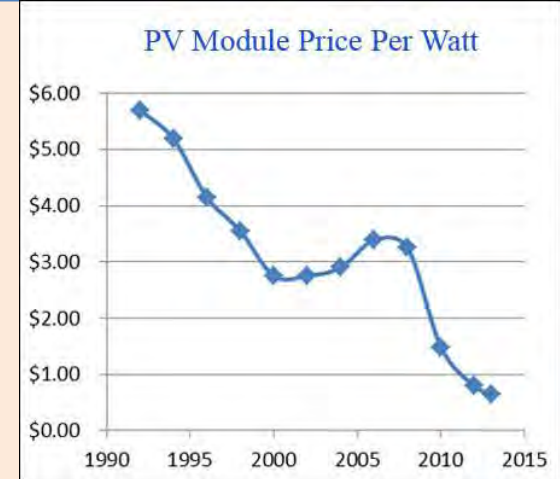
1990: \$6/Watt;

2018: < \$0.60/Watt!

- **Since Cost of Power System is more than half of total cost of offgrid PURE system**

...schemes too costly just 5 years ago are now affordable.

- Other than cost, PV often has clear advantage over wind, hydro, biomass as power source for offgrid: *shortest project gestation period, no need for pre-project resource measurements, simplest to operate*
- Post-harvest systems **specially designed for solar power** (DC systems) now in market.



EU-PHIL ACCESS TO SUSTAINABLE ENERGY PROGRAMME (ASEP)

ASEP RE Productive Uses TA :

Objective : Increase HH incomes with RE micro-business to improve capacity to pay for electricity services provided by ECs



Pilot Sites Selected in 2017

Barangay Banacon, Getafe, Bohol

Fishing community

No. of HHs: 320

Proposed project: Ice plant plus diesel/solar microgrid



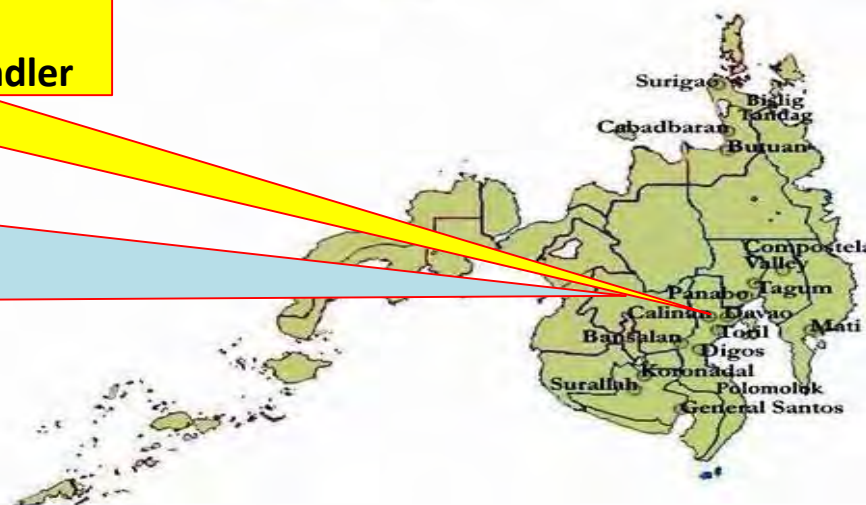
Sitio New Mabuhay, Malita, Davao Occidental

Sitio New Mabuhay, Malita, Davao Occidental

Agricultural community

No. of HHs: 136

Completed project (2018): Abaca Spindler



Sitio Mahayag, Don Marcelino, Davao Occidental

Agricultural Community

No. of HHs: 104

Completed project: Corn Sheller, Corn Miller, Biomass Dryer



Methodology

Site Visits

- Initial assessment of the potential sites productive activities
- Currently using manual labour?
- Crops that can be applied with existing small scale technologies?
- Distances to existing processing facilities?
- Gateways to market?

Baseline Surveys

- Quantify the existing agricultural or fishing related activities
- Quantify the existing access to energy and expenses
- Qualify the highest income generating activities



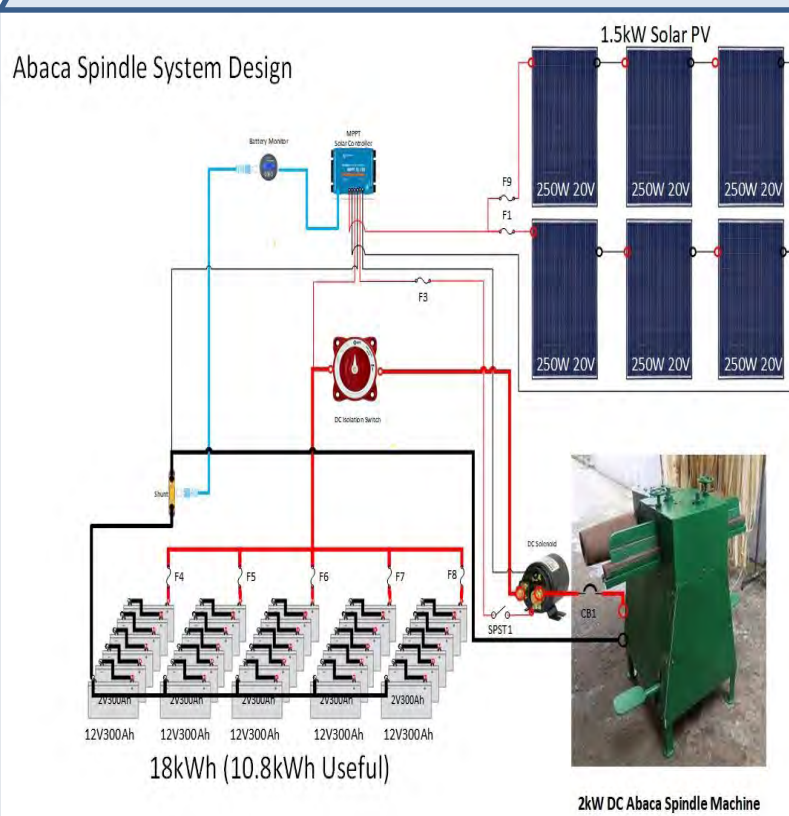
Methodology

System Design

- Determining the level of production capacity required
- Applying the technologies selected for optimal use in RE applications

Financial Analysis

- Comparison of product payback periods
- Model outlining the financial return
- Understanding the benefit to the user through income generation



Particulars	Community Operated
Investment Cost (PHP)	₱983,270
Number of Hired Operators	1
Annual Labour Cost (PHP)	₱38,298
Annual Repair and Maintenance (2.5%/yr)	₱24,581
Annual Operating Expenses (PHP)	₱62,879
Annual Revenue of Equipment (PHP)	₱306,380
Total Cost of Production inc CapEx (PHP/kg)	₱5.26
Annual Net Income	₱243,500
Lifetime Gross Income (PHP)	₱3,063,800
Lifetime Operating Costs (PHP)	₱628,793
Lifetime Profit after CapEx (PHP)	₱1,451,737
Payback (years)	4.0
IRR	9.5%



New Mabuhay: Solar-powered abaca spindle machine



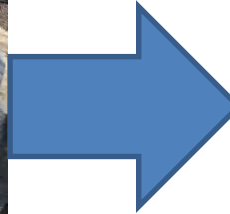
Manual stripping



Abaca spindle machine



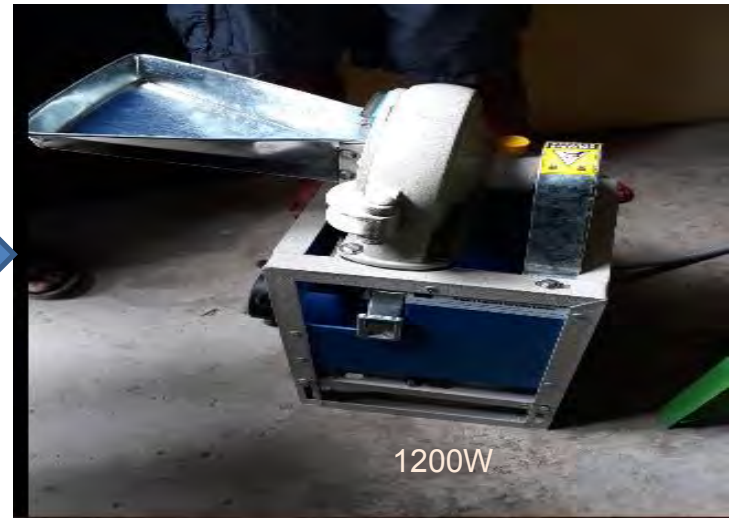
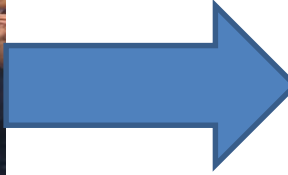
Mahayag: Solar-powered corn sheller and miller



~2 sacks of corn on
cob
=
1 sack of shelled corn



Mahayag: Solar powered corn miller and dryer





Corn Sheller

- High Output per hour
 - 250kg/hr
 - (manual 12.5kg/hr)
 - 1 day per tonne vs 10days per tonne
- Low Power Consumption
 - 2kWh/day
 - 0.14kWh/kg



Biomass Crop Drier (1MT)

- 3 weeks to dry 1 harvest
- 3 Harvests per year
- Low utilization @ 20%
- Waste cob used as biomass
- Low Power Consumption
 - 7kWh/day
 - 0.007kWh/kg



Business Model

ELECTRIC COOP Solar Business Unit (organized for SHS program)

General /
Management
Oversight

Capital
Investment

EC SBU Representative (Municipal level)

Direct
supervision
of operation

Policy
enforcement;
M&E

Community Livelihood Unit (Sitio)

Day-to-day operation
and maintenance

Accounting,
bookkeeping,
marketing



Upcoming: Banacon, Bohol



Banacon is an isolated fishing community and ice is a valued commodity.





Microgrid to compliment the system, utilising possibly unused daily power generation and reducing overall cost of energy

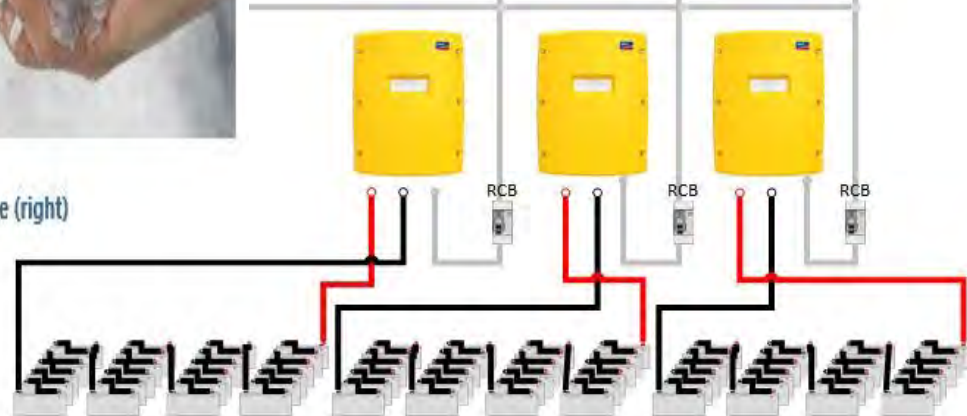
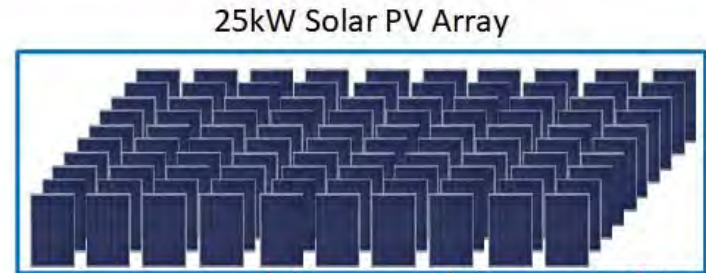


Technical Design: Ice making system

Ice Making System Design



Proposed flake ice making system(left) and the product of flake ice (right)



336kWh (200kWh Useful)



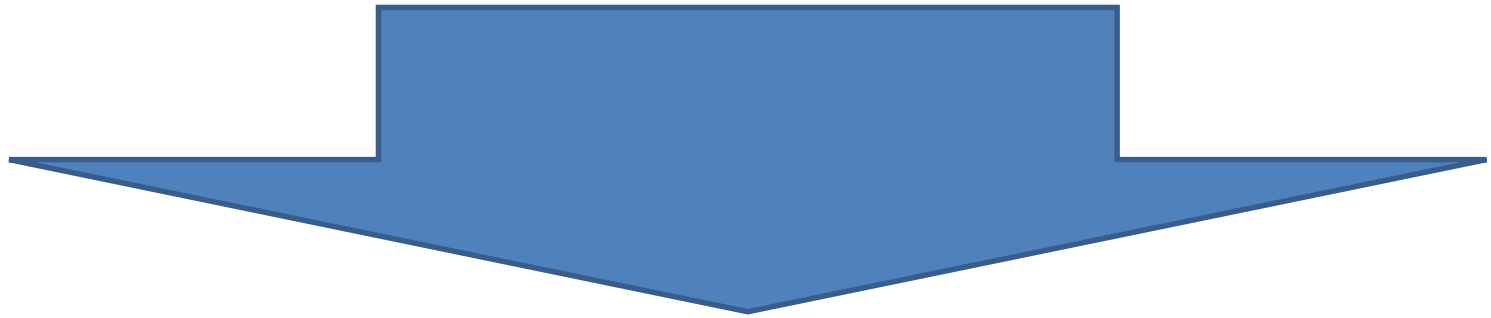
Upcoming PURE Activities

TA Activity	Estimated Start
<p>Banacon Ice Maker and Solar/Diesel Microgrid</p> <ul style="list-style-type: none">• Est 20 m capex• FS already completed Feb 2019, just needs refinements.• Others	<p>July 2019 (Funding Application, Equipment, Procurement, Site Installation, Community Training)</p>
<p>Small PURE system in Luzon, different post-harvest crop (TBD) Est Php 1-2 m capex</p>	<p>April 2019 (Baseline Study and FS) Installation Sept 2019</p>



Some conclusions

PURE projects have broader benefits for the country




- increased productivity
- higher employment
- balanced regional development
- higher economic growth



However, the realities...

- Given micro-scale investments, difficulty of finding private sector to finance;
- Need coherent Government program to pro-actively identify, do good FS and rank the most promising projects.
- Key is to do projects that are not just technology demonstrations but have credible income generating possibilities for communities.



A large group of people, including men, women, and children, are gathered in front of a yellow house with solar panels on the roof. They are all smiling and raising their hands in celebration. The house has a corrugated metal roof with two large blue solar panels. In the background, there is another house with a thatched roof and a dirt path leading up a hillside. The scene is set in a lush, green, rural environment.

Maraming Salamat!



New Mabuhay - Financial Analysis

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Assumptions:

- Life of System = 10years
- Lifetime Processing = 306MT
- Daily Processing Capacity = 120kg (x2 machines)
- Labour Cost = PHP150/day
- Lifetime R&M = 25% Capex
- Processing Fee = PHP10/kg

