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Community based Bamboo Biomass Distributed Power

Life Changing Rural Electrification Strategy in Indonesia

Jaya Wahono

Clean Power Indonesia

INBAR Webinar July 30th 2020

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Indonesia:
Energy Rich and Electricity Poor

Picture taken by NASA in 2017

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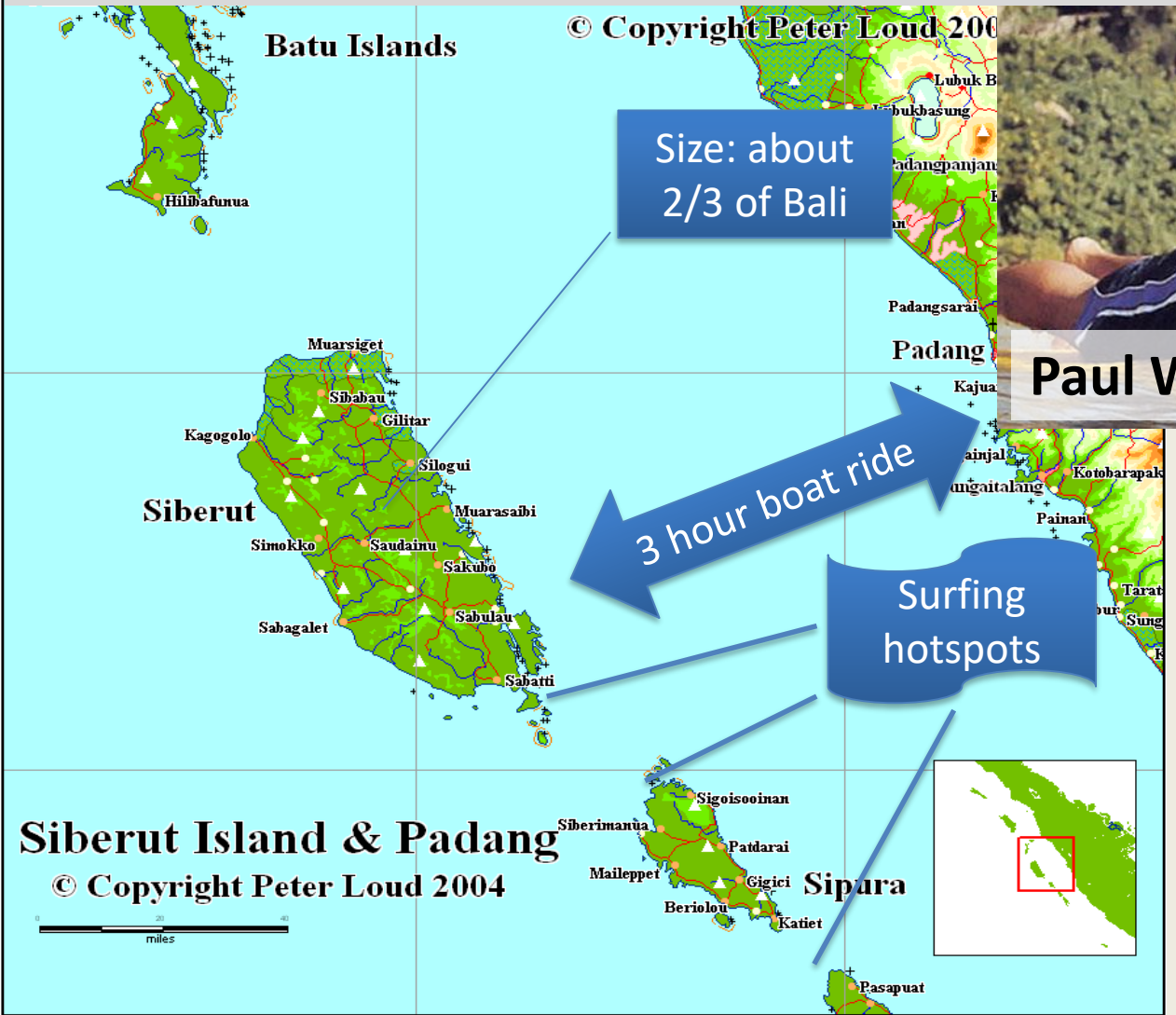
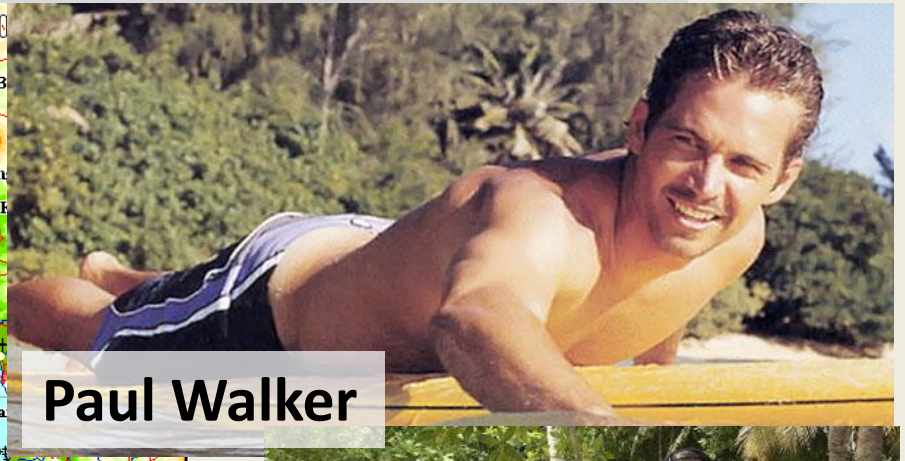
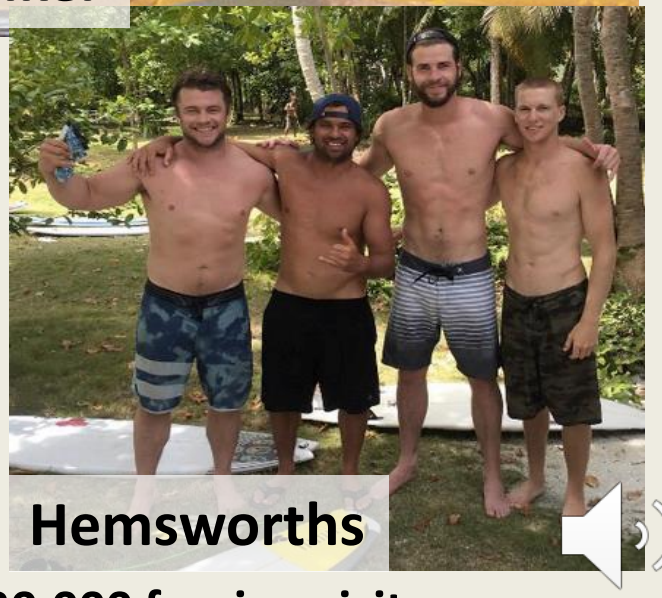
Mentawai is famous all over the world and yet many of the people still live in the dark







20,000 foreign visitors per year

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The experience of people in Mentawai who do not have access to grid electricitiy

- People are using kerosene lamps or expensive diesel genset for simple lighting which roughly cost them about **10-20 times higher** for electricity than what people are paying in Jakarta and other big cities in Indonesia
- Some received solar PV grant assistance from Ministry of Energy, but they have difficulty in maintaining and replacing spare parts when it breaks down.

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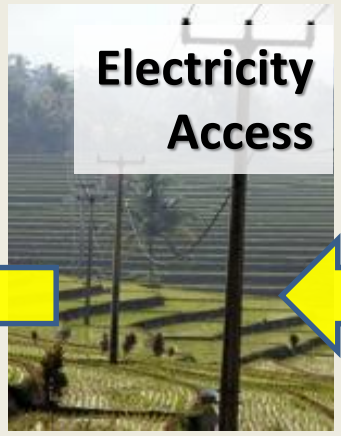
Bamboo comes to the rescue



People of Mentawai becomes producers of biomass

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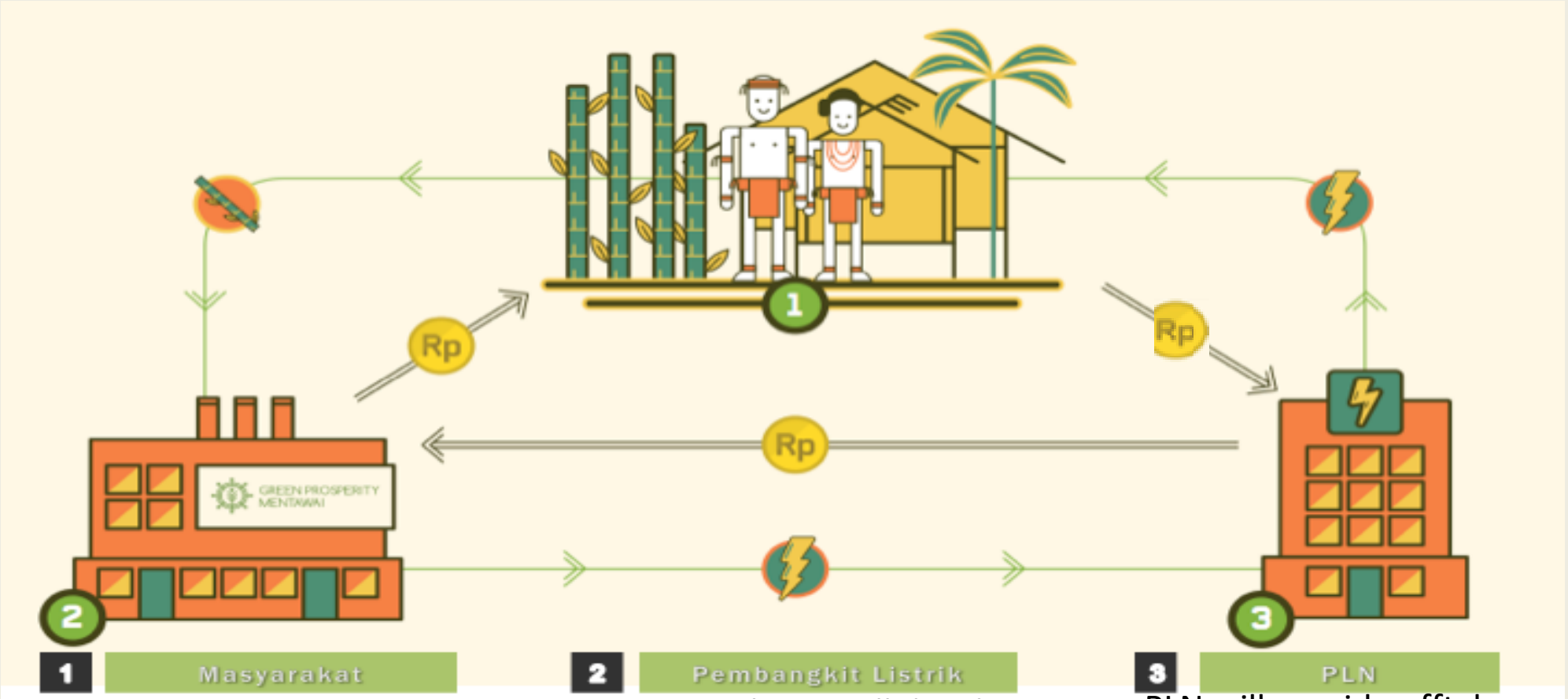

Local Village will provide bio-mass for power plant and Regional Government will become part owner of the power plant.

Private Developer will develop and build the source of **biomass feedstock**, **the power plant** and **the distribution network**.

PLN will provide offtaker guarantee and distribute government's subsidy to local communities

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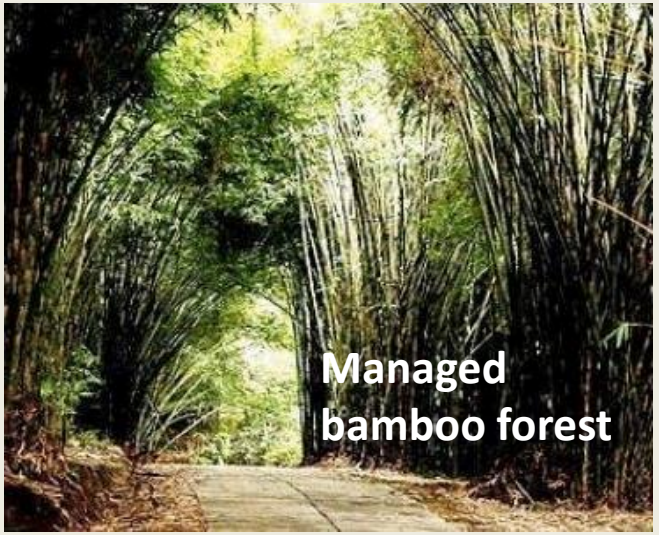
MENTAWAI MODEL is now a best practice in Indonesia



Crop Drying System

Cooking fuel

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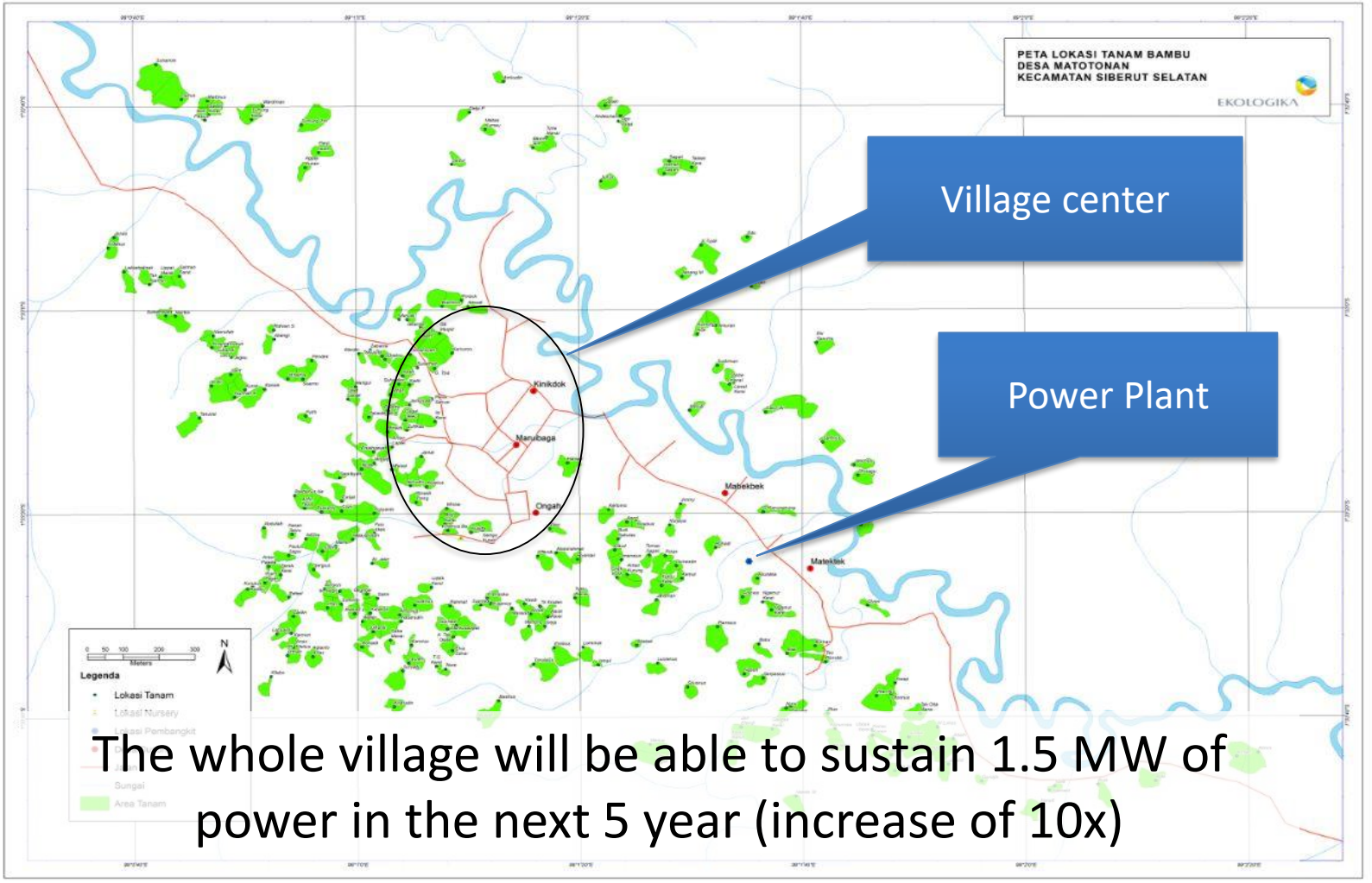
Matotonan Village: 150 kWe

Planting areas in Matotonan

270 households each received 100 bamboo seedlings



The whole village will be able to sustain 1.5 MW of power in the next 5 year (increase of 10x)

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Challenge on electrifying remote villages

Matotonan Village:
1 x 100 kWe + 1 x 50 kWe

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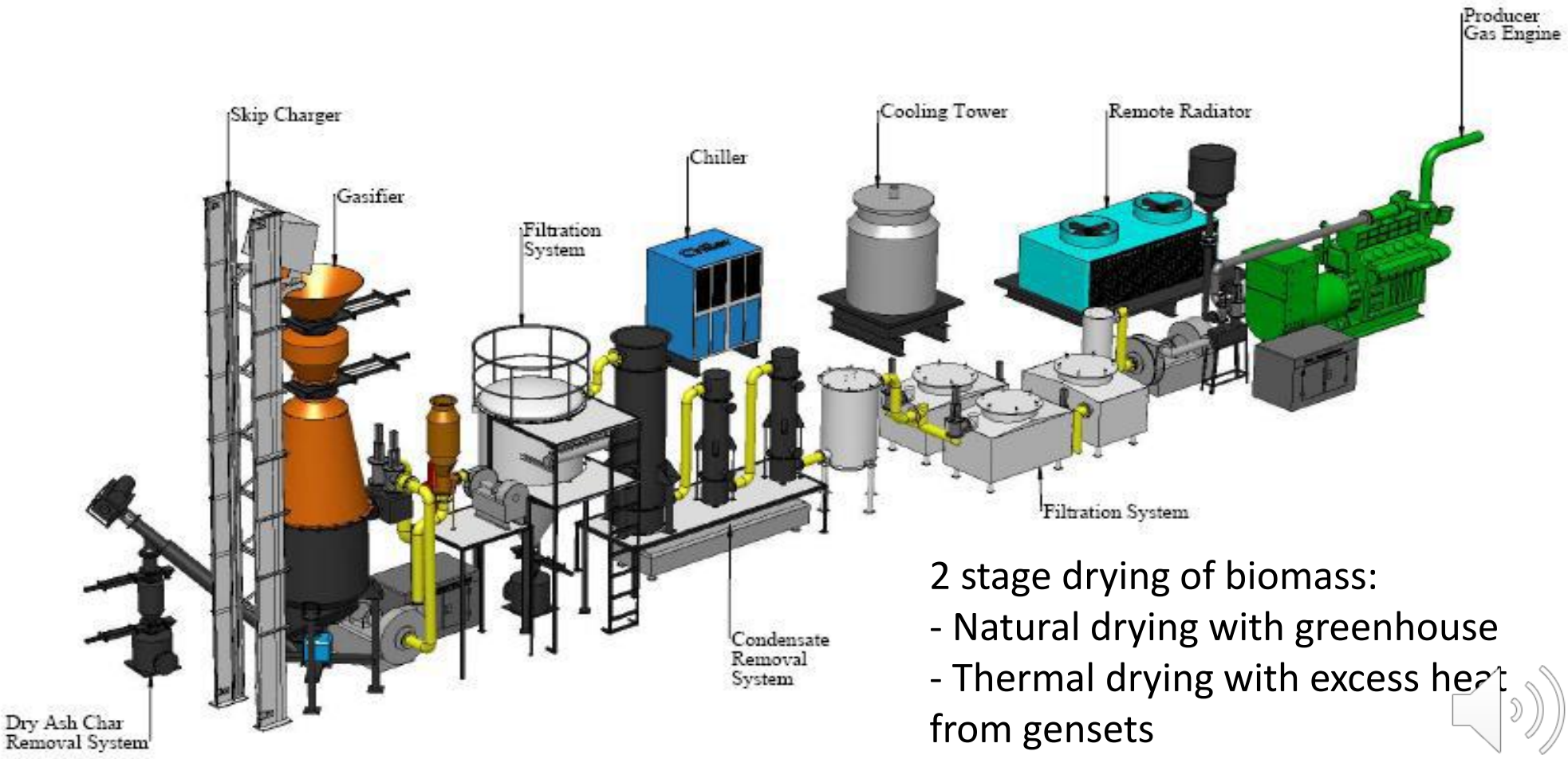
Typical System Configuration



2 stage drying of biomass:
- Natural drying with greenhouse
- Thermal drying with excess heat from gensets

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Locals are being trained as operators

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Feedstocks are exclusively supplied by locals

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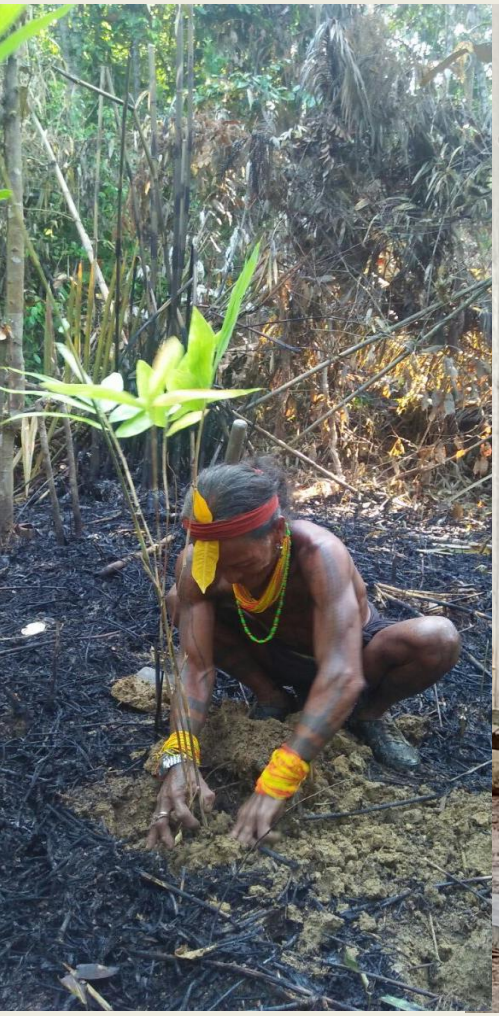
Women can work to supply bamboo



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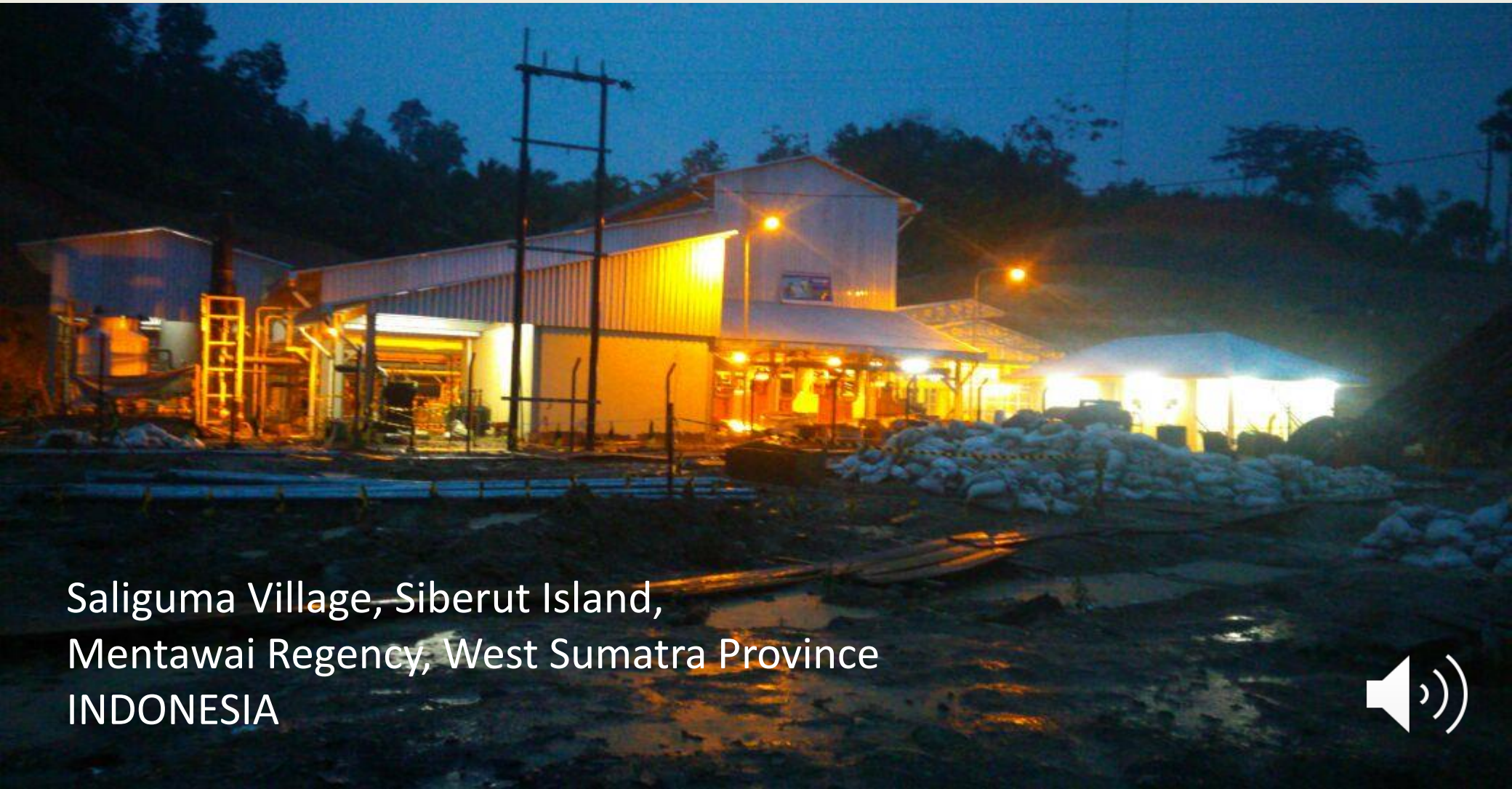
First Light on First community based Bamboo Biomass Power Plant in the world (April 2018)



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Since then people of Saliguma village have access to reliable, equitable, affordable and sustainable electricity

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Inauguration by Minister of National Development Planning on September 17th, 2019

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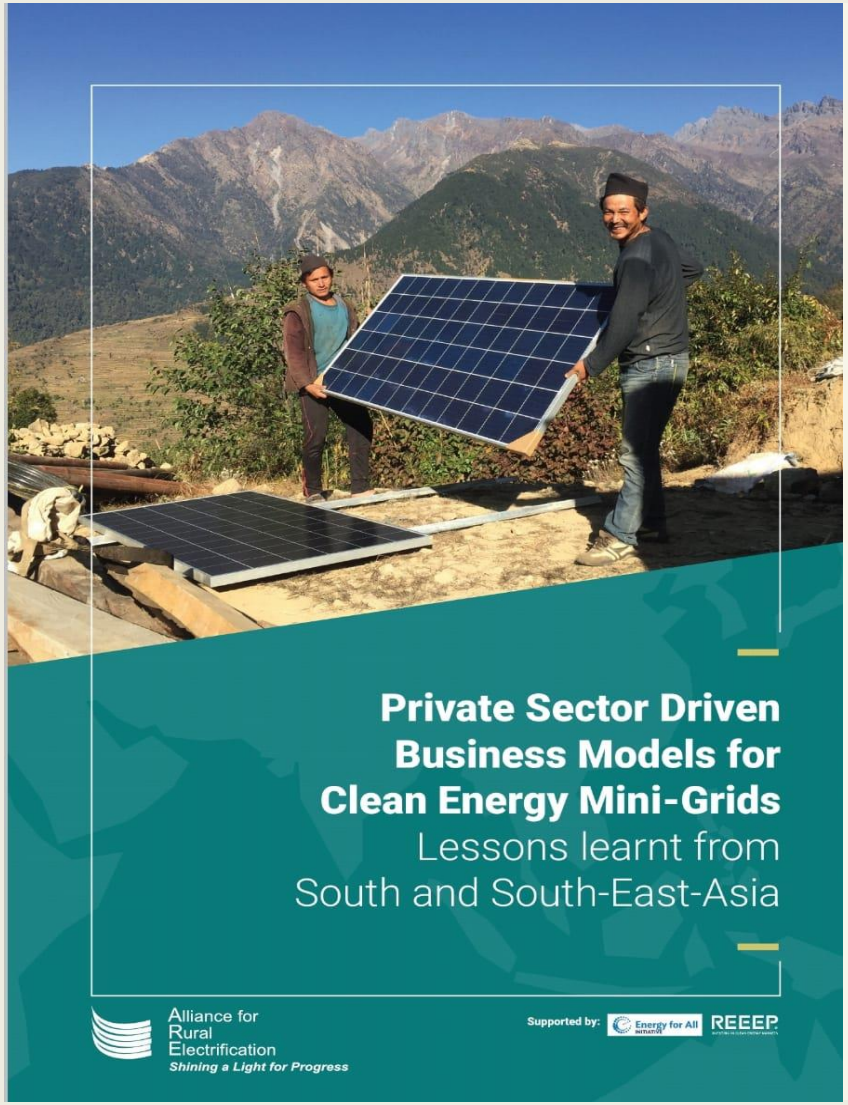
Jobs creation and GHG emission reduction is key in Mini-Grids Development



Private Developer(s)	Location	Commissioning year	Size & technology	Households electrified	Jobs Created	Annual GHG emissions avoided (tonnes CO_2)
Rahimafrooz Renewable Energy	Ghorjan Island, Bangladesh	2018	80 kWp solar PV hybrid	310	60	25
Okra and Pteah Baitong	Kbal Damrei, Cambodia	2018	8 kWp solar DC hybrid	64	5	1
Mlinda Foundation	Sahitoli, India	2016	22.4 kWp solar PV hybrid	124	18	29
Tara Urja	Derni, India	2018	31.2 kWp solar PV hybrid	141	43	44
Clean Power Indonesia	Mentawai, Indonesia	2018	700 kWp biomass gasifier	1,250	450	3,000
Mandalay Yoma	Dee Doke South, Myanmar	2018	55 kWp solar PV hybrid	126	23	5
Yoma Micro Power	Thit Seint Gyi Village, Myanmar	2017	31.2 kWp solar PV hybrid	270	20	23
Gham Power	Khotang, Nepal	2015	52 kWp solar PV hybrid	650	200	36
Subas and Sujan Electric Service Center	Simli Khola, Nepal	2016 (original project start 2009)	29 kWp hydro	495	140	9
PowerSource Philippines	Rio Tuba, Philippines	2016 (original project start 2005)	893 kWp biomass gasifier	1,885	16	n/a
Blue Solar and Symbior Solar	Koh Jik Island, Thailand	2018 (original project start 2004)	60 kWp solar PV hybrid	400	13	8

Table 1. Overview of mini-grid case studies and their impact in rural South and South-East Asia

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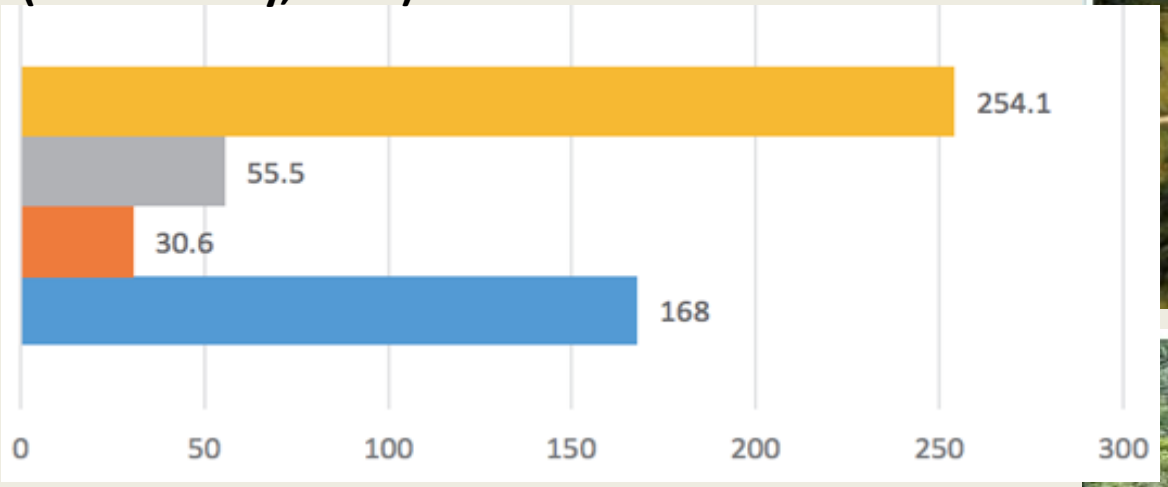
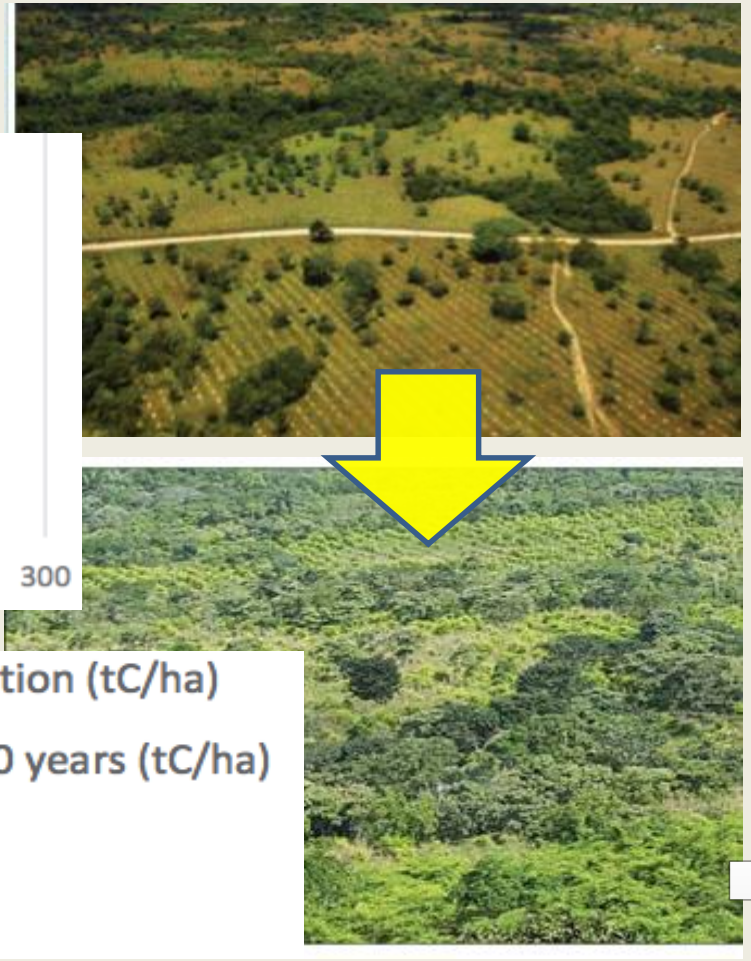
Synergy between Renewable Energy & Forest Restoration

Carbon sequestration and carbon emissions reduction through bamboo forests and products. (INBAR study, 2018)





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Synergy between Renewable Energy & Village based Industry

Coconut Sugar Production

Rural Fish Processing Facility

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Multiple Benefits if PLN's Diesel Gensets are replaced with community based Biomass PP

Type of Plant	BPP (cUSD/kWh) Case Study of 2.2 MW	PLN Savings/year Case Study of 2.2 MW	Local Community Engagement
Diesel only	22.67	-	Passive
Hybrid (Diesel + Solar)	21.06 ↓ 7.07% from Diesel	3.64 Billion	Passive
Biomass	**15.01** ↓ **33.8%** from Diesel	16.2 Billion	**Active** - Direct purchase of Bamboo from Local Community - Bamboo Price = Rp 300-400/kg, capital benefit to local community = [illegible]-10 **Billion/year (Rp. 1 Billion/village)**..

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Potential Impact is enormous

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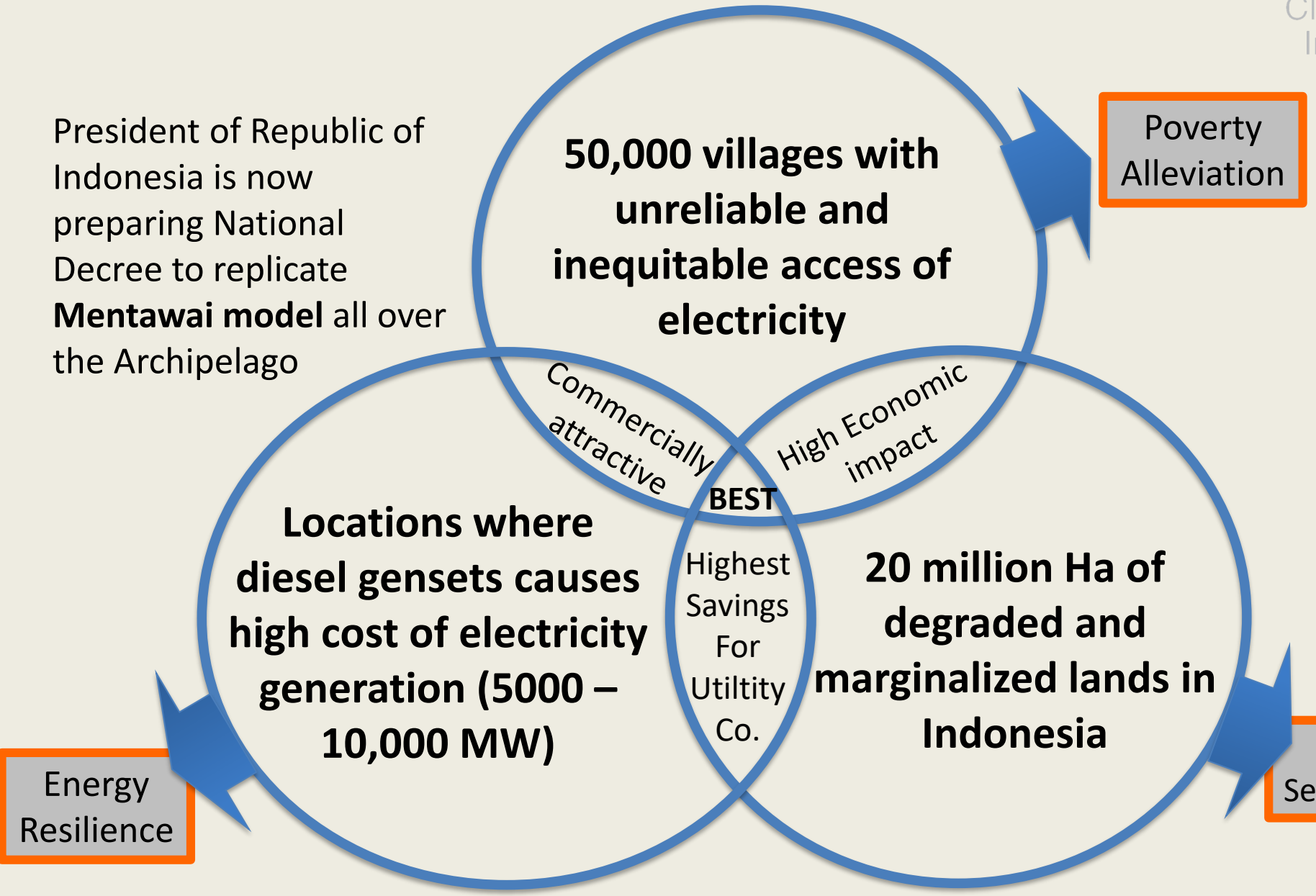
President of Republic of Indonesia is now preparing National Decree to replicate **Mentawai model** all over the Archipelago



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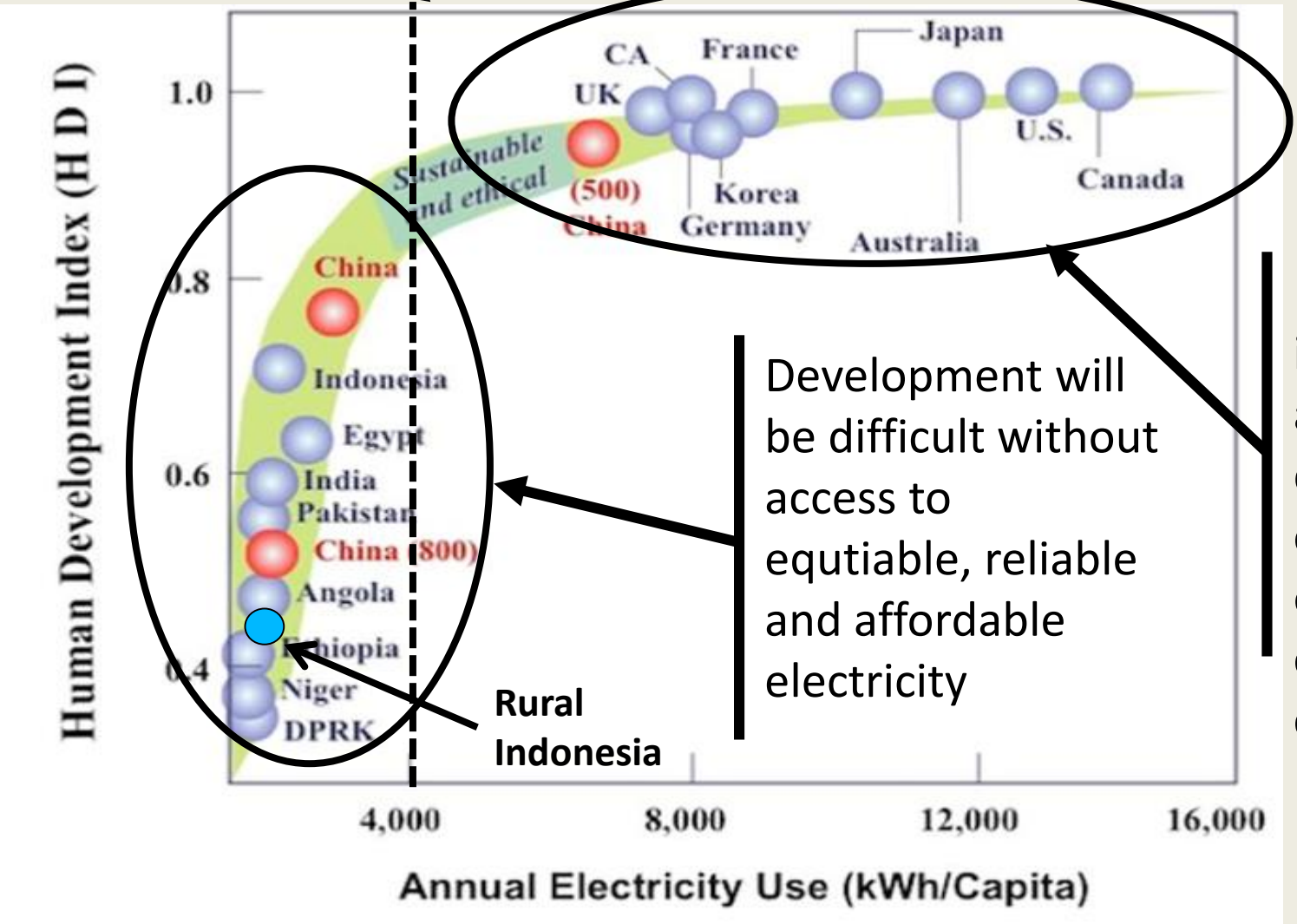
Bringing the rural Indonesia to the forefront of development



"Good Life" threshold

Development will be difficult without access to equtiable, reliable and affordable electricity

Rural Indonesia

Many urban areas in Indonesia already at par with developed countries in terms electricity consumption per capita

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INDONESIA post Covid 19

The most important issues:

- Jobs Jobs Jobs
- Cost efficiencies on PLN's distributed power generations.
- Energy self sufficiency for all regions in Indonesia.

The Government aims to bring universal access of electricity to Indonesia by the end of this year and increase Renewable Energy mix to 23% by 2025.

Bamboo biomass will be key