

Private Sector Development of the Sabang Micro-Grid Project

A Solar PV-Diesel Powered Off-Grid Solution in Palawan, Philippines

Asia Clean Energy Forum 2018

By

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Agenda

- I. Project Site**
- II. Project Objectives**
- III. Project Design**
- IV. Challenges**

Site Characteristics

Energy Demand and Ecological Requirements in Bgy Cabayugan

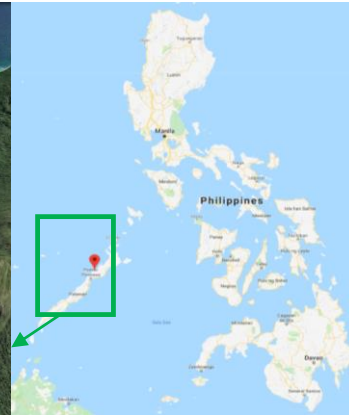
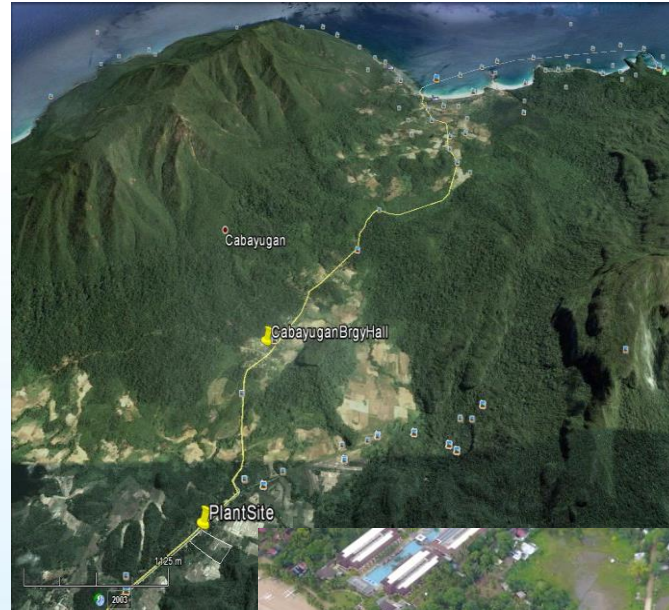
Sights/ Attractions:

- Puerto Princesa Subterranean River National Park
 - Protected Area
 - Tourist Attraction

→ Ideal for green growth projects

Customers:

- ~ 600 Households
- Public buildings (schools, churches, etc.)
- Hotels/ cottages/ restaurants
- Small businesses/ shops



Objectives and Targets

Objectives

- To provide electricity to households and businesses
- At 24/7
- For an affordable price
- In the cleanest possible way
- Within the shortest possible time



3 Targets to meet:

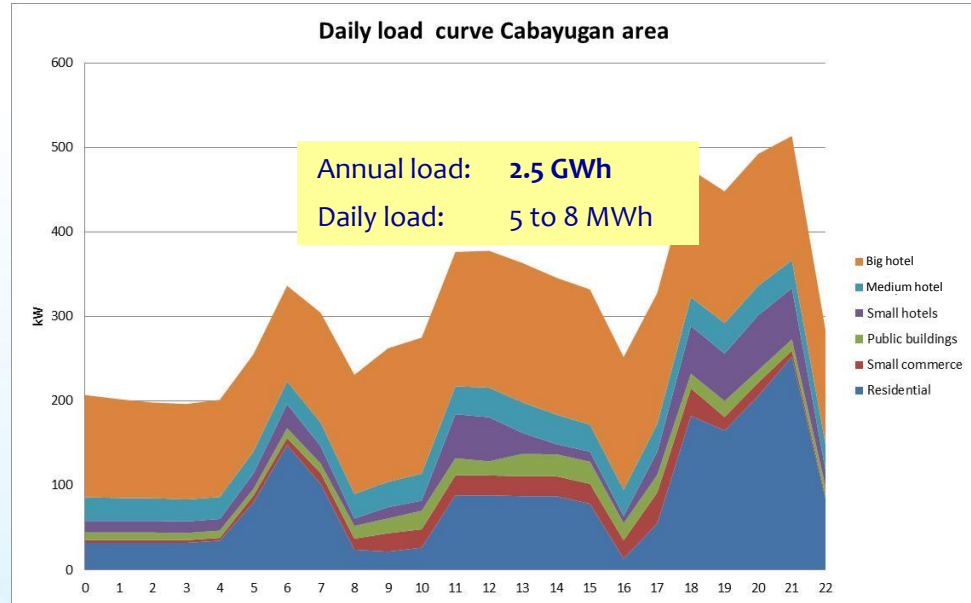
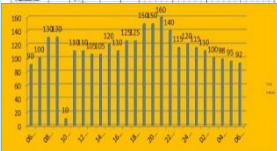
- Continuous power supply
- As green as possible
- In compliance with the Philippine regulatory framework

Load Estimate

24-hours Load Curve is key for Solar Hybrid System – Not only Peak Load



Serial	Name	Address	Phone	Occupation	Load (kW)	Remarks
1	Mr. John Doe	123 Main St	0912 345 6789	Teacher	1.5	Public building
2	Ms. Jane Smith	456 Main St	0912 345 6789	Small business	2.5	Small commerce
3	Mr. John Doe	789 Main St	0912 345 6789	Residential	1.0	Residential
4	Ms. Jane Smith	101 Main St	0912 345 6789	Public building	2.0	Public building
5	Mr. John Doe	202 Main St	0912 345 6789	Small business	1.5	Small commerce
6	Ms. Jane Smith	303 Main St	0912 345 6789	Residential	1.0	Residential
7	Mr. John Doe	404 Main St	0912 345 6789	Public building	2.0	Public building
8	Ms. Jane Smith	505 Main St	0912 345 6789	Small business	1.5	Small commerce
9	Mr. John Doe	606 Main St	0912 345 6789	Residential	1.0	Residential
10	Ms. Jane Smith	707 Main St	0912 345 6789	Public building	2.0	Public building
11	Mr. John Doe	808 Main St	0912 345 6789	Small business	1.5	Small commerce
12	Ms. Jane Smith	909 Main St	0912 345 6789	Residential	1.0	Residential
13	Mr. John Doe	1010 Main St	0912 345 6789	Public building	2.0	Public building
14	Ms. Jane Smith	1111 Main St	0912 345 6789	Small business	1.5	Small commerce
15	Mr. John Doe	1212 Main St	0912 345 6789	Residential	1.0	Residential
16	Ms. Jane Smith	1313 Main St	0912 345 6789	Public building	2.0	Public building
17	Mr. John Doe	1414 Main St	0912 345 6789	Small business	1.5	Small commerce
18	Ms. Jane Smith	1515 Main St	0912 345 6789	Residential	1.0	Residential
19	Mr. John Doe	1616 Main St	0912 345 6789	Public building	2.0	Public building
20	Ms. Jane Smith	1717 Main St	0912 345 6789	Small business	1.5	Small commerce
21	Mr. John Doe	1818 Main St	0912 345 6789	Residential	1.0	Residential
22	Ms. Jane Smith	1919 Main St	0912 345 6789	Public building	2.0	Public building
23	Mr. John Doe	2020 Main St	0912 345 6789	Small business	1.5	Small commerce
24	Ms. Jane Smith	2121 Main St	0912 345 6789	Residential	1.0	Residential

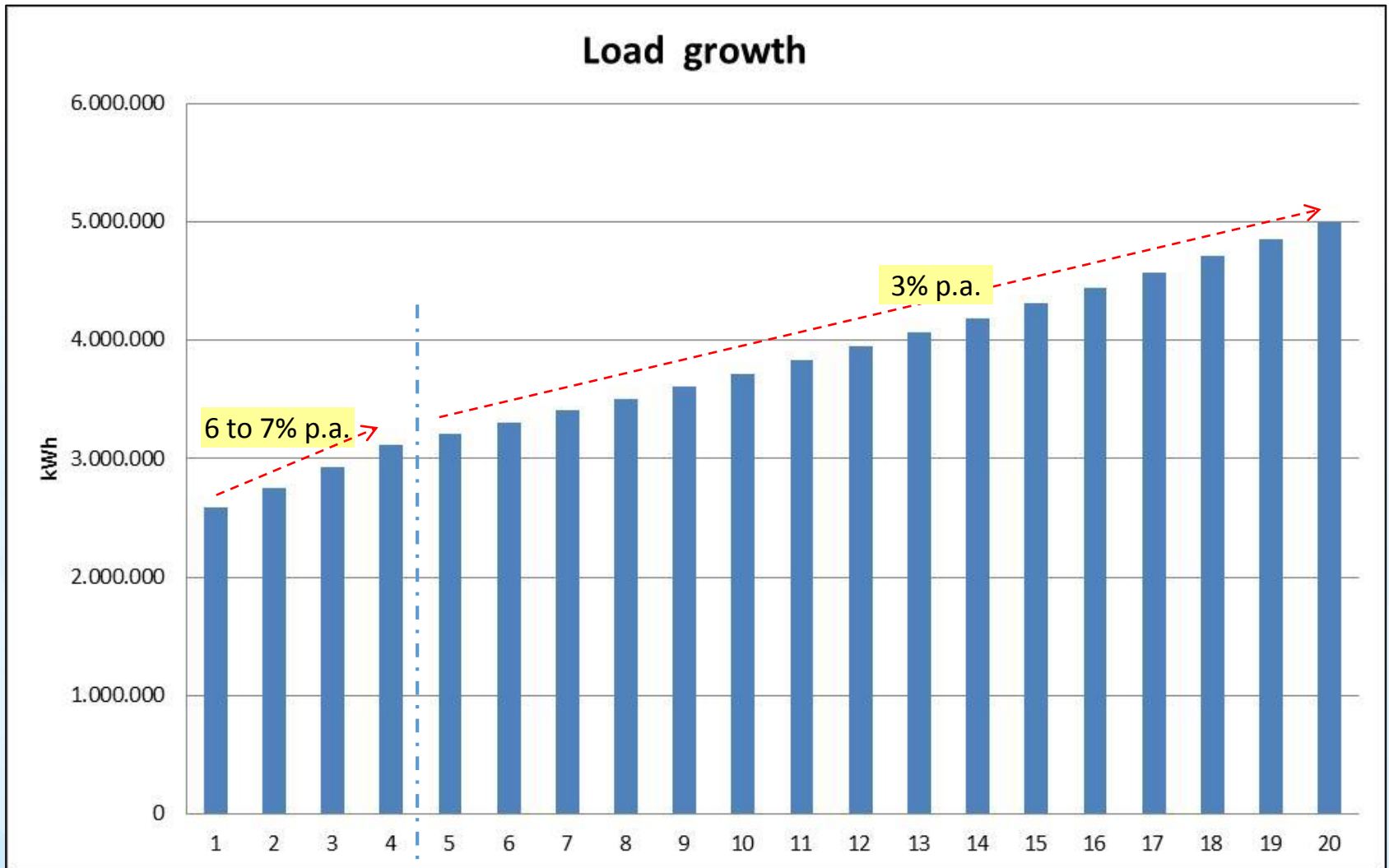


Load estimates based on:

- Interviews regarding consumers' economic status and their future consumption needs & demands if given 24/7 electricity

Energy Demand Projection

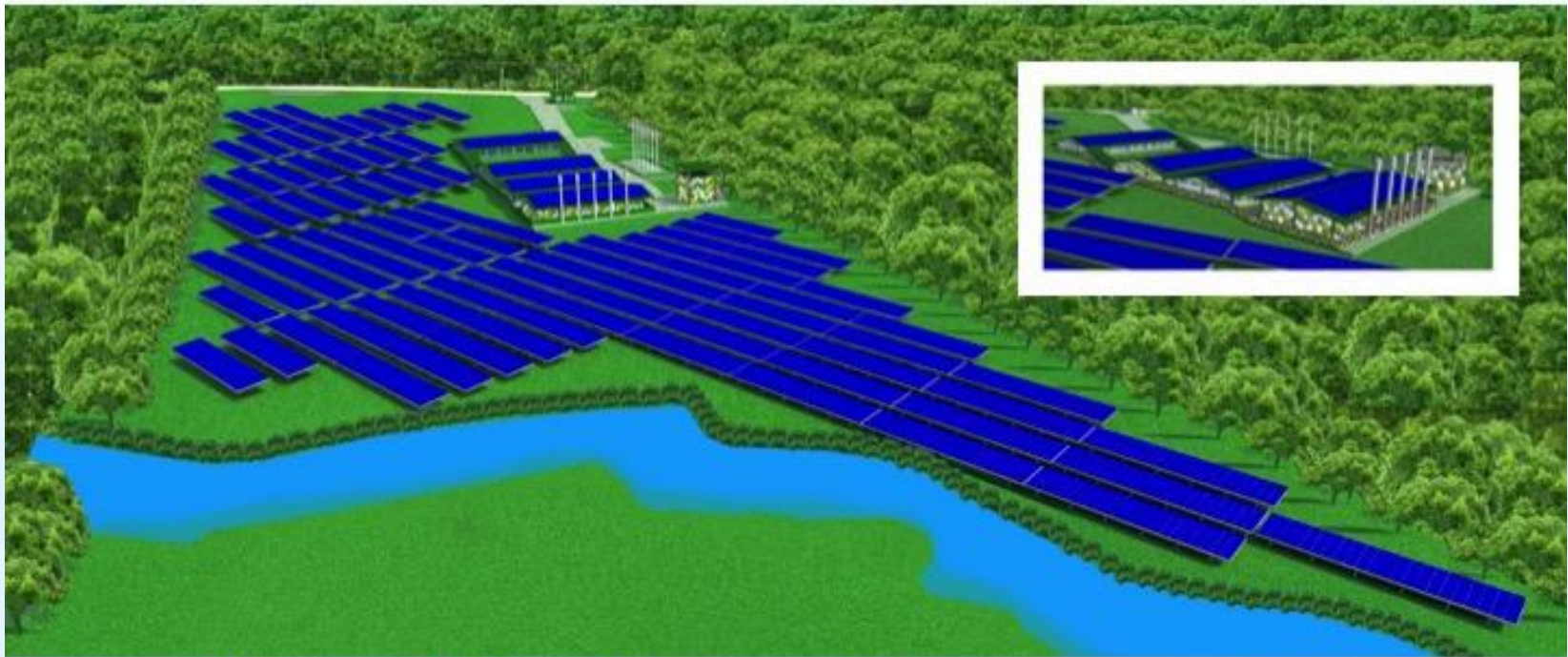
Estimate for the Load Growth in Cabayugan



Solar PV-Battery-Diesel Hybrid Power Plant plus Micro Grid

24/7 power with on average 50% clean solar PV in the energy mix

Electrifying Barangay Cabayugan ("Sabang"), Puerto Princesa City, Palawan, The Philippines



1.4 MWp
SOLAR PV
POWER PLANT

1.2 MW
DIESEL
GENERATORS

2.3 MWh
DURABLE BATTERY

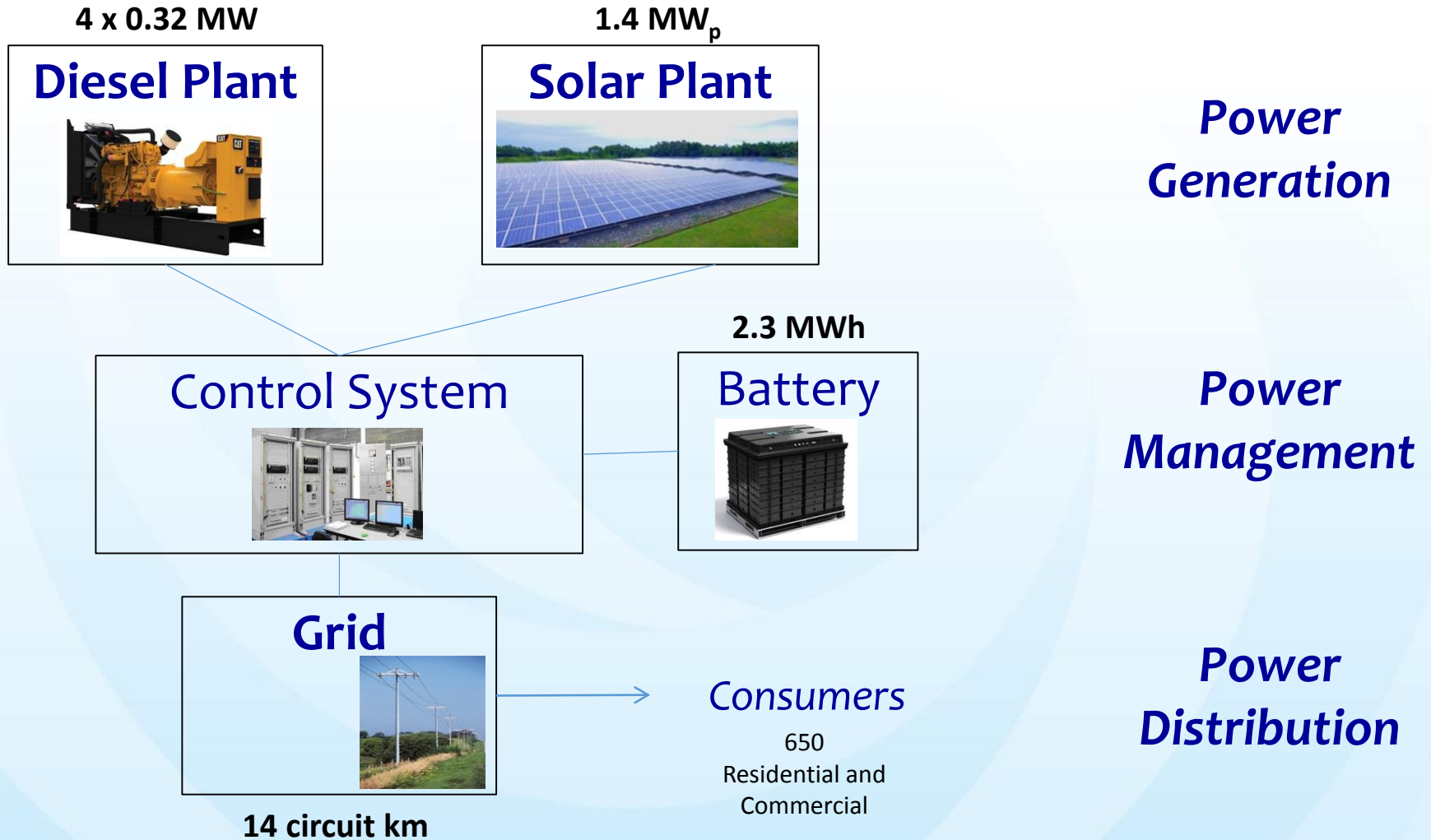
14 km
MICRO GRID with
SMART METERS

650
OFFTAKERS
SMALL & LARGE

25,700
METRIC TONS CO₂
SAVINGS OVER
20 YEARS

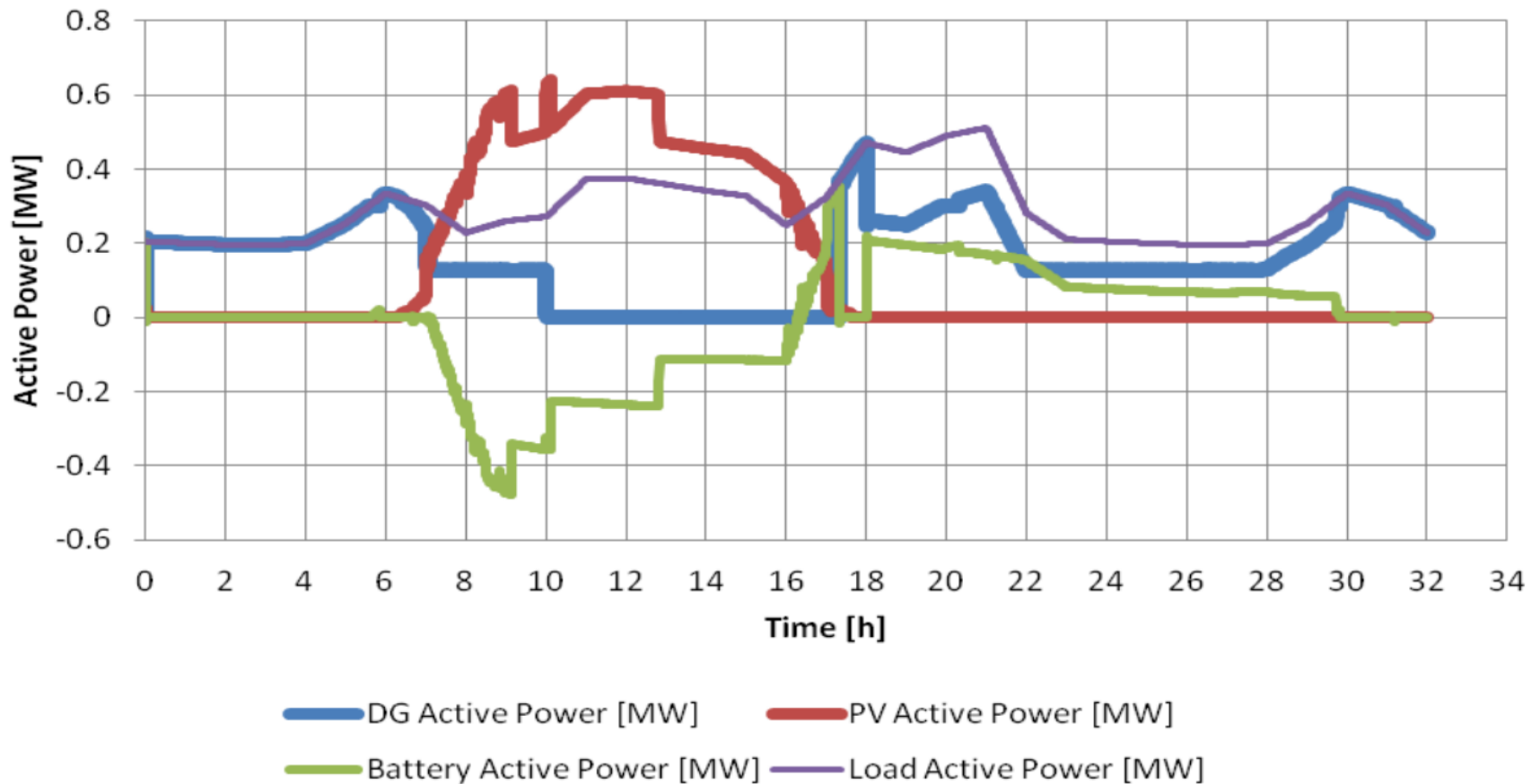


System Components



Mode of Operation of the Hybrid Plant

Example for the plant operation at an average day:

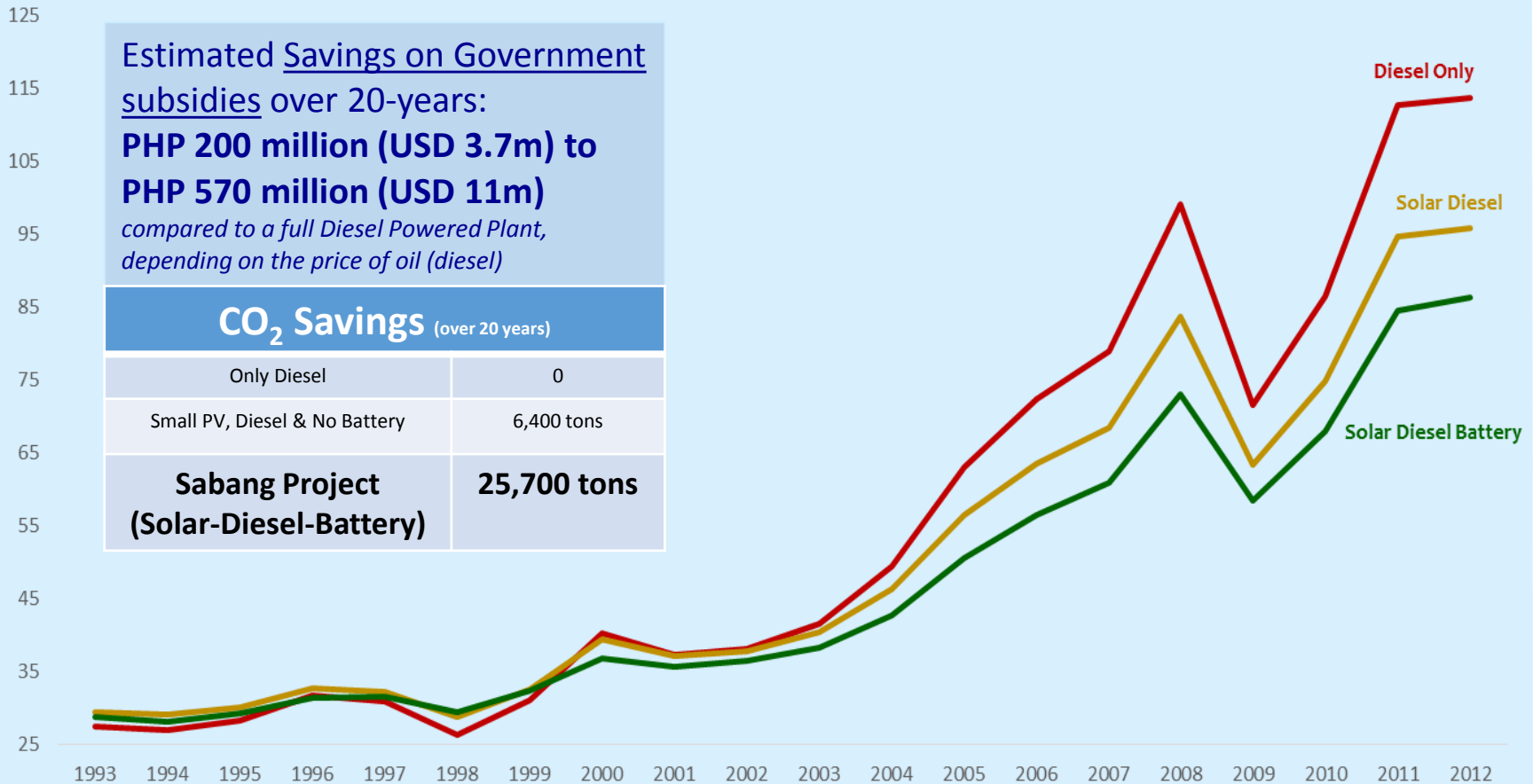


Subsidy Savings

Solar-Diesel Hybrid Compared to Diesel Only

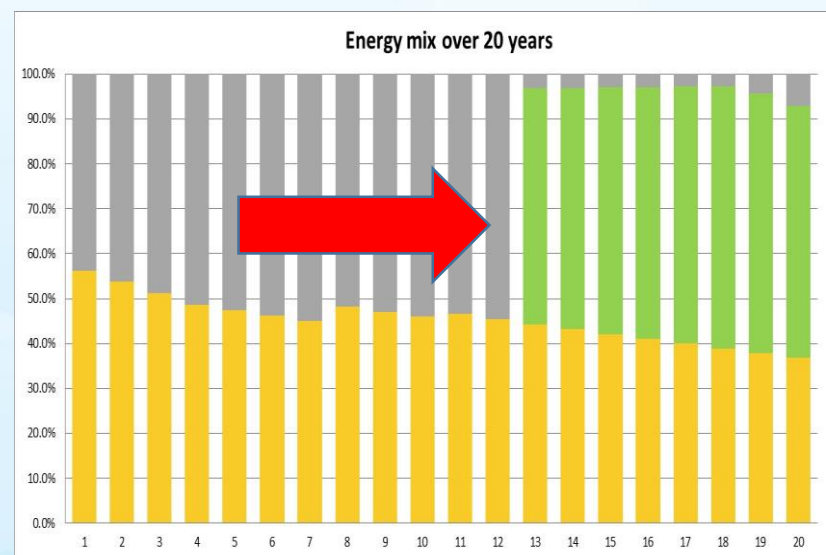
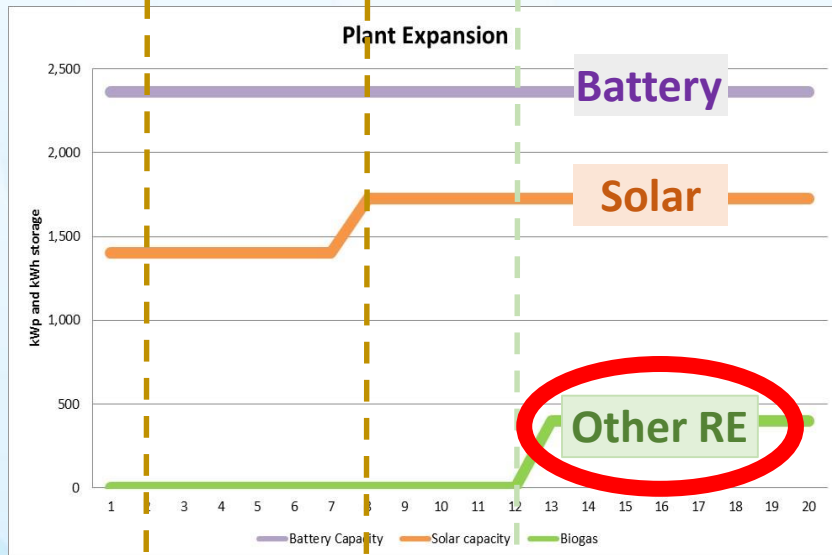
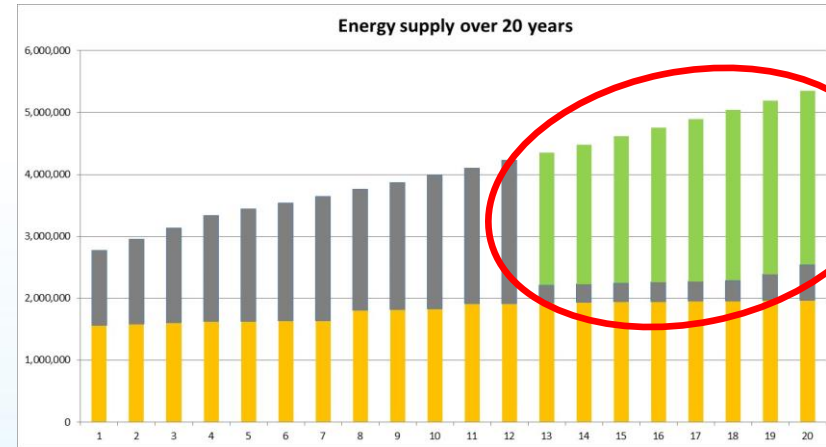
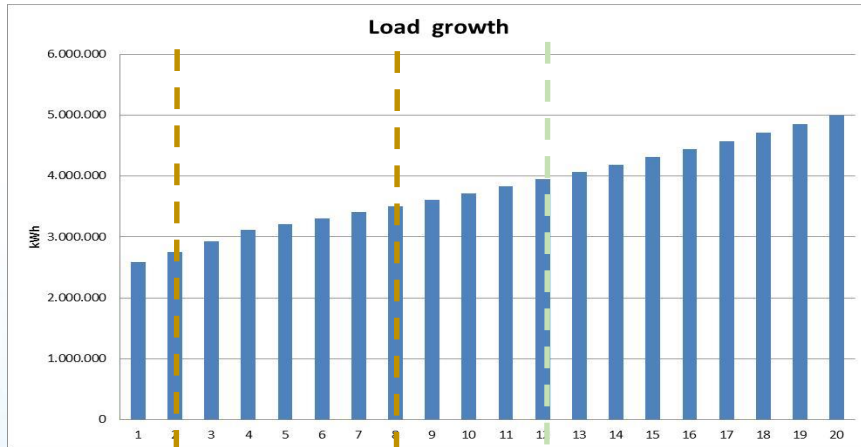
Electricity Price Evolution 1993-2012 in actual historical data

— Diesel Only — Solar Diesel — Solar Diesel Battery



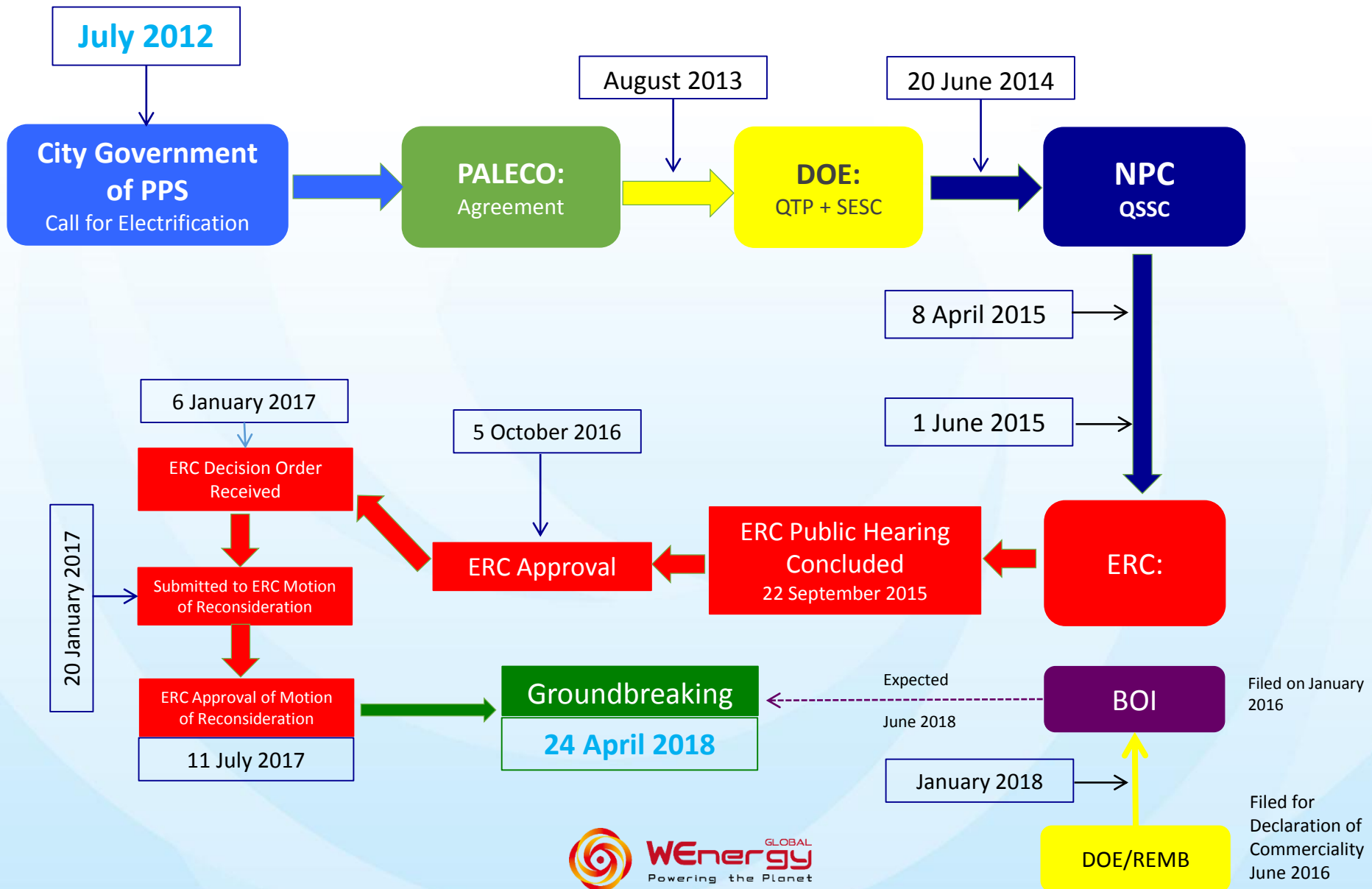
Plant Design for Future Development

Potential Roadmap for Technology Deployment – Getting Diesel Out!



The Development Process of the Sabang Project

Delay = loss of economic development



Challenges in Developing Micro Grid Projects

Old Protocols, New Technologies



Governments

- Unsuitable frameworks for RE Hybrid Systems & Micro Grids
- High transaction cost, due to
 - Old Policies
 - Lack of synchronicity



Banks/Financial Institutions/Insurance Companies/Pension Funds

- Lack of experience/knowledge in RE Hybrid Systems and Micro Grids
- Thresholds for project sizes are too high
- Lack of knowledge in policy frameworks
- Excessive IRR expectations



Companies

- Either technology or finance driven: both is needed!
- Weak ability to work in complex decision-making environments

Thank You!