The Results of Study Identifying the Potential Site of the Project

Challenergy Inc.
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January 18, 2018

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Survey Area in F/S

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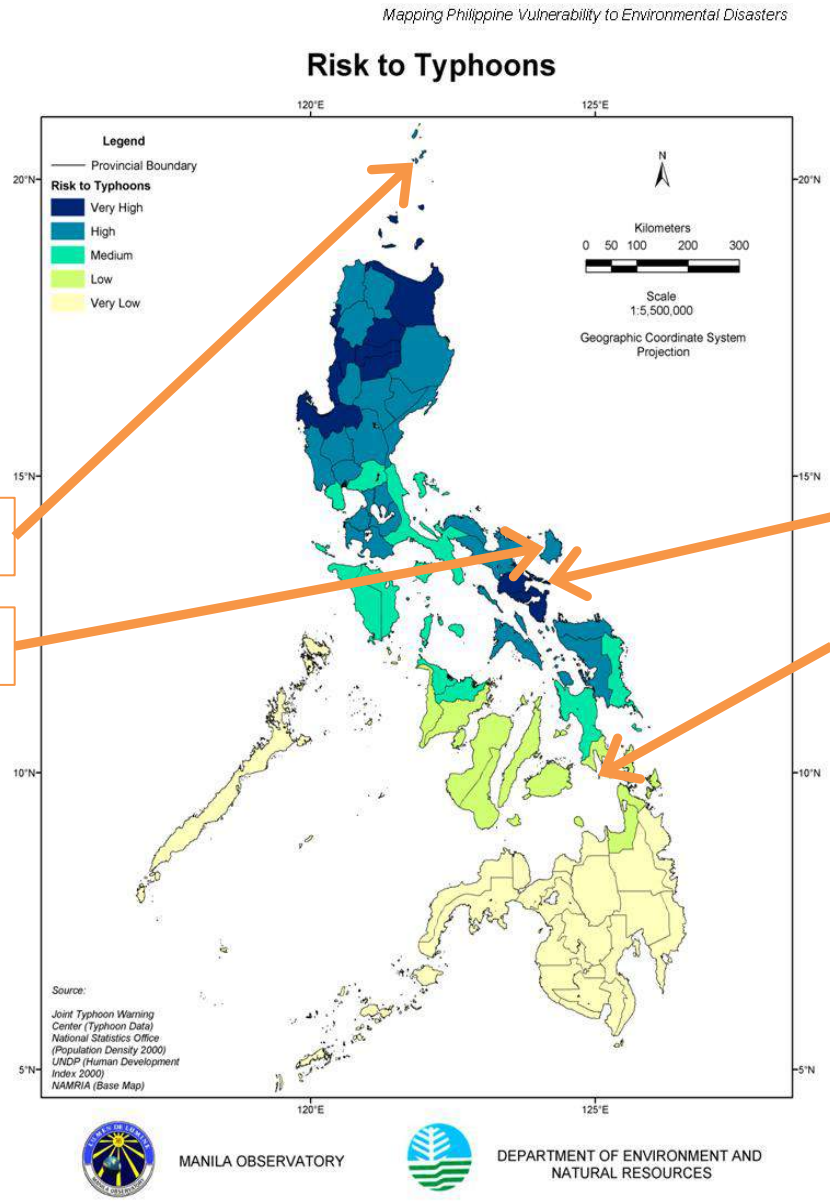

First Survey

2.Batanes

1.Catanduanes

Second Survey

4.Rapu-Rapu

3.Limasawa

Wind Energy Potential Analysis

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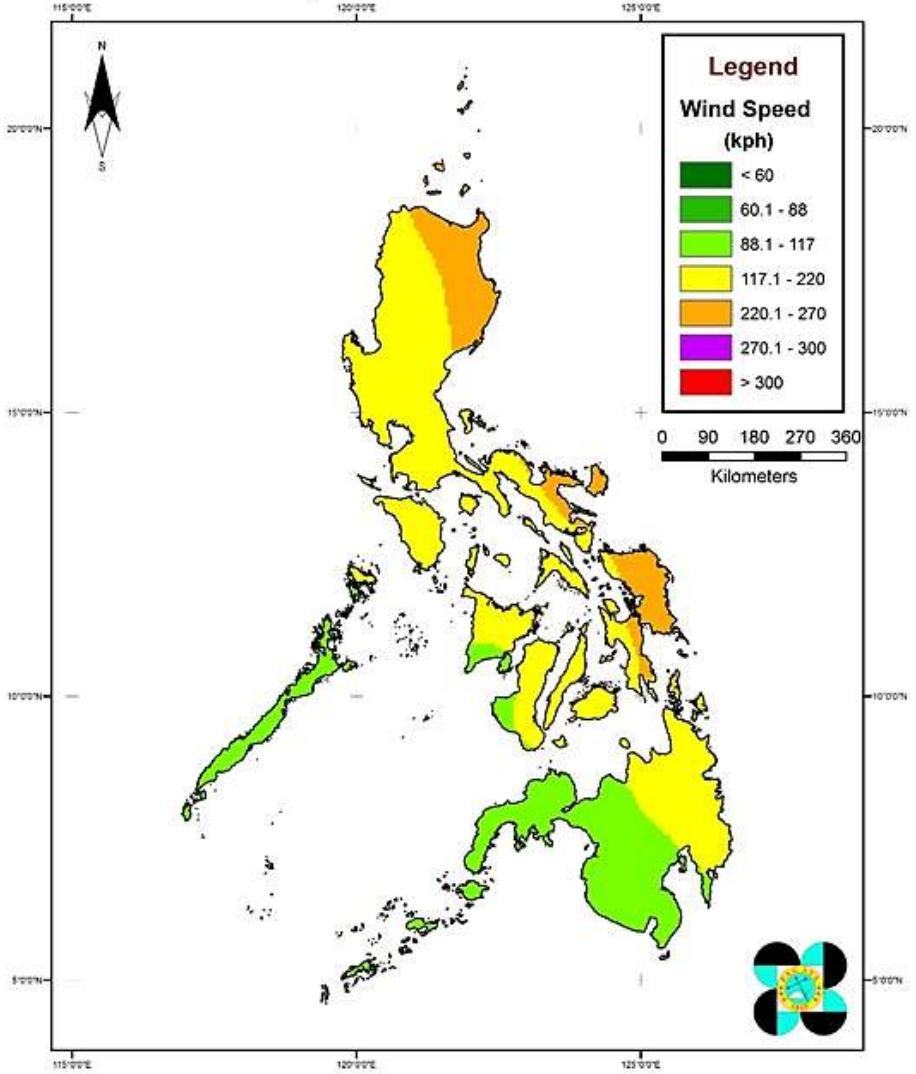
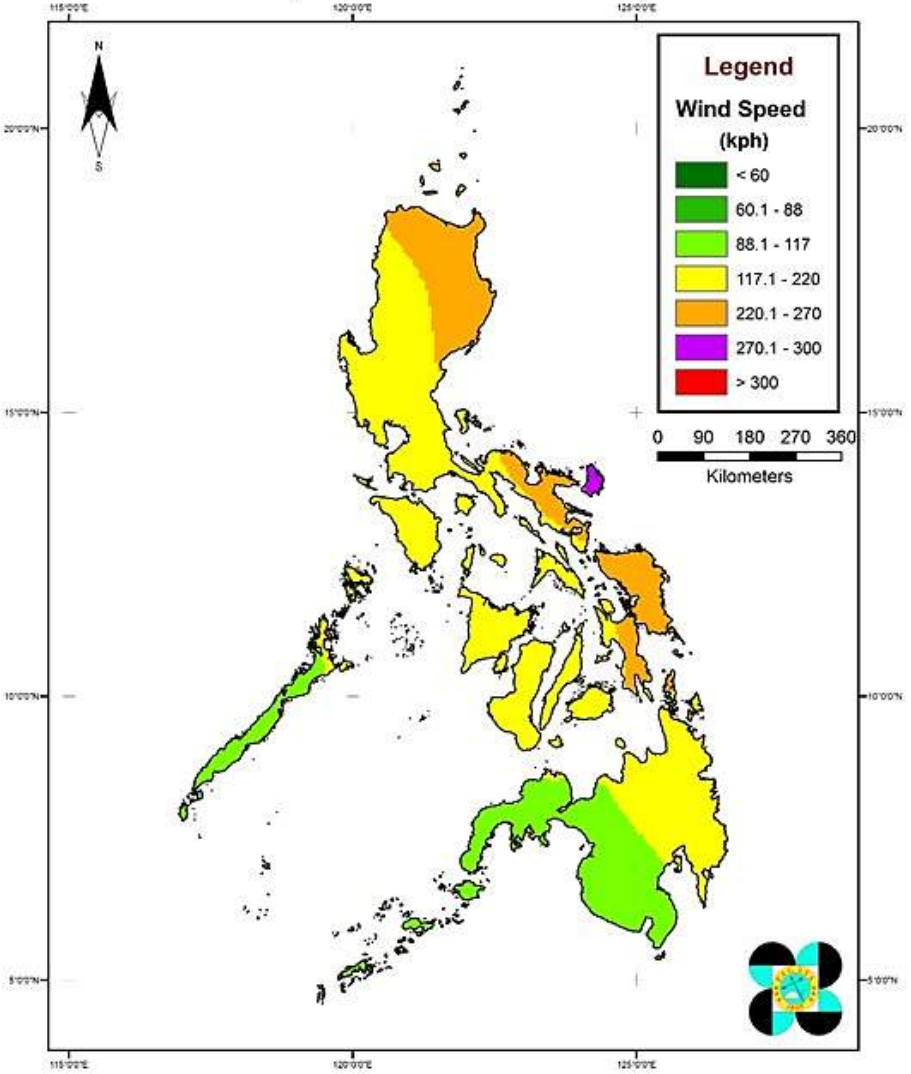
Regional Wind (3-sec peak gust) Hazard Map of the Philippines
(50-Year Return Period)



Regional Wind (3-sec peak gust) Hazard Map of the Philippines
(100-Year Return Period)



(Reference) Existing and Planned Wind Power

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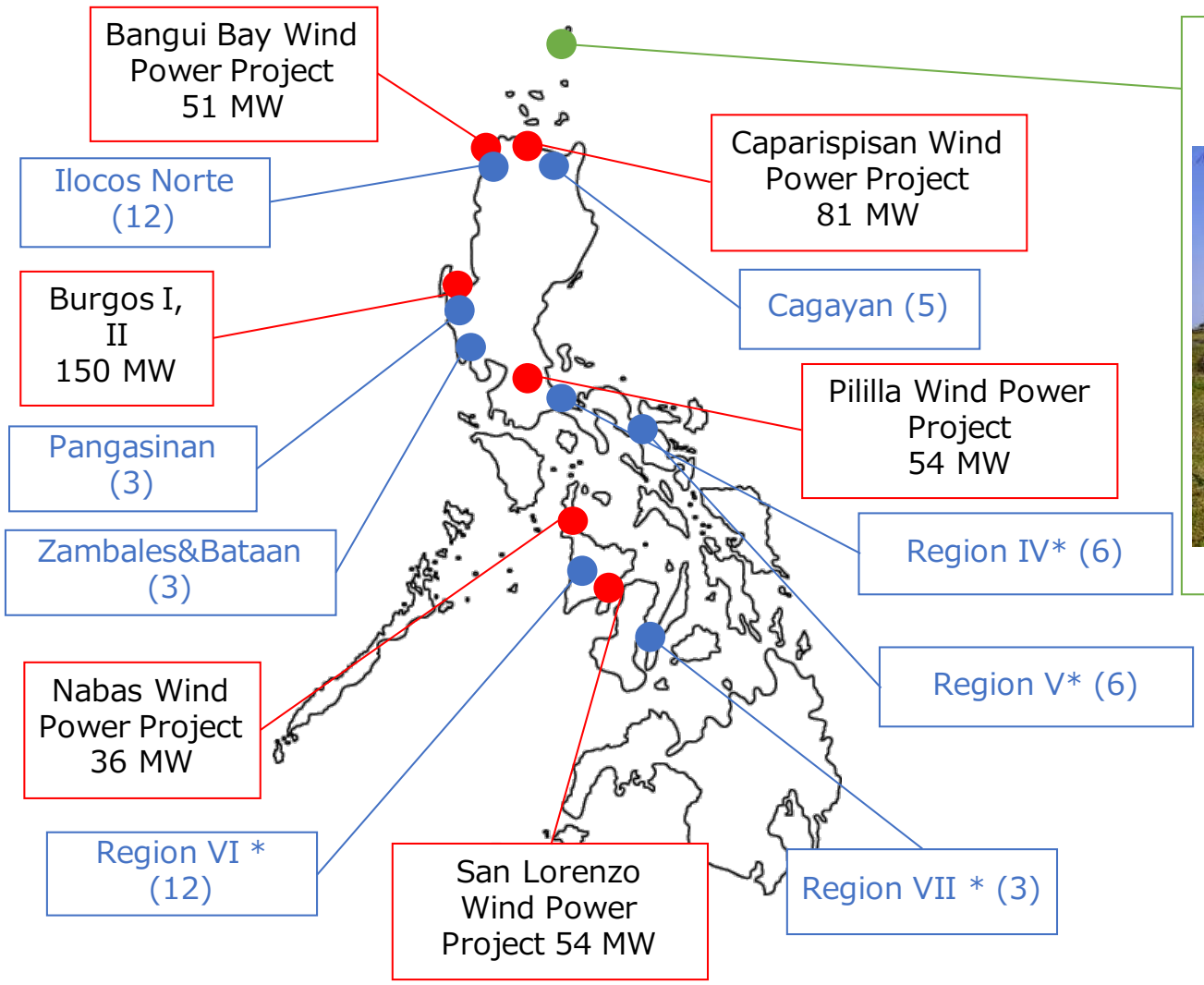


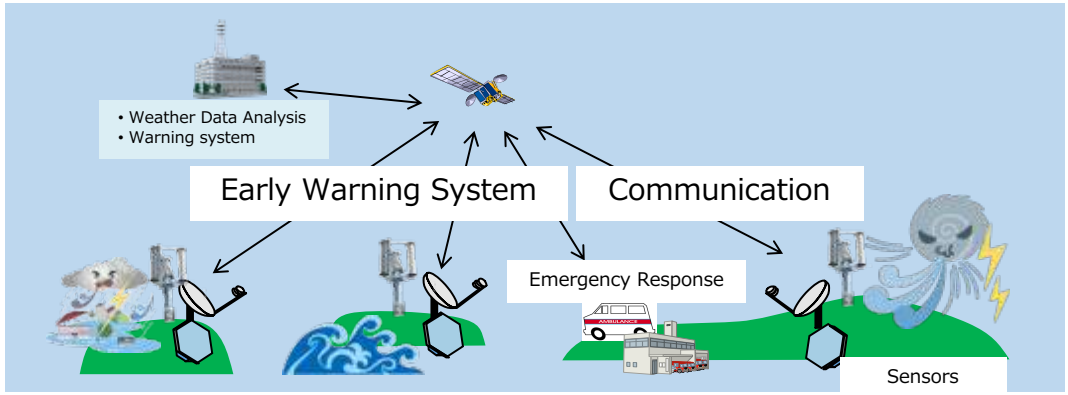
Mahato, Bangui Wind Farm
150kW remains broken

- Installed
- Planned
- Not Operational

Disaster Risk Reduction

More resilient to Typhoon Disaster

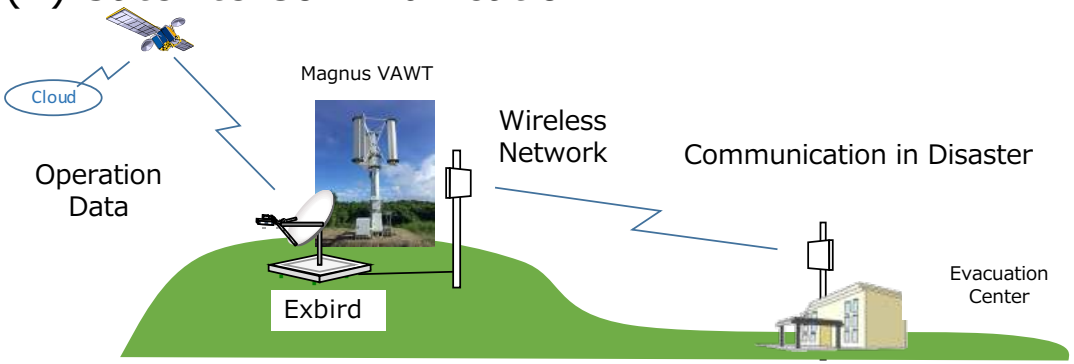
(1) Disaster Alarming System



Stand alone Generation and Communication = Always Available

- Wind energy used for the independent power source of sensor and satellite antenna.
- Stable connection with the central agency

(2) Satellite Communication



- Secured power supply for medical and communication purpose
- Satellite antenna for monitoring and emergency communication

1-1. Catanduanes

Population	260,000 (Main Island)
	3,000 (Palumbanes)
Electricity	Supply:14.6MW, Demand:10MW 4 DPP station, 3 Hydro
	Supply:22kW, Demand:22kW Only 1 DPP (Generation Cost : P 23.5/kWh)
Operation Hours	24hrs/day
	8hrs/day
Typhoon suffered	Any time in whole year Max wind speed 250～300km/h （70～80m/s) Lose power for 5 day up to 1 month after typhoon hit
Communication	Weak connection even to 3G in the center 11 Sat Phone for disaster in each Barangay
	No mobile station in the island Slow connection

PAGASA Radar Station

DPP at Palumbanes island

1-2. Supports from LGU

Governor of Catanduanes

Barangay Caramoran

1-3. Candidate Sites

Terms	PAGASA Virac Radar Station	KAYANDIT WRANCH Guinsaa	Palumbanes
Wind	8～10m/s Strong SE wind from Sep to April Calm SW wind in the rest	10～15m/s	5～7m/s Not always strong wind
Land	PAGASA and LGU	Central Government	LGU
Access	Well paved access road Easy to transport const equip and parts	Poor infra (no paved road and transmission line)	1 hour away from main island (no paved road and poor infra)
Others	Virac Radar Station donated by Japanese Government. Need to maintain a stable electricity and communication supply	Preserved area for the famous tourists destination. Need permits	-
Site			

1-3. Candidate Sites

Virac Radar Station

1-3. Candidate Sites

KAYANDIT WRANCH Guinsaa

1-3. Candidate Sites

Palumbanes Island

2-1. Batanes

Population	17,000
Electricity	Supply: 2.1MW, Demand:1.6MW Wind Turbine (3 X 60kW) was installed in 2005 but not operation anymore.
Operation Hours	24hrs/day (However, often power cuts)
Typhoon suffered	Max wind speed:300km/h (80m/s) Radar dome was destroyed by typhoon in 2016 Lack of fuel in the remote islands
Communication	No internet access since last typhoon due to all mobile stations are down. High needs for improving internet access even in normal days (NPC uses sat communication in their station)

Destroyed PAGASA Radar Dome

Batanes DPP

2-2. Support from LGU

Governor of Batanes

Mr. Florencio Barsana Abad

2-3. Candidate Sites

Terms	Mahato Wind Power	Basco Rolling Hills	Basco Light House:Naidi Hills
Wind	5～6m/s Strongest wind in Feb High elevation	10～13m/s Always constant strong wind	8～10m/s Always constant strong wind
Land	Owner: unknown Maintain: NPC	Mountain side Very few flat land	Many available flat land Tourists destination and preserve heritage
Access	Already transport more than 15m turbine blades	20 mins away from the city center	5 mins from Basco Paved road
Others	Wind and generate data available. Already with transmission line	New transmission line shall be invested	Just near to the city center. Easy to transmit electricity. The Land owened by DICT
Site			

2-3. Candidate Sites

Mahato Wind Power

2-3. Candidate Sites

Basco Rolling Hills

2-3. Candidate Sites

Basco
Light House:Naidi Hills

3-1. Limasawa

Population	6,300
Electricity	Supply:520kW、Demand:213kW 1 DPP (contains of 4 units)
Operation Hours	24hrs/day (18hrs/day last year) Electricity consumption is still low
Typhoon suffered	Max wind speed:250km/h in 1984 Recent typhoons have only 60 to 100km/h max wind speed and passed upper north side After Yolanda, power cuts lasted for 2 weeks
Communication	Able to connect 4G in the limited area and use Wi-Fi in the hotel But LGU office doesn't have internet access. After typhoon, communication line also down for a week.

MAP to Evacuation Center

Limasawa DPP

3-2. Supports from LGU

LGU of Limasawa

3-3. Candidate Sites

Terms	N.L. 9°57’53” E.L. 125°3’41”	N.L. 9°54’36” E.L. 125°4’22”	Highest Point
Wind	4～5m/s	1～2m/s	3~4m/s
Land	LGU owns the most of land and partially private	Owner unknown	Owner unknown
Access	Far north of the island Accessible road and water pump station with transmission line	No access load and transmission line Near to mobile station tower	No access load and transmission line 30 mins walk from the nearest road
Others	Water pump station powered by solar panel and transmission line	Need new transmission line to supply electricity to the resident area	No access road
Site			

3-3. Candidate Sites

3-3. Candidate Sites

3-3. Evacuation Center (School)

4-1. Rapu-Rapu

Population	9,000
Electricity	Supply:1,340kW, Demand:475kW 1 DPP (contains of 6 units)
Operation Hours	16hrs/day (8AM~24PM) No strong demand for the electricity in the night time (Plan to operate 24hrs/day in the next year)
Typhoon suffered	Most of the typhoon comes in Sep to Dec. 24 causalities due to Storm Surge of 2005 typhoon Typhoon NINA hit the island with 4m storm surge and power cut for 3 months
Communication	Connect to 3G internet access in the limited area. No internet access in the other area of island. No access to the internet even in LGU office

Only available transportation in Rapu-Rapu

Rapu-Rapu DPP

4-2. Support from LGU

LGU of Rapu-Rapu

4-3. Candidate Sites

Terms	Mining Site (south east)	South west
Wind	4～5m/s	2～3m/s
Land	Private land owned by LG Stopped operation in 2013	Owner unknown
Access	Highly equipped port facility and pave road going to top of hills Easy access by barge boat (transportation will be much easier than the existing port)	Only accessible by boat and sometimes high wave Poor infrastructure (port facility and access road)
Others	Transmission line exists	Transmission line installed in 2014 after typhoon knocked down them
Site		

4-3. Candidate Sites

4-3. Candidate Sites

5. Other supports

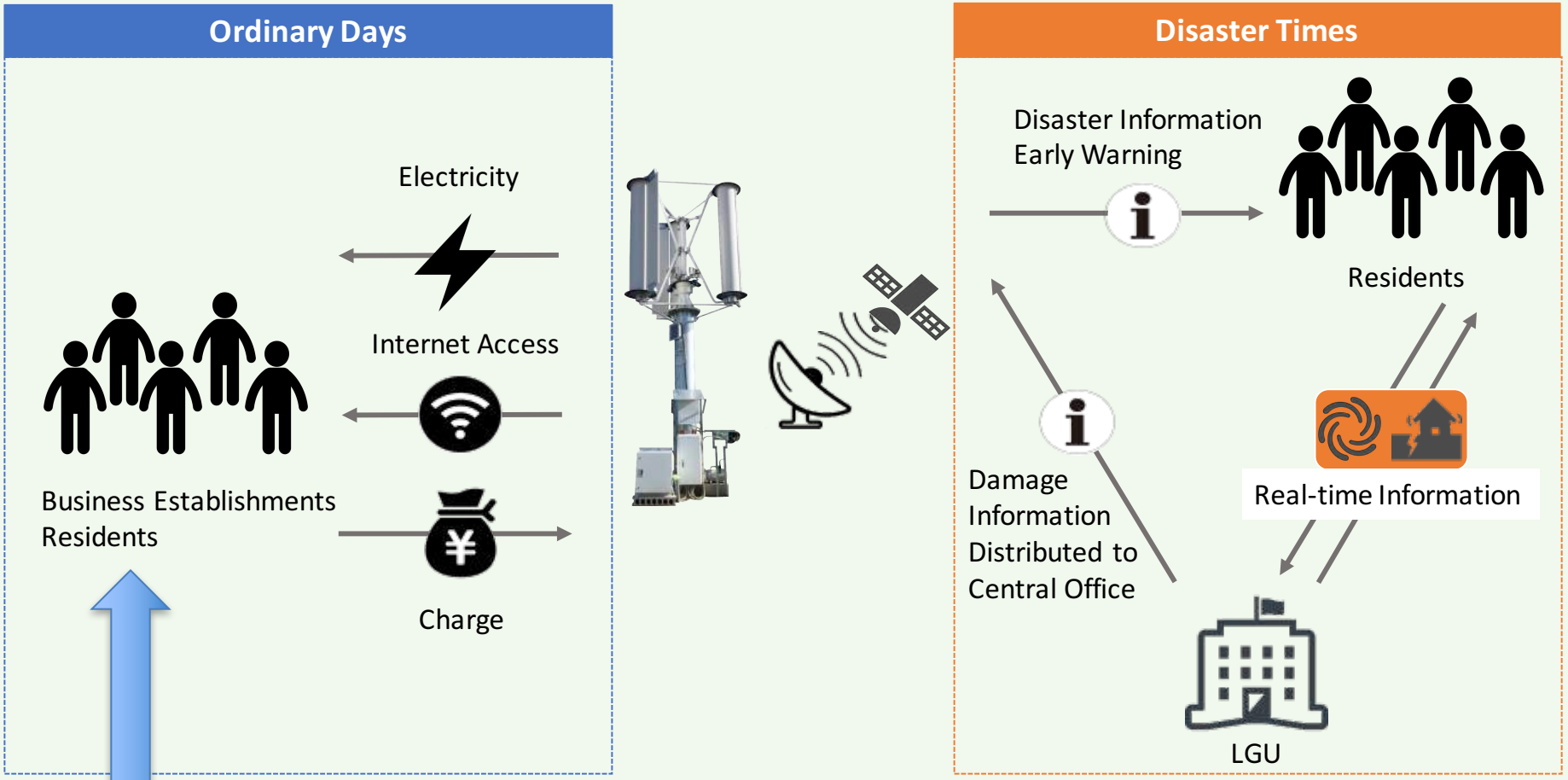
RDRRM Seminar @Legazpi
December 7, 2017

PSF Seminar @Legazpi
December 8, 2017

6. Summary

- We visited 4 islands (Catanduanes, Batanes, Limasawa and Rapu-rapu) during this F/S.
- In terms of wind condition, **Catanduanes and Batanes** are the candidate sites for the beginning of the projects.
- We would like to survey the candidate sites in those two islands more specifically for planning of the adaptation projects.
- And also we shall build the more economically viable business model for the remote island areas to sustain the projects for more than decades.
- In addition to that, we are also welcoming any business / non-profit partners who want to build the businesses / help the communities in those remote areas.
  (ex. mobile, banking, merchandize, education, entertainment, agriculture, fishery and etc.)

Usage of Wind Energy and Satellite Communication



There are thousands of business opportunities taking advantage of internet access.

8. Schedule

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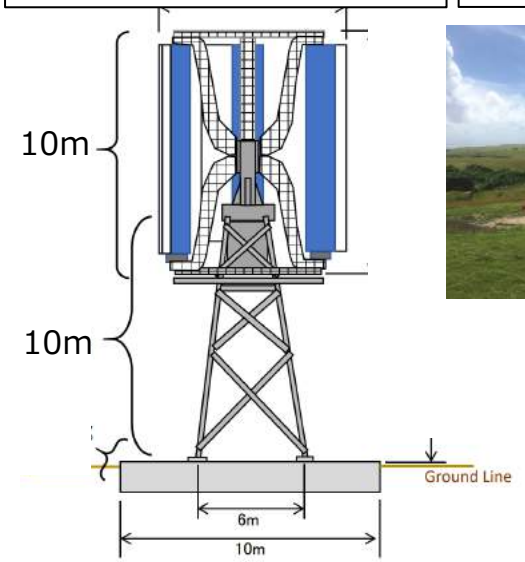
2017 2018 2019 2020 2021 2022 2023

1st Phase (F/S) | 2nd Phase (F/S) | Demo Phase | Business Phase

Field Test@Okinawa (Aug)

Field Test@Philippines

Start Mass Production



▶Accept orders in all over the world

▶Field Demonstration in the Philippines

▶Start Pre-Order (only 50 units)

▶Performance Evaluation by Field Test

▶Value Chain Management

▶Core technology development for 10kW model


Challenge to Energy