INDONESIA WIND POWER POTENTIAL & CHALLENGES

CHINA RE INVEST INDONESIA – A Renewable Investment Forum
Session II : Wind Energy
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IFNALDI SIKUMBANG – VICE CHAIRMAN

INDONESIAN WIND ENERGY ASSOCIATION
(ASOSIASI ENERGI ANGIN INDONESIA)

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3. Wind Power Status in Indonesia
4. Potency & Opportunities
5. Challenges

Introduction AEAI

AEAI - Indonesian Wind Energy Association

ESTABLISHED : 2014

MEMBERSHIP

AEAI's Membership is a limited liability company, institution or other Indonesian legal entity that engaged in Wind Power / Wind Energy;

1. Developer of Wind Energy Power Plant (IPPs - Independent Power Producers)

2. Wind Turbines and Components Manufacturers, Wind Power Equipment Manufacturers

3. Contractors, Service Company and the Consultant / Contractor, Services & Consultant

4. Related Companies / Related Parties

Extraordinary Member (Anggota Luar Biasa) as above criteria without Indonesia Legal Entity

AEAI MEMBER 2020

1. RANCANG BANGUN PUTRA NUSANTARA
2. HYWIND ENERGY SOLUTION
3. LIMAPUTRA CONTRINDO
4. RADIANT UTAMA INTERINSCO, TBK.
5. PERTAMINA POWER INDONESIA
6. WINDLIFE GREEN INDONESIA
7. AWINA SINERGI INTERNASIONAL
8. MATLAMAT CAKERA CANGGIH (MARUBENI)
9. VENA ENERGY
10. ALPENSTEEL
11. SUMMIT NIAGA
12. ENERGI ANGIN INDONESIA
13. PONDERA
14. ISKANDARSYAH & PARTNERS LAW FIRM

 # MEMBER : 14

Indonesia Renewable Energy

NATIONAL ENERGY MASTER PLAN - RUEN
(CURRENT ACHIEVEMENT)

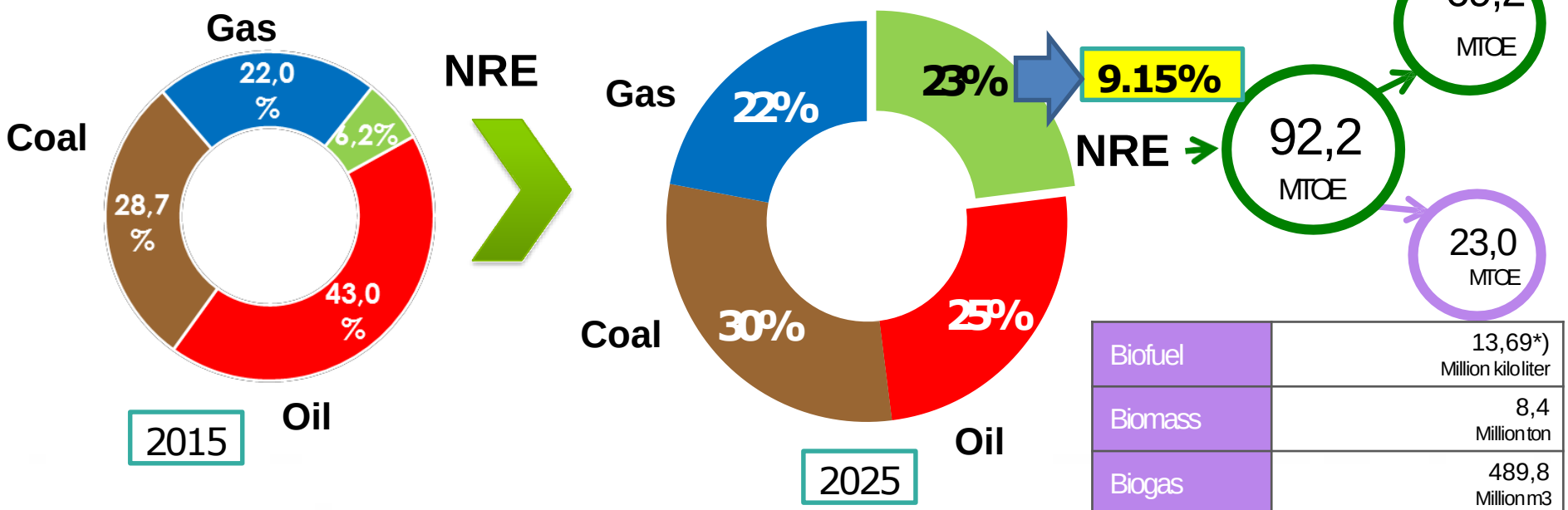
National Power Plant Capacity	135 GW
NRE Power Plant Capacity	45 GW

NRE Electricity 45 GW

WIND : 1.8 GW

2020 Achievement 10,4 GW

WIND : 0.14 GW



Biofuel	13,69*) Million kiloliter
Biomass	8,4 Million ton
Biogas	489,8 Million m3
CBM	46,0 mmscfd

*) exclude biofuel for power plant:: 0,7 million kL at 2025

Government efforts to pursue RUEN targets

With only 5 years remaining to achieve the target of 23% EBT portion in the national energy mix in 2025 from the current position which only reached 9.15%, it is necessary to encourage, to drive EBT (New Renewable Energy) to achieve or approach this target. Government & PLN launch 3 program

A. Green Booster : 2,6 GW

1. Construction of PLTS in the ex-mine mouth complex: 435.6 MW
2. Floating PLTS: 612 MW
3. PLTS in the PLTU Complex: 112 MW
4. Cofiring Biomassa: 1,027 MW
5. Utilization of Reservoir: 414.1 MW.

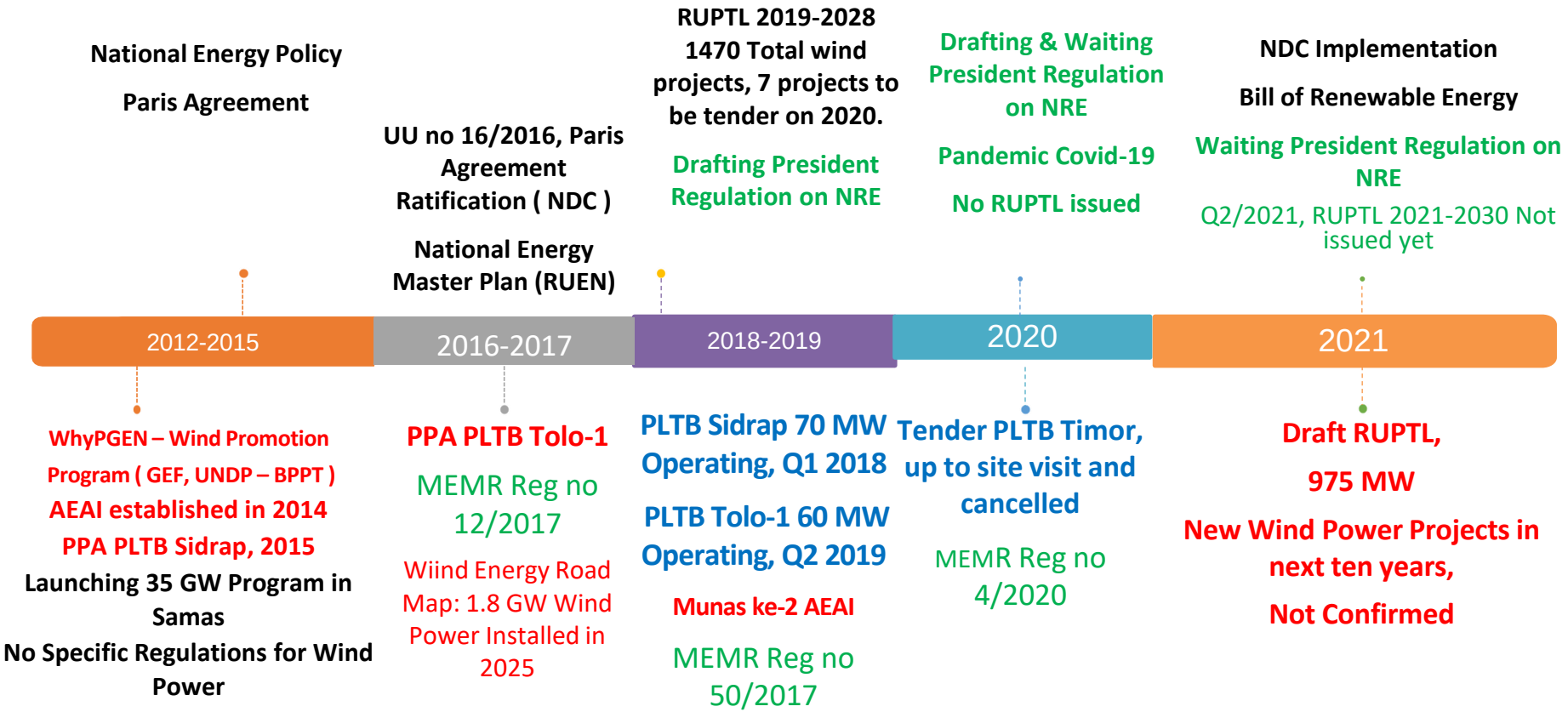
Conversion of old Fossil Power Plant PLTD to PLT Renewable Energy:

1. **Diesel Power Plant (PLTD) 2,6 GW**
2. CFPP **Coal Fired Power Plant** (PLTU) PT PLN & IPP 5,655 GW, Lifetime > 20 Years:
3. **CCPP Combined Cycle Power Plant (PLTGU) PLN & IPP 5,912 GW,** , Lifetime > 20 Years

C. Develop More Renewable Power Plant (+/- 17 GW) ---→ RUPTL

WIND POWER STATUS IN INDONESIA

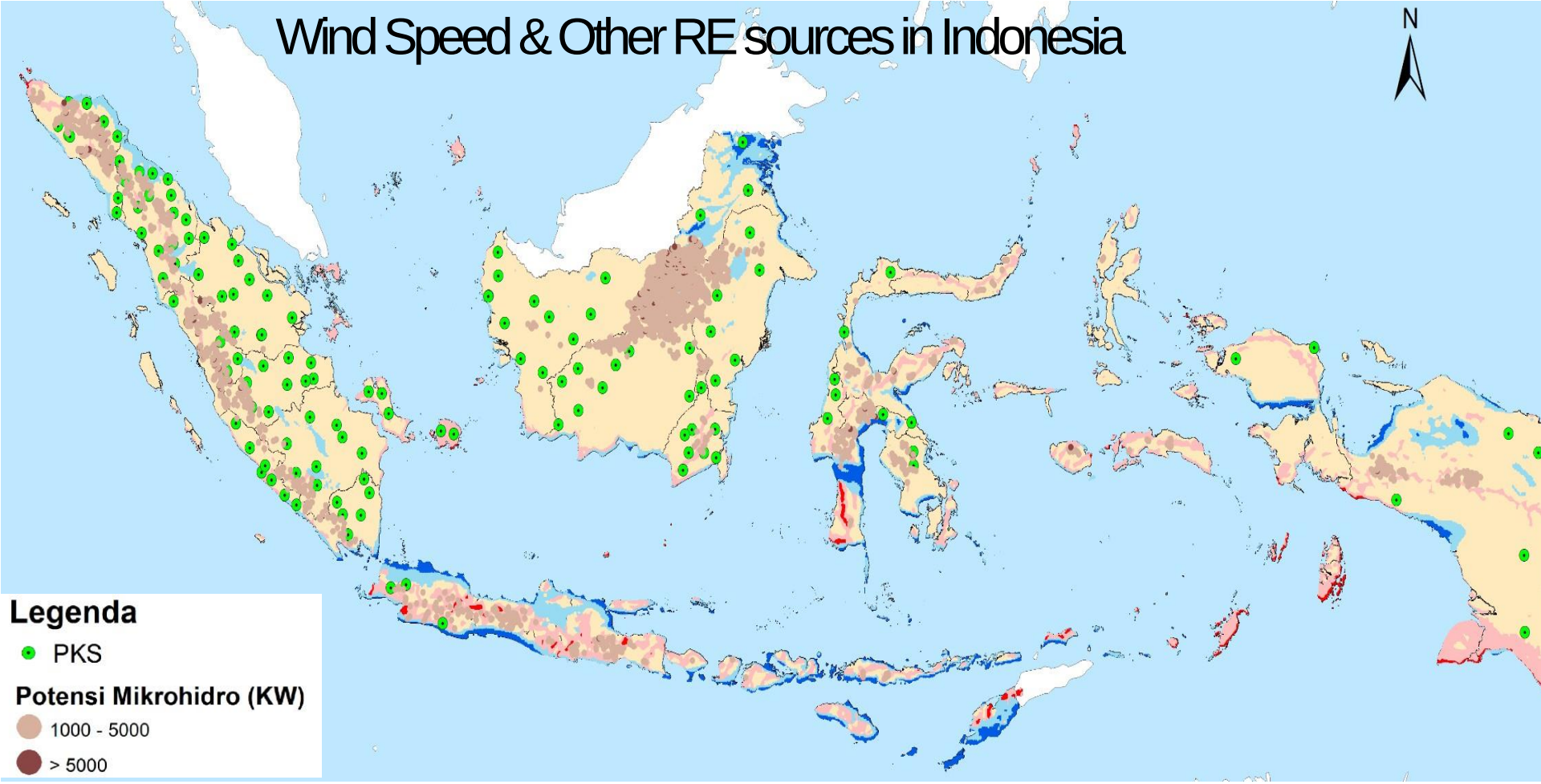
Last 10 Years Noted



DEVELOPMENT HIGHLIGHT

POTENCY	STATUS	2021 Q2	REMARK
15 GW 6 m/sec up **or** **66.4 GW 4 m/sec up**	**INSTALLED**	149 MW (PPA 130 MW)	Sidrap 75 MW Jeneponto 72 MW Small Scale & Non Commercial 2 MW
	CONSTRUCTION	0	
	PPA	0	No PPA since 2017
	TENDER 2021	??	Pending Covid Wait for RUPTL and President Regulations on NRE
	Listed/Mention on Draft RUPTL (not Confirmed)	2215 MW;	Listed 975 MW + PLTB tersebar
	MEASURED POTENCY	Around 3 GW	Private/PLN/ P3TEK EBTKE
	TARGET	1.8 GW BY 2025 28 GW by 2050	Road Map Win Energy 2017

Wind Speed & Other RE sources in Indonesia



- **Wind Potency with wind speed >6 m/s mainly located in Java, East Nusa Tenggara, South Sulawesi and Maluku**

Various Wind Map for References

https://globalwindatlas.info/area/Indonesia

indonesia.windprospecting.com

https://onemap.esdm.go.id/map.html

POTENTIAL & OPPORTUNITIES

Prices of Electricity Generated by Wind Power in President Regulation on Renewable Energy (Final Draft)

Wind Power / PLTB

Capacity (MW)	Feed In Tarrif (≤ 5 MW) / Direct Appointment		Harga Patokan Tertinggi / Ceiling Prices (Tender)	
	Staging tahun 1-12	Staging tahun 13-30	>5 MW s.d 20 MW	>20 MW
(cent $/kWh)	**13,18 x F**	**8,24**	**(12,00 x F)***	**(10,00 x F)***

F = multiplication Factor, Jawa = 1, Eastern Indonesia, Small Island bigger

Wind offshore not regulated yet, it's mean B to B Negatiation

LIST OF PROJECTS/LOCATIONS MENTIONS ON DRAFT RUPTL (NOT CONFIRMED)

Sumatera 180 MW

Aceh Besar, Padang Sidempuan

Java 1188 MW

PLTB Kab Lebak	150 MW
PLTB Kab Pandeglang	200 MW
PLTB Cirebon	85 MW
PLTB Garut	150 MW
PLTB Sukabumi	170 MW
PLTB Samas	50 MW
PLTB Tegal	132 MW
PLTB Gunung Kidul	10 MW
PLTB Samas Bantul	50 MW
PLTB Banyuwangi	75 MW
PLTB Probolinggo	50 MW
PLTB Tuban	66 MW

Kalimantan 70 MW

PLTB Tanah Laut	70 MW

Bali 60 MW

PLTB Lembongan/N. Ceningan	20 MW
PLTB Nusa Penida	20 MW
PLTB Bali Utara	20 MW

Of Total 2285 MW, 975 MW look like will be listed on RUPTL, the rest are categorized as PLTB Tersebar (Potency to increase RE Power Plant)

PLTB Oelbubuk, Timor NTT, PLTB Tanah Laut South Kalimantan, PLTB Sumba Timur NTT (retender) will be among the first projects to be tender

Sulawesi 458 MW

PLTB Bitung	63 MW
PLTB Selayar	5 MW
PLTB Sidrap Expansion	63 MW
PLTB Jeneponto II	72 MW
PLTB Bulukumba	50 MW
PLTB Bantaeng	100 MW
PLTB Takalar	60 MW
PLTB Buton	15 MW
PLTB Majene	30 MW

Maluku 50 MW

PLTB Ambon	20 MW
PLTB Ambon	15 MW
PLTB Maluku Tenggara Barat	5 MW
PLTB Keikecil	5 MW
PLTB Nusa Saumlaki	5 MW

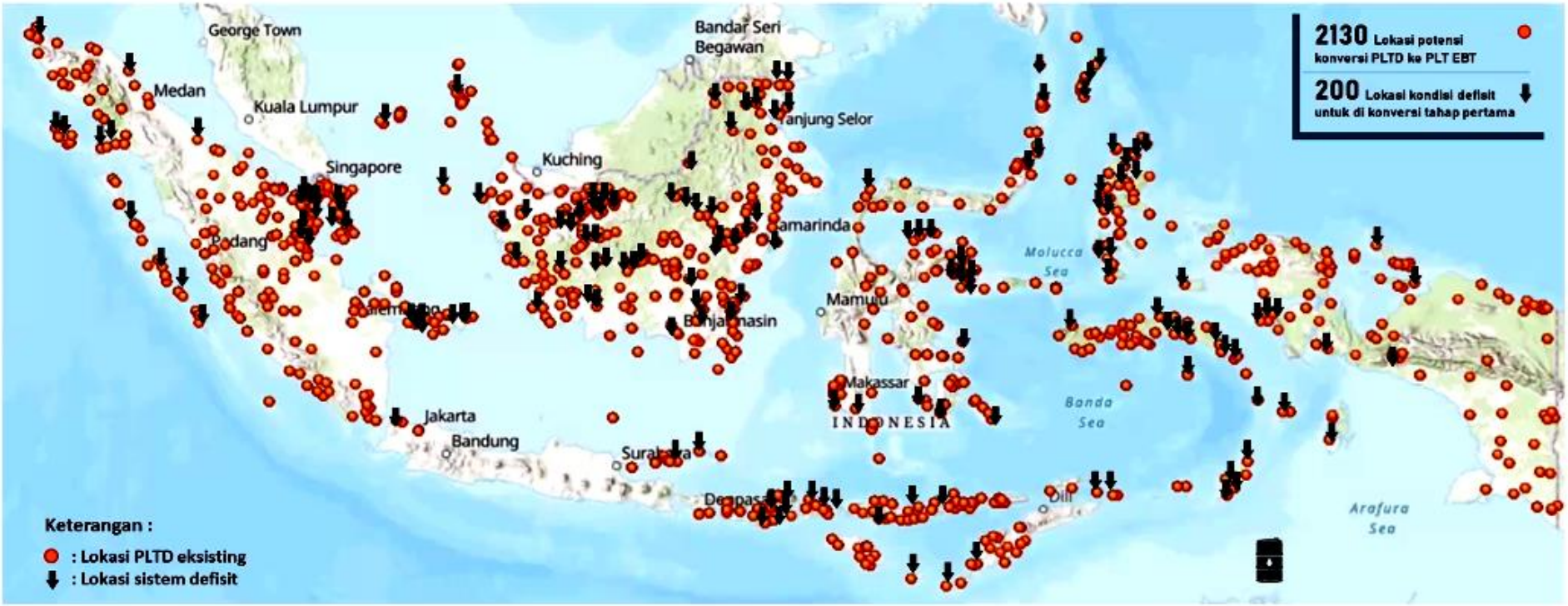
Papua 108 MW

PLTB Papua	50 MW
PLTB Papua Barat	58 MW

Nusa Tenggara 171 MW

PLTB Lombok	115 MW
PLTB Mandalika	30 MW
PLTB Oelbubuk – Timor	20 MW
PLTB Sumba	3 MW
PLTB Sumba Timur	3 MW

2130 LOKASI PLTD TERSEBAR



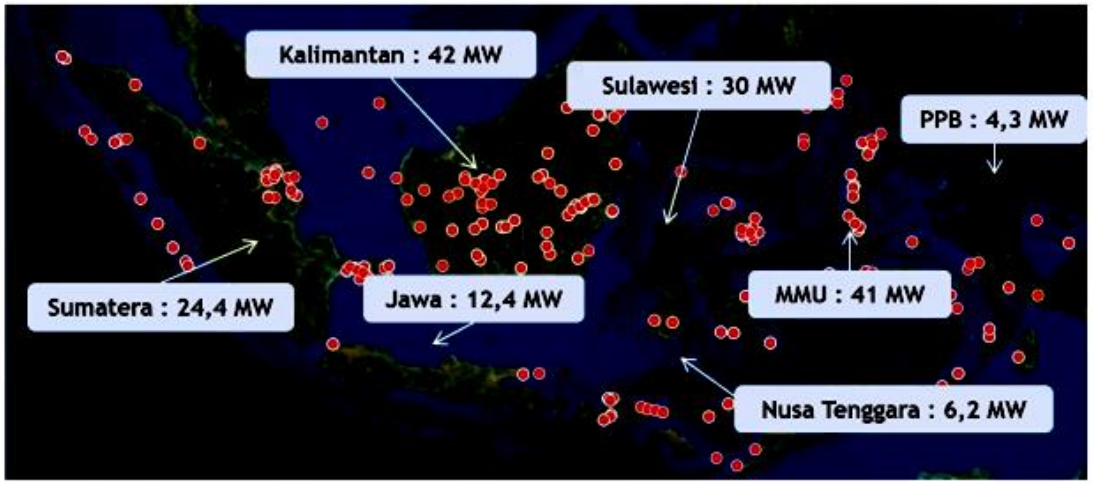
- Pengembangan pembangkit berbasis EBT yang bersih dan lebih murah akan diprioritaskan dan diakselerasi pada daerah-daerah defisit yang masih menggunakan BBM sebagai bahan bakar PLTD.

5200 units in 2130 locations of old diesel power plant with capacity around 2,6 GW to be converted to Renewable Power plant.
Fuel diesel cost around IDR 15 T/ year.
Wind Developer may consider this opportunities, ideal location PLTD in area with 6m/sec up wind speed

Diesel Power Plant to EBT/Hybrid Power Plant Conversion Program

EXISTING PLN DIESEL POWER PLANT

PRIORITY 1 of DIESEL-EBT/HYBRID CONVERSION PROGRAM



CONVERSION TECHNOLOGY TYPE

1	PV if potential of iraddiasi > 1,600 KwH/m2/year	3	Biomass Power Plant if biomass potential within radius <25 km
2	Wind Energy if wind speed > 6 m/s	4	Micro Hydro PP if hydro potential within radius < 25 km

PRIORITY I	
Number of Location	200
Total Capacity (MW)	±155
Number of Machines (unit)	809

For the first phase, conversion will conduct on 200 location with total capacity around 200 MW.

To provide 24 hours electricity, total Solar PV to build is around 660 MWp

MALUKU

CAPACITY & Example of Diesel Conversion Program

No.	PLTD LOCATION	CAPACITY (KW)
1	Adaut	1,200
2	Air Buaya	1,212
3	Buano	720
4	Geser	722
5	Kairatu	5,111
6	Kesui	448
7	Lonthoir	1,390
8	Ondor	1,806
9	saparua	4,129
10	Saumlaki	12,200

NTT

1	Wai Werang	7,805
2	Pemana	600
3	Seba	3,506
4	Semau	1,778
5	Rinca	200
6	Komodo	425
7	Ndoriwoy	846
8	Ndao	665

2. 2 GW PLTD to Renewable Energy Conversion Program, has been launched on Nov 2020. First Phase will be carried out at 200 locations throughout Indonesia with a total capacity of 200 MW. The average age of this PLTD is above 15 years with an average diesel consumption of 0.359 liters / kwh and a BPP of IDR 3360 / kwh**. ($ cent 23/kWh)**
This conversion program will replace the current electricity supply, which in many locations is only able to provide 6-10 hours / day. The replacing EBT electricity will provide electricity 24 hours / day and will also provide sufficient supply for local economic and industrial activities

For example, in Nasi Island, Aceh Province, which consists of 5 villages. There is 24-hour electricity supplied from PLTD Deudap for 521 customers. The need for diesel fuel is around 0.33 liter / kwh with a local BPP of IDR 4073 / kwh. The peak load is 220 kW with the total electricity required of 578,078 kWh / year. The EBT electricity that will replace it is projected to serve 700 customers with an annual production of 750,000 kWh / year, while the potential for local EBT is solar with radiation of 1811kwh / m2 / year and wind with a speed of 9.16 m / sec

CHALLENGES

What is faced by Wind Energy and other Renewable Energy in Indonesia in the last 5 years is a difficult situation for several reasons;

Under Demand / Negative Growth Conditions (due to Covid-19.

Competition among all types of Renewable Energy with a potential around 440 GW while the potential for new projects in the next 10 years is less than 20 GW.

Uncertainty due to the absence of workable regulations

The said condition resulted in the lack of new projects and projects delayed

Type	**Potency / Installed**		
Hydro	: 75 GW	/	6.02 GW
Geothermal	: 23.9 GW	/	2.1 GW
Bio Energy	: 32.6 GW	/	1.9 GW
Solar	: 207.8 GW	/	0.15 GW
Wind Energy	: 60.6 GW	/	0.14 GW
Ocean Energy	: 17.9 GW	/	0

CONCLUSIONS

TERIMA KASIH

Hydro	**: 75 GW / 6.02 GW**
Geothermal	**: 23.9 GW / 2.1 GW**
Bio Energy	**: 32.6 GW / 1.9 GW**
Solar	**: 207.8 GW / 0.15 GW**
Wind Energy	**: 60.6 GW / 0.14 GW**
Ocean Energy	**: 17.9 GW / 0**

No	Generation Type	Investment	Capacity Factor
1	PLTP / Geothermal	**5**	**90-95**
2	PLT Bayu / Wind	**2,35**	**30-40**
3	PLT Biomasa / Biomassa	**2,24**	**85**
4	PLTA /Hydro Large	**2,22**	**60**
5	PLT Bg / Biogas	**2,15**	**85**
6	PLTS / Solar PV	**0,98**	**20**
7	PLTMH / Mini Hydro	**1,48**	**60**
8	*PLTU Mulut Tambang / Mine Mouth*	***1,18***	***70-80***
9	*PLTU / Coal FP*	***1,15***	***70-80***
10	*PLTS / Solar PV*	***0,98***	***20***
11	*PLTG/PLTMG / Gas*	***0,79***	***70***
12	*PLTD / Diesel Power*	***0,79***	***70***