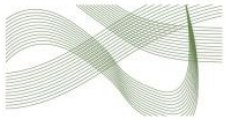
Realizing Indonesia's Wind Energy Potential

Investment Opportunities & Challenges

Jakarta, 19th May 2022



Onshore wind

Offshore wind

Geothermal

Solar PV

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CEO Pondera SEA & PT. Hywind Energy Solution

Who is Pondera?

- Specialist in the development of **renewable energy projects**
- **Consultant**, **Engineer** and **Developer**
- Operates **globally**, with offices in the **Netherlands**, **Indonesia**, **Vietnam** and **South Korea**
- Medium-sized group of companies with **70 employees**
- Operating since **2007**
- **ISO-9001 certified** since 2020

Indonesia's renewable energy potential

Hydro, Mini/Micro
Potential: 75 GW
Utilized: 5.29 GW *(7.07%)*

Solar
Potential: 207.08 GWp
Utilized: 0.09 GWp *(0.04%)*

Wind
Potential: 60.6 GW
Utilized: 147 MWp *(0.02%)*

Geothermal
Potential: 12.3 GW (Resources), 17.2 GW (Reserve)
Utilized: 1.64 GW *(5.6%)*

Bioenergy/Biomass
Potential: 32.6 GW
Utilized: 1.78 GW *(5.5%)*

Tidal/Wave
Potential: 17.9 GW
Utilized: 0 GW *(0%)*

Source: DG NRE and Energy Conservation MEMR

TOTAL WIND ENERGY POTENTIAL: 60.6 GW
UTILIZED: 147 MW (0.02%)

FOSSIL ENERGY

Proven reserve:
- Oil : 3.6 billion barrel
- Gas : 100.3 TSCF
- Coal : 7.2 billion tonnes

Production:
- Oil : 288 million barrel
- Gas : 2.97 TSCF
- Coal : 434 million tonnes

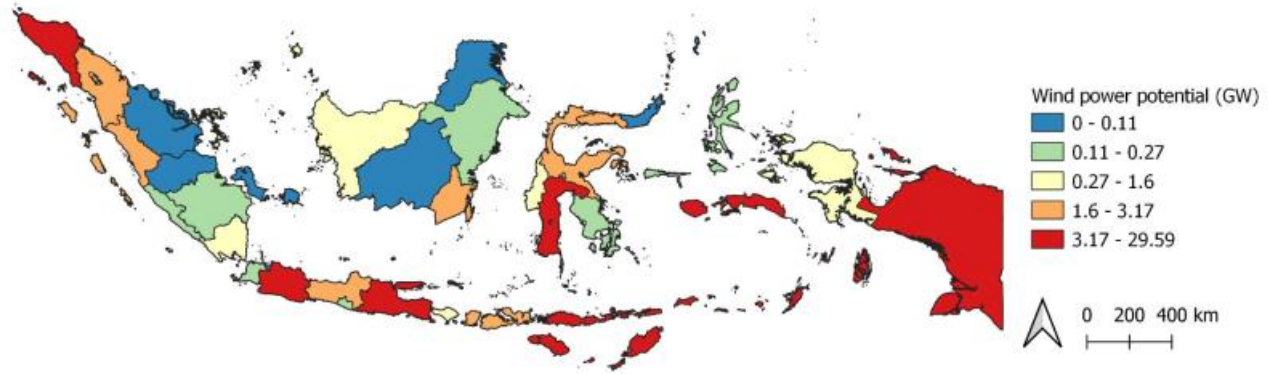
Expected to be run out in:
- Oil : 13 years
- Gas : 34 years
- Coal : 16 years

Source : Coordinating Ministry. Economic Affairs

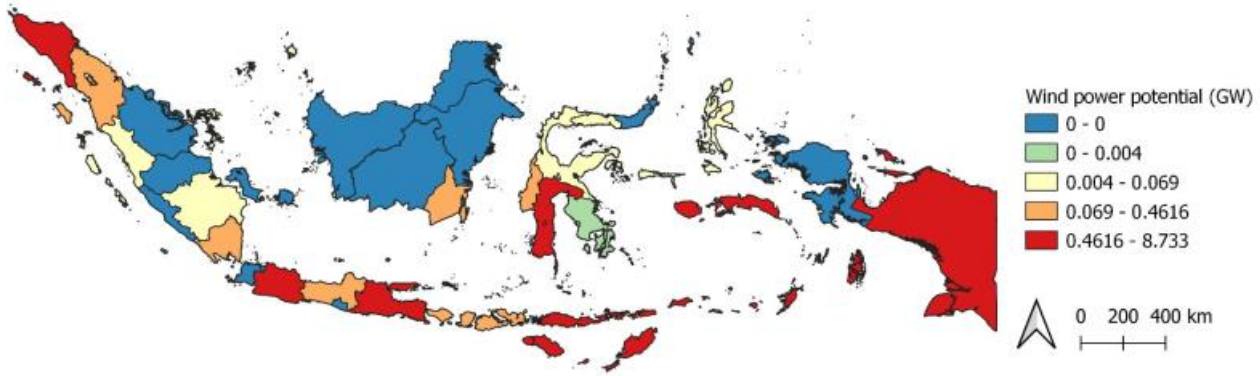
Potensi PLTB di ketinggian 50 m
(batas kecepatan angin 6 m/s dan 7.25 m/s)

IESR Institute for Essential Services Reform

Skenario 1
(106 GW)

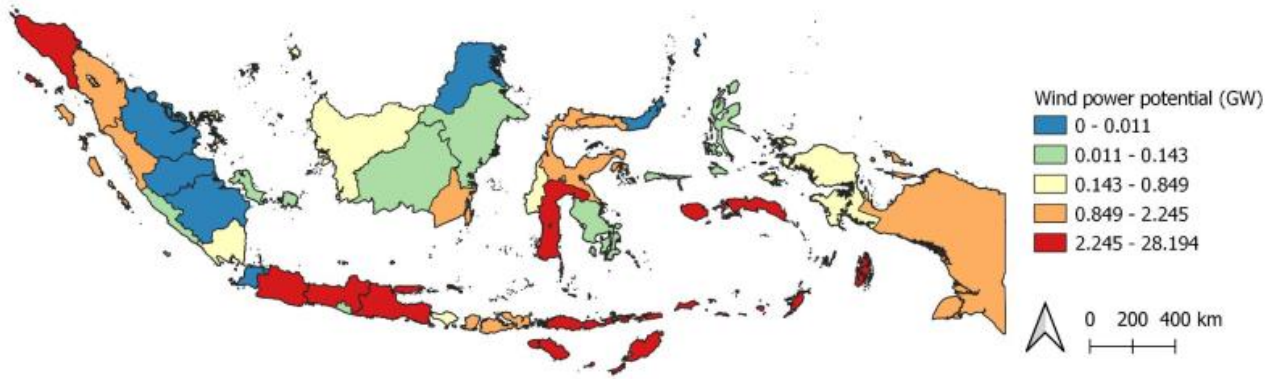


Skenario 2
(87,6 GW)

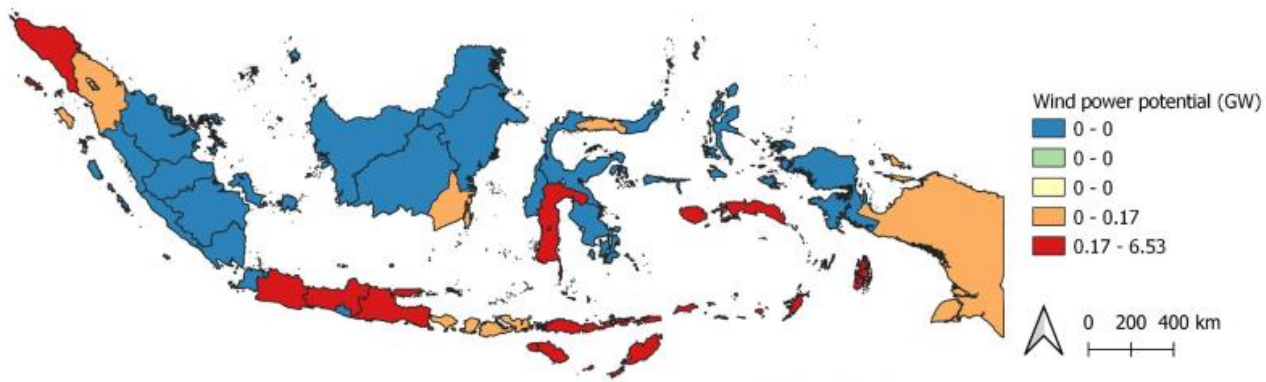


Potensi PLTB di ketinggian 100 m
(batas kecepatan angin 6.6 m/s dan 7.99 m/s)

Skenario 1
(25 GW)



Skenario 2
(19,7 GW)



A closer look into the wind potential

- Total wind energy **potential of 60.6 GW**
- Wind energy projects **RUPTL 2021-2030 (597 MW)**
  - Tanah Laut, South Kalimantan (70 MW, RFP stage)
  - Timor Island (20 MW) & East Sumba (5 MW)
  - West Java, Banten, & Central Java (>100 MW)
  - Sumatra – South (>100 MW)
- There are **many small islands with relatively good wind speeds**, however, with **limited electricity demand** (up to 5 MW).
- Wind energy can take part in **de-dieselisation**

PLN's planning according to RUPTL 2021-2030

Per Year (MW)

No	Pembangkit - EBT	Kapasitas	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Jumlah
1	PLTP	MW	136	108	190	141	870	290	123	450	240	118	2,665
2	PLTA	MW	400	53	132	87	2,478	327	456	1,611	1,778	550	7,872
3	PLTM	MW	144	154	277	289	189	43	-	2	13	6	1,118
4	PLT Surya	MWp	59	288	1,306	624	1,633	127	148	165	172	157	4,679
5	PLT Bayu	MW	-	2	33	337	155	70	-	-	-	-	597
6	PLT Biomasa/ Sampah	MW	12	43	88	191	221	20	-	15	-	-	590
7	PLT EBT *Base*	MW	-	-	-	-	-	100	265	215	280	150	1,010
8	PLT EBT Peaker	MW	-	-	-	-	-	-	-	-	-	300	300
Jumlah		**MW**	**752**	**648**	**2,026**	**1,670**	**5,546**	**978**	**991**	**2,458**	**2,484**	**1,280**	**18,832**

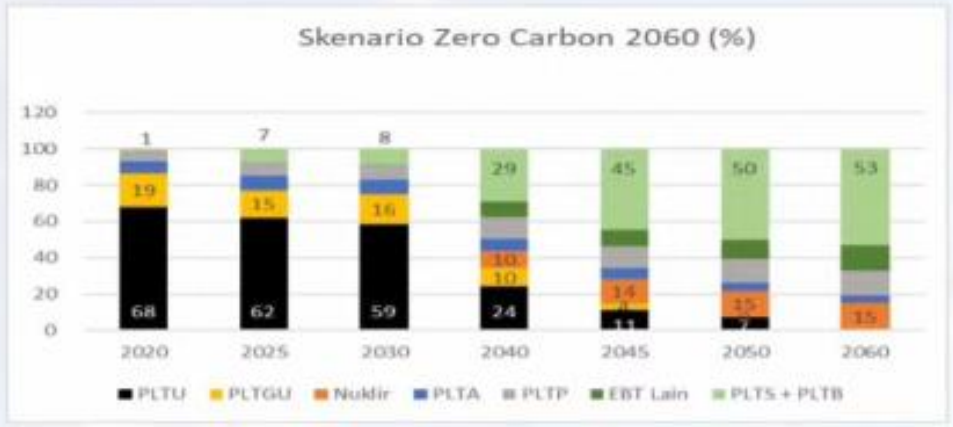
Per Regional (MW)

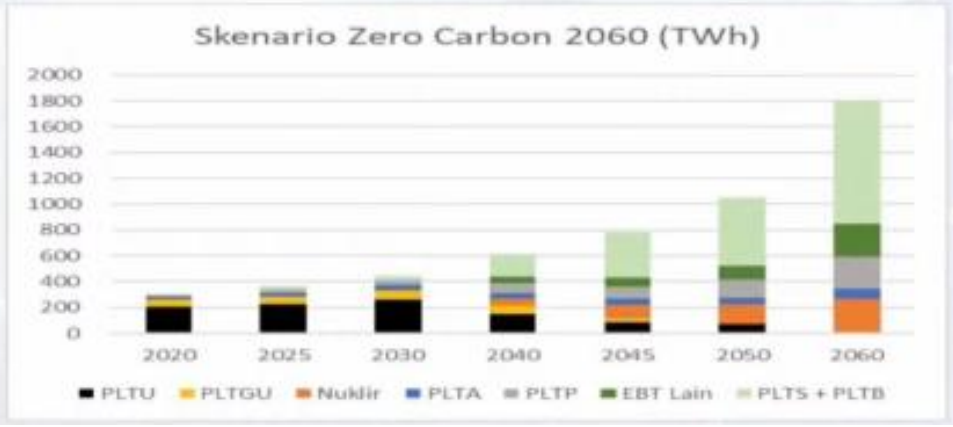
No	Pembangkit - EBT	Kapasitas	Jamali	Sumatera	Kalimantan	Sulawesi	MPNT	Jumlah
1	PLTP	MW	1,225	1,180	-	75	185	2,665
2	PLTA	MW	2,903	2,282	1,153	1,444	90	7,872
3	PLTM	MW	418	426	28	156	91	1,118
4	PLT Surya	MWp	2,906	193	304	176	1,101	4,679
5	PLT Bayu	MW	260	110	70	130	27	597
6	PLT Biomasa/ Sampah	MW	232	117	86	50	106	590
7	PLT EBT *Base*	MW	-	230	100	230	450	1,010
8	PLT EBT *Peaker*	MW		300				300
Jumlah		**MW**	**7,944**	**4,837**	**1,741**	**2,261**	**2,050**	**18,832**

- The addition of RE PP until 2025 is 18.8 GW.
- Baseload/Peaker RE is a Coal PP plan that has been replaced with RE generators to meet the needs of base/peak load generations (the type of generator will be determined through a more comprehensive study).

Pushing for zero carbon by 2060

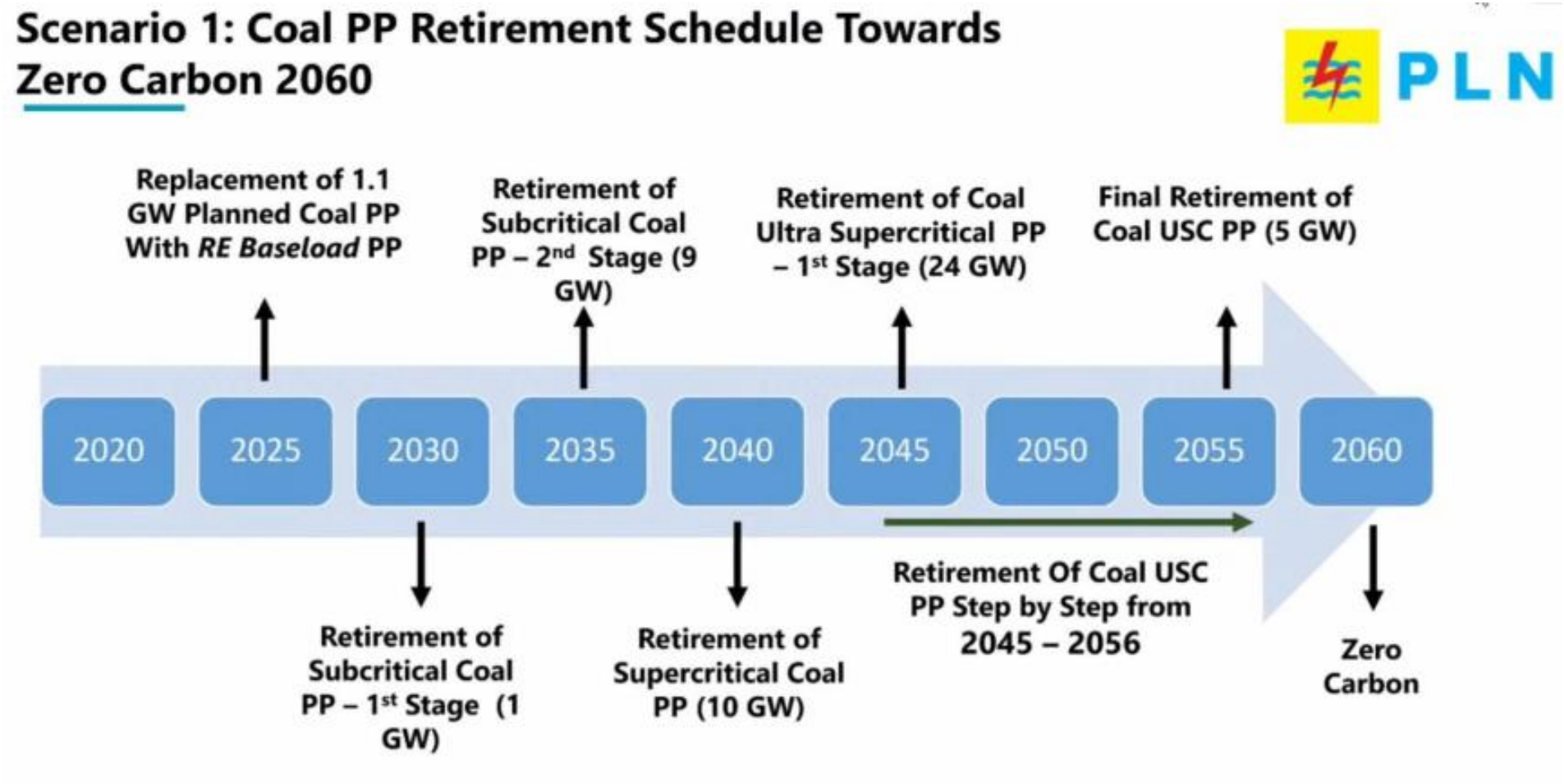
Scenario 1: By 2060 All Power Plants in Indonesia Already Using Clean Energy





1. From 2020 onwards, the portion of Coal PP capacity will be reduced (in the graph, it can be seen from the decreasing black color).
2. Efforts to retire fossil power plants will begin in 2030 and will significantly decrease in number by 2040, following the completion of the power plant contract.
3. Nuclear PP will enter in 2040 to maintain system reliability as nuclear technology becomes more secure, safer, modular & cheaper.
4. Phase out all coal-fired power plants will be end in 2056 and replaced by RE PP.
5. the development RE PP will experience a massive increase starting in 2028 due to the advancement of battery technology and lower cost. Then it will increase exponentially starting in 2040. And by 2045, the portion of RE PP will dominate the total power plant. The next decade, all power plants in Indonesia will beoame from RE.

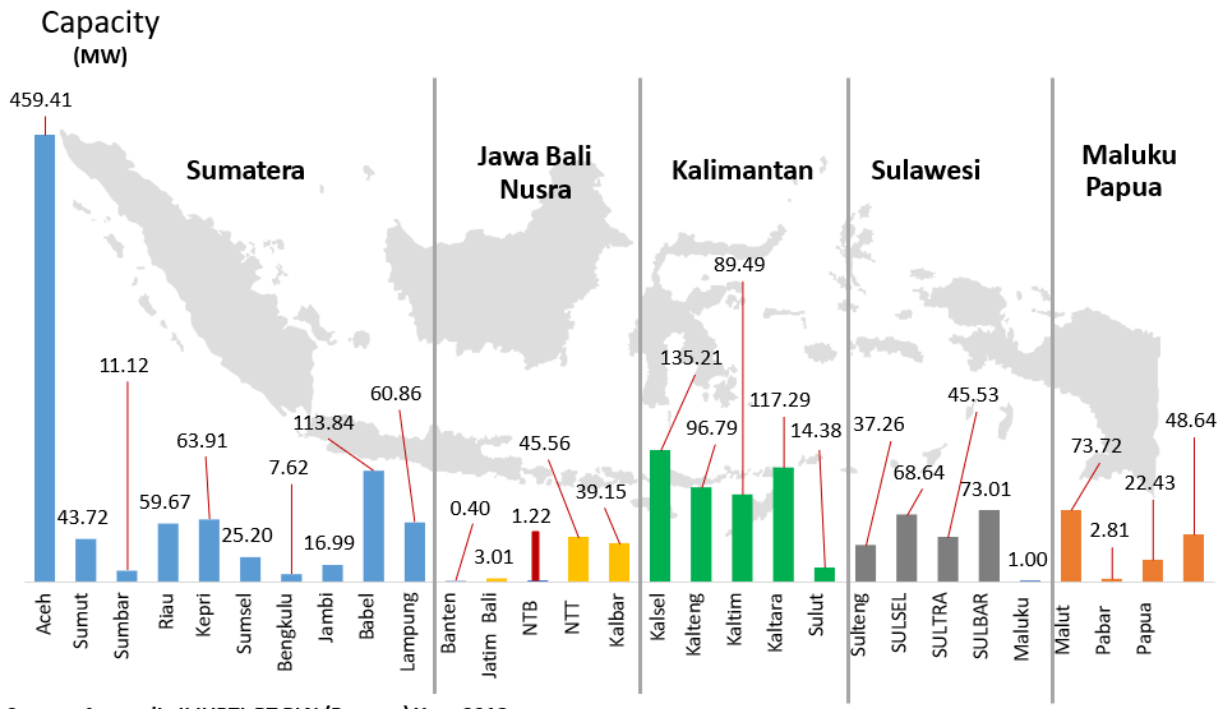
Pushing for zero carbon by 2060



Conversion of diesel power plants to wind / solar

• DIESEL POWER PLANTS (PLTD)

Total PLTD Owned by PT PLN (Persero) Lifetime > 15 Years:
2.246 Units in 29 Provinces, Installed Capacity : 1.777,87 MW



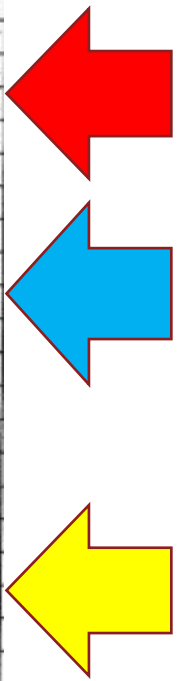
Source: Appendix II IUPTL PT PLN (Persero) Year 2018

No	Province	PLTD total > 15 years	PLTD capacity > 15 years (MW)
1	Aceh	365	459,41
2	Sumut	42	43,72
3	Sumbar	47	11,12
4	Riau	136	59,67
5	Kepri	120	63,91
6	Sumsel	2	25,20
7	Bengkulu	13	7,62
8	Jambi	18	16,99
9	Babel	96	113,84
10	Lampung	20	60,86
11	Banten	2	0,40
12	Jatim	12	3,01
13	Bali	3	1,22
14	NTB	54	45,56
15	NTT	117	39,15
16	Kalbar	148	135,21
17	Kalsel	77	96,79
18	Kalteng	199	89,49
19	Kaltim	130	117,29
20	Kaltara	24	14,38
21	Sulut	56	37,26
22	Sulteng	121	68,64
23	Sulsel	27	45,53
24	Sultra	100	73,01
25	Sulbar	4	1,00
26	Maluku	180	73,72
27	Malut	10	2,81
28	Pabar	50	22,43
29	Papua	73	48,64
	Total	2.246	1.777,87

PONDERA HyWind

Diesel Power Plant in North Sulawesi, Central Sulawesi & Gorontalo

PLTD BULAGI	2,80
PLTD BUNGKU	12,49
PLTD BUNTA	4,98
PLTD BUOL (PEMDA)	3,70
PLTD KOTAMOBAGO	8,00
PLTD KOTARAYA	7,74
PLTD LEOK	4,00
PLTD LIRUNG	4,84
PLTD LUWUK	10,96
PLTD MANGARAN	2,65
PLTD MANTANGISI	3,20
PLTD MELONGUANE	3,52
PLTD MOILONG/TOILI	2,60
PLTD MOLIBAGU	4,23
PLTD MOUTONG	2,25
PLTD NOPI	9,79
PLTD ONDONG	4,23
PLTD PALELEH	3,15
PLTD POSO	3,77
PLTD SIBOANG	2,70
PLTD SILAE	60,24
PLTD SW AMPANA (PT WIC)	5,00
PLTD SW BOLANO (PT KERTABUMI TEKNINDO)	3,00
PLTD SW LEOK (PT KERTABUMI TEKNINDO)	3,00
PLTD SW LEOK (PT THAS POWER)	3,00
PLTD SW LUWUK (PT KRISTA INTI PERSADA)	3,00
PLTD SW LUWUK (PT SUMBERDAYA SEWATAMA)	3,00
PLTD SW LUWUK (PT WAHANA IDEA CIPTA)	3,00
PLTD SW SABANG (PT KUTILANG PAKSI MAS)	5,00
PLTD SW TAHUNA (PT KRISTA INTI PERSADA)	4,00
PLTD SW TINABOGAN (PT KERTABUMI TEKNINDO)	4,00
PLTD SW TOILI (PT WAHANA IDEA CIPTA)	4,00
PLTD SW TOLI-TOLI (PT SUMBERDAYA SEWATAMA)	5,00
PLTD TAGULANDANG	4,98
PLTD TAHUNA	5,71
PLTD TALAGA	24,13
PLTD TAMAKO	3,00
PLTD TARUN	3,90
PLTD Tersebar *)	57,89
PLTD TOMPIRA	



Opportunities for wind energy development

Construction of wind power plants

Onshore wind power – large scale

- 7 IPPs projects in 2020 (pending due to Covid-19 pandemic)
- Total **1.6 GW of projects listed in RUPTL** 2021-2030
- **1.8 GW** installed capacity of wind **by 2025** (RUEN)
- **60.6 GW of wind energy potential** in Indonesia

Onshore wind power – small scale and hybrid

- **100% electrification program** in eastern Indonesia; wind power as priority
- **De-dieselization** in small islands

Offshore wind power

- Large potential and promising
- No regulatory framework

Wind-related technologies

- Battery Energy Storage System
- Smart grid

Government policy efforts

- Stay **committed in emission reduction** through NDC and LCDI
- Legislate **new regulations on emission trading** and **NRE power plant development**
- **Conversion of conventional power plants**: 13 GW of old coal plants (CFPP & CCPP) and diesel generators

Challenges hampering wind energy development

- State electricity company **PLN is the sole offtaker** of RE-based power
- Presidential Regulation on **RE Feed-in Tariff (FIT) is not yet settled**
  - In Java: Domination of coal (60%) forces RE FIT to compete with low prices
  - Outside Java: Presence of gensets at small islands allows for higher FIT
- Issues with grid integration: **intermittency & grid stability**
  - Battery Energy Storage System (BESS) development becomes important
- **Prolonged land acquisition** for onshore wind farm
- **Build, Own, Operate, and Transfer (BOOT) scheme** of 25 years
- **Local content percentage (TKDN)** requirements

Thank you.

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