DIRECTORATE GENERAL OF NEW RENEWABLE ENERGY AND ENERGY CONSERVATION
MINISTRY OF ENERGY AND MINERAL RESOURCES
THE REPUBLIC OF INDONESIA

G20 INDONESIA 2022

NRE DEVELOPMENT TOWARD NET ZERO EMISSION (NZE)

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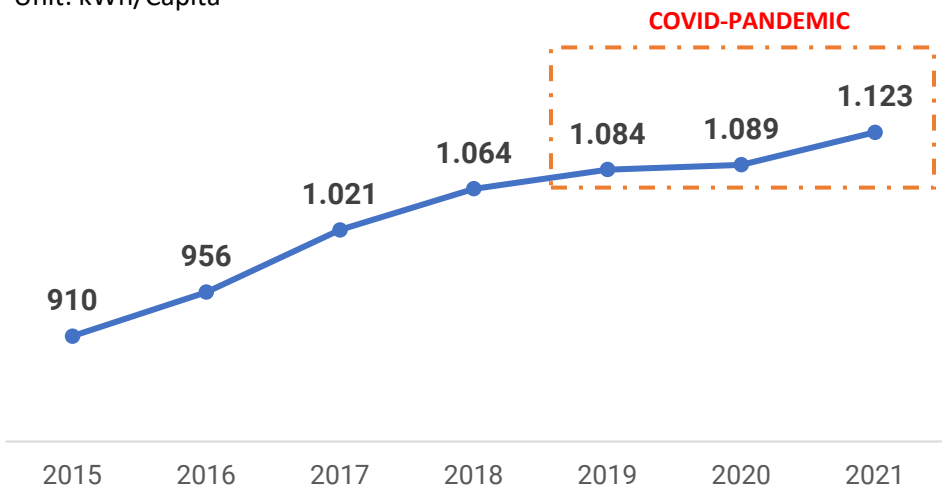
On
ReInvest Indonesia Investment Forum 2022 – Japan

INDONESIA NEW AND RENEWABLE ENERGY POTENTIAL

ELECTRICITY CONSUMPTION

Unit: kWh/Capita



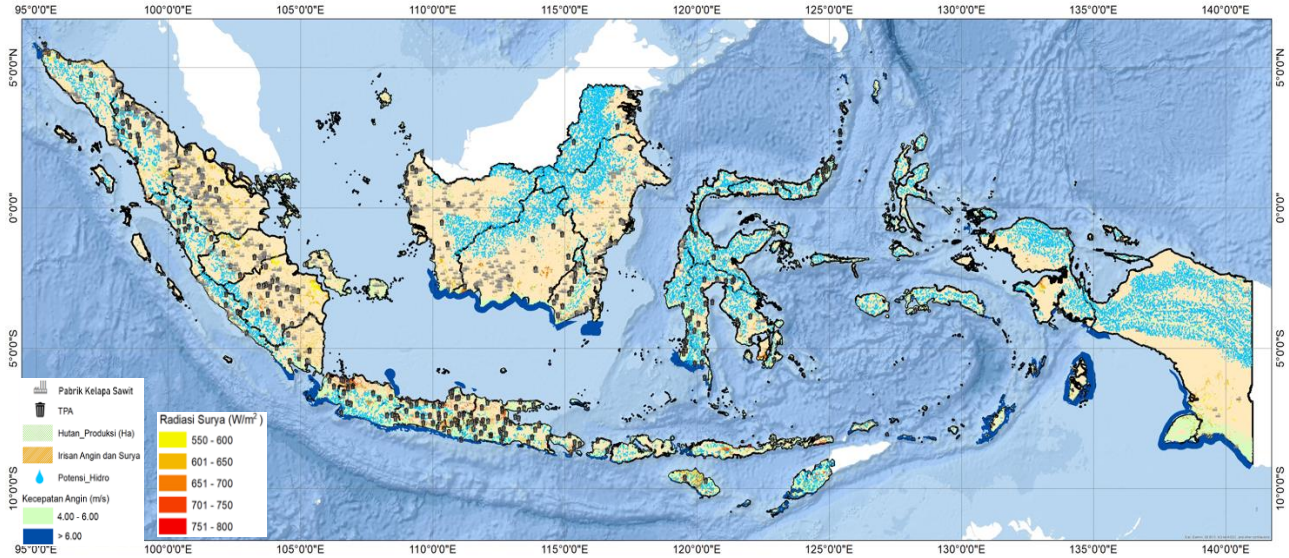
NRE POTENTIAL AND UTILIZATION

ENERGY	POTENTIAL (GW)	UTILIZATION (MW)
SOLAR	3,295	217
HYDRO	95	6,649
BIOENERGY	57	2,284
WIND	155	154
GEOTHERMAL	24	2,293
TIDAL	60	0
TOTAL	3,686	11,597*

Notes: *) May 2022

Nuclear: Uranium 89,483 tons - Thorium 143,234 tons

Indonesia has **abundant**, **various**, and **spreading** NRE resources, to support national energy security and NRE mix target achievement

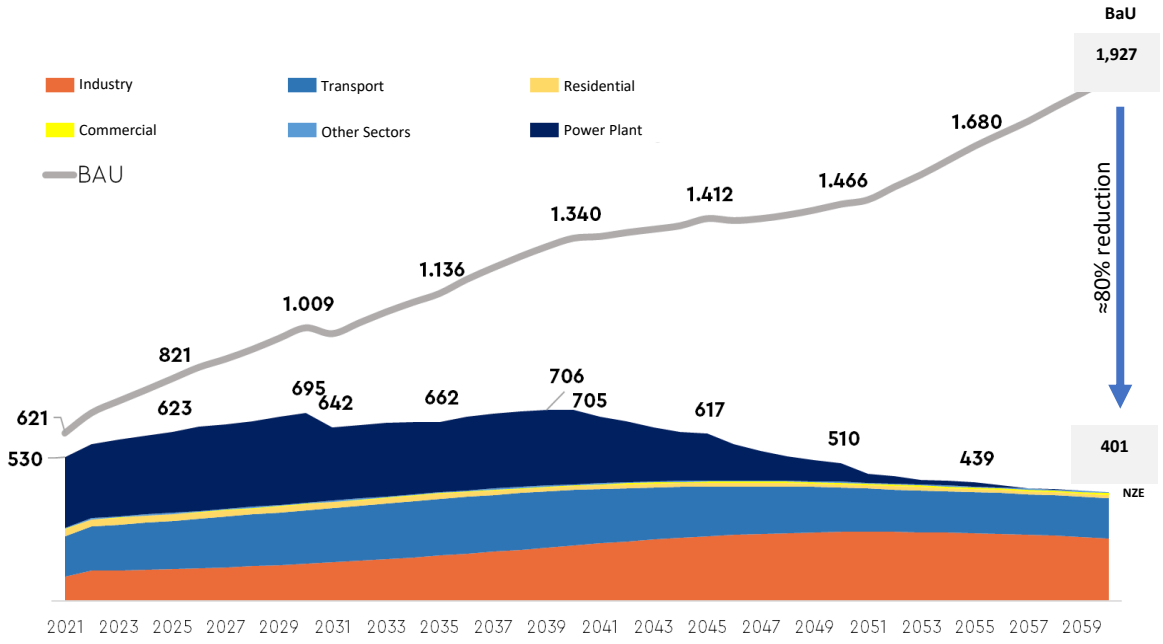


> ***"Only 0.3% of the total potential has been utilized. Therefore, the opportunity for NRE development is very open, especially supported by environmental issues, climate change, and increasing electricity consumption per capita."***

- **Hydro** potential spreads all over Indonesia's areas, particularly in North Kalimantan, NAD, North Sumatra and Papua.
- **Solar** potential spreads all over Indonesia's areas, particularly in East Nusa Tenggara, West Kalimantan and Riau which has higher radiation.
- **Wind** potential (>6 m/s) is particularly located in East Nusa Tenggara, South Kalimantan, West Java, NAD and Papua.
- **Ocean** energy potential spreads all over Indonesia's areas, particularly in Maluku, East Nusa Tenggara, West Nusa Tenggara and Bali.
- **Geothermal** potential spreads in ring of fire areas, including Sumatra, Java, Bali, Nusa Tenggara, Sulawesi, and Maluku.

NET ZERO EMISSION IN ACCORDANCE WITH ENERGY SECURITY

NZE Energy Sector (2060 or sooner)



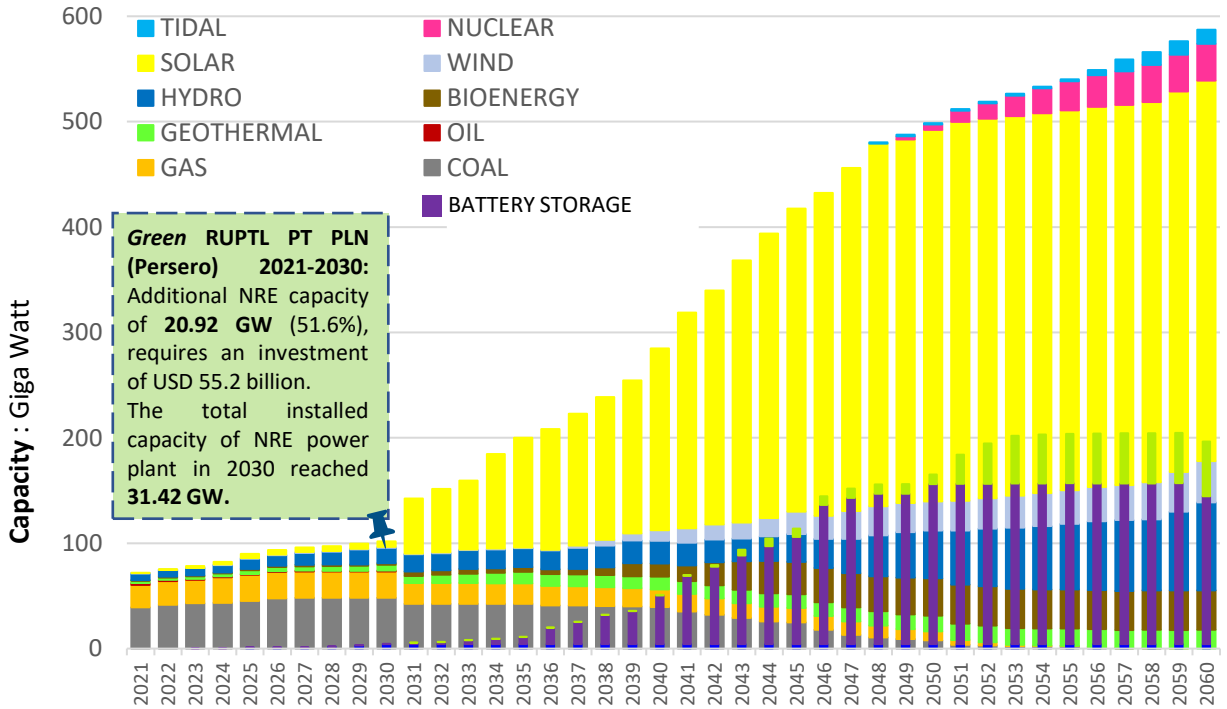
Implementation Strategies:

1. Gradual retirement of coal-fired PP.
2. NRE development acceleration, particularly Solar PV and Wind Power Plant.
3. More efficient technology utilization.
4. Encouraging the use of electric vehicle and electric stoves.
5. The implementation of Smart Grid to overcome intermittency of VRE (Variable Renewable Energy).

NZE Power Plant Development Roadmap

2060: All electricity will be generated by NRE PP.

NRE capacity 587 GW: Solar 361 GW, Hydro 83 GW, Wind 39 GW, nuclear power plant 35 GW, Biomass/Bioenergy 37 GW, Geothermal 18 GW, Tidal/Ocean 13.4 GW. Pumped Storage 4.2 GW, BESS 140 GW, Hydrogen 52 GW.

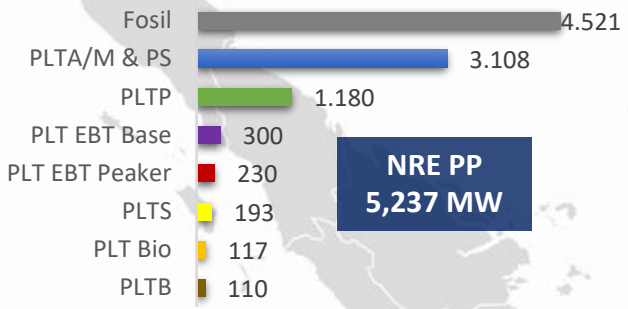


- Pump storage enters the system in 2025, Battery Energy Storage System (BESS) to be massively utilized in 2031. Hydrogen is utilized gradually starting in 2031, and massively in 2051.
- Nuclear PP will enter the system in 2049 to maintain system reliability, by 2060, it will need up to 35 GW.
- Total investment required: **1,177 billion USD or 29 billion USD p.a.**

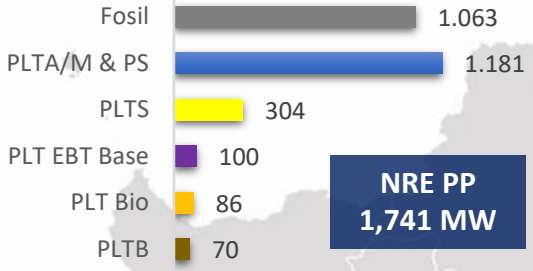
NRE PP DEVELOPMENT PLAN YEAR 2021-2030 - *GREEN* RUPTL

- NRE additional capacity is targeted to reach 20,9 GW (51,6% of the power plant in RUPTL 2021-2030.
- NRE development has been carried out in accordance with the systems' electricity balance.

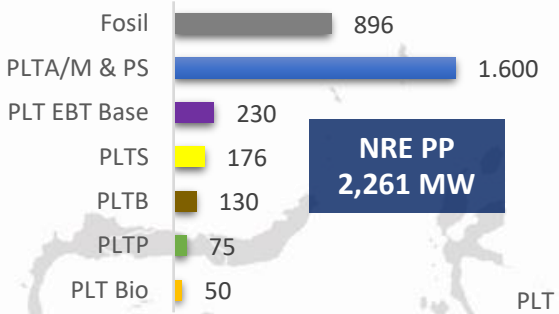
SUMATERA



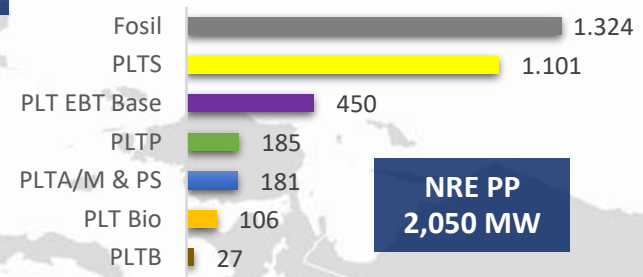
KALIMANTAN



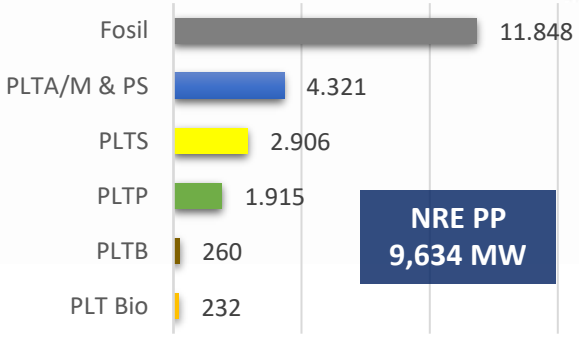
SULAWESI



MALUKU PAPUA NUSA TENGGARA



JAWA MADURA BALI



No	PP	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
1	Geothermal (PLTP)	136	108	190	141	870	290	123	450	240	808	3,355
2	Large Hydro (PLTA)	400	53	132	87	2,478	327	456	1,611	1,778	1,950	9,272
3	Mini Hydro (PLTM)	144	154	277	289	189	43	-	2	13	6	1,118
4	Solar PV (PLTS)	60	287	1,308	624	1,631	127	148	165	172	157	4,680
5	Wind Turbine (PLTB)	-	2	33	337	155	70	-	-	-	-	597
6	Bioenergy (PLT Bio)	12	43	88	191	221	20	-	15	-	-	590
7	NRE PP - Base	-	-	-	-	-	100	265	215	280	150	1,010
8	NRE PP - Peaker	-	-	-	-	-	-	-	-	-	300	300
Total		752	648	2,028	1,670	5,544	978	991	2,458	2,484	3,370	20,923

OPPORTUNITIES FOR INVESTMENTS IN NRE

Encouraging economic growth and employment

01

SOLAR PV ROOFTOP

Additional Capacity until 2025: **3.61 GW**
GHG Emission Reduction : **5.4 million tons CO2e**
Investment Required : **3 Billion USD**

Investment opportunity through:

- Installing Solar PV Rooftop on Buildings and Houses
- Installing Solar PV Rooftop in Industries

02

LARGE SCALE SOLAR PP

Additional Capacity until 2030 : **4.68 GW**
GHG Emission Reduction : **6.97 million tons CO2e**
Investment Required : **3.2 Billion USD**

Investment opportunity through:
Offer on Solar PP Quota from PT PLN (Persero)

03

HYDRO PP

Additional Capacity until 2030 : **104 GW**
GHG Emission Reduction : **46.46 million tons CO2e**
Investment Required : **25.63 Billion USD**

Investment opportunity through:
Development of Large Scale, Mini, Micro Hydro and *Pump storage*

04

NRE PP - BASE

Additional Capacity until 2030 : **1.01 GW**
GHG Emission Reduction : **4.51 million tons CO2e**
Investment Required : **5.49 Billion USD**

Investment opportunity through:
NRE PP which can fulfill baseload generation needs, i.e. Geothermal PP

05

GEOTHERMAL PP

Additional Capacity until 2030 : **3.35 GW**
GHG Emission Reduction : **22.4 million tons CO2e**
Investment Required : **17,.35 Billion USD**

Investment opportunity through:

- Offer on Working Area dan Geothermal PSPE Area
- Implementation of geothermal supporting industries and services

06

BIOENERGY PP

Additional Capacity until 2030 : **590 MW**
GHG Emission Reduction : **4.61 million tons CO2e**
Investment Required : **2.2 Billion USD**

Investment opportunity through:
Development of Biomass, Biogas, and Waste PP

07

WIND PP

Additional Capacity until 2030 : **597 MW**
GHG Emission Reduction : **2.22 million tons CO2e**
Investment Required : **1.03 Billion USD**

Investment opportunity through:
Development of Wind PP by through offers from PT PLN (Persero)

08

NRE PP - PEAKER

Additional Capacity until 2030 : **300 MW**
GHG Emission Reduction : **2.01 million tons CO2e**
Investment Required : **0.28 Billion USD**

Investment opportunity through:
Utilization of NRE PP – Peaker quota listed on the electricity balance i.e. *Battery Energy Storage System (BESS)*

Thank you

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