Renewable Energy Development Plan

Presented in
Japan-Indonesia Business Forum
for Energy Efficiency, Conservation and Renewable Energy

Hotel Indonesia Kempinski
Jakarta, 14th November 2018

Directorate of Corporate Planning
PTPLN (Persero)

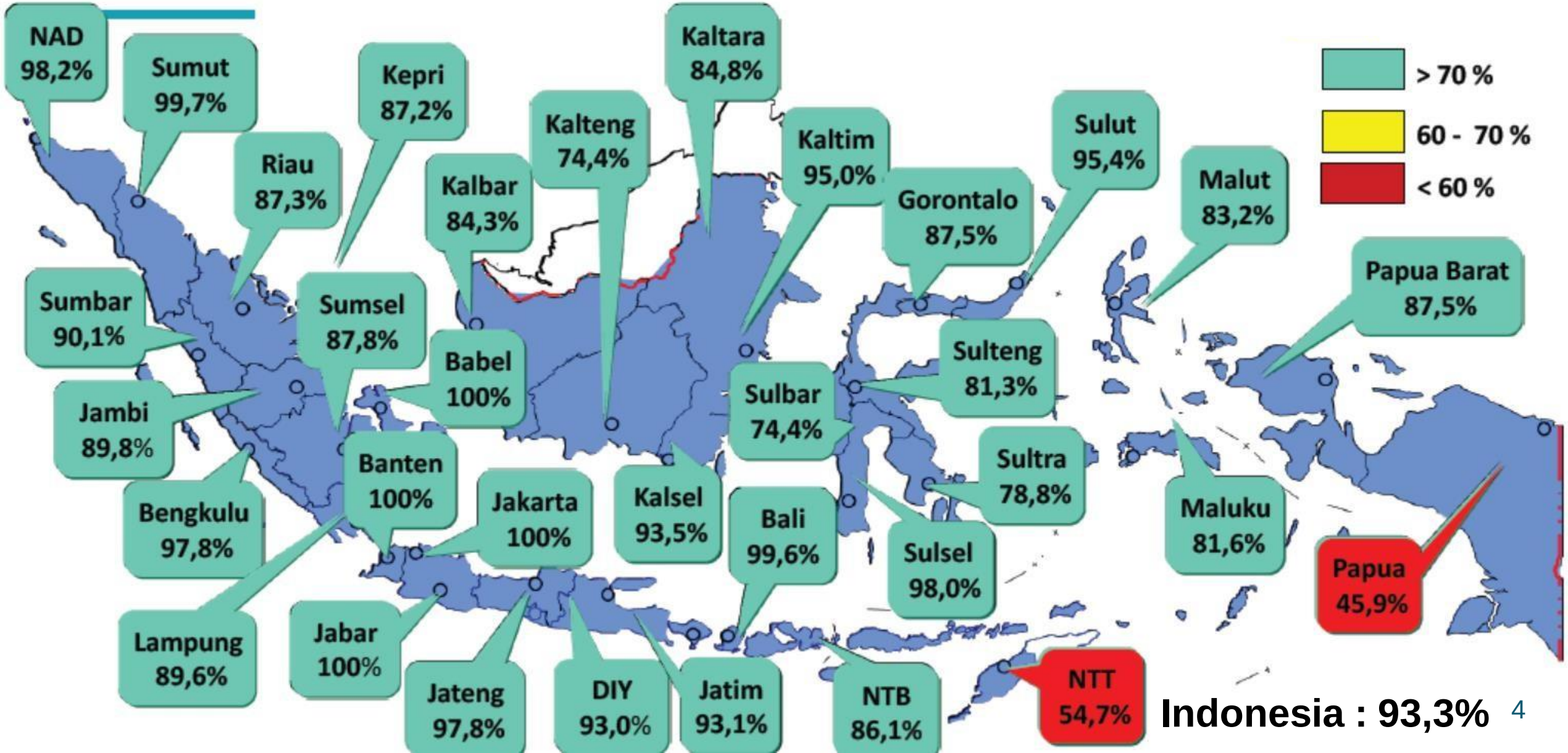
Proper Emas 2017
PLTU Paiton 1 & 2

Content

PLN Company Profile

Description	Unit	Up to Jul 2018	2017	2016	2015	2014
Installed Capacity	MW		55.926	54.665	50.859	49.591
Sales	GWh	133.440	223.134	21.600	202.846	198.602
Installation						
Transmission Lenght	kms		48.901	46.266	41.683	39.910
Substation Capacity	MVA	122.370	113.790	108.479	92.651	86.472
Production			254.403	248.611	233.982	228.553
Own Production	GWh	101.856	167.977	166.457	156.631	152.853
Rent	GWh		13.447	17.352	19.841	22.443
Purchase	GWh	43.793	72.979	64.802	57.510	53.257
Quality						
Network Losses	Percentage	9,55	8,76	9,48	9,77	9,71
Number of Customers	Thousand customers		68.068	64.282	61.157	57.493

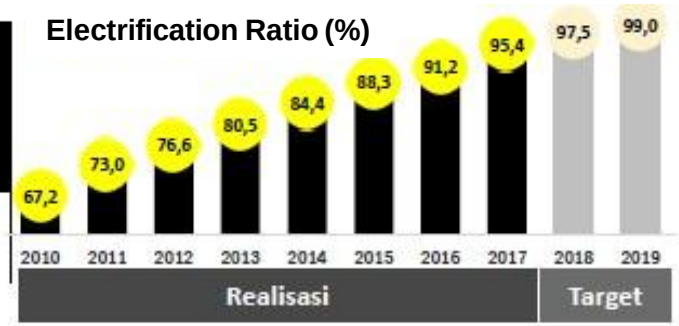
PLN Electrification Ratio – July 2018

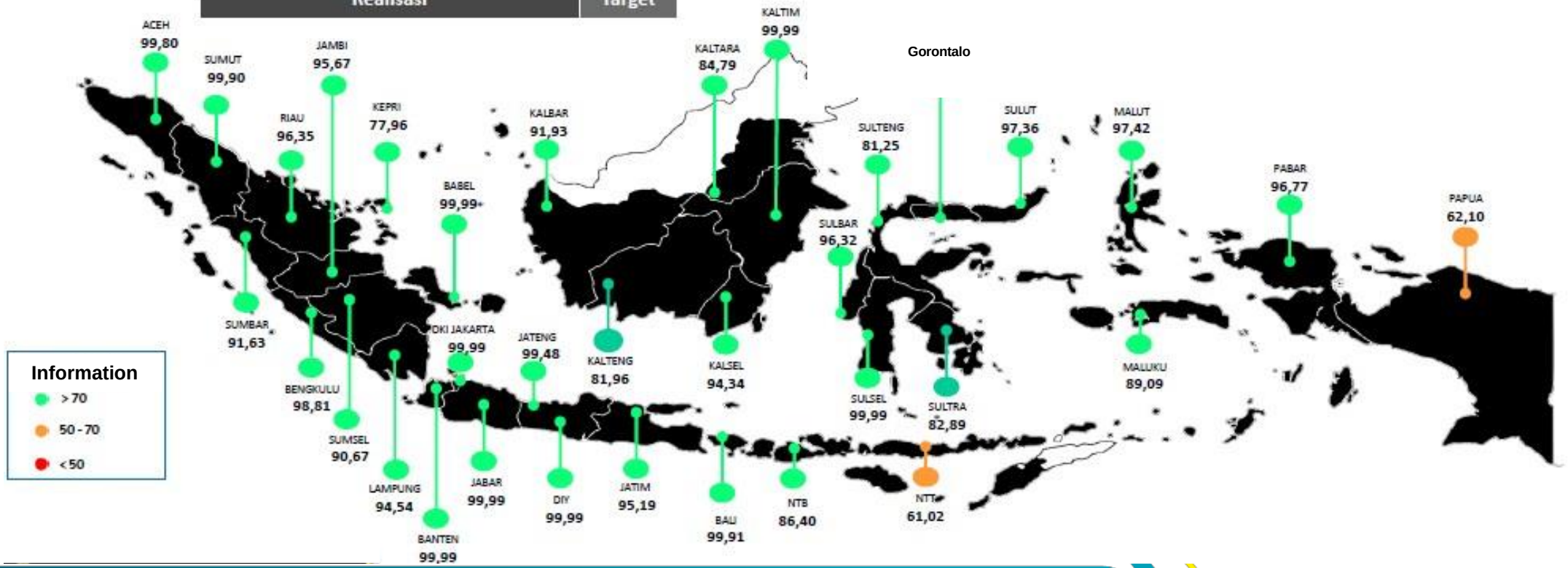


Indonesia : 93,3%

Electrification Ratio

95,35%
Realization 2017





Target of Electrification Ratio in RUPTL (1/2)

No.	Provinsi	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1	Aceh	97,4	99,3	99,9	100,0	100,0	100,0	100,0	100,0	100,0	100,0
2	Sumut	98,9	99,4	99,7	100,0	100,0	100,0	100,0	100,0	100,0	100,0
3	Sumbar	93,5	96,3	99,1	100,0	100,0	100,0	100,0	100,0	100,0	100,0
4	Riau	95,3	97,5	99,8	100,0	100,0	100,0	100,0	100,0	100,0	100,0
5	Kepri	85,1	94,5	98,2	99,9	99,9	100,0	100,0	100,0	100,0	100,0
6	Jambi	88,9	92,2	96,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
7	Bengkulu	96,9	97,9	99,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
8	Sumsel	93,0	96,0	99,1	100,0	100,0	100,0	100,0	100,0	100,0	100,0
9	Babel	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
10	Lampung	94,0	99,2	99,8	100,0	100,0	100,0	100,0	100,0	100,0	100,0
11	Jabar	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
12	DKI	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
13	Banten	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
14	Jateng	98,9	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
15	DIY	94,9	97,9	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
16	Jatim	95,5	98,2	99,8	100,0	100,0	100,0	100,0	100,0	100,0	100,0
17	Bali	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Target of Electrification Ratio in RUPTL (2/2)

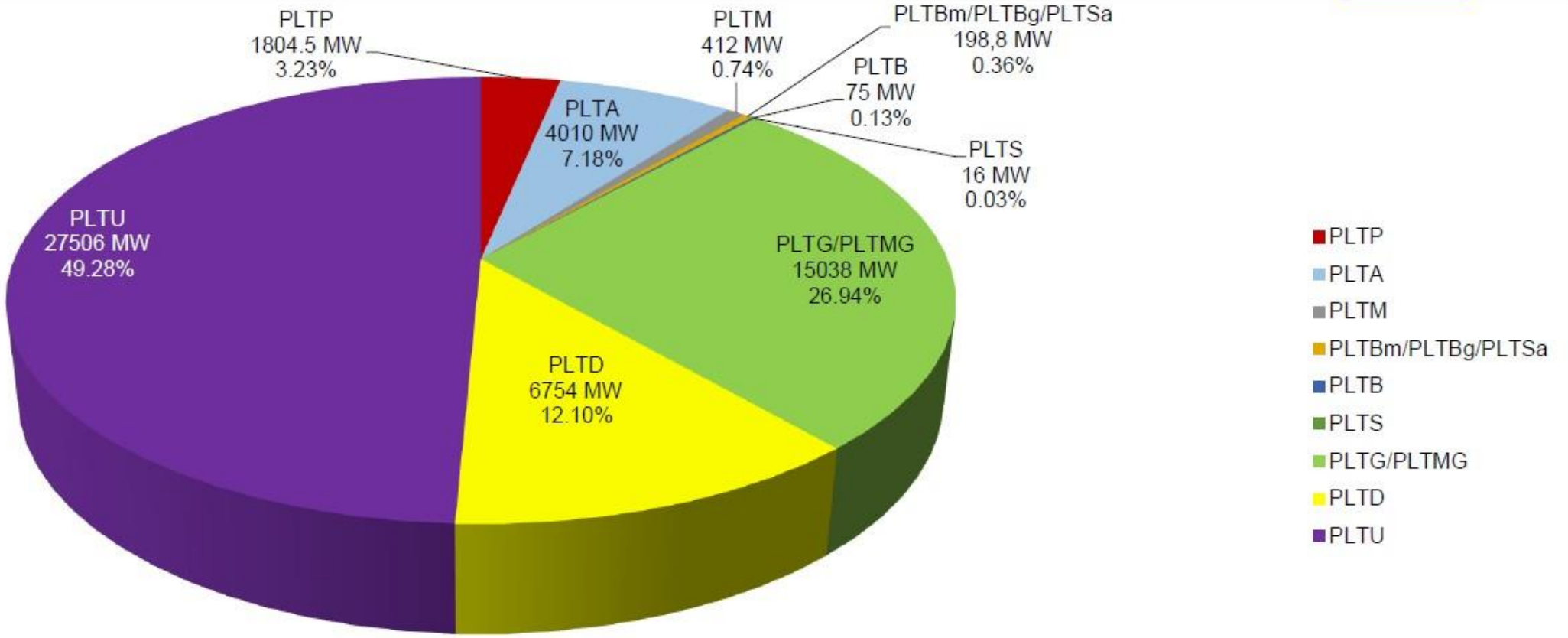
No.	Provinsi	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
18	NTB	93,5	97,5	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
19	NTT	70,0	77,0	84,3	90,1	96,0	99,9	100,0	100,0	100,0	100,0
20	Kalbar	93,3	96,1	99,1	100,0	100,0	100,0	100,0	100,0	100,0	100,0
21	Kalsel	95,0	97,3	99,6	100,0	100,0	100,0	100,0	100,0	100,0	100,0
22	Kalteng	70,4	81,1	85,7	89,9	93,9	97,8	100,0	100,0	100,0	100,0
23	Kaltim	99,4	99,6	99,7	100,0	100,0	100,0	100,0	100,0	100,0	100,0
24	Kaltara	86,3	90,5	95,2	100,0	100,0	100,0	100,0	100,0	100,0	100,0
25	Sulut	97,5	99,0	99,8	99,9	100,0	100,0	100,0	100,0	100,0	100,0
26	Sulteng	91,5	94,9	98,4	99,9	100,0	100,0	100,0	100,0	100,0	100,0
27	Gorontalo	97,4	98,4	99,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
28	Sulsel	99,8	99,9	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
29	Sultra	87,7	90,2	92,6	95,1	97,5	100,0	100,0	100,0	100,0	100,0
30	Sulbar	87,3	89,4	91,6	93,7	95,8	97,9	100,0	100,0	100,0	100,0
31	Maluku	92,6	94,8	96,4	98,2	100,0	100,0	100,0	100,0	100,0	100,0
32	Malut	98,9	99,2	99,6	99,9	100,0	100,0	100,0	100,0	100,0	100,0
33	Papua	65,0	77,7	82,7	87,7	92,7	97,7	100,0	100,0	100,0	100,0
34	Pabar	90,4	93,6	96,8	98,1	98,1	98,2	100,0	100,0	100,0	100,0
Indonesia		96,2	98,0	99,1	99,6	99,8	99,9	100,0	100,0	100,0	100,0

Strategies for Increasing Electrification Ratio

- Developing and monitoring electricity infrastructures projects stated in RUPTL.
- Developing New and renewable energy for remote and isolated areas.
- Encouraging programs of rural electrification in order to achieve 100% rural areas electrified in 2019.
- Enhancing the role of PLN *corporate social responsibility* (CSR), especially for activities related to rural electrification.
- Obtaining good corporate relationship with the government for pre-electrification program such as LTSHE (efficient solar PV lamp) program.
- Working together with local governments in order to develop new and renewable energy projects and free electricity installment for houses of poor families in all over Indonesia.

01 | Current Renewable Energy Development

Installed Capacity (June 2018)



Tambahan Pembangkit EBT 2017 : 408 MW

Tambahan Pembangkit EBT 2018 : 127,3 MW

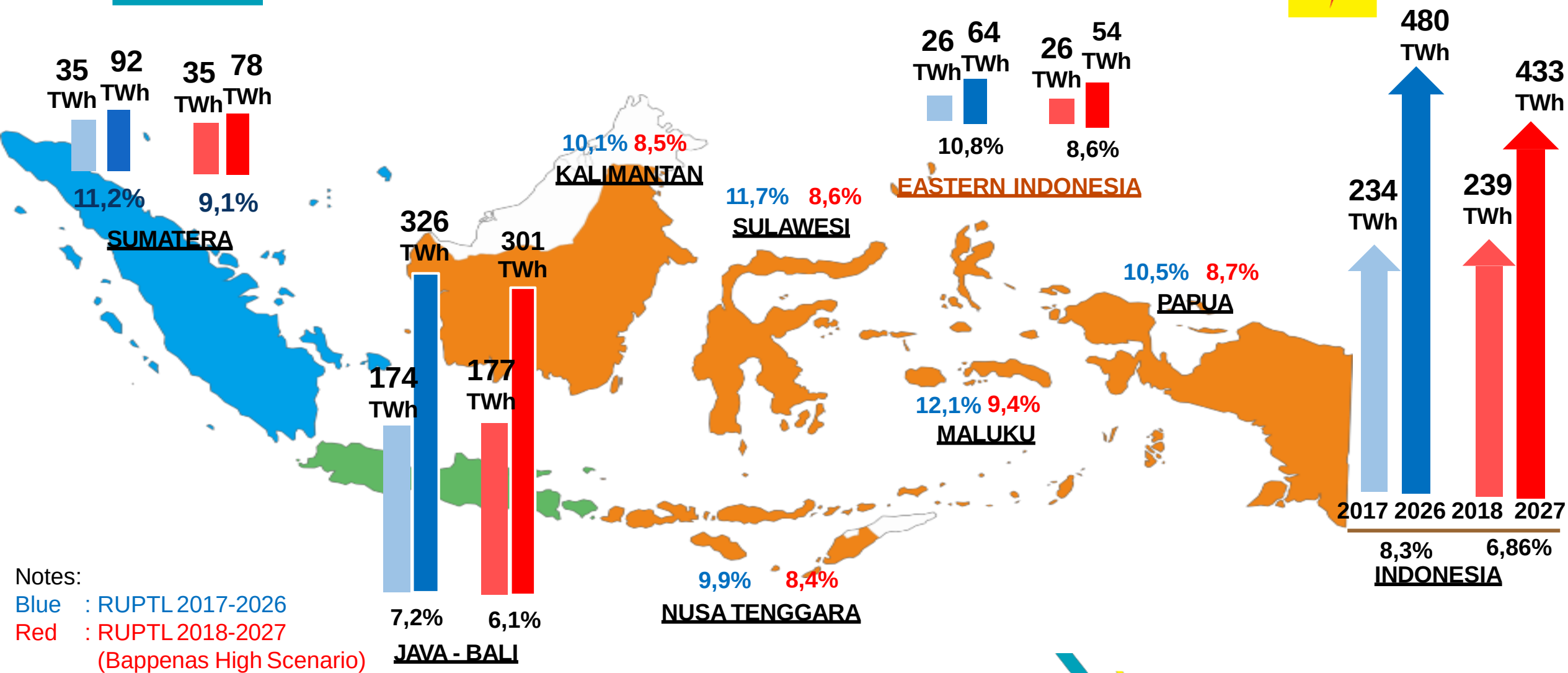
- Total Power Plant : 55.814 MW
- Total New and Renewable Energy Power Plant : 6516,3 MW
- New and Renewable Energy Percent : 11,68 %

Progress of Renewable Energy Development (June 2018)

Status	PLTP (MW)	PLTA (MW)	PLTM (MW)	PLTBm/PLT Bg (MW)	PLTSampah (MW)	PLTB (MW)	PLT AL (MW)	PLTD CPO (MW)	PLTS (MW)	PLTHybrid (MW)	Total (MW)
Operasi	1,804.5	4,010	412.0	181.2	17.6	75	-	-	16.0	-	6,516.3
Konstruksi	386	2,192	245.0	24	10.2	60	-	-	4	-	2,921
PPA/Proses FC	-	200	420.0	75.3	13.8	-	-	-	45	-	754
Eksplorasi (PLTP)	2,223	-	-	-		-	-	-	-	-	2,223
Proses PPA	-	1,057	58.0	112.6		-	-	5	5	-	1,238
Tender oleh Pemerintah	710	-	-	-		-	-	-	-	-	710
Studi, Pendanaan dan pengadaan	1,264	9,493	102.8	109.5		270	-	-	0	899	12,138
Proposal	-	7,950	725.0	25.8		503	12	2	800	482	10,500
Total	6,387.5	24,902	1,963	528	41.6	908	12	7	870	1,381	37,000.3

02| Electricity Demand Forecast

Electricity Demand Forecast 2018-2027



Notes:
Blue : RUPTL 2017-2026
Red : RUPTL 2018-2027
(Bappenas High Scenario)

03| Power Development Plan

Comparison Between RUPTL 2017-2026 and RUPTL 2018-2027

TYPE	RUPTL 2017-2026	RUPTL 2018-2027
CFPP	31.935	26.807
CC/GT/GE PP	24.389	14.305
HEPP	13.762	8.283
GeoPP	6.290	4.583
Other RE	1.224	**2.046**
TOTAL	**77.873**	**56.024**

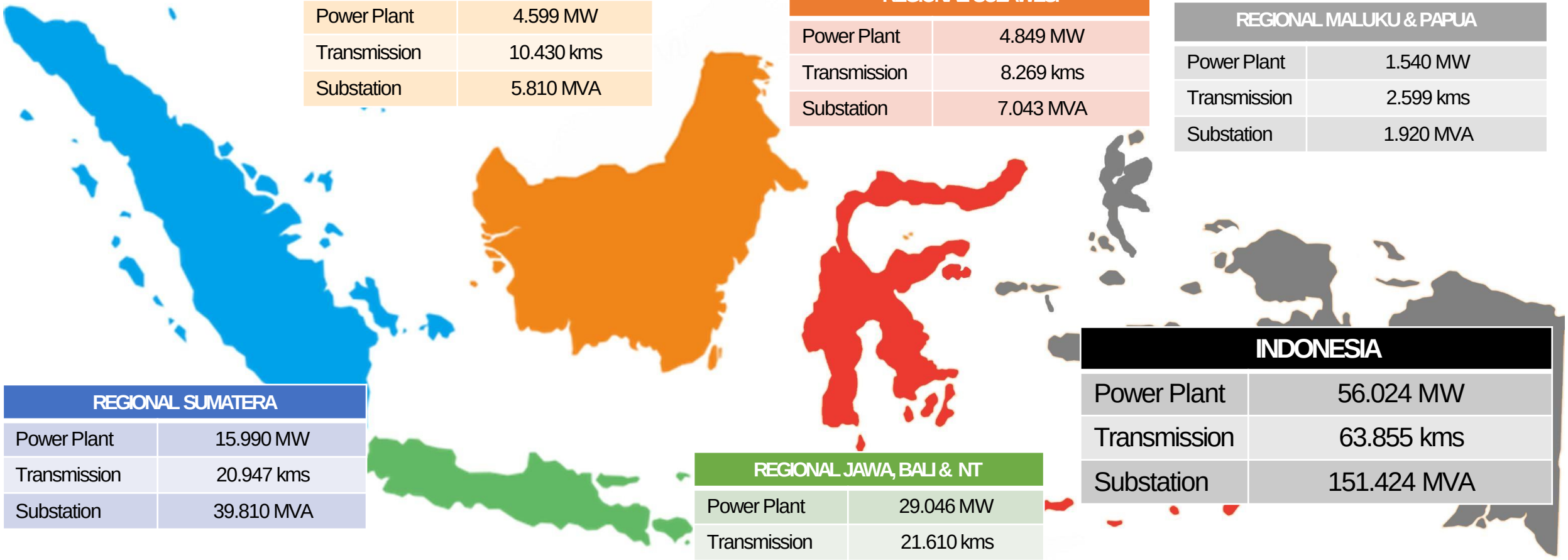
- The additional capacity is lower from previous RUPTL due to lower demand growth.
- Decrease thermal power plant, especially coal fired power plant.
- Increase other renewable energy (wind, solar PV etc.)

Electricity Infrastructure Development

REGIONAL KALIMANTAN	
Power Plant	4.599 MW
Transmission	10.430 kms
Substation	5.810 MVA

REGIONAL SULAWESI	
Power Plant	4.849 MW
Transmission	8.269 kms
Substation	7.043 MVA

REGIONAL MALUKU & PAPUA	
Power Plant	1.540 MW
Transmission	2.599 kms
Substation	1.920 MVA

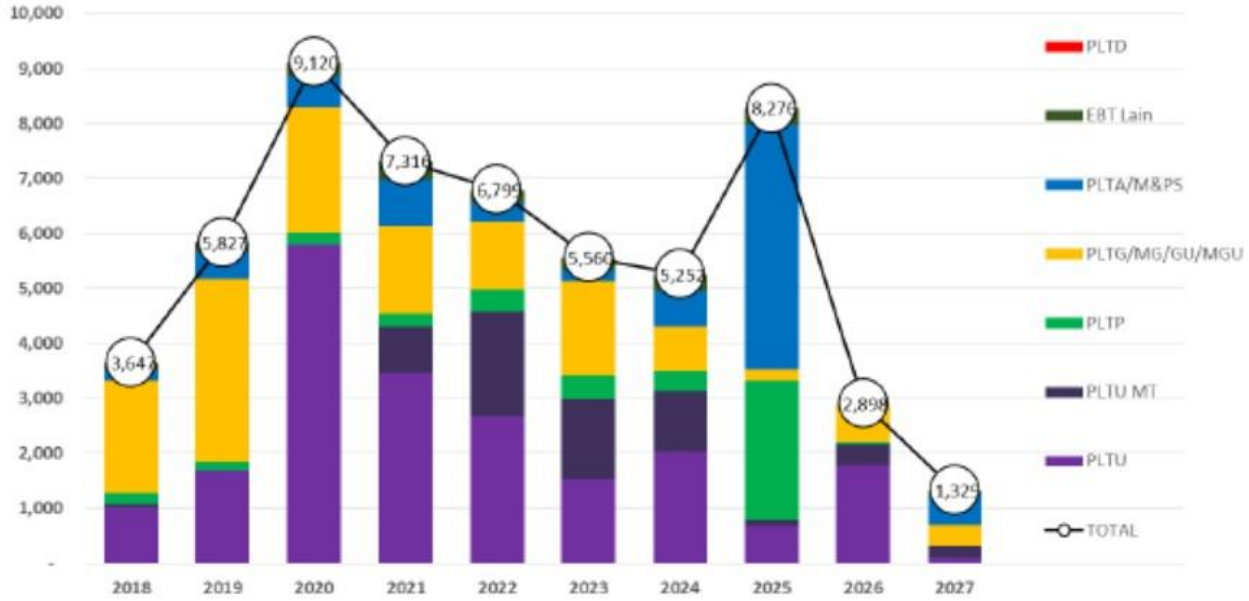


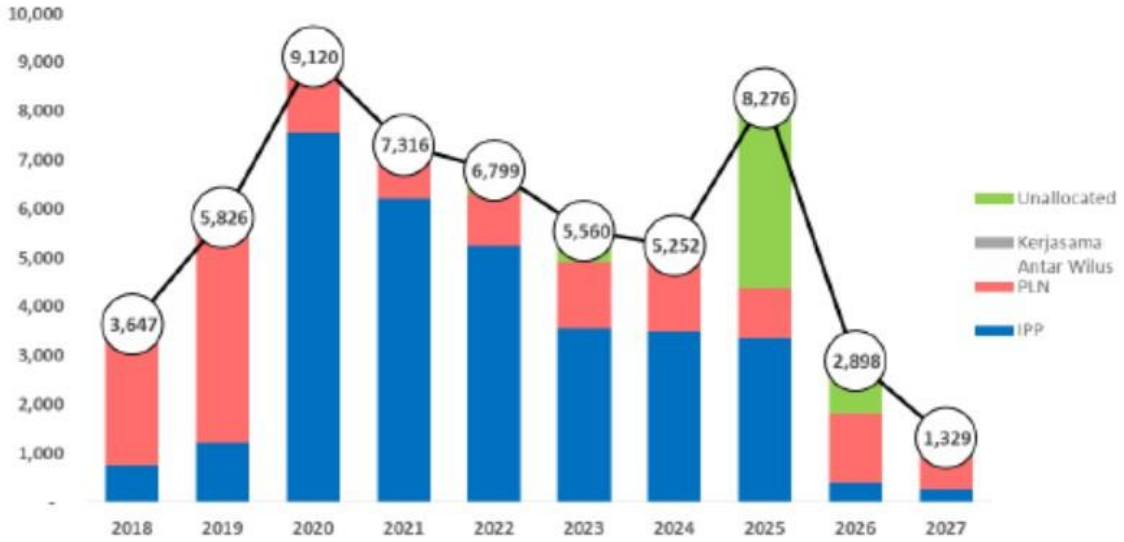
REGIONAL SUMATERA	
Power Plant	15.990 MW
Transmission	20.947 kms
Substation	39.810 MVA

REGIONAL JAWA, BALI & NT	
Power Plant	29.046 MW
Transmission	21.610 kms
Substation	96.841 MVA

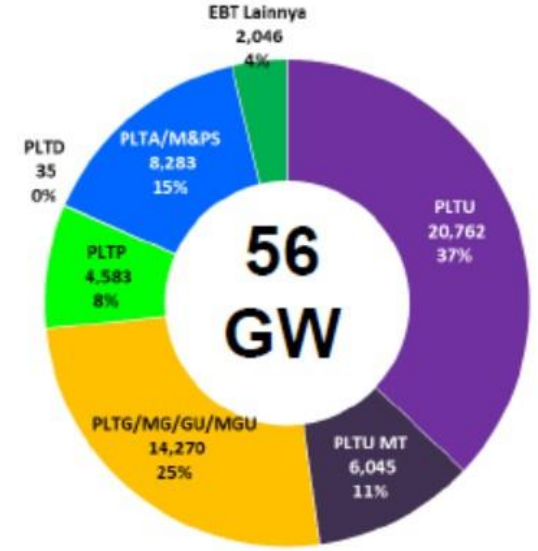
INDONESIA	
Power Plant	56.024 MW
Transmission	63.855 kms
Substation	151.424 MVA

Power Plant Development Plan (MW)

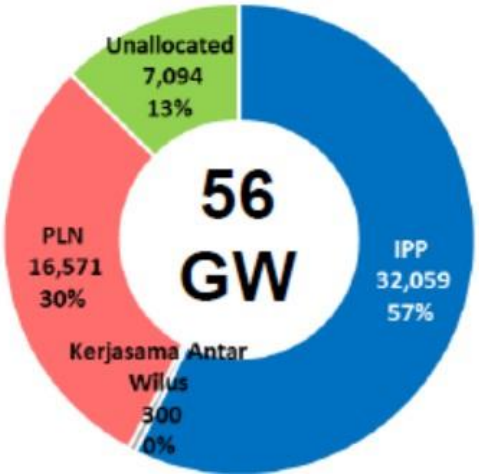




KOMPOSISI PEMBANGKIT

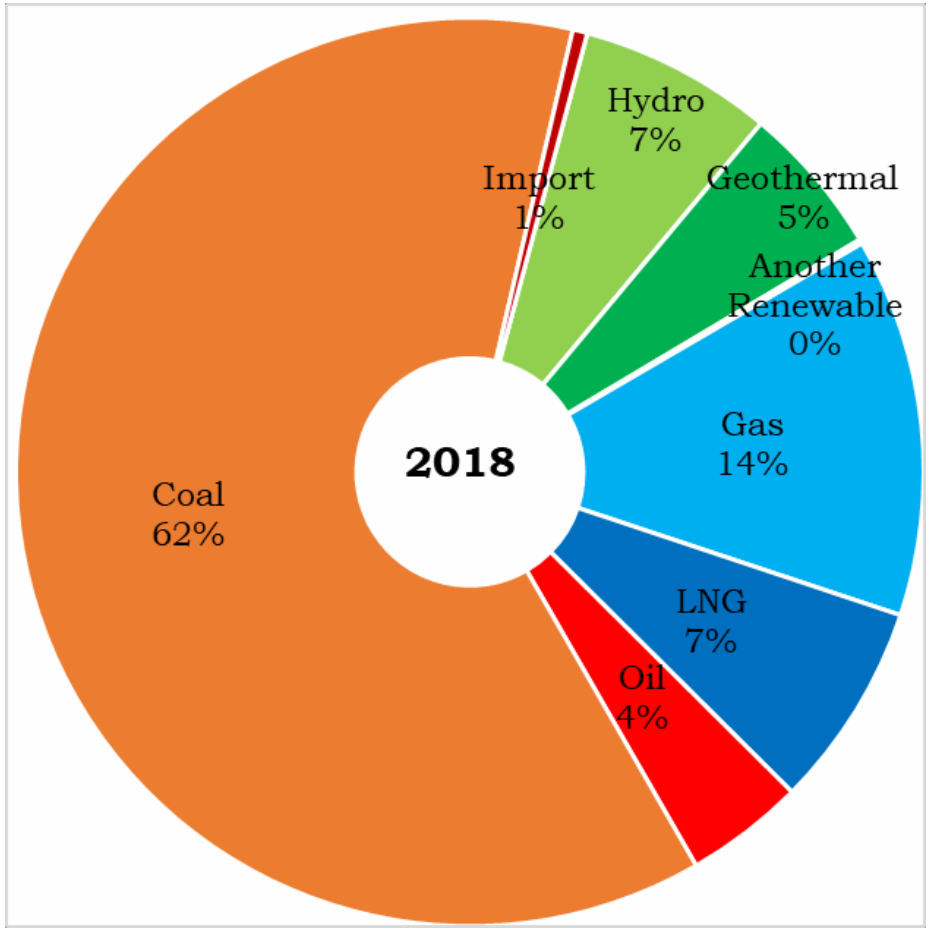


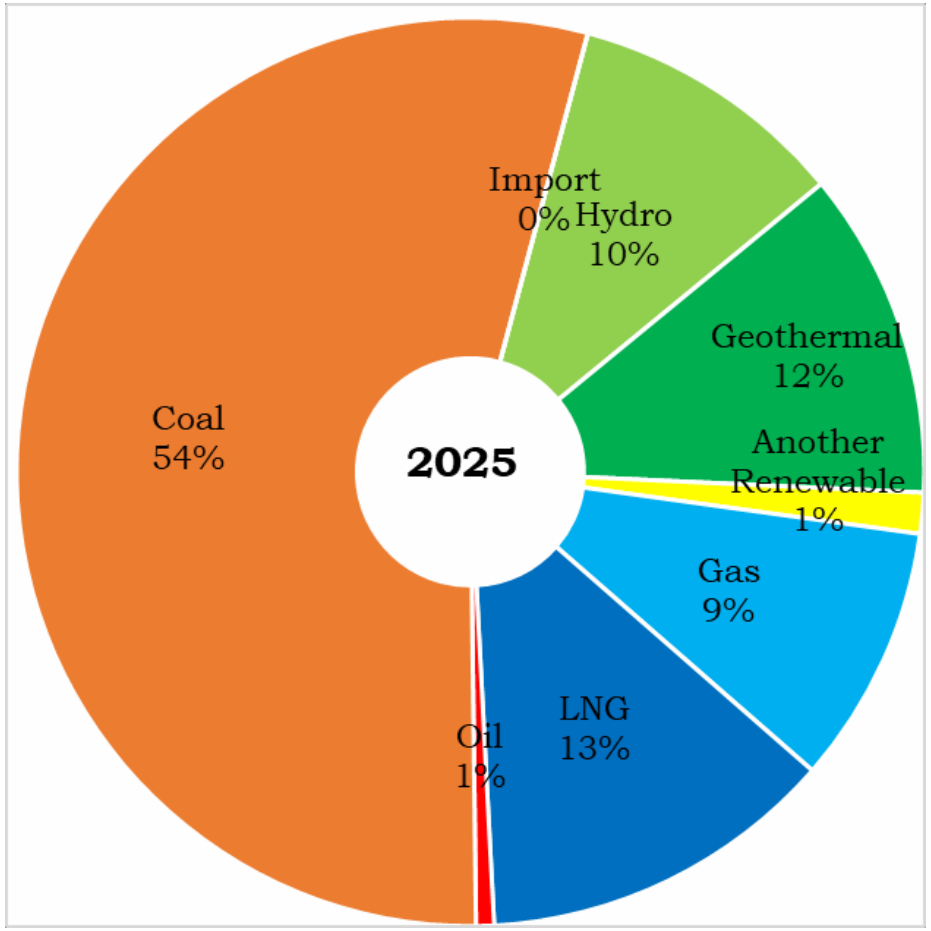
KOMPOSISI KEPEMILIKAN



Fuel Mix
04| Projection

Fuel Mix Projection





RE portion in 2018 : 12,4%

RE portion in 2025 : 23,0%

05| Renewable Energy Development

Renewable Energy Criteria

1. Supply and Demand Balance
2. System Readiness
3. Financing Capability
4. Economic Feasibility

Renewable Energy Development Strategies

- The development of RE power plants shall consider the balance between supply-demand and the readiness of the system as well as the cost efficiency.
- PLN will utilize the renewable energy resources from water energy resources, geothermal (which include small scale/modular), biofuel, wind energy, solar energy, biomass and waste, etc., and will support any effort to create RE-BID (renewable energy based on Industrial Development).
- Particularly for PV, PLN would develop centralized PV to electrify isolated areas that relatively far from existing grids. These areas could be undeveloped areas, border areas and outermost islands. Hybrid system (PV, other RE and Diesel PP) would also be developed for areas that still have less than 12 hours electricity, commonly in the eastern part of Indonesia.
- PLN will develop Smart Grid system to increase penetration of intermiten RE and increase reability of power system. PLN would also develop micro grid (usually using PV) for the areas where distribution lines will not be developed in 2-3 years ahead.
- PLN will reduce the use of HSD and MFO and encourage the utilization of biofuel.

Renewable Energy Development Plan

RE in 2017

- Geo: 1808 MW
- Bio: 1841 MW
- Hydro: 5125 MW
- Miro/mini hydro: 206 MW
- Solar PV: 90 MW
- Wind: 1,2 MW
- Biofuel: 3230 KL

Wind Farm: 147 MW

Construction
- 30 x 2.5 MW
- 20 x 3.6 MW

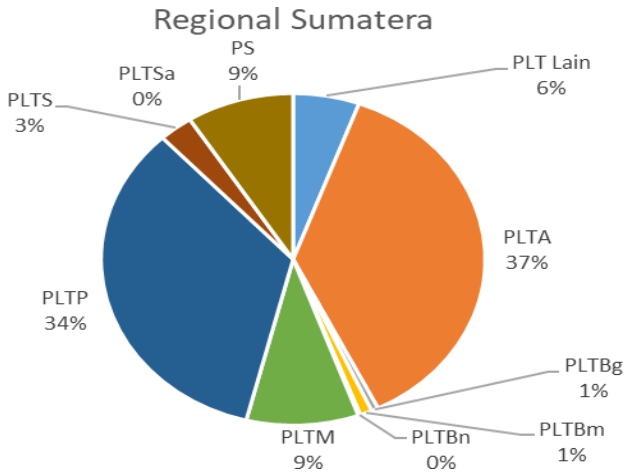
Floating PV: 200 MW

Planning
Cirata Dam

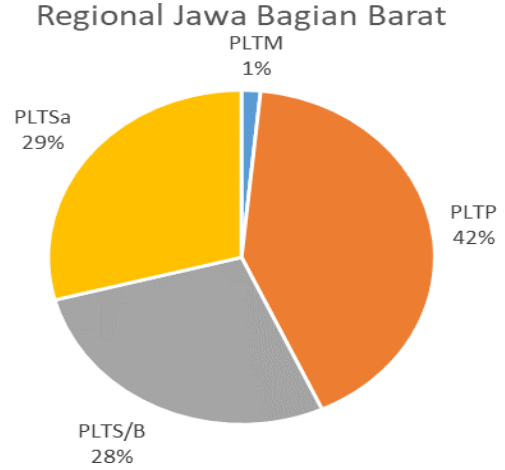
No	Power Plant	Cap.	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
1	Geothermal	MW	210	150	221	235	405	445	355	2.537	20	5	4.583
2	Hydro	MW	66	287	193	755	315	196	635	4.461	-	564	7.472
3	Minihydro	MW	108	202	366	103	31	-	-	-	-	-	811
4	Solar	MWp	5	22	214	281	-	200	-	325	-	-	1.047
5	Wind	MW	70	60	5	45	10	30	309	-	-	60	589
6	Biomass/ Municipal waste	MW	53	53	41	19	235	-	-	-	-	10	411
7	Ocean Energy	MW	-	-	-	-	-	-	-	-	-	-	-
8	Biofuel	Thousand KL	607	598	375	217	146	150	154	157	165	176	2.745
TOTAL		MW	512	774	1.040	1.438	996	871	1.296	7.323	20	639	14.912

Ministerial Decree of MEMR No. 1567K/21/MEM/2018 on Ratification Power Supply Business Plan of PT. PLN Persero 2018-2027

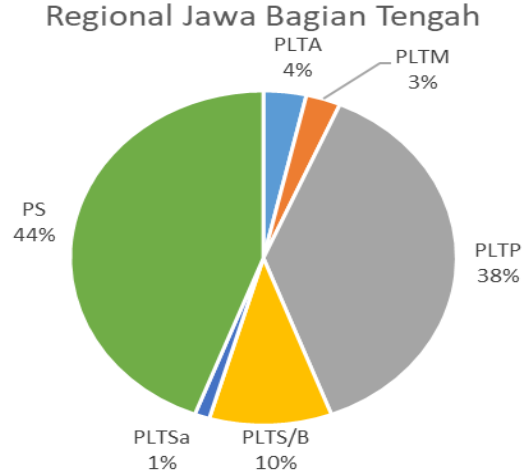
Renewable Energy Development Plan per Regional



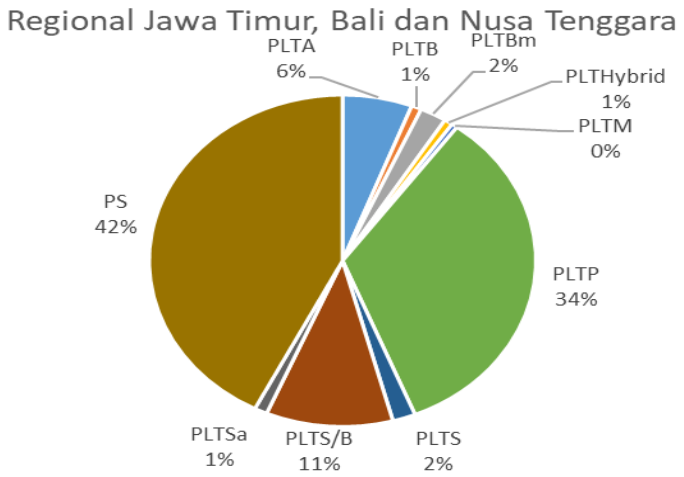
Total Reg Sumatera : 5.533,6 MW



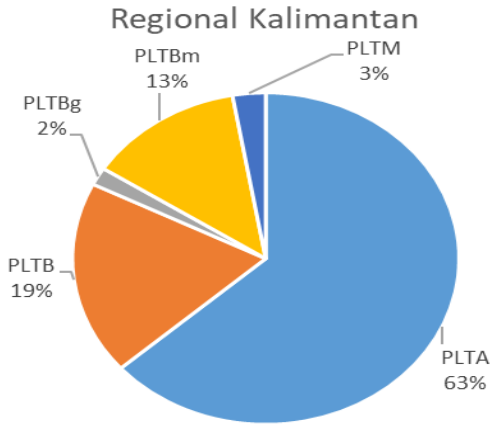
Total Reg JBB : 360,7 MW



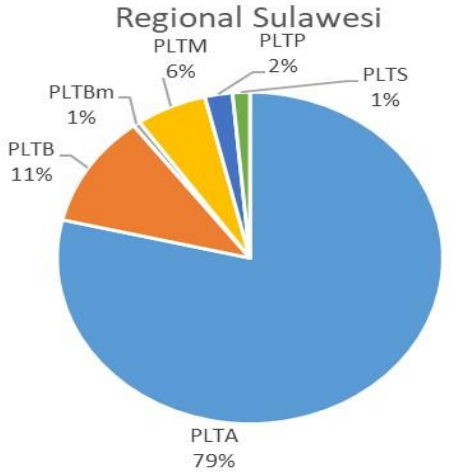
Total Reg JBT : 4.387,6 MW



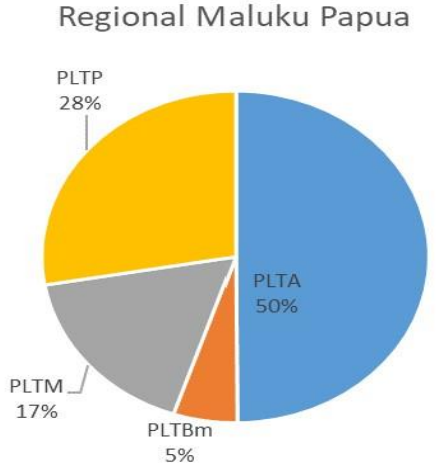
Total Reg JTBN : 2.352,3 MW



Total Reg Kal : 370,1 MW



Total Reg Sul : 1.726,5 MW

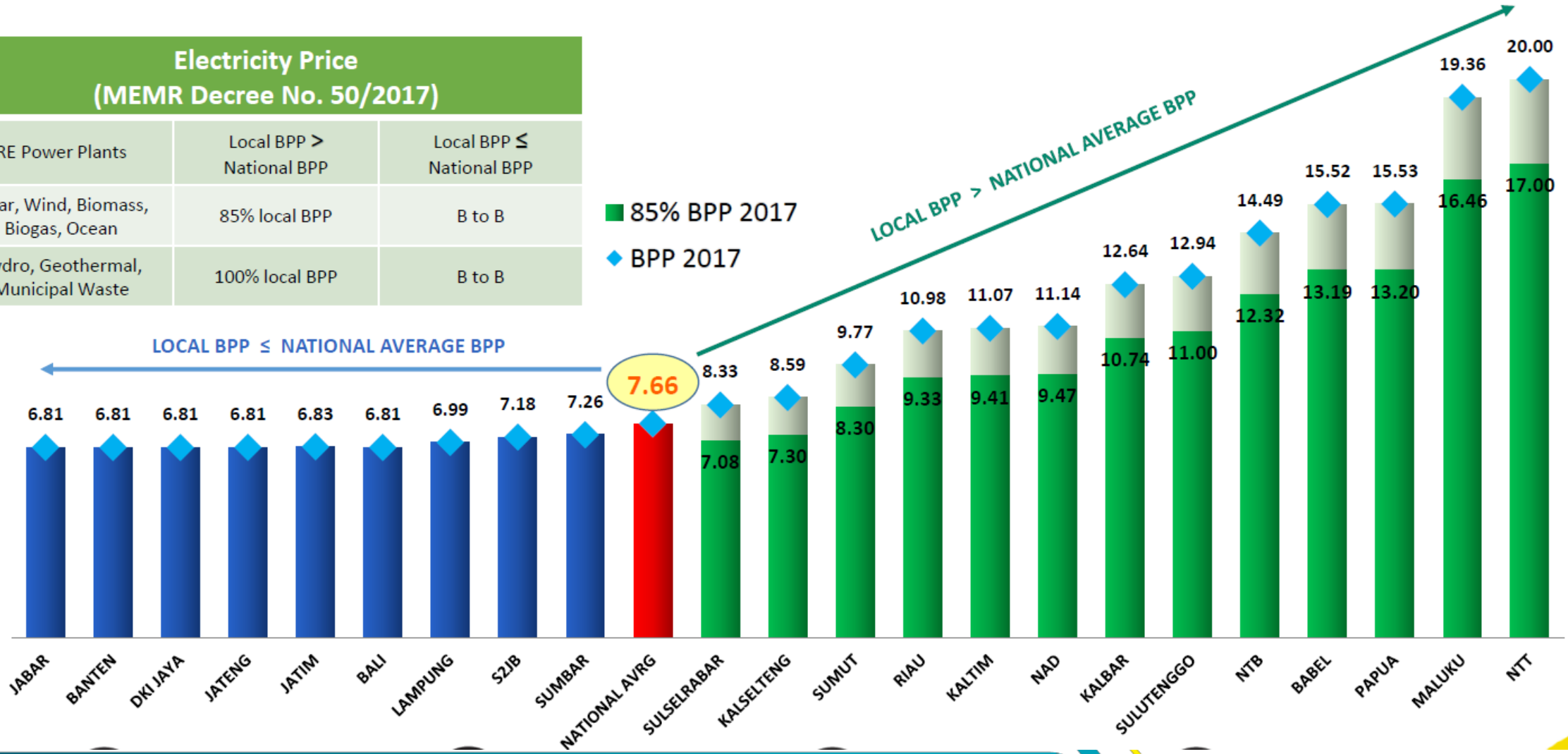


Total Reg MP : 180,4 MW

06 | Renewable Energy Procurement

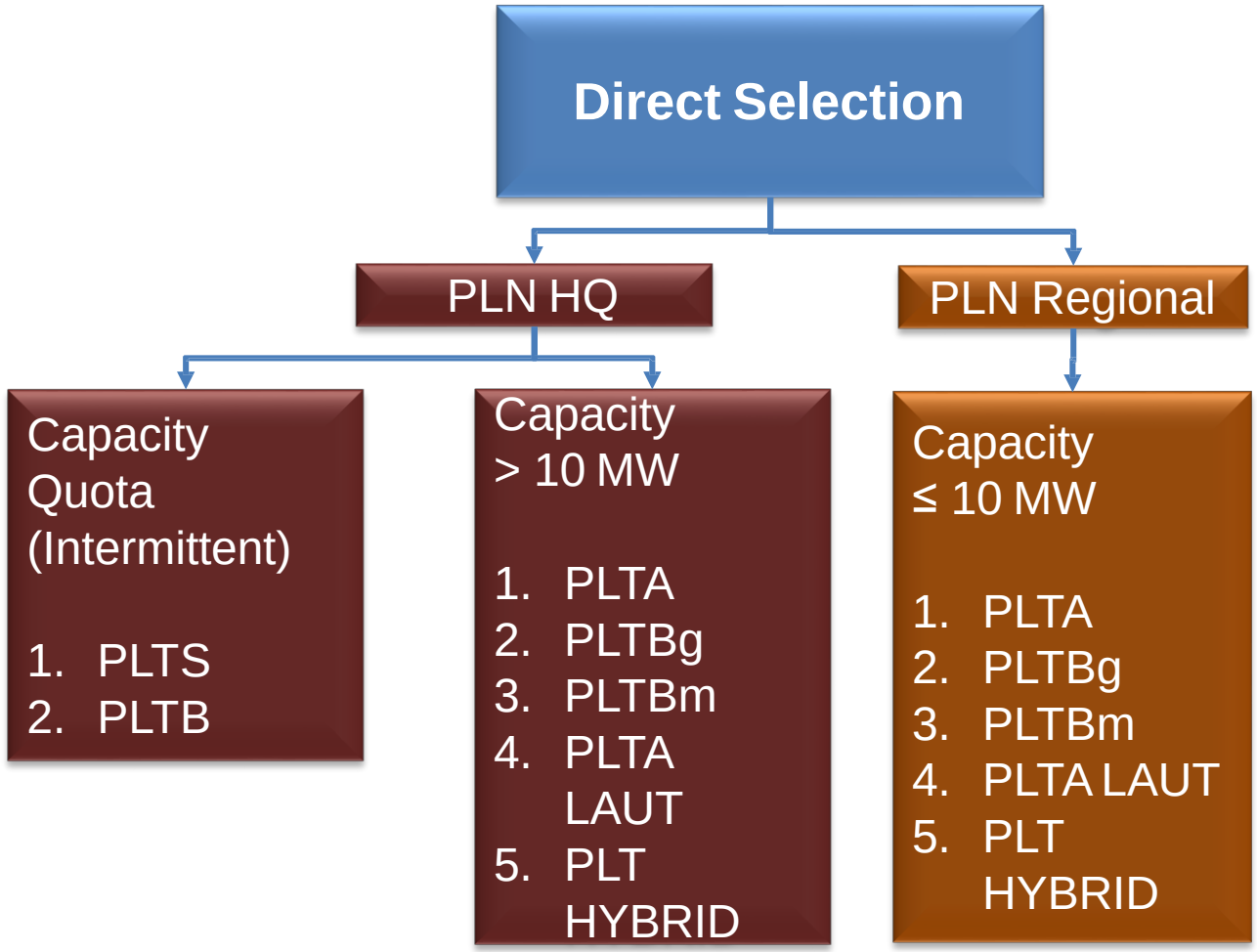
Renewable Energy Price and Cost of Production (BPP) 2017 (cent USD/kWh)

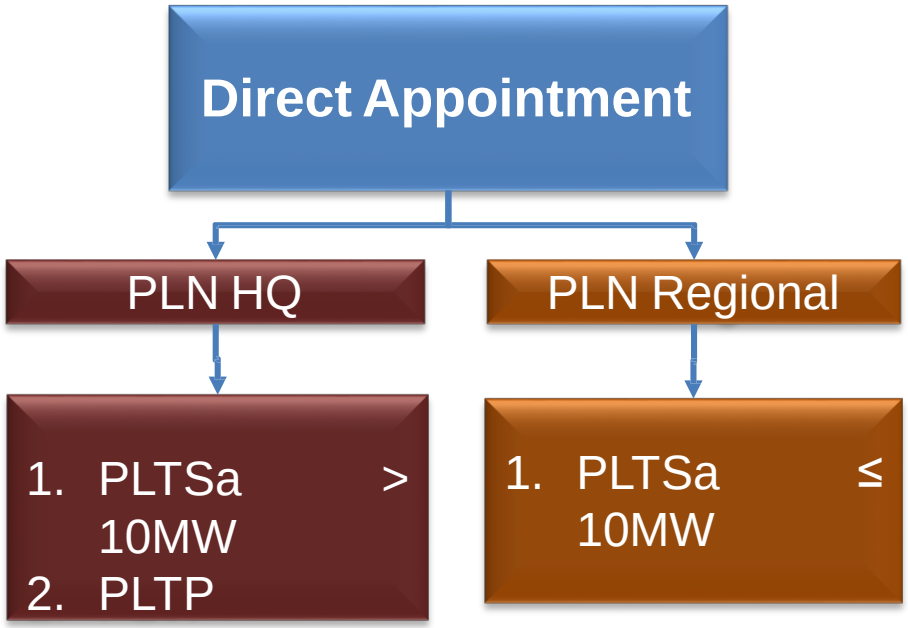
Electricity Price (MEMR Decree No. 50/2017)		
RE Power Plants	Local BPP > National BPP	Local BPP ≤ National BPP
Solar, Wind, Biomass, Biogas, Ocean	85% local BPP	B to B
Hydro, Geothermal, Municipal Waste	100% local BPP	B to B



Source: Ditjen EBTKE

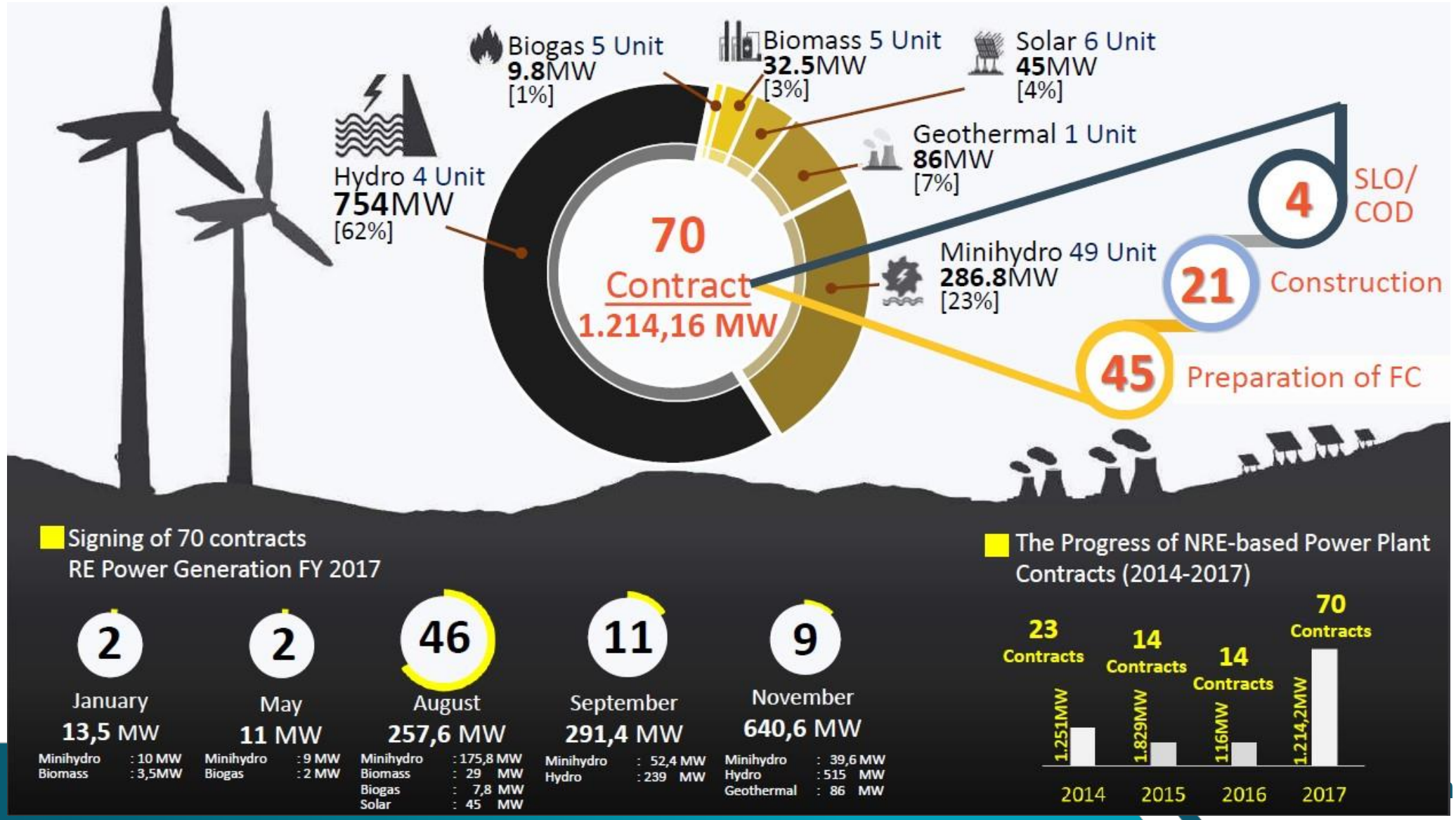
Renewable Energy Procurement





Note: for Selected Providers (DPT)

70 Renewable Energy PPA in 2017



07 | Renewable Energy Investment

PLN's Renewable Energy Investment On Going Projects

No.	Projects	Location	COD	Lender
	On Going Projects			
1	Rehabilitation of PLTP Kamojang Unit 2-3	West Java	2020	KfW
2	1000 Islands Renewable Energy for Electrification Programme (REEP) phase I in NTT	NTT	2021	KfW
3	PLTA Kumbih-3 (3 x 15 MW)	Aceh - North Sumatera	2023	KfW
4	Updates of Feasibility Studies of Small Hydropower Plants in Eastern Indonesia			AFD
5	Peusangan Hydroelectric Power Plant Construction Project	Aceh	2020-2021	JICA
6	Asahan No. 3 Hidroelectric Power Plant Construction Project	North Sumatera	2023-2024	JICA
7	Hululais Geothermal Power Plant Project (E/S)	Bengkulu	2020-2021	JICA
8	Tulehu Geothermal Power Plant Project (E/S)	Maluku	2020	JICA
9	FS and Preparation of Design and Bid Documents for Matenggeng Pumped Storage Power Project and related Capaicty Building	Central Java	2025	World Bank

PLN's Renewable Energy Investment Pipeline Projects

No.	Projects	Location	COD	Lender
	Pipeline Projects			
1	PLTP Ulumbu 5 (1x10 MW) & Mataloko 2-3 (2x10 MW) Flores	NTT	2021-2023	KfW
2	Sector Loan (PLTA Bakaru+REEP II)	South Sulawesi	2019-2024	KfW
3	PLTA Sawangan (2X6 MW)	North Sulawesi	2024	KfW
4	PLTM Nua (2X4,4 MW) Seram	Maluku	2020	KfW
5	Masang II Hydro Power Plant Development	West Sumatera	2023	AFD
6	Hululais Geothermal Power Plant 1 & 2 (2x55 MW)	Bengkulu	2020-2021	JICA
7	Additional Loan for Peusangan 1 & 2 Hydroelectric Power (87 MW)	Aceh	2020-2021	JICA
8	Matenggeng Pumped Storage	Central Java	2025	World Bank
9	PLTA Poko (2x65 MW)	South Sulawesi	2022	World Bank

* and many more renewable energy development with unallocated funding

New and Renewable Energy (NRE) Investment

1. Total investment for the new and renewable energy (NRE) in RUPTL 2018-2027 is about USD 30 billion, accounted for 32% from the total power plant investment*.
2. PLN encourage private developers to develop NRE, with 77% of those investment was IPP projects.
3. It's expected that NRE investment will be cheaper in the future, to reduce electricity production cost.
4. Government and Lending institutions will have more important roles to reduce the financing cost to have cheaper investment of NRE.
5. PLN and private developers should have easy access to the cheaper Green Climate Fund to support NRE development.
6. In the mean time, PLN will continue to strengthen the grid to give more opportunity for the NRE in the electricity system.

*PLN+IPP investment

Thank You

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