Directorate General of Electricity
Ministry of Energy and Mineral Resources
Republic of Indonesia

DISTRIBUTED GENERATION ON ELECTRICITY SYSTEM IN INDONESIA

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Current Condition of Power Sector
In Indonesia

Government Policy On Power Sector

(Based on Law No. 30 Year 2009 on Electricity)

- **Objective of Electricity Development**

  To ensure the availability of electricity in sufficient quantity, good quality and reasonable price in order to improve the welfare of the people (article 2 clause (2)).

- **Utilization of Primary Energy Source**

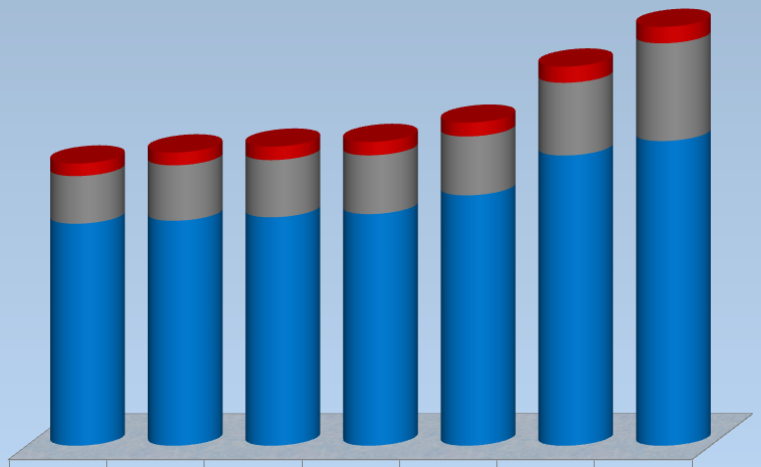
  - ✓ Primary energy sources from domestic and overseas shall be used optimally in accordance with National Energy Policy to ensure a sustainable supply of electricity (article 6 clause (1)).
  - ✓ Utilization of domestic energy sources will be prioritized for national interests (article 6 clause (3)).

Overview of Indonesian Electricity Condition

(Current Condition)

- **Total installed capacity:** 44,064 MW (PLN 73%, IPP 23%, and PPU 4%)
- **Current electrification ratio:** 76.47%
- **Energy mix in power generation:** Coal 51%, Gas 23%, Oil 15%, Hydro 6%, Geothermal 5%
- **Total investment in Power Sector : USD 10.7 Billion/year**

Installed Capacity of Power Generation



	2006	2007	2008	2009	2010	2011	2012
PPU	1,321	1,354	1,414	1,414	1,448	1,704	1,729
IPP	5,012	5,835	6,017	6,179	6,197	7,653	10,287
PLN	23,355	23,664	24,031	24,366	26,338	30,529	32,048

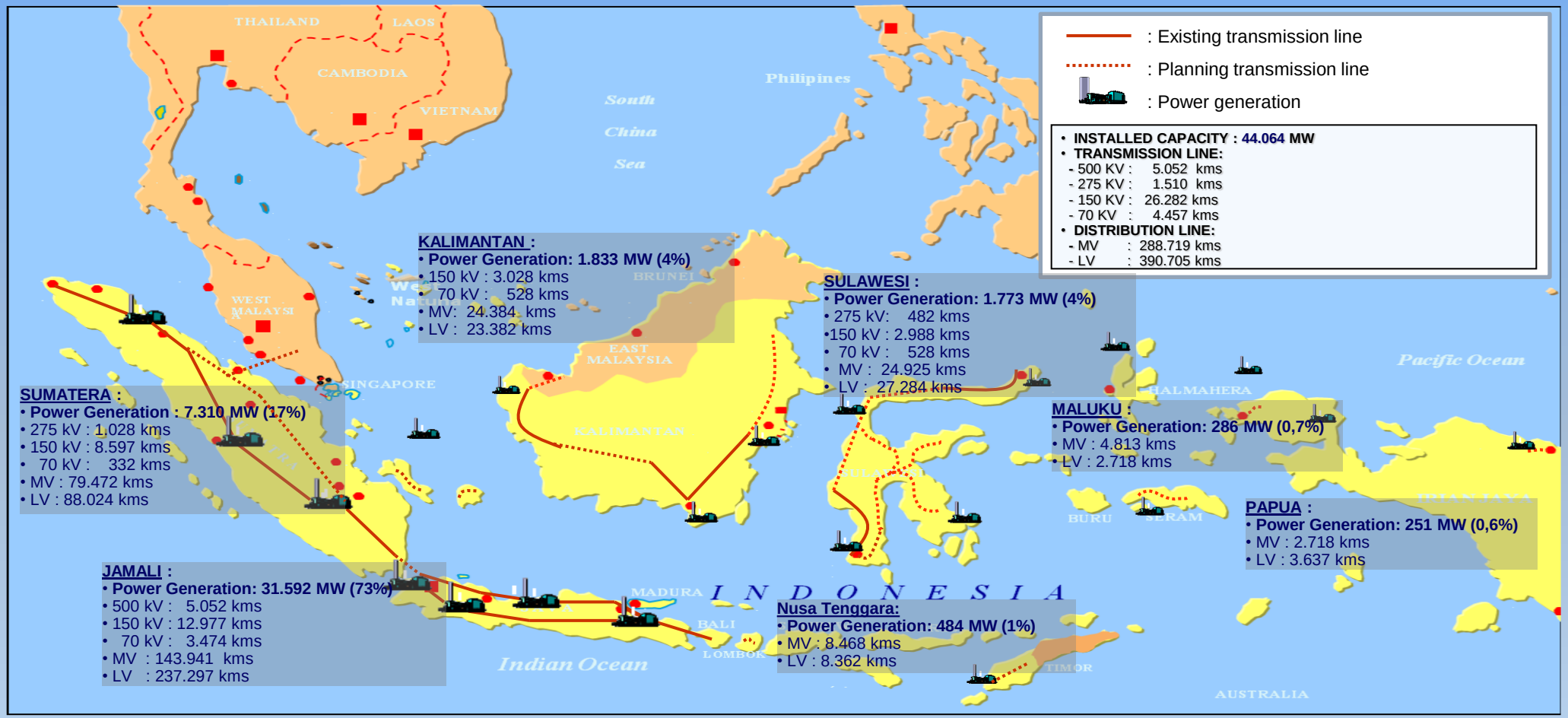
Investment Needs
(based on *RUKN* draft 2012-2031)

(juta USD)

Sarana	Jawa - Bali	Luar Jawa - Bali	Total
Pembangkit	178,858.1	176,672.2	355,530.3
Jaringan Transmisi dan Gardu Induk *)	6,010.3	5,503.5	11,513.8
Jaringan Tegangan Menengah, Jaringan Tegangan Rendah dan Gardu Distribusi *)	6,194.0	6,005.5	12,199.5
Total	**191,062**	**188,181**	**379,244**

Note: RUKN : National Electricity General Plan

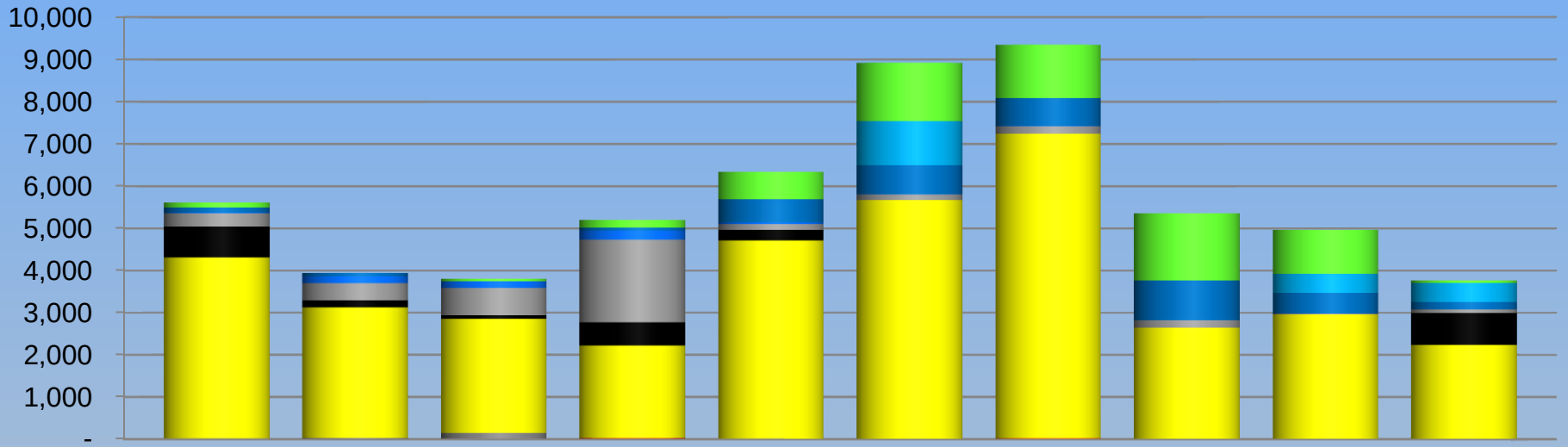
Indonesia Electricity Infrastructure



Status: 2012

- Total of national power generation installed capacity until early October 2012 is amount of 44,064 MW, transmission line is amount of 37,301 kms, and distribution line is amount of 679,424 kms.
- The power system which has been well interconnected is in Java-Bali System and Sumatera System.

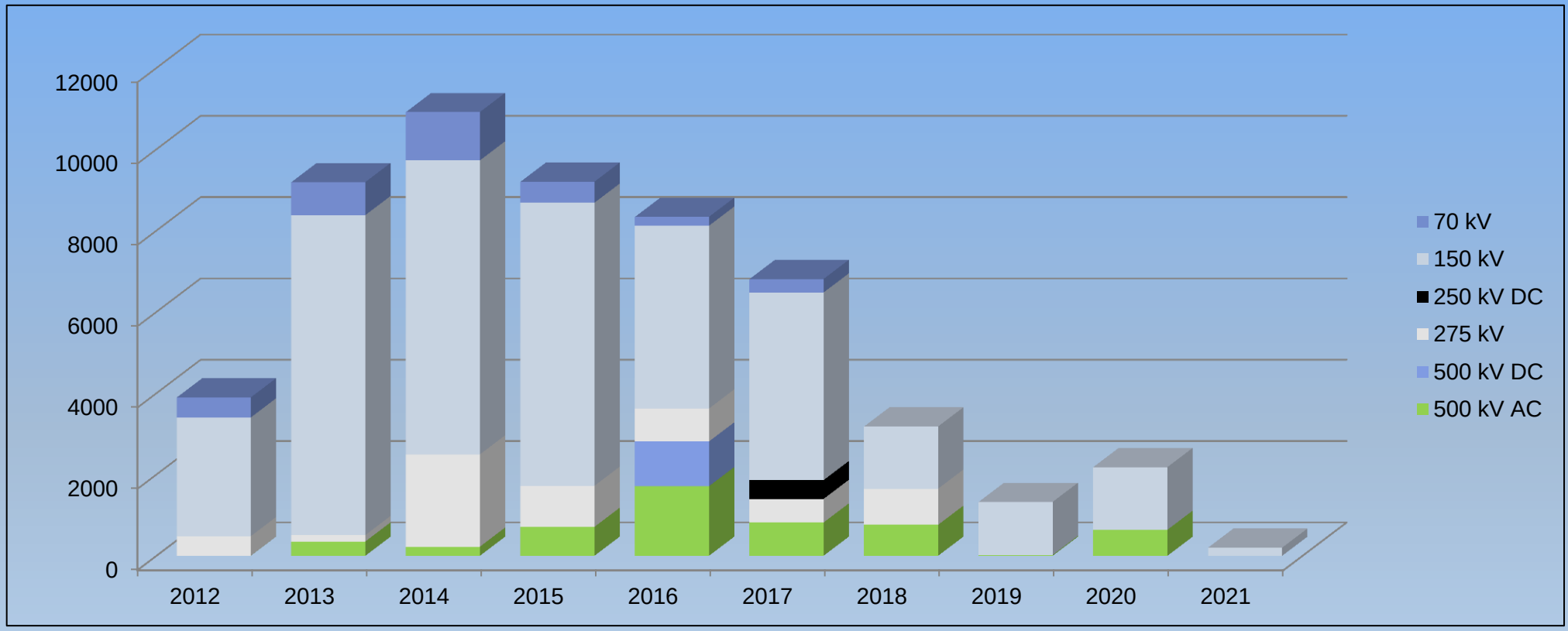
Estimation of Electricity System Condition For The Next 10 Years



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PLTP	110	5	63	188	660	1,375	1,260	1,588	1,045	55
Pump Storage	-	-	-	-	-	1,040	-	-	450	450
PLTA	130	85	-	78	546	694	660	936	482	183
PLTM	18	158	150	201	32	6	6	2	2	-
PLTG/MG	304	412	652	1,963	138	131	181	180	30	85
PLTGU	740	160	90	550	250	-	-	-	-	750
PLTU	4,304	3,098	2,705	2,199	4,707	5,652	7,213	2,630	2,950	2,240
PLTD	4	4	4	8	3	1	9	10	5	3
PLT lain	-	25	145	17	7	16	15	6	-	-

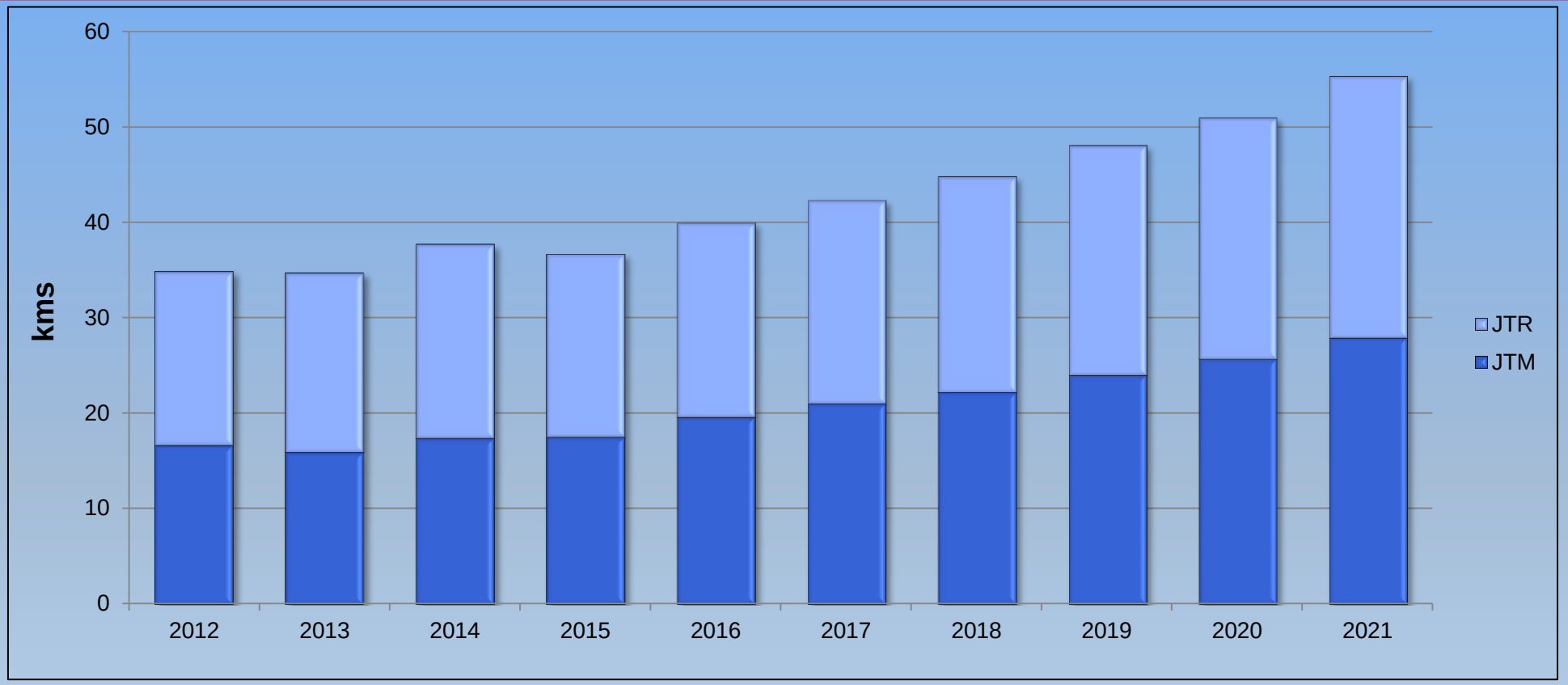
- Based on PLN's Electricity Business Plan (RUPTL PLN) 2012-2021, stated that the electricity demand growth is projected about 8.65% per year.
- In order to fulfill the demand growth the additional capacity of power generation that will be developed up to year 2021 is about 57,250 MW or 5,725 MW per year in average.

Development of Transmission Line



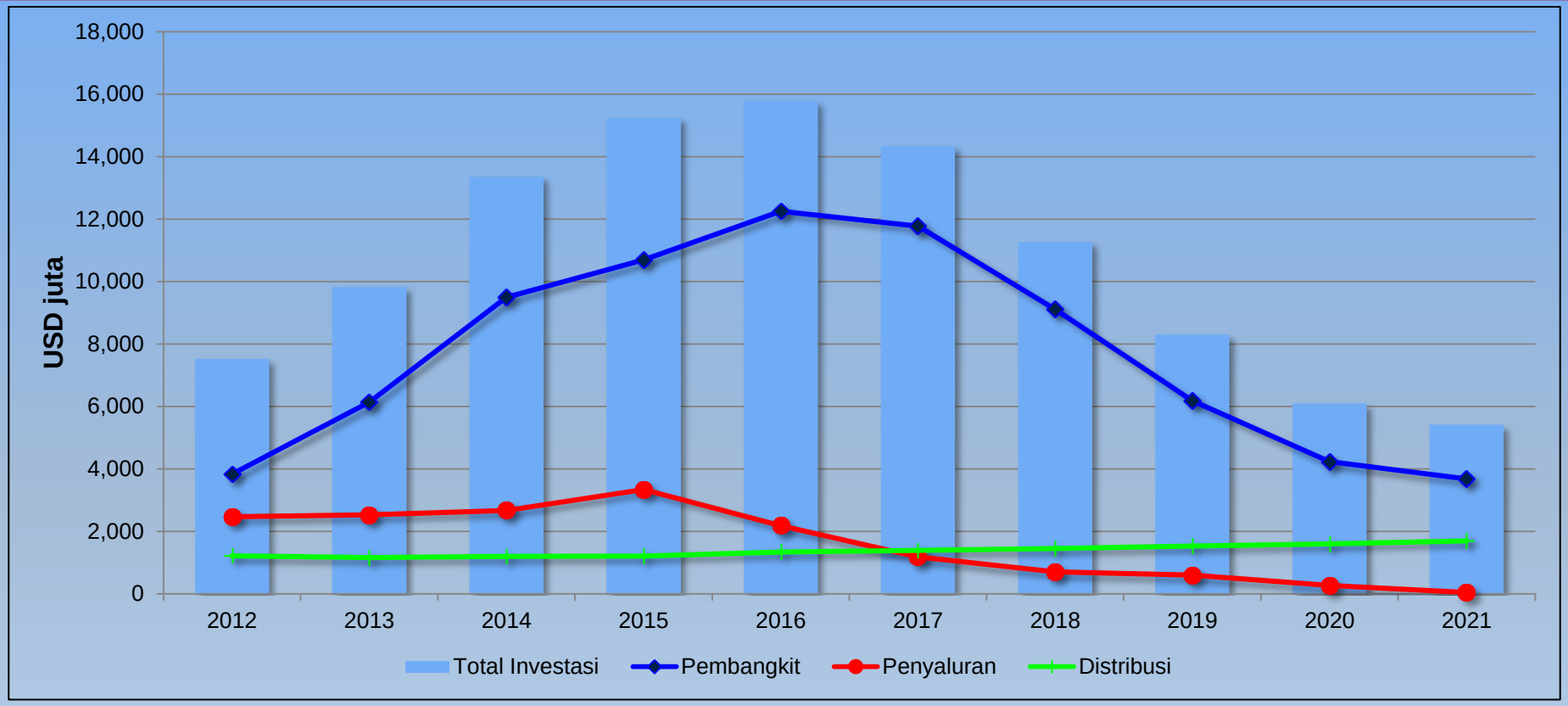
- Up to year 2021, the total transmission line that will be developed about 55,234 kms, consists of 500 kV dan 150 kV line for Java-Bali system and 500 kV, 275 kV, 150 kV, dan 70 kV line for outside Java-Bali system. Those consist of 5.241 kms 500 kV AC transmission line, 1.100 kms of 500 kV DC, 6.207 kms of 275 kV, 462 kms of 250 kV DC, 38.664 kms of 150 kV and 3.560 kms of 70 kV.

Development of Distribution Line



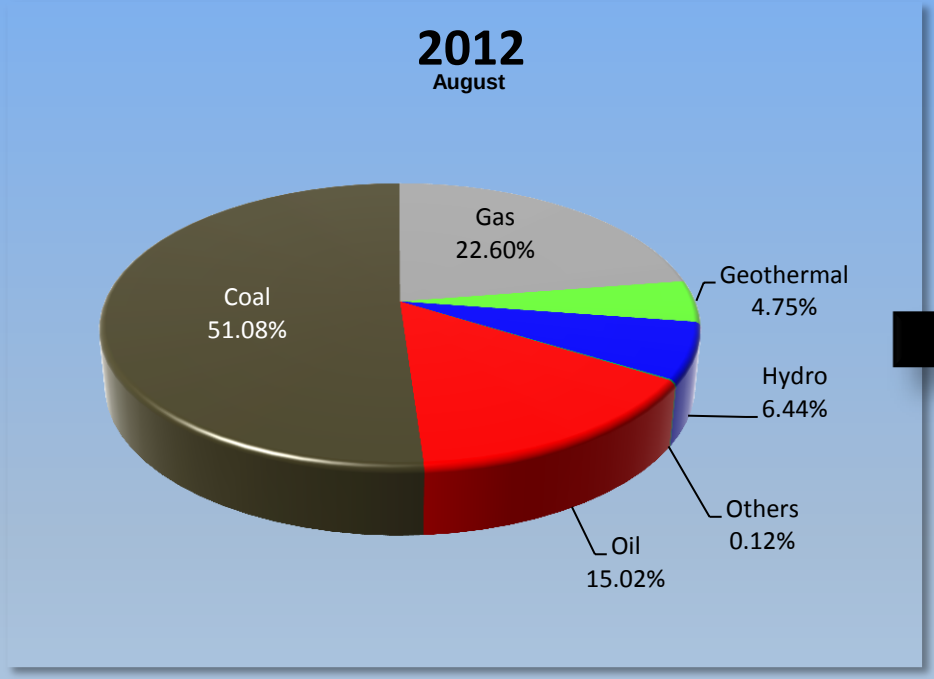
- Up to 2021, total length of distribution line are 425.794 kms, that consist of 207.539 kms of Middle-Voltage line (JTM) and 218.255 kms of Low-Voltage line (JTR).
- Distribution development plan objectives are to maintain system realibility and to accommodate additional new consumer.

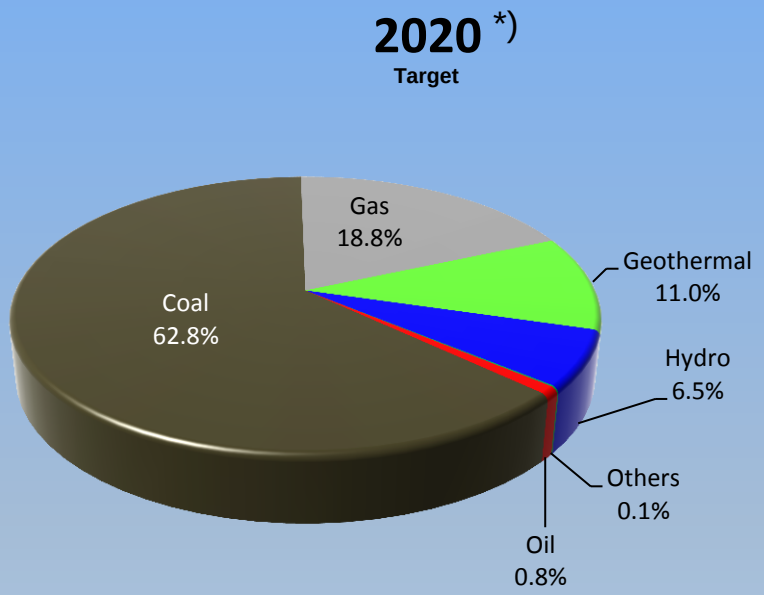
Investment Requirement for Electricity Infrastructure Development



- Up to year 2021, the total investment requirement for electricity infrastructure development is about USD 107,117 Million (USD 10,712 Million per year in average) which is consist of USD 77,376 Million for power generation, USD 15,975 Million for transmission and substation and USD 13,766 Million for distribution.
- The largest investment requirement is for power generation, afterward for transmission and substation and then for distribution development.

Target of Energy Mix For Power Generation





- → Electricity efficiency effort is conducted through diversification of primary energy in power generation (supply side) by optimizing utilization of gas, replacement of HSD to MFO, increasing coal utilization, and developing renewable energy power generation.
- → Gas and coal are given priority to reduce dependence on oil in power generation.

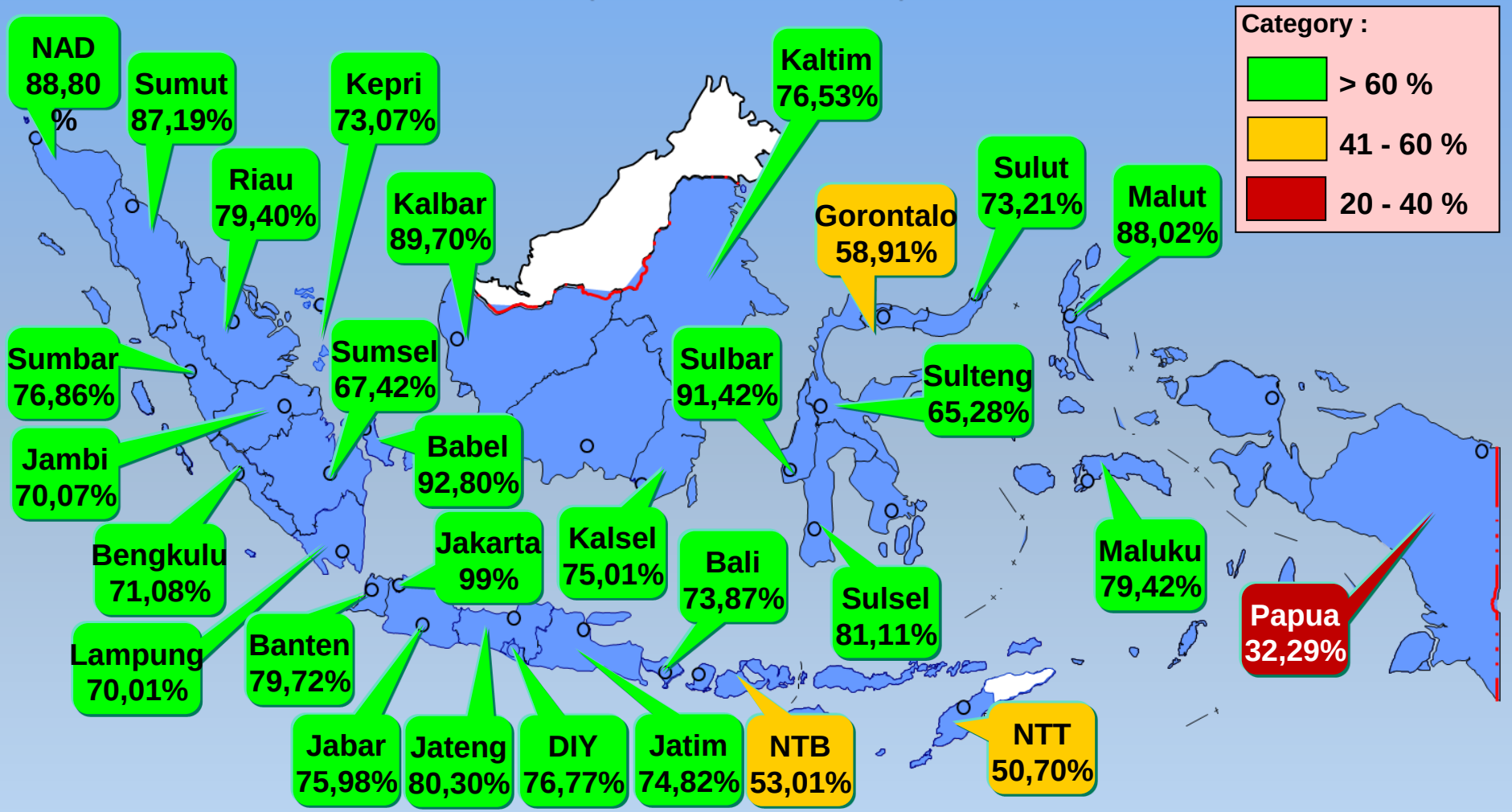
*Source: RUPTL PLN 2012-2021

Electricity Development Priorities Up To 2020

- **Power Generation**
  - To finalize the construction of Fast Track Program 10.000 MW Phase I and Phase II
  - To finalize the construction of power generation project owned by PLN and IPP in regular program
  - To finalize development of GeoPP and HEPP in an effort to utilize new and renewable energy and local energy.
  - To encourage the development of Pump Storage HEPP to minimize utilization of gas and oil during the peak load in Java-Bali system.
  - To encourage the development of Mine Mouth CFPP in an effort to utilize the potential of Low Rank Coal and CFPP with Ultra Super Critical technology to reduce emmision.
  - To accelerate gas allocation and supply for power generation in an effort to reduce oil cunsumption.
- **Transmission Line**
  - To finalize development of transmission line related to Fast Track Program 10.000 MW Phase I and Phase II
  - To solve de-bottlenecking of transmission line especially in Java-Bali and Sumatera system
  - To develop Java-Sumatera interconnection system in order to transfer power from a large Mine Mouth CFPP in Sumatera to Java.
  - To develop interconnection system in Kalimantan and Sulawesi
  - To develop West Kalimantan-Serawak interconnection system in order to fulfill the demand and to reduce the oil utilization.
  - To develop Sumatera-Malaysia Peninsula interconnection system in order to optimize the power system operation.
- **To Accelerate The Electrification Ratio Level**

Realization of Electrification Ratio

(As of December 2012)



	REALIZATION (year)							PLAN (year)	
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Electrification Ratio	63%	64.3%	65.1%	65.8%	67.2%	72.95%	76.47%	79.2%	82.0%

APPLICATION OF DISTRIBUTED GENERATION

In Indonesia

Scope of Distributed Generation

Bunaken 300 kW PV Plant, isolated grid

Siteki 1,2 MW Mini Hydro Plant, grid connected

- **Distributed generation** also known as **embedded generation** is a small capacity power generation installation that generates electricity from many small energy sources, which can be renewable or thermal energy.
- It may be connected to the 20 kV distribution lines which is part of a larger grid, or supplying an isolated MV/LV grid.
- Sources of primary energy may come from renewables such as hydro, PV, wind, biomass, etc or thermal energy such as micro gas engines or other type of captive power.
- Installed capacity < 10 MW, and must confirm with Distribution Code when connecting to the grid
- *Feed-in tariff* is applied for energy transaction

Technical Consideration for Distributed Generation (DG) Connection

- Need to ensure that the distribution system working properly as the distributed generation connected. Conditions to be maintained in the system are:
  - voltage regulation;
  - thermal ratings of equipment being not exceeded;
  - fault ratings of switchgear and cables being not exceeded;
  - fault current contribution;
  - voltage disturbance affected in terms of step changes, flicker and harmonics being kept to a minimum and within accepted limits;
  - reverse power flow
  - protection coordination

Commercial Consideration for Distributed Generation (DG) Connection

- Power Purchase Agreement using *Feed-in Tariff* : for capacity < 10 MW from renewables energy, PLN buys the energy at a pre-determined tariff.
- PPA periods cover up to 15 years and can be renewed.

- MD No. 04, 2012: New electricity tariff generated from renewable energy power plants up to 10 MW (valid to date)

- Ministry of Energy and Mineral Resources Decree No. 04 was released on January 31, 2012
- The utility or PLN (a monopoly state-own electricity company) has obligation to off-take the electricity form renewable energy sources
- The tariff was set-up based on the avoided cost level of utility's electricity delivery cost (cost of good sold) regionally
- New fixed floor and un-negotiated tariff from all kind of renewable energies (can be the excess power from it) up to 10 MW.

- **New Feed-in Tariff from all kind of renewable energy power plants below 10 MW (including the excess power from it) with new floor of *(1 USD = 9,200 IDR)* :**

	Price in IDR	Remark	Price in USD Cent							
Renewable Energy	9.200		Jawa/Bali	Sumatera/ Sulawesi	Kalimantan, NTB/NTT	Maluku & Papua	Jawa, Madura, Bali & Sumatera	Sulawesi, Kalimantan, NTT/NTB	Maluku & Papua	all over Indonesia
		F	1	1,2	1,3	1,5	1	1,2	1,3	
Renewable energy	656	JTM	7,13	8,56	9,27	10,70				
	1.004	JTR	10,91	13,10	14,19	16,37				
Biomass/BioGas	975	JTM					10,60	12,72	13,78	
	1.325	JTR					14,40	17,28	18,72	
Zero Waste	1.050	JTM								11,41
	1.395	JTR								15,16
Sanitary Landfill	850	JTM								9,24
	1.198	JTR								13,02

Benefits from Distributed Generation (DG)

- When DG installed in remote areas, they will ease the logistic issue of supplying fuel to the remote locations
- When installed in larger interconnected networks, they will help reduce distribution losses
- Improve voltage regulation and reliability of supply when the output of DG is not intermittent such as small hydro.

Distributed Generation (DG) that has been installed so far …

- **Mini Hydro Power Plant**

Status	IPP	
	Number	Installed Capacity (kW)
Operation	20	43.790
Construction	42	158.408
PPA	41	206.750
Permit Process	49	186.034
Proposal	31	157.342
Total	**183**	**752.324**

Status	PLN	
	Number	Installed Capacity (kW)
Operation	104	120.280
Construction	10	15.200
Study	83	188.784
Total	**197**	**324.264**

- **Concentrated PV Plant**

NO.	Project Name	Location	Capacity (kWp)	STATUS
1	PLTS BUNAKEN	PULAU BUNAKEN, SULUT	335	Operasi
2	PLTS NAIRA	BANDA NAIRA, MALUKU	100	Operasi
3	PLTS SAONEK	KEP. RAJA AMPAT, PAPUA	40	Operasi
4	PLTS DERAWAN	P. DERAWAN, KALTIM	170	Operasi
5	PLTS TOMIA	PULAU WAKATOBI SULTRA	75	Operasi
6	PLTS TRAWANGAN	GILI TRAWANGAN NTB	200	Operasi
7	PLTS MARAMPIT	PULAU MARAMPIT, SULUT	125	Operasi
8	PLTS MIANGAS	PULAU MIANGAS, SULUT	85	Operasi
9	PLTS LABALEKANG	P. LEMBATA, NTT	200	Operasi
	TOTAL		***1,330***	

PLN Program [100 Islands]

100% SOLAR ENERGY FOR 100 ISLANDS

PLN Program [PV for 1000 Islands] until 2014

- **Concentrated PV for 1000 Islands (40 – 300 kWp)**

No	Region	*TOTAL*	
		Number of Location	***Capacity***
1	West Indonesia	358	61,825
2	East Indonesia	293	50,507
3	Java Bali	21	6,284
Total		**672**	**118,616**

In Summary

- **Indonesia seeks to enhance contribution of distributed generation to the electricity supply provision.**
- **It also aims to increase role of renewable energy.**

ありがとう
ございます。

Thank You...