
DISTRIBUTED GENERATION

Indonesia View Point and Case

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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)).

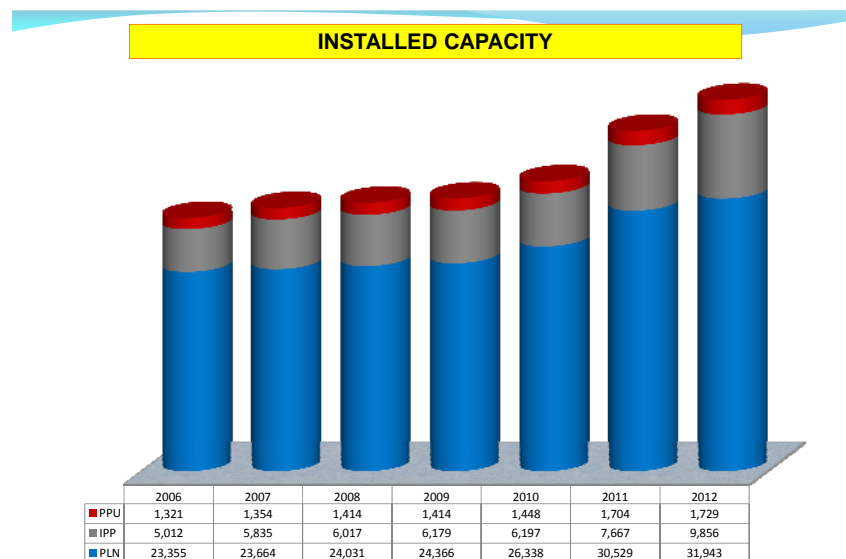
☐ **Utilization of Primary Energy Source**

- ✓ 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:** 43,528 MW (PLN 73%, IPP 23%, and PPU 4%)
- ❑ **Current electrification ratio:** 74.60%
- ❑ **Energy mix in power generation:** Coal 51%, Gas 22%, Oil 16%, Hydro 6%, Geothermal 5%
- ❑ **Total investment in Power Sector : USD 9.6 Billion/year**

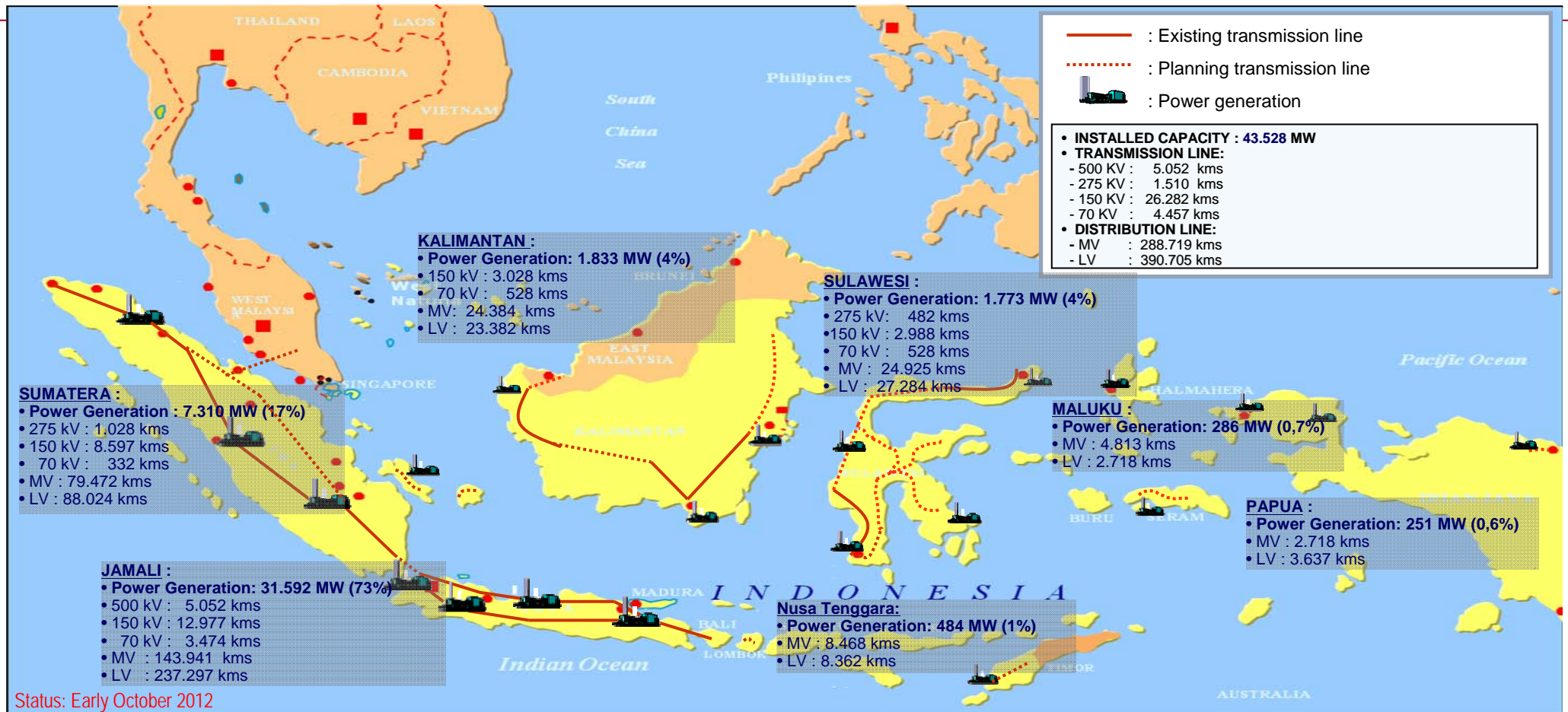


Investment Requirement (based on draft RUKN 2010-2029)

Million USD			
Infrastructure	JAMALI	Outside JAMALI	Total
Generation	121,217	79,607	200,824
Transmission Line and Substation	9,180	5,844	15,024
Distribution Line	6,546	4,728	11,275
Total	136,944	90,179	227,122

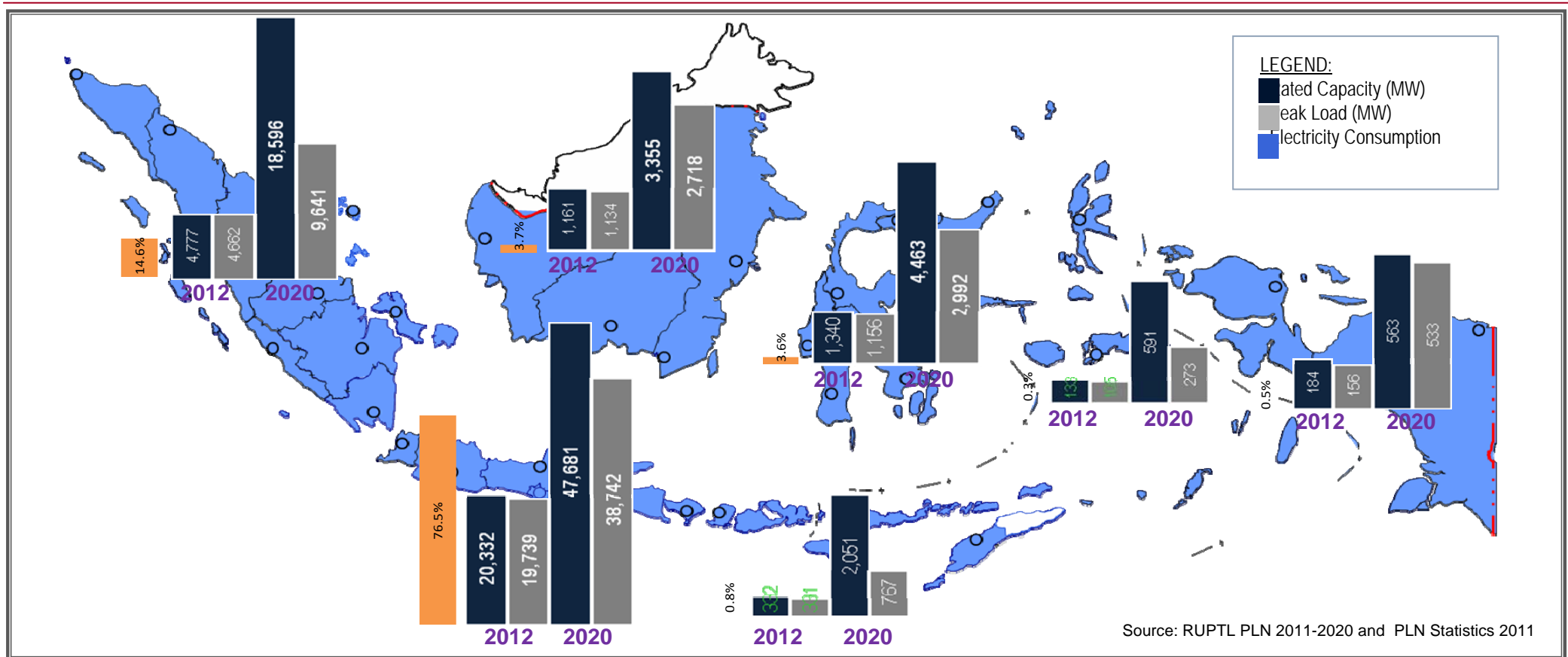
Note: RUKN : National Electricity General Plan

Indonesia Electricity Infrastructure



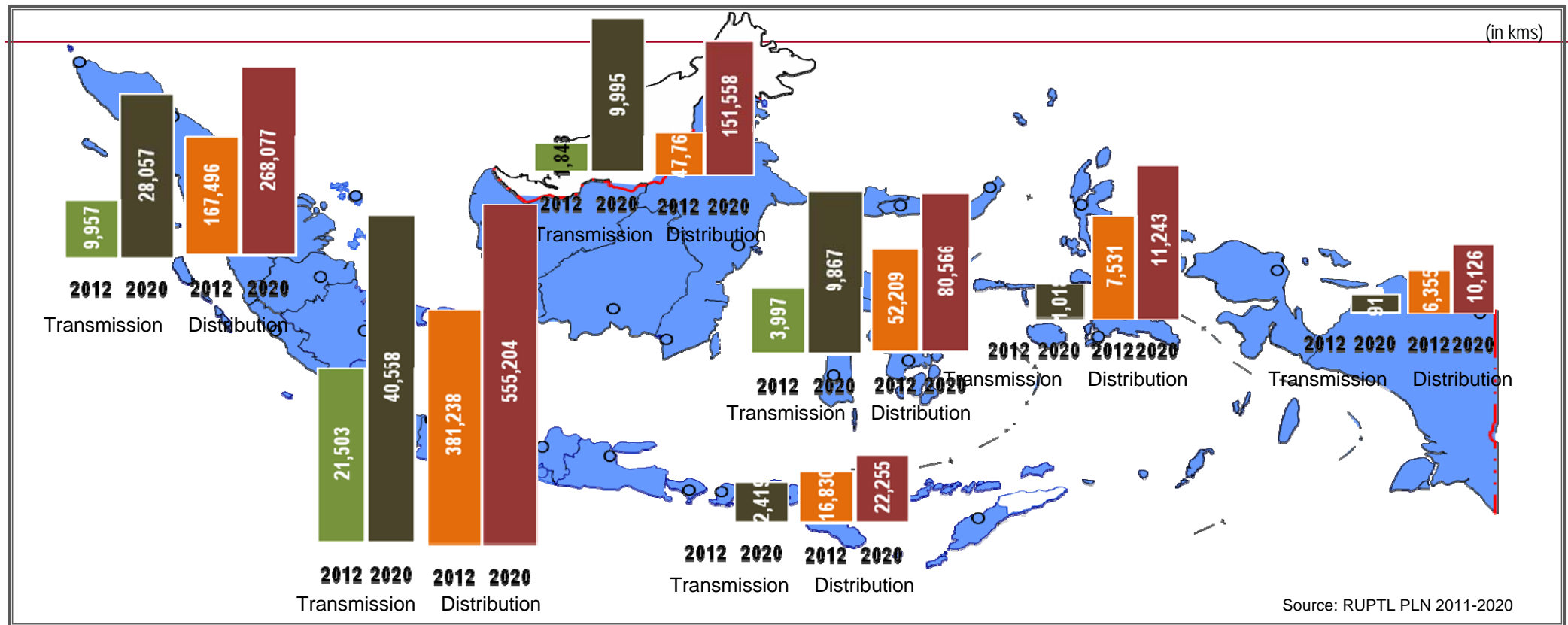
- ❑ Total of national power generation installed capacity until early October 2012 is amount of 43,528 MW, transmission line is amount of 37,301 kms, and distribution line is amount of 679,424 kms.
- ❑ The power system which has been well interconnected is in Java-Bali System and Sumatera System.

Estimation of Electricity System Condition For The Next 10 Years



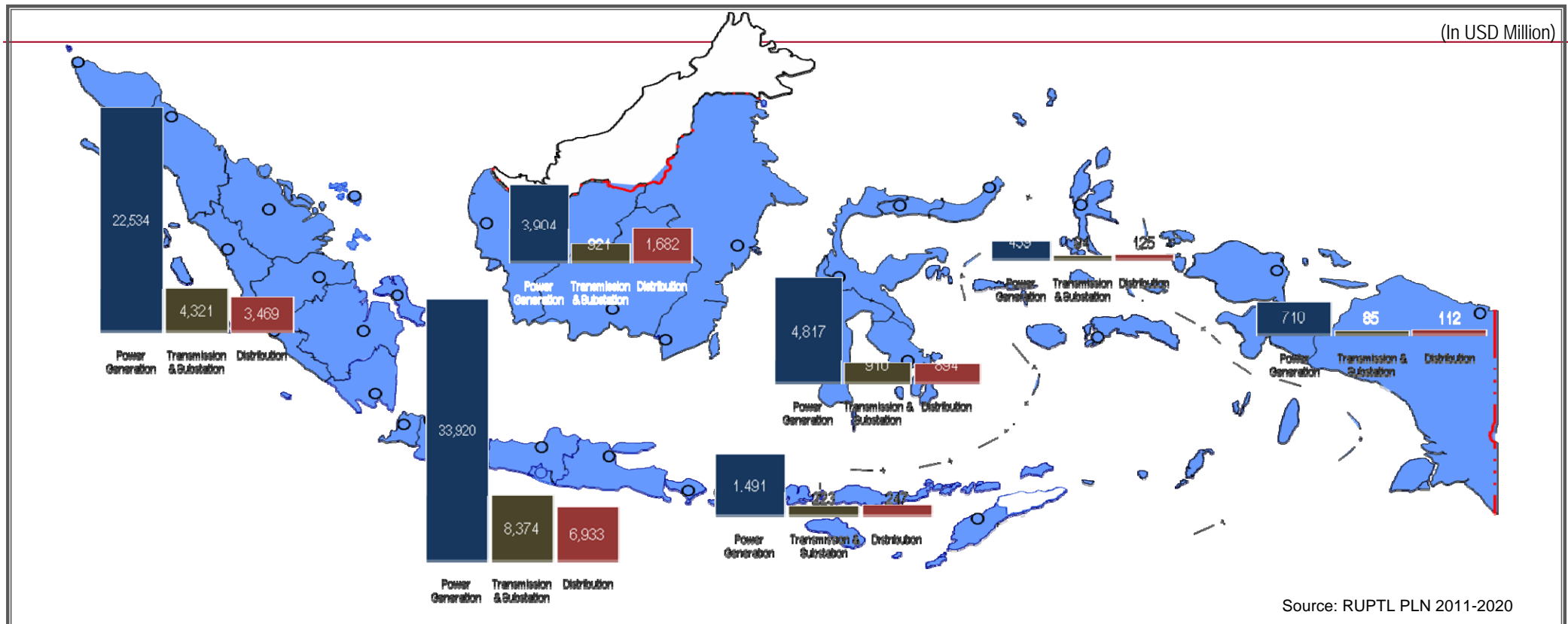
- ❑ Based on PLN's Electricity Business Plan (RUPTL PLN) 2011-2020, stated that the electricity demand growth is projected about 8.46% per year.
- ❑ In order to fulfill the demand growth and to support the MP3EI program, the additional capacity of power generation that will be developed up to year 2020 is about 55,795 MW or 5,580 MW per year in average.

Development of Transmission and Distribution Line



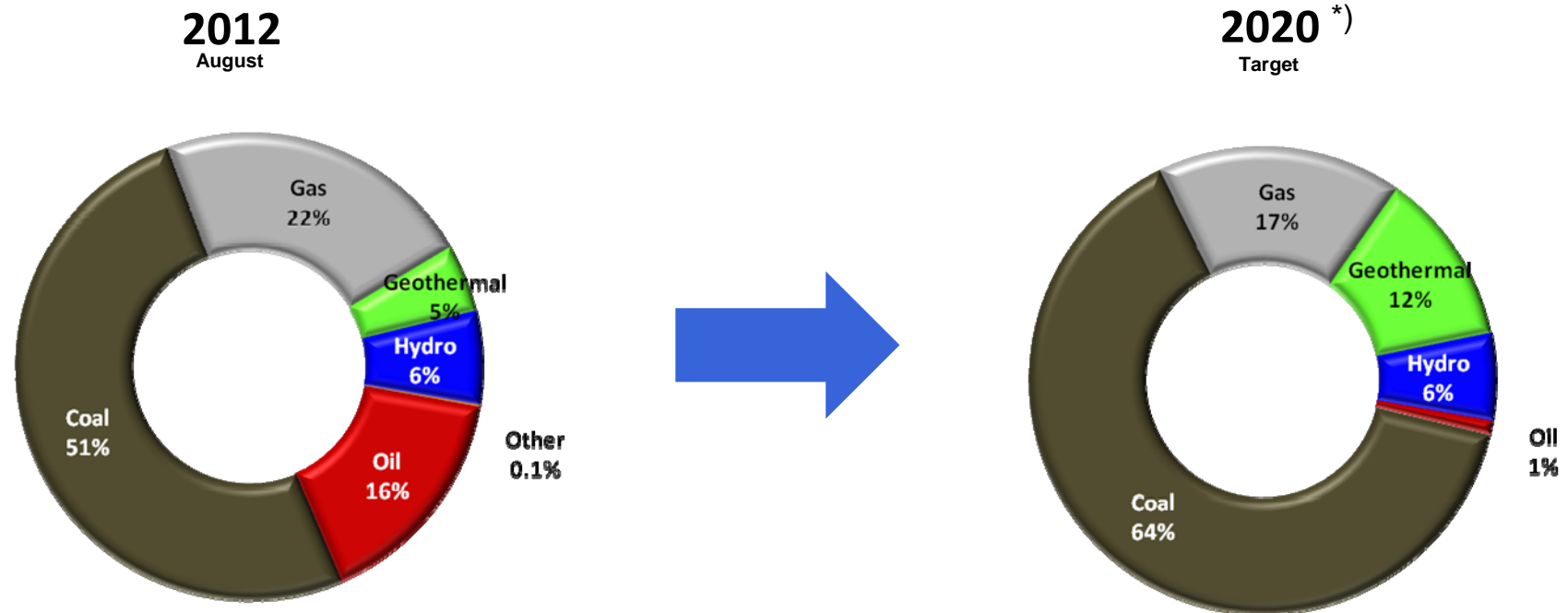
- ❑ Up to year 2020, the total transmission line that will be developed about 49,299 kms, consists of 500 kV dan 150 kV line for Java-Bali system and 500 kV, 275 kV, 150 kV, dan 70 kV line for outside Java-Bali system.
- ❑ Up to year 2020, the total distribution line that will be developed about 416,906 kms. Development of distribution line is aimed to maintain the realibility of the system and accomodate the additional of new customers.

Investment Requirement for Electricity Infrastructure Development



- ❑ Up to year 2020, the total investment requirement for electricity infrastructure development is about USD 96,205 Million (USD 9,621 Million per year in average) which is consist of USD 67,815 Million for power generation, USD 14,928 Million for transmission and substation and USD 13,461 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.

Electricity Development Priorities Up To 2020

❑ **Power Generation**

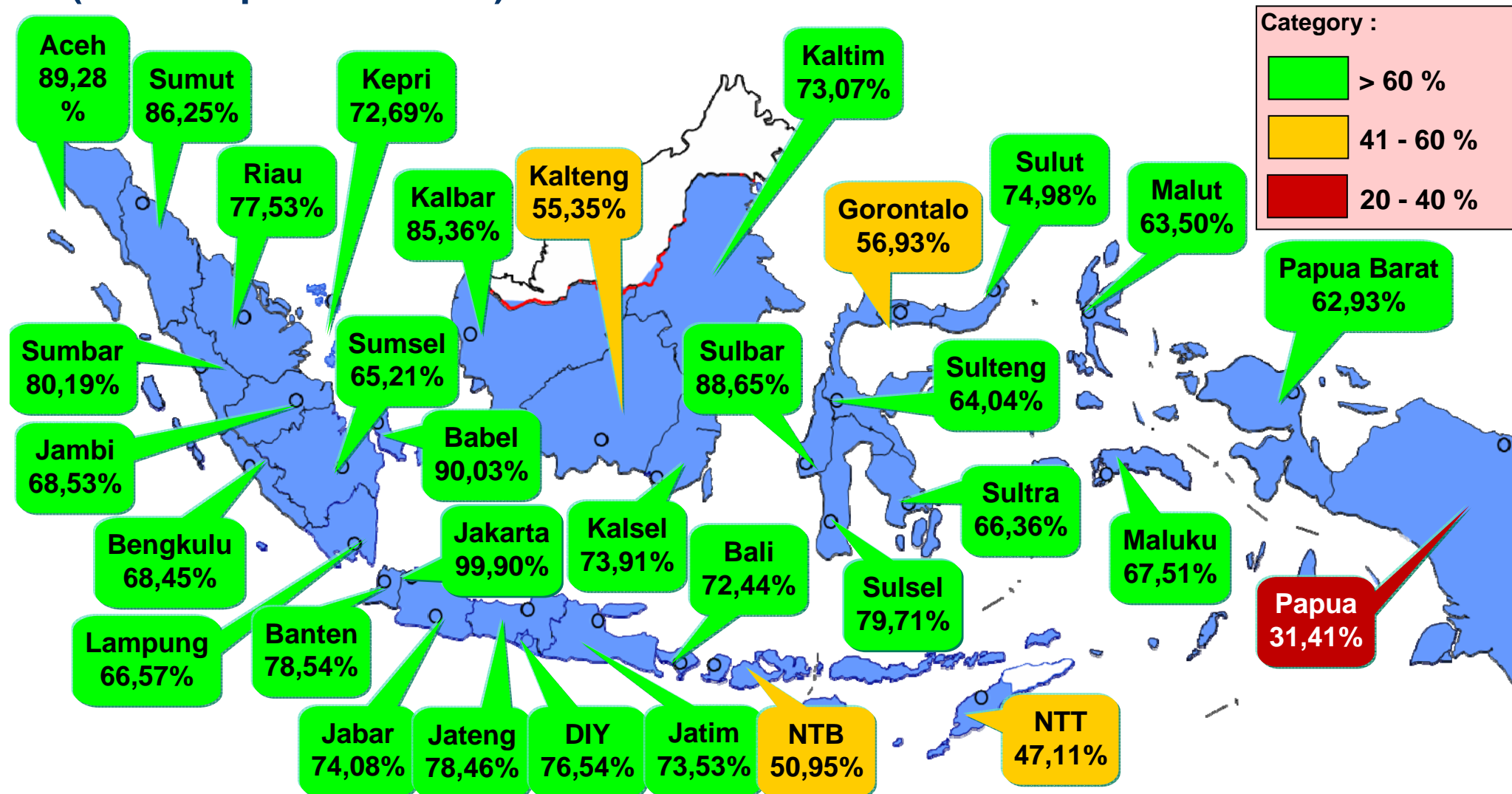
- To finalize the construction of Fast Track Program 10.000 MW Phase I and Phase II
- To finalize the construction of power generation project owned by PLN and IPP in regular program
- To finalize development of GeoPP and HEPP in an effort to utilize new and renewable energy and local energy.
- To encourage 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 emission.
- To accelerate gas allocation and supply for power generation in an effort to reduce oil consumption.

❑ **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 September 2012)



	Realization							Target		
	2006	2007	2008	2009	2010	2011	Sep 2012	2012	2013	2014
Electrification Ratio	63%	64,3%	65,1%	65,8%	67,2%	72,95%	74,60%	75,30%	77,65%	80,0%

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.

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- [MD No.31, 2009: New electricity tariff generated from renewable energy power plants up to 10 MW \(valid to date\)](#)
 - Ministry of Energy and Mineral Resources Decree No. 31 was released on **Nov 13, 2009**
 - The utility or PLN (a monopoly state-own electricity company) has obligation to off-take the electricity from 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.**

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- ❑ **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) :**

Grid interconnected at middle-voltage point:

- USD cents 7.13/kWh for Java, Madura, and Bali
- USD cents 8.56/kWh for Sumatera and Sulawesi
- USD cents 9.27/kWh for Kalimantan and Nusa Tenggara
- USD cents 10.69/kWh for Maluku and Papua

Grid interconnected at low-voltage point:

- USD cents 10.91/kWh for Java, Madura, and Bali
- USD cents 13.09/kWh for Sumatera and Sulawesi
- USD cents 14.18/kWh for Kalimantan and Nusa Tenggara
- USD cents 16.36/kWh for Maluku and Papua

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]



PT PLN (Persero)

100% SOLAR ENERGY FOR 100 ISLANDS

Salah Satu Program Unggulan PLN 2011

Mohon Doa Restu

Kami akan melistriki 100 pulau terpencil dengan 100% Energi Surya dan harus selesai pada akhir tahun 2011 ini juga !

PAPUA

1. Mirdipera
2. Keppi
3. Atsy
4. Kimaam

PAPUA BARAT

5. Mansinam
6. Bubo
7. Saissafor
8. Kokas
9. Atiyo
10. Manggorewan
11. Mbrandi
12. Supnima
13. Nasubunak
14. Owi
15. Dufi
16. Kampung Friwen
17. Kampung Saporken
18. Kampung Yambeser
19. Kampung Wawiyai
20. Duwai
21. Sanibi
22. Kabare
23. Waligama
24. Samore

MALUKU

25. Takalapa (P. Kelang)
26. Nusa Ela (P. Tiga)
27. Kesai
28. Manasvaka (Sera)
29. Tiore (Larat)
30. Ambalau (Masawey)
31. Pacir Putih (Kab. Bumi)
32. Panjang (Kab. SBT)
33. Wetar (Ebwaki)
34. Kisar (Woreli)
35. Leti (Serwari)
36. Moa (Moa)
37. Lakor (Seira)
38. Romang (Hila)

MALUKU

39. Kai Timbir
40. Kur
41. Elat

MALUKU UTARA

42. Moeotai (Daruha)
43. Moeotai (Bore bere)
44. Patani
45. Oti (Lainui)
46. Taliabu (Bebeng)
47. Taliabu (Gila)
48. Mangole (Dofa)
49. Kiyua
50. Hiri (Tobolobe)
51. Makim (Ngofogita)
52. Kasikuta
53. Moti

NUSA TENGGARA TIMUR

54. Maritaing
55. Pura
56. Nule
57. Rajua
58. Sabu
59. Lamolera
60. Soloe Barat
61. Panana

MALUKU

62. Ndoriwoy
63. Rinea
64. Komodo

NUSA TENGGARA BARAT

65. Gili Trawangan (Est.)
66. Gili Meno
67. Gili Air
68. Mangli
69. Medang
70. Sehotok
71. Labuan Haji
72. Mejo
73. Lamung
74. Bupo Palau

SULAWESI SELATAN

75. Karamang
76. Kadingareng
77. Tarekeke
78. Batang Lompo
79. Sabutung
80. Salerno

SULAWESI TENGGARA

81. Kapota
82. Kabarna

SULAWESI UTARA

83. Manado Tua
84. Bunaken (Est.)
85. Nain
86. Mantehage
87. Talise
88. Makalehi
89. Dapalan
90. Karutung
91. Miangas
92. Marampit
93. Nandakele
94. Marore
95. Biao
96. Gangga

SULAWESI TENGAH

97. Kep. Togian
98. Kep. Togian
99. Kep. Togian
100. Kep. Togian
101. Simatang

KALIMANTAN SELATAN

102. Marapodan
103. Kerajan
104. Kerumpatan
105. Kanasan
106. Tanjung Nyir



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**

Thank You...
