



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



# GRID SMALL HYDRO POWER DEVELOPMENT IN INDONESIA

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# Development of Grid Small Hydro Power

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- **Introduction**
- **Hydro Power Generation**
- **Distributed Generation**
- **Barriers and Countermeasures**
- **Feed in Tariff (FIT)**
- **Summary**

# Introduction

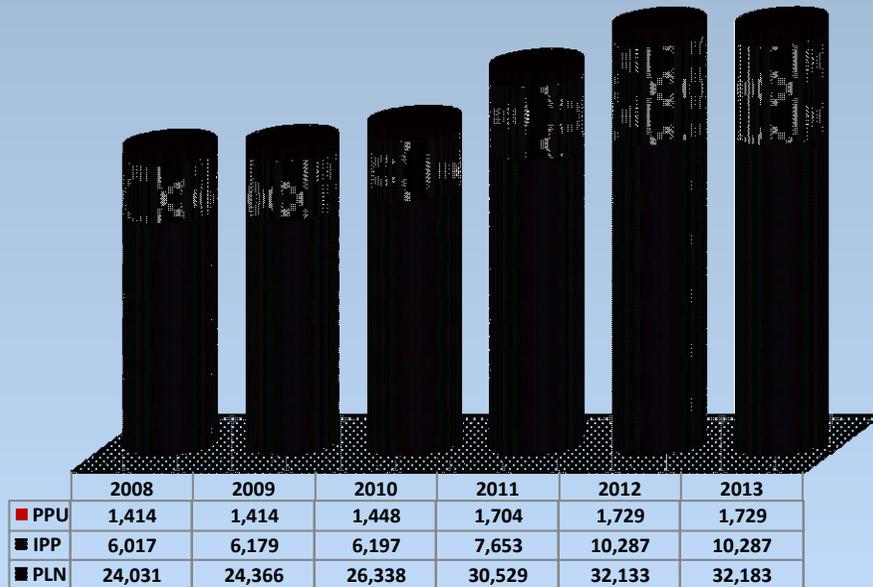
- Overview of Indonesian Electricity Condition
  - Electrification Ratio
  - Indonesia Electricity Infrastructure
- Target of Energy Mix for Power Generation

# Overview of Indonesian Electricity Condition

## (Current Condition)

- ❑ **Total installed capacity:** 44,216 MW (PLN 73%, IPP 23%, and PPU 4%)
- ❑ **Current electrification ratio:** 76.56%
- ❑ **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**



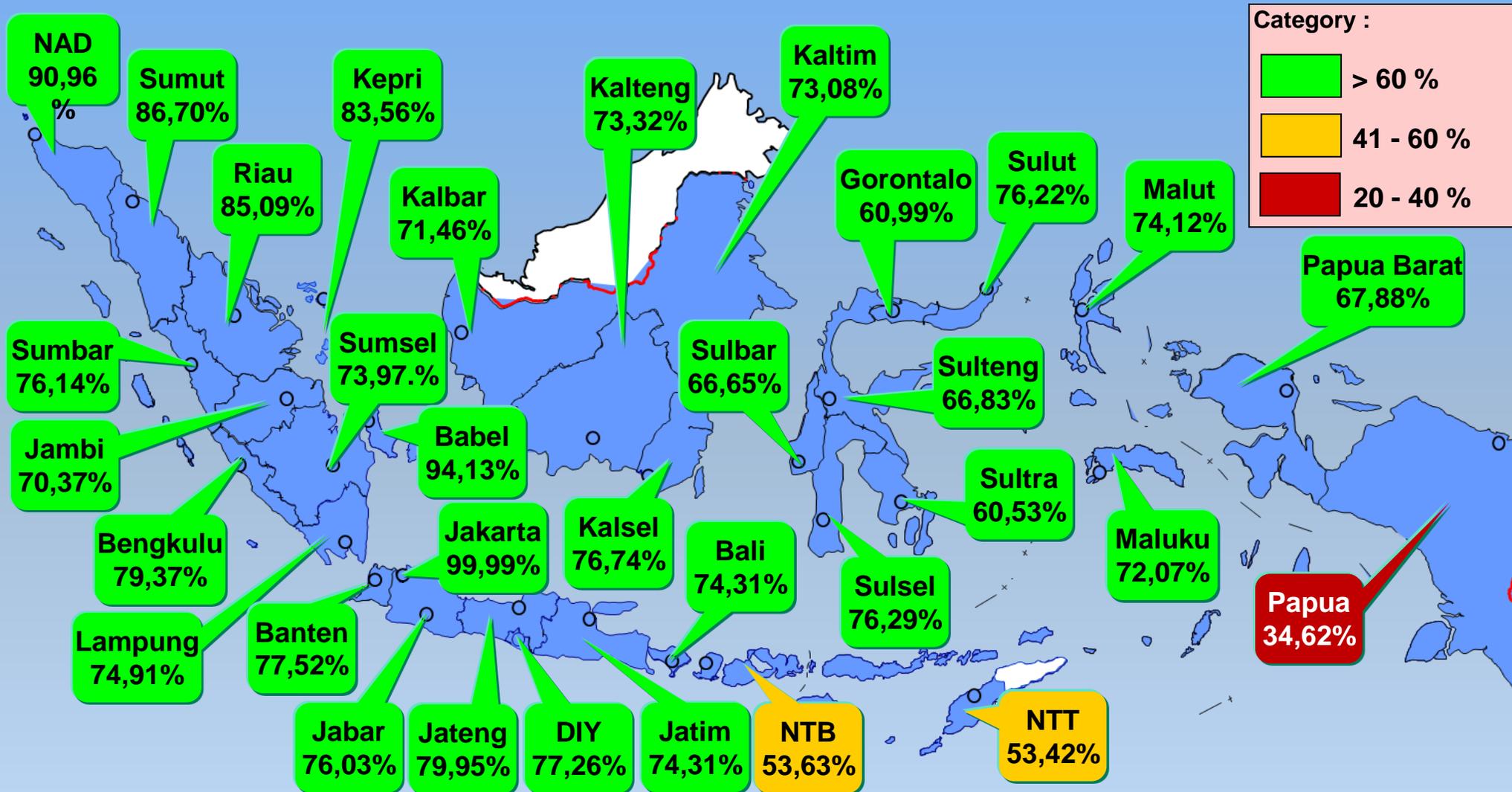
**Investment Needs**  
(based on RUKN draft 2012-2031)

(million USD)

	Infrastructure	Java - Bali	Outside Java-Bali	Total
Generation		178,858.1	176,672.2	355,530.3
Transmission and Substation		6,010.3	5,503.5	11,513.8
Distribution		6,194.0	6,005.5	12,199.5
<b>Total</b>		<b>191,062</b>	<b>188,181</b>	<b>379,244</b>

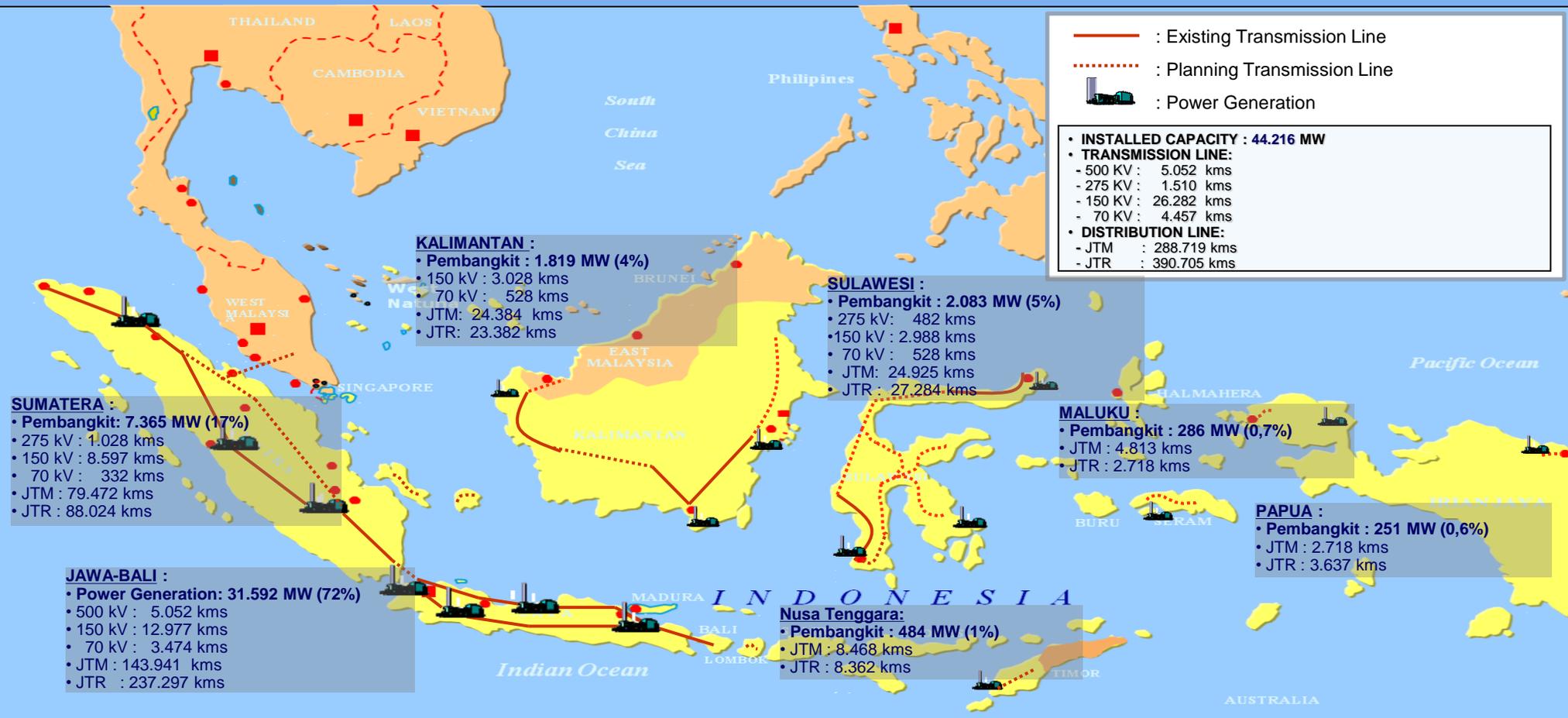
Note: RUKN : National Electricity General Plan

# Electrification Ratio (by Province)



	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%	76,56%	79,3%	81,4%

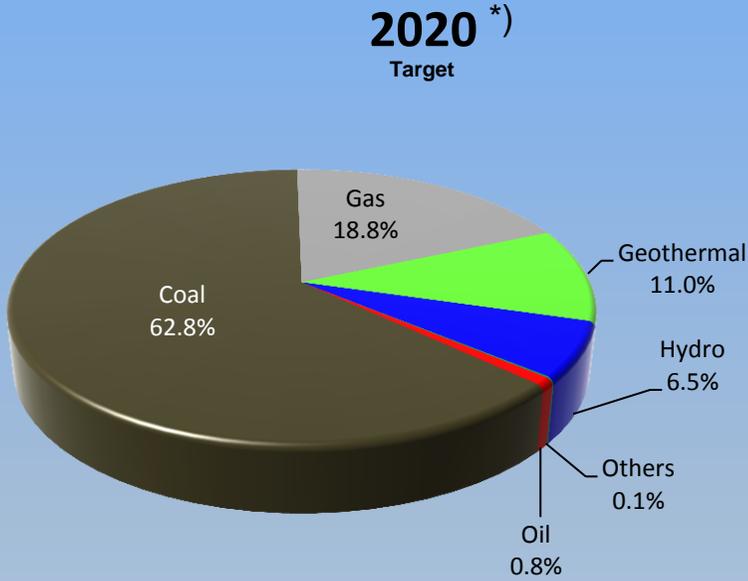
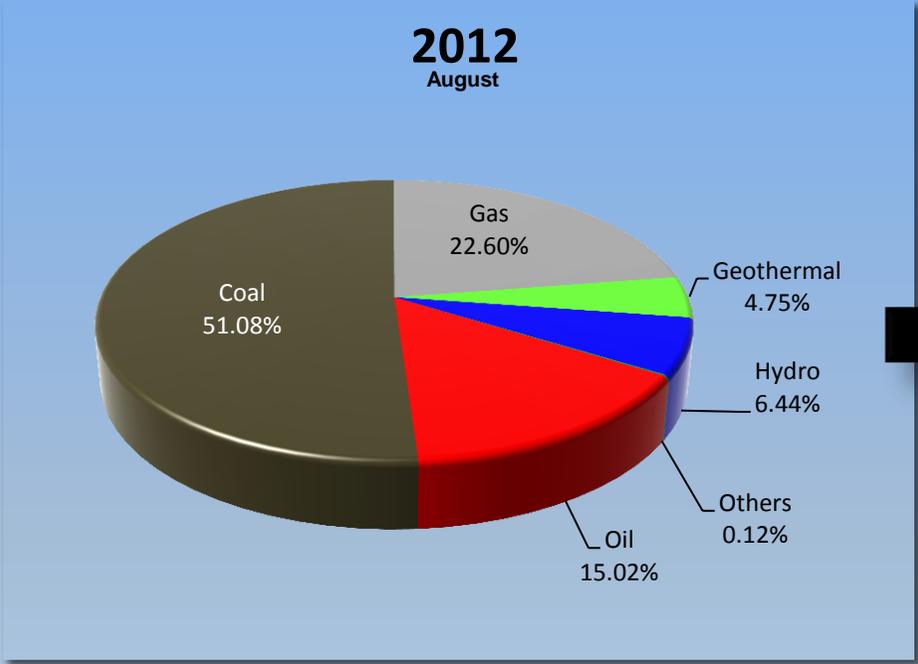
# Indonesia Electricity Infrastructure



❑ Total of national power generation installed capacity is amount of 44,216 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.

# 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

# Hydro Power Generation

- Renewable Energy Potency
  - Ownership
  - Current Progress
- Development Stage

# Renewable Energy Potency

NO	RENEWABLE ENERGY	SOURCES	INSTALLED CAPACITY	RATIO
1	2	3	4	5 = 4/3
1	Hydro	75.000 MW	6.848,46 MW	9,13%
2	Geothermal	29.164 MW	1.341 MW	4,6 %
3	Biomass	49.810 MW	1.644,1 MW	3,3%
4	Solar	4,80 kWh/m <sup>2</sup> /day	22,45 MW	-
5	Wind	3 – 6 m/s	1,87 MW	-
6	Ocean	49 GW	0,01 MW	0%

# Small Hydro Power - Based on Ownership

## Private

- Independent Power Producer (IPP)

## Stated Owned Company

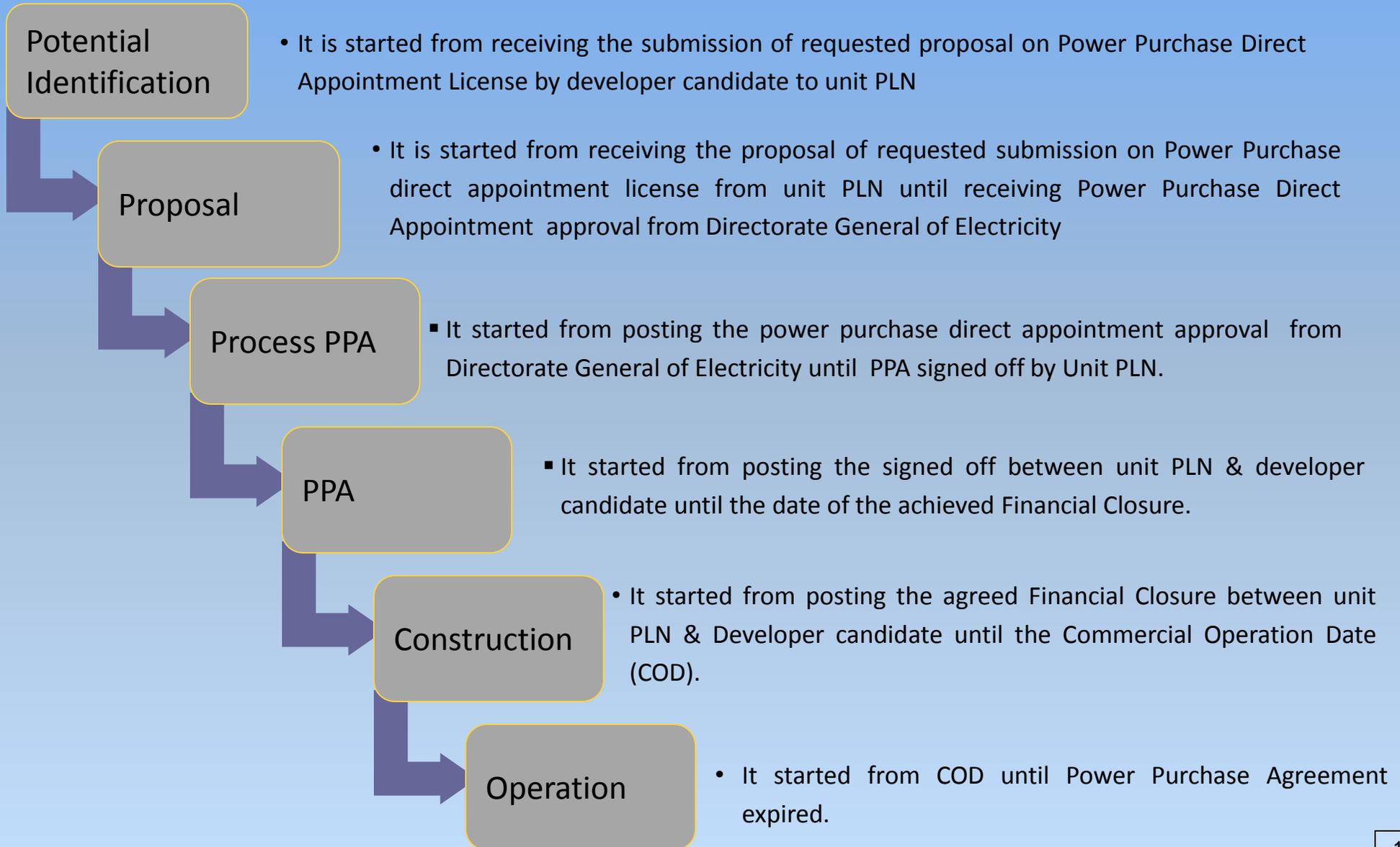
- Perusahaan Listrik Negara (PLN)

# Current Progress of Small Hydro Power Development

Status	IPP	
	Number	Installed Capacity (kW)
Operation	29	61.265
Construction	36	160.738
PPA	53	280.610
Permit Process	52	209.232
Proposal	65	327.573
Potential	140	653.340
<b>Total</b>	<b>375</b>	<b>1.692.758</b>

Status	PLN	
	Number	Installed Capacity (kW)
Operation	113	140.680
Construction	3	5.500
Study, Funding & Procurement	34	70.343
<b>Total</b>	<b>163</b>	<b>246.633</b>

# Development Stage Of Small Hydro In Indonesia (IPP)



# Development Stage Of Small Hydro In Indonesia (PLN)

Study, Funding & Procurement

- It is started from feasibility study, design (basic design and / detail design), bid document, bidding process until construction preparation (design report, funding: APLN, APBN, Technical Assistance & Loan)

Construction

- It is started from posting the agreed Financial Closure between unit PLN & Developer candidate until the Commercial Operation Date (COD).

Operation

- It is started from COD until Power Purchase Agreement expired.

# Distributed Generation

- Scope of Distributed Generation
- Benefit of Distributed Generation

# Scope of Distributed Generation



- **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.



*Bunaken 300 kW PV Plant, isolated grid*

- 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.



*Siteki 1,2 MW Mini Hydro Plant, grid connected*

- Installed capacity  $< 10$  MW, and must confirm with Distribution Code when connecting to the grid
- *Feed-in tariff* is applied for energy transaction

# Benefits of Distributed Generation

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- 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.

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# Barriers and Countermeasures

# BARRIER AND COUNTERMEASURES

## Barrires:

**LACK OF VIABILITY**

**LACK OF EQUITY**

## Countermeasures: (Policy and Regulation)

- **DIRECT APPOINTMENT**
- **FEED-IN TARIFF**
- **IMPROVEMENT ON FINANCIAL MECHANISM**

## **Feed in Tarrif (FIT)**

- Past, Current and Future

# PAST FIT REGULATION

- **Ministry of Energy and Mineral Resources Decree No. 112K/30/MEM/2002**
  - Small Scale of Renewable Energy and Excess Power Less Than 1 MW.
  - Only for Small Enterprise.
  - Feed-in Tariff:
    - 0,8 x Production Cost of Electricity (Connected to MV)
    - 0,6 x Production Cost of Electricity (Connected to LV)
- **Ministry of Energy and Mineral Resources Decree No. 002 Year 2006**
  - Medium Scale of Renewable Energy and Excess Power from 1 up to 10 MW.
  - Only for Regional Owned Company, Coperative and Private Enterprise.
  - Feed-in Tariff:
    - 0,8 x Production Cost of Electricity (Connected to MV)
    - 0,6 x Production Cost of Electricity (Connected to LV)

# PAST FIT REGULATION (cont'd)

- **Ministry of Energy and Mineral Resources Decree No. 31 Year 2009**
  - Small and Medium Scale of Renewable Energy and Excess Power up to 10 MW.
  - Only for Regional Owned Company, Coperative and Private Enterprise.
  - Feed-in Tariff based on Region:

	Price in IDR	Remark	Price in USD Cent			
<b>Renewable Energy</b>	9.200		Java/Bali	Sumatera/ Sulawesi	Kalimantan, NTB/NTT	Maluku & Papua
		F	1	1,2	1,3	1,5
	656	MV	7,13	8,56	9,27	10,70
	1.004	LV	10,91	13,10	14,19	16,37

# CURRENT FIT REGULATION

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- **Ministry of Energy and Mineral Resources Decree No. 04 Year 2012**
  - Small and Medium Scale of Renewable Energy and Excess Power up to 10 MW.
  - Only for Regional Owned Company, Coperative and Private Enterprise.
  - PLN (State-Owned Electricity Company) has obligation to buy 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.

# CURRENT FIT REGULATION (Cont'd)

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

F = Incentive Factor based on Region.

# FUTURE FIT REGULATION

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- **Currently the FIT regulation for Small Hydro Power is under preparation.**
- **It is expected the FIT will be increased in order to attract investor.**
- **Green Banking Scheme is currently under assessment of Reserved Bank to accomodate the funding for Renewable Energy Project.**

# Summary

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- **Indonesia seeks to enhance contribution of grid small hydro power generation to the electricity supply provision.**
- **Regulation of Feed-in Tariff for Renewable Energy especially on Small Hydro Power Generation has developed progressively to facilitate investor in Hydro Power Generation business.**
- **Financial mechanism will be simplified by the intervention of Reserved Bank.**

*Thank You...*