Ministry of Energy and Mineral Resources
Republic of Indonesia

LOW CARBON DEVELOPMENT on ENERGY SECTOR

Overview of the EC and NRE Sector in Indonesia

Jakarta, August 22nd , 2019

Paris Agreement and Energy Sector Commitment on Climate Change

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

Global Commitment:

Target of *Paris Agreement*:
Keep global temperature rise not exceed 2°C, and strive to reach 1.5°C

National Commitment:

The mandate of Law No. 16 of 2016 on the Ratification of the Paris Agreement
Reduce GHG emissions according to NDC by 2030:

- 29% from BaU (National Effort)
- 41% from BaU (International Support)

Energy Sector Commitment:

Reduce GHG emissions by 314 - 398 Million Tonnes of CO2 by 2030

PP 79/ 2014 National Energy Policy & Perpres No 22 / 2017 National Energy General Plan:
Target 23% of RE on Primary Energy Mix & 17% Final Energy Saving from BAU Schenario

NDC Indonesia

No	Sektor	GHG Emission 2010 (MTon CO2e)	GHG Emission Level 2030 (MTon CO2e)			Reduction (MTon CO2e)	
			BaU	CM1	CM2	CM1	CM2
1	Energy*	453.2	1,669	1,335	1,271	314	398
2	Waste	88	296	285	270	11	26
3	IPPU	36	69.6	66.85	66.35	2.75	3.25
4	Agriculture	110.5	119.66	110.39	115.86	9	4
5	Forestry**	647	714	217	64	497	650
	TOTAL	1,334	2,869	2,034	1,787	834	1,081

38% emission reduction from energy

Note :
* Including Fugitive Emission
** Including Forest Fire

NDC Energy Sector

Sub Sector	Reduction (MTon CO2e)			
	2017	**2020**	**2025**	**2030**
RE	9,39	28,79	108,69	170,42
Energy Efficiency	20,78	33,01	57,27	96,33
Clean Energy Supply	3,02	8,19	15,74	31,80
Fuel Switching	10,02	10,02	10,02	10,02
Reclamation of Post Mining	1,94	2,72	4,08	5,46
Total	45,14	82,74	195,80	314,03

Progress: 40 Million Ton CO2e in 2017 (temporary figures)

Action Plan on Energy Sector to achieve NDC Target

Energy Actions:

- ✓ **Renewable Energy**
- ✓ **Energy Efficiency**
- ✓ **Clean Technology**
- ✓ ***Fuel Switching***
- ✓ **Reclamation after Mining**

- Reduction : 314 JutaTon CO2 (2030)
- Investment : Rp 3500 Trilliun = 259 billion USD

RE - Electricity

- Production : 48,9 GW
- Mitigation : 156,6 J Ton CO2
- Investment Estimated: 125 M USD

RE – Non Electricity

- Production:
  - Biodiesel : 9,2 Jt KL
  - Biogas : 19,4 Jt M^3
- Mitigation : 13,8 Jt Ton CO_2
- Investment Estimated: 6.2 M USD

Reclamation of Post Mining

- Activity : 145,2 Ribu HA
- Mitigation : 5,5 Jt Ton CO2
- Investment Estimated : 0.3 M USD

Energy Efficiency & Conservation

- Saving : 117 TWh
  - Energy Management (for consumer 6000 TOE);
  - Partnership program on Energy Audit or IGA;
  - Energy and Water Saving Program for Public Sector;
  - LED Street Lighting – PV;
  - Retrofit LED Street Lighting;
  - EE Label for CFL/LED;
  - EE Label/MEPS for AC
  - EE Label/MEPS for other
- Mitigation: 96,3 Jt Ton CO_2
- Investment Estimated : 6.8 M USD

Oil and Gas

- Activity:
  - conversion Mitan to LPG : 5,6 JtTon
  - SPBG : 143,75 MMSCFD
  - Jargas : 2,4 Jt Pelanggan
- Mitigation: 10 Jt Ton CO_2
- Investment estimated: 1.23 M USD

Clean Energy Tech

- Activity (Production) : 102 GW
  - Waste Heat Recovery
  - Cogeneration
  - Clean Coal Technology
- Mitigation : Rp.31,8 Jt Ton CO_2
- Investment estimated : 120 M USD

Mitigation Action on Energy Sector (Presidential Regulation No 61/2011)

NRE Sector

- Geothermal Power Plant (PP) Development
- Solar PP Development
- Minihydro PP Development
- Microhydro PP Development
- Wind PP Development
- Hybrid PP Development
- Biomass PP Development
- Biogas Utilization
- Biodiesel/Biofuel Utilization

- Mandatory of Energy Management
- Implementation of Energy Conservation partner ship program
- Increasing of home appliances efficiency
- Smart Street Light Development

Oil and Gas

- Conversion of Kerosin to LPG
- Utilization of Natural Gas as Public Tran sportation Fuel
- Development of City Gas Pipiline

Mineral and Coal Sector

- Reclamation of Post mining areas

Eletricity Sector

- ✓ Hydro Power Plant Development
- ✓ Clean Coal Technology Utilization on Power Plant
- ✓ Waste Heat Recovery Utilization on P ower Plant
- ✓ Coogeneration Utilization on Power Plant

NREEC Policies

National Energy Policies

1. ***Maximizing*** renewable energy utilization;
2. ***Minimizing*** oil utilization;
3. ***Optimizing*** natural gas and new energy utilization;
4. ***Utilizing*** coal as a reliable national energy supply;
5. ***Utilizing*** nuclear as the last option.

Source: article 11 of Government Regulation No. 79 year 2014 concerning National Energy Policy.

Indonesia's Commitment

- ✓ The GOI committed to participate on global sustainable action as pledged by President Joko Widodo, at the 21st COP 2015 in Paris;
- ✓ The GOI ratified Paris Agreement, trough the Law No.16 year 2016;
- ✓ 29% of greenhouse gas (GHG) emission reductions in 2030 to with own efforts and 41% GHG emissions reduction with International support

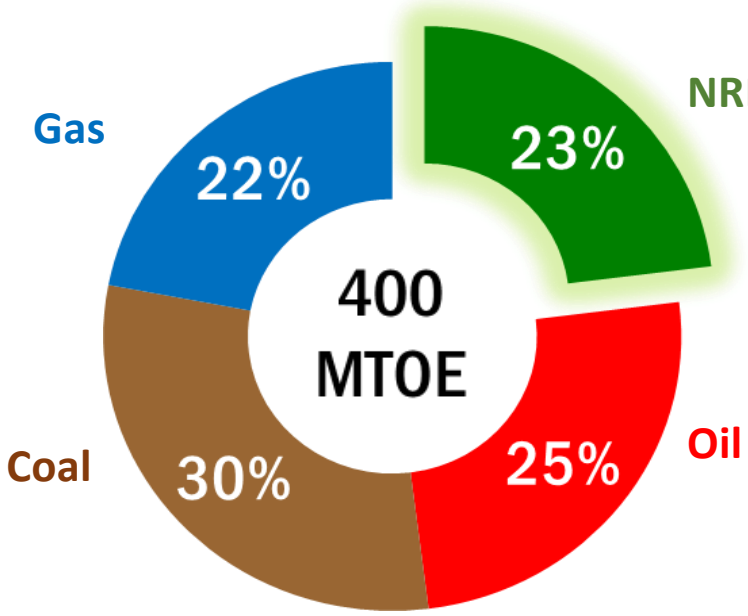
"Mitigation actions will be conducted through:

- ✓ Shift fuel subsidy budget to productive activities (infrastructure);
- ✓ 23% renewable energy of the total national primary energy mix by 2025;
- ✓ Waste to Energy (WtE).

GHG target for energy sector: 314 million ton CO_2 eq in 2030.
realization in 2018 was 50,4 million ton CO_2 eq

Renewable Energy Targets

PRIMARY ENERGY MIX BY 2025



NRE → 92.2 MTOE

- 69.2 MTOE
  - Electricity — 45.2 GW
    1. Geothermal PP 7,2 GW
    2. Large Hydro PP 17,9GW
    3. Mini Hydro PP 3 GW
    4. Biomass/gas PP 5,5GW
    5. Solar PV PP 6,5GW
    6. Wind Power PP 1,8GW
    7. Others 3,1GW
- 23.0 MTOE — Direct Use
  - Biofuels — 13.8 Million KL
  - Biomass — 8.4 Million tons
  - Biogas — 489.8 Million M3
  - CBM — 46.0 MMSCFD

Source: the Government Regulation No. 79/2014 concerning National Energy Policy and the Presidential Regulation No. 22/2017 on RUEN (General Plan on National Energy)

National Energy Management

Definition of Energy Conservation (Law No. 30 of 2007 and GR No. 70 of 2009)

Task

Energy Conservation is systematic, well-planned, and integrated efforts to :

① conserve domestic energy resources;

② increase the efficiency of its energy resources utilization;

Scope of Work

Energy Conservation is implemented in all phases of energy management:

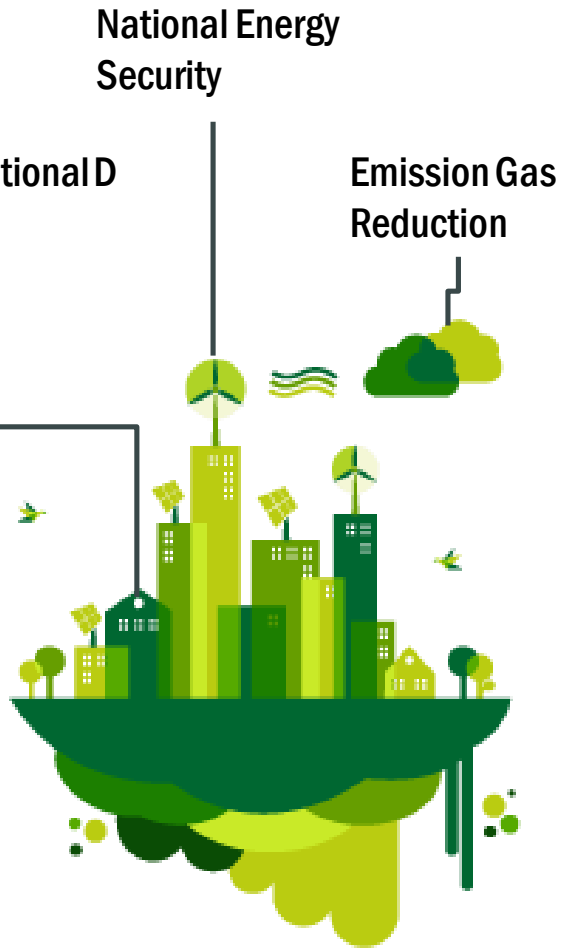
1. Energy Provision
2. Energy Business
3. Energy Utilization
4. Energy Resource Conservation

Global Perspective

The development of *advanced energy technology* to respond to global challenge on clean energy, climate change, and sustainable development.

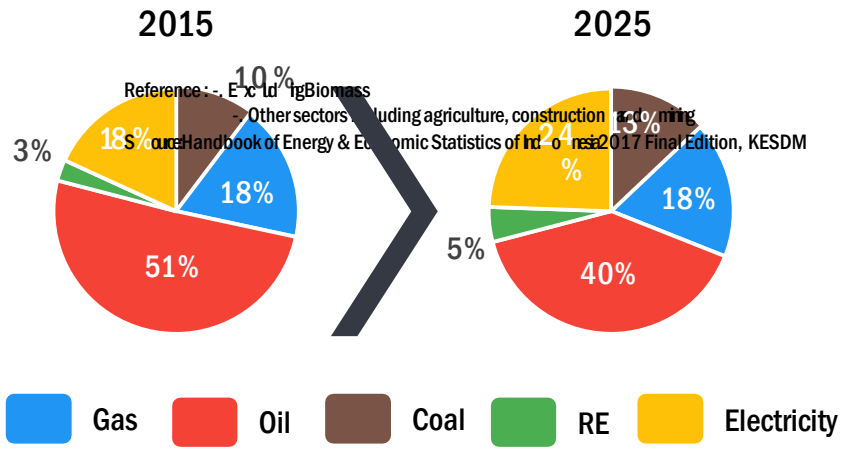
(IEA *'s Energy Technology Perspectives* 2010)

GOALS



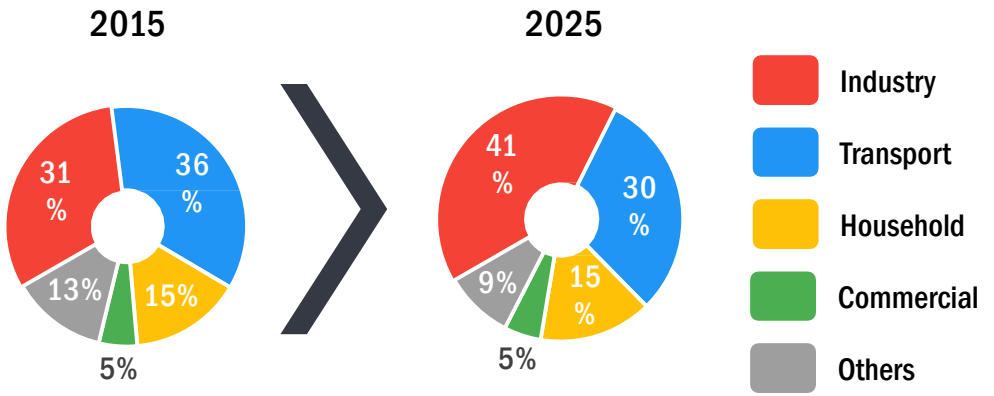
Energy Conservation Target and Strategy

Final Energy Mix by Type of Energy

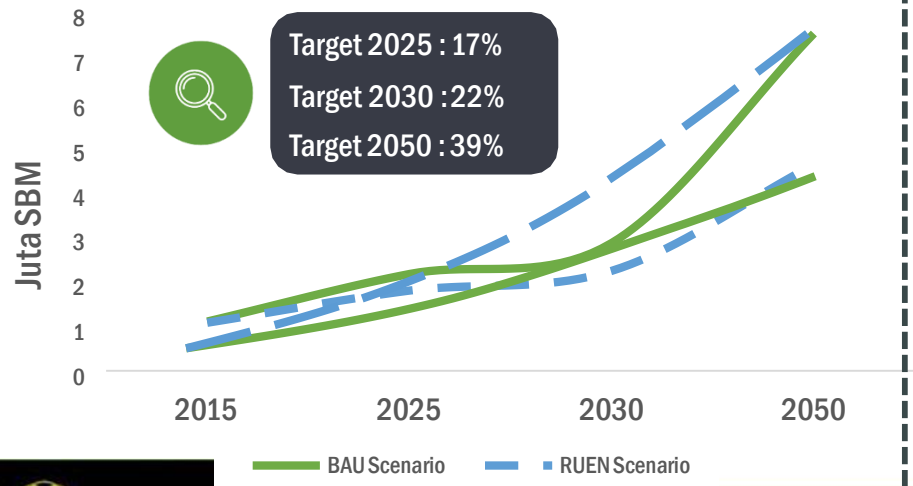


Reference : - Excluding Biomass
- Other sectors : including agriculture, construction, mining
Source : Handbook of Energy & Economic Statistics of Indonesia 2017 Final Edition, KESDM

Final Energy Mix by Sector



Supply Energi Final 2015 - 2050



Energy Conservation Implemetation Strategy

1. Implement Mandatory Energy Manag ement for Large Energy users ≥ 6.00 0 TOE;
2. Apply Energy Efficient Standard and Labeling on appliances;
3. Implement energy conservation in public sector as best practices;
4. Promote private sector investment in energy conservation;
5. Increease awareness on energy conservation;
6. Build capacity and technology transfer;
7. Implement monitoring, evaluation system in energy conservation.

Target 2025

- Reduce energy intens ity 1% per year up to 2025
- Reach energy elastici ty < 1 on 2025
- Reduce final energy c onsumption by 17% on 2025

Main Program of Energy Conservation

Energy Diversification

CONSERVING ENERGY THROUGH ENERG Y DIVERSIFICATION TOWARDS THE MAXI MUM UTILIZATION OF NRE AND COST-EF FICIENCY

Energy Efficiency

ENERGY EFFICIENCY ASSESSMENT, IMPLE MENTATION, AND SOCIALIZATION TO INDU STRY, TRANSPORTATION, COMMERCIAL, A ND HOUSEHOLD SECTOR

Supply Side

Energy Resources

- Energy Diversification (New Renewable Energy Utilizati on)
- Clean Energy Technology Implementation
- Energy Efficiency on Power Plant
- Energy Efficiency on Coal Mining
- Energy Efficiency on Transmission/Distribution system
- Energy Efficiency on Oil and Gas Refinery

Demand Side

Energy Utilization

- Energy Efficiency in End Users Sector (Industry, Building, Household & Transportation)
- Energy Efficiency Standard and Labelling for Energy- using Devices
- Energy Management in Industry/building
- Mass Transportation

THANK YOU

MINISTRY OF ENERGY AND MINERAL RESOURCES
Jl. Medan Merdeka Selatan No. 18, Jakarta

DIRECTORATE GENERAL OF NEW, RENEWABLE ENERGY AND ENERGY CONSERVATION
Jl. Pegangsaan Timur No.1 Menteng, Jakarta

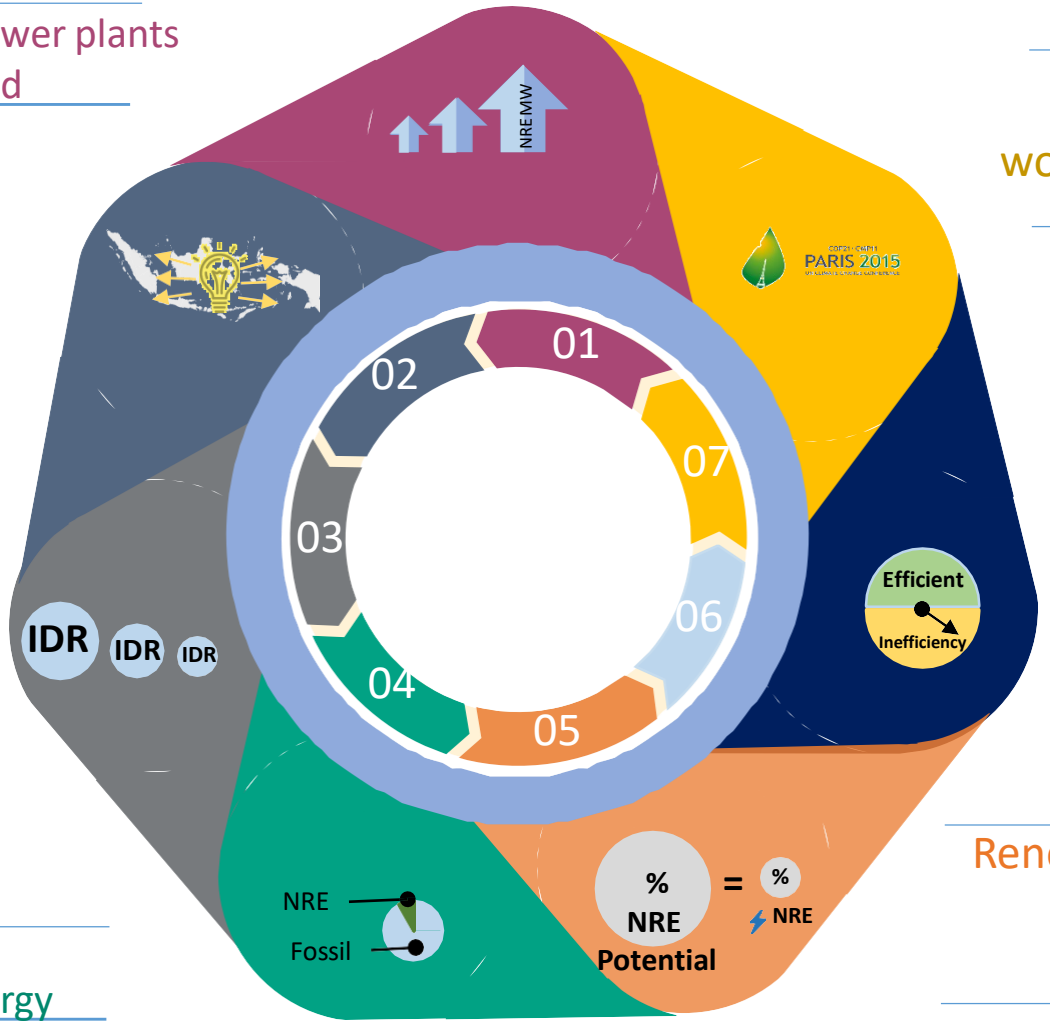
Current Energy Condition

The capacity of NRE-based power plants needs to be increased

Energy distribution should be optimized to increase the electrification ratio and ensure energy equality

Energy price is required to be pushed down to make it affordable

Indonesia's energy is still dominated by fossil energy



Indonesia is committed to work towards *Paris Agreement*

Energy utilization is not yet efficient

Renewable Energy potential is abundant but not yet optimally utilized

Renewable Energy Potentials

- Resource: 11,0 GW
- Reserve: 17,5 GW
- Utilization for PLTP 1,949 GW (0,44%)

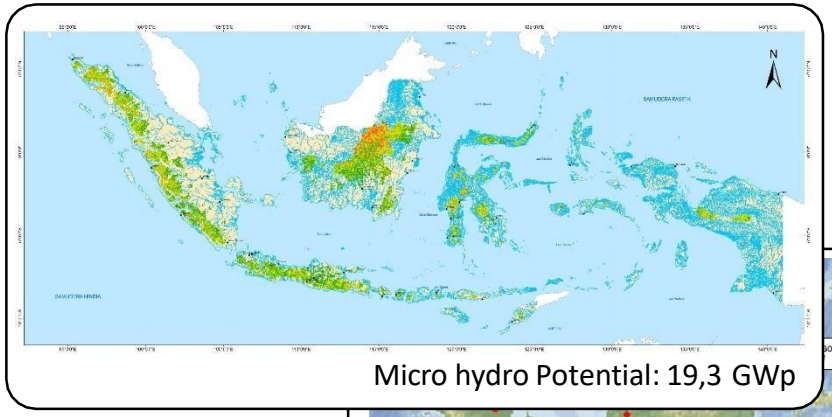
- Resource: 75 GW (19,3 GW)
- Utilization for: PLTA 5,124 GW
  PLTMH 0,225 GW (1,21%)

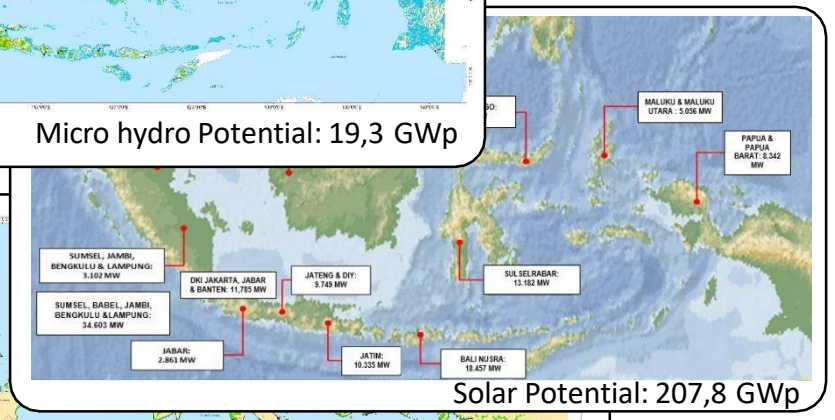
- Resource: 32,6 GW
- Resource BBN: 200 Thou Bph
- Utilization for: PLTBio 1,857 GW (0,42%)
  BBN 3 million kL per year

- Resource: 60,6 GW
- Utilization PLTB: 0,076 GW (0,02%)

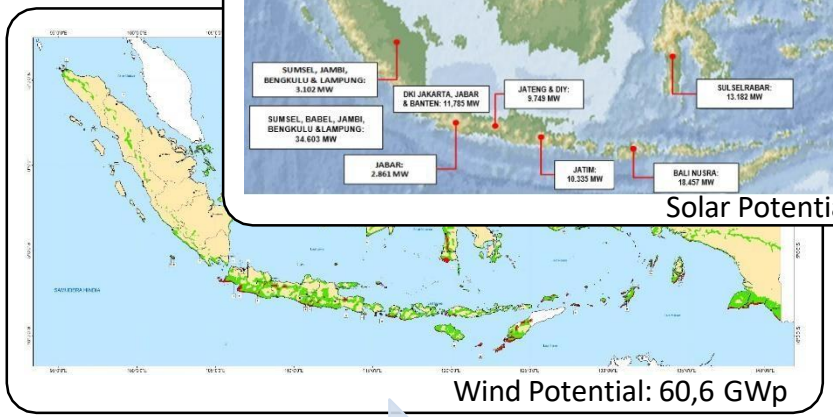
- Potential PLTS: 207,8 GWp
- Utilization for: PLTS 0,090 GWp (0,02%)

- Potential: 17,9 GW
- Utilization: -


Micro hydro Potential: 19,3 GWp



Solar Potential: 207,8 GWp


Wind Potential: 60,6 GWp

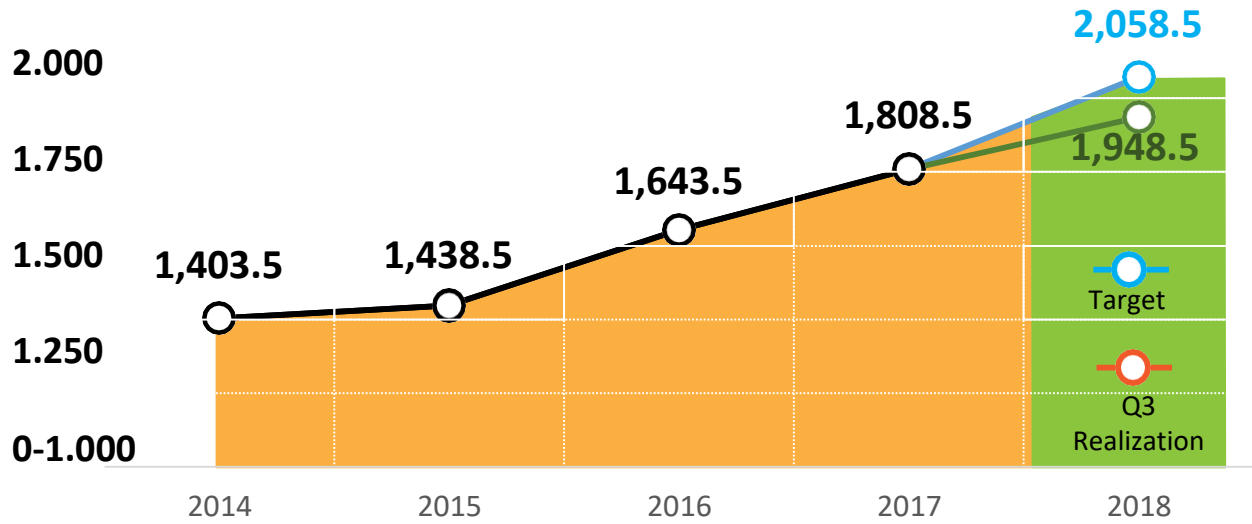
Total Potential 442 GW → Total Installed 9,32 GW (2%)

Renewable Energy Development

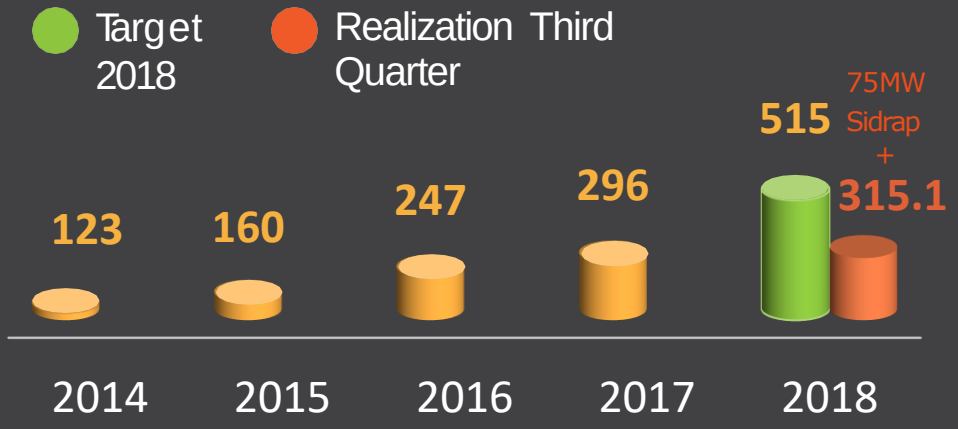
Third Quarter -2018

140 MW Geothermal Power Plant a dditional capacity from Karaha #1 (30 MW) & Sarulla #3 (110 MW)

GEOTHERMAL POWER PLANT INSTALLED CAPACITY (MW)

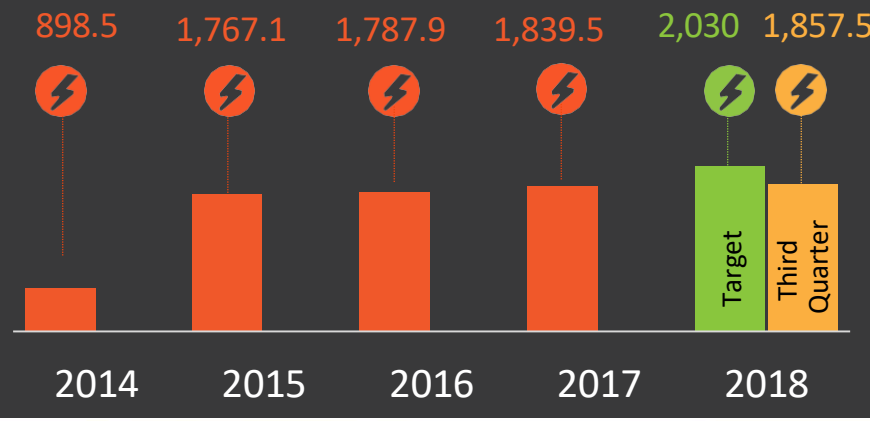


INSTALLED SOLAR, MINIHYDRO/ MICROHYDRO & WIND POWER PLANT (MW)

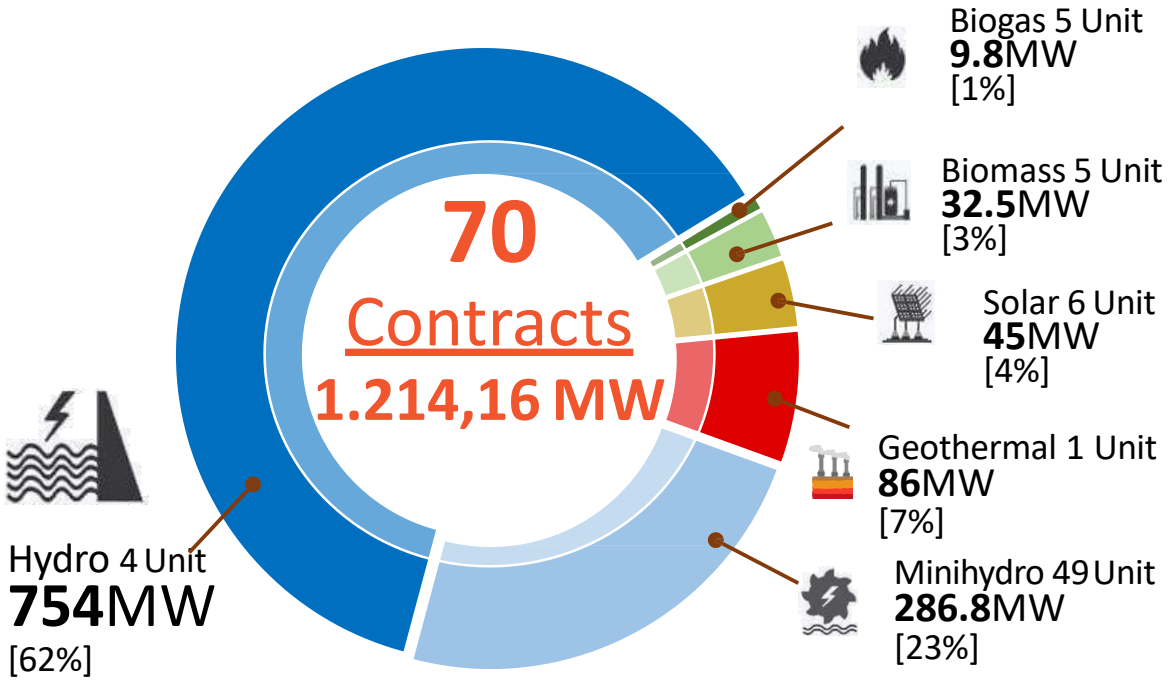


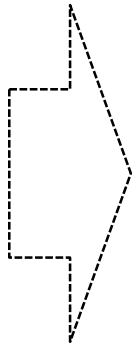
BIOENERGY POWER PLANT INSTALLED CAPACITY (MW)

Bioenergy Power Plantconsiste d of Biomass, Biogas, Municipal Waste, and Biofuel. Mostly are off-grid power plant.



More Power Purchase Agreement from Renewable Energy have been signed

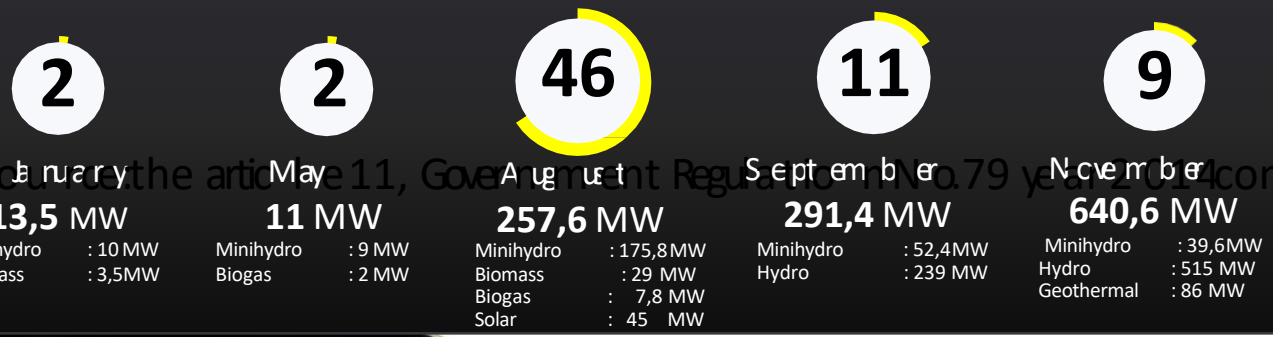




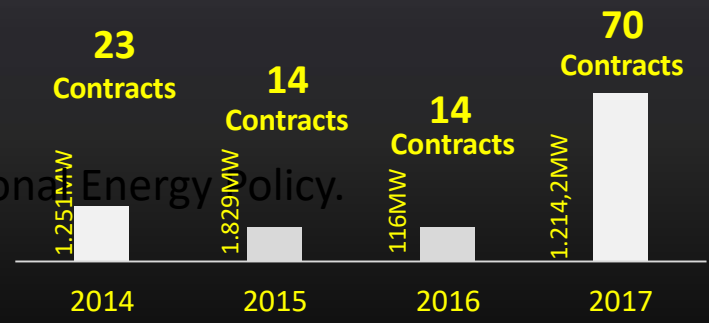
As of October 2018

Source: the article 11, Government Regulation No.79 year 2014 concerning National Energy Policy.

Signing of 70 contracts RE Power Generation FY 2017



The Progress of NRE-based Power Plant Contracts (2014-2017)



Big Wind Energy Projects

Wind Power Plant Sidrap
(30x2.5 MW) COD April 2018

Located at
Sidereng Rappang (SIDRAP) Regency
South Sulawesi

Electricity Production
247 GWh/year

PPA Price :
US$ 11.41 cent/kWh

Investment
US$ 150 Million

Avarage Wind Speed
(85 m) 7+ m/s (25+ KPH)

Existing Renewable Energy Projects

PLTB Jeneponto
Capacity 72 MW

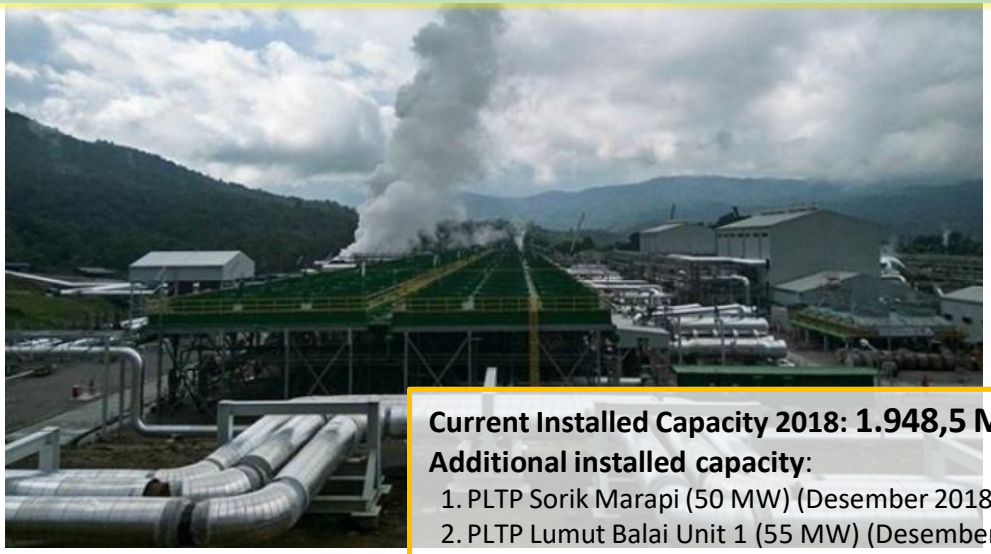
PLTB Sidrap II
Capacity 50 MW

PLTB Tanah Laut
Capacity 70 MW

PLTS Floating Cirata
Capacity 200 MW

Indonesia is Home for Geothermal

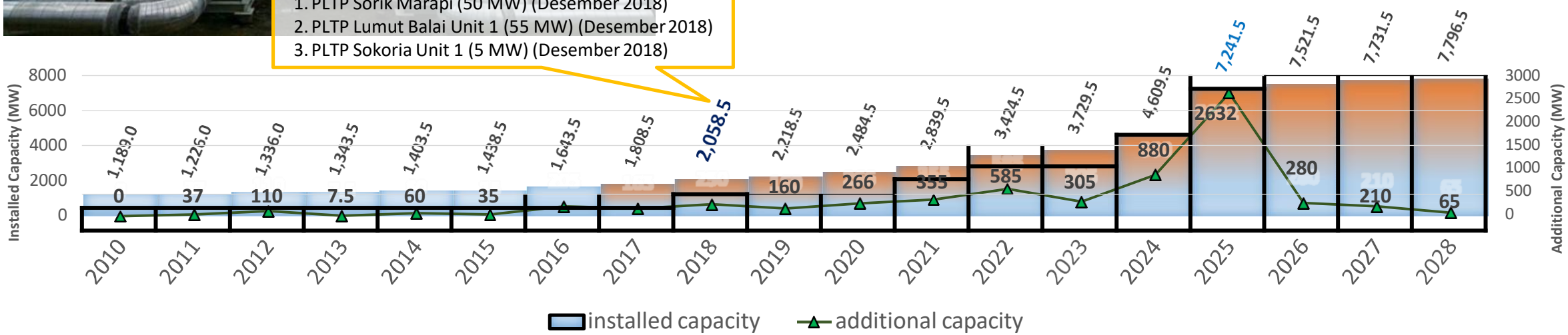
Sarulla: The biggest Geothermal Power Plant in Sumatera



Current Installed Capacity 2018: 1.948,5 MW
Additional installed capacity:
1. PLTP Sorik Marapi (50 MW) (Desember 2018)
2. PLTP Lumut Balai Unit 1 (55 MW) (Desember 2018)
3. PLTP Sokoria Unit 1 (5 MW) (Desember 2018)

Sarulla operation Ltd.

3 x 110 MW

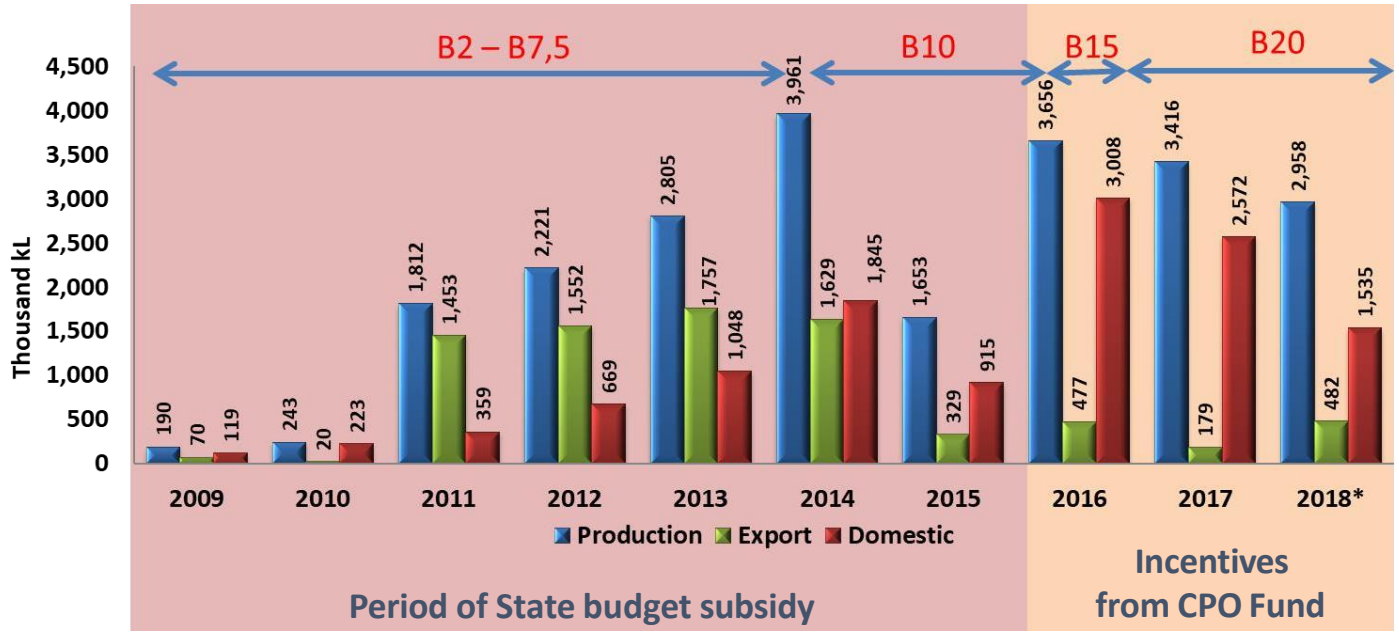


Mandatory of Biodiesel Blending

2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

B2,5 – B7,5 | B10 | B15 | B20

- Regulation on licensing biodiesel for commercial.
- Mandatory Biodiesel Blending in the transportation, industrial and power generation sectors.
- Establishment of CPO Fund as an incentive for biodiesel blended with PSO diesel fuel (B15).
- B20 Implementation
- Prior the implementation of B20 the government have conducted a series of performance and road test in cooperation with related stakeholder for up to 40,000 km.
- Performance test also conducted to heavy vehicles, marine engine, and military vehicles
- Enforcement of B20 to all related sectors by expanding the CPO Fund Incentives to boost domestic consumption and reduce diesel fuel import

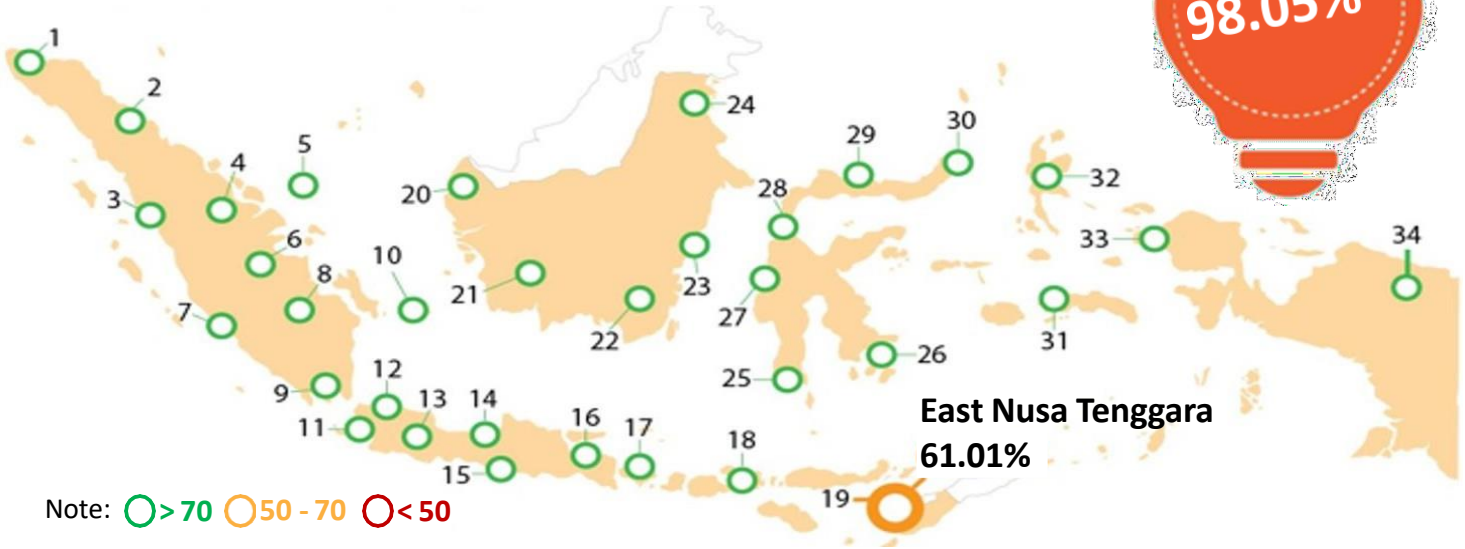


Installed Capacity of Biodiesel Producers

Region	Capacity (kL)	Investment (USD)
Sumatera	7.337.299	721.909.824
Java	2.983.852	353.818.187
Kalimantan	1.262.356	91.987.951
Sulawesi	475.862	32.620.407
Total	**12.059.369**	**1.200.336.369**

Electrification Ratio 2018

The Achievement for national electrification ratio until Q3 2018 has reach 98.05%*, with the composition as follows:
PLN 95.43%; Non-PLN 2.50%; and LTSHE 0.12%.



SUMATRA

1	Aceh	98.59
2	North Sumatra	99.99
3	West Sumatra	91.72
4	Riau	98.44
5	Riau Islands	88.10
6	Jambi	96.54
7	Bengkulu	99.77
8	South Sumatra	90.79
9	Lampung	94.58
10	Babel	99.99

JAVA-BALI-NUSRA

11	Banten	99.99
12	Jakarta	99.99
13	West Java	99.99
14	Central Java	98.15
15	Yogyakarta	99.99
16	East Java	93.87
17	Bali	99.99
18	West Nusa Tenggara	88,52
19	**East Nusa Tenggara**	**61.01**

KALIMANTAN

20	West Kalimantan	86.66
21	Central Kalimantan	84.56
22	South Kalimantan	94.66
23	East Kalimantan	99.99
24	North Kalimantan	90.28

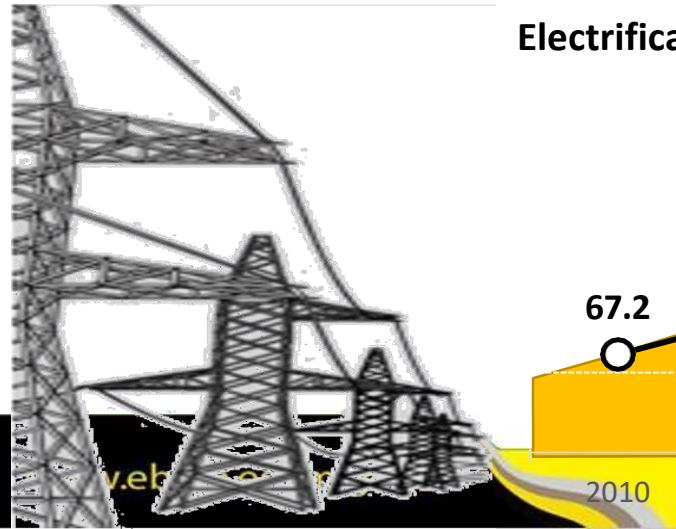
SULAWESI

25	South Sulawesi	99.99
26	Southeast Sulawesi	86.68
27	West Sulawesi	99.73
28	Central Sulawesi	91.54
29	Gorontalo	88.41
30	North Sulawesi	97.11

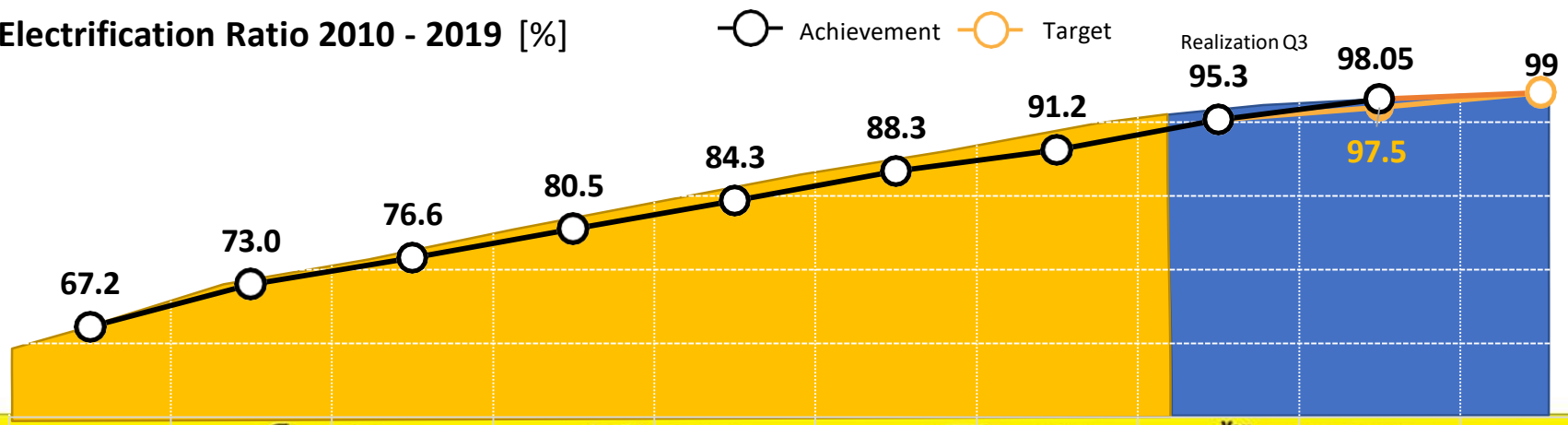
MALUKU & PAPUA

31	Maluku	89.18
32	North Maluku	99.45
33	West Papua	99.99
34	Papua	81.66

*) unaudited



Electrification Ratio 2010 - 2019 [%]



Energy Saving Solar Power Lamps

Pre-electrification for 2,519 villages

Energy Saving Solar Power Lamps (LTSHE)

REALIZATION 2017

79,556 household
in 5 provinces

TARGET 2018

175,782 household
in 16 provinces

State Budget Plan 2019

98,481 household

Source of financing:
State Budget
2017-2019 >350K household

Q3 Realization:
22,820 units installed.

Component:

Specification:

- **4 Ultra Efficient LED 3 Watt = Lampu Pijar 25 Watt**
- **Modul Surya – 20 Watt Peak**
- **Lithium Energy Storage Pack (Lithium Battery)**
- **Chip Management Energy**

Can light up to 6-12 hours or a maximum 60 hours in a single battery charge

Riau
1. Meranti Islands

West Papua
1. Tambrauw
2. TelukBintuni
3. Fakfak
4. Manokwari
5. Mount Arfak
6. South Manokwari
7. Wondama Bay

West Nusa Tenggara
1. West Lombok
2. North Lombok
3. East Lombok
4. Sumbawa
5. Dompu
6. Bima

Maluku
1. South Buru
2. Buru
3. Central Maluku
4. EastSeram
5. Aru Islands

Papua
1. Nabire
2. Mamberamo Raya
3. Sarmi
4. Tolikara
5. Lanny Jaya
6. Asmat
7. Jaya Wijaya
8. Yalimo
9. Mount Bintang

Solar Panel with 4 LED Lamps and USB Port, provides an extensive benefit in remote area

EFFICIENT SOLAR POWERED LIGHTING PROGRAM

- To provide pre electrification to the are that are technically difficult for the grid extension
- Solar Panel with 4 LED Lamps and USB Port, provides an extensive benefit in remote area
- 2017: Illuminating 79,556 houses in 5 Provinces
- 2018: Illuminating 175,782 houses in 15 Provinc es
- 2019: Illuminating 150.000 houses

Energy Conservation Standards and Regulations

2007
- Law No. 30/2007 on Energy

2009
- Government Regulation No.70/2009 on Energy Conservation

2011
- Presidential Instruction No. 13/2011 Water and Energy Saving
- Presidential Regulation No. 61/2011 National Action Plan on GHG E mission Reduction;
- National Standard SNI : 6196:2011 on Energy Audit Procedure on B uilding;
- National Standard SNI : 6197:2011 on Energy Conservation on Light ing System;
- National Standard SNI : 6389-2011 on Energy Conservation on Buil ding Envelope;
- National Standards SNI : 6390-2011 on Energy Conservation for Air Conditioning on Building

2012
- Ministry EMR Regulation No. 14/2012 on Energy Management;
- Ministry EMR Regulation ESDM No. 15/2012 tentang Ground Water Saving;
- Governor Jakart Regulation No. 38/ 2012 on Green Building

2013
- Ministry EMR Regulation No. 01/2013 on Fuel Usage Control

2014
- Ministry EMR Regulation No. 18/2014 on Energy Efficiency Labeling for CFL;
- Government Regulation No. 79/2014 on National Energy Policy.

2015
- Presidential Regulation No. 38/2015 on PPP for Government Infrast ructure Projects (including energy conservation);
- Ministry of Labor Regulation No. 80/2015 on Standard of Competen cy for Energy Manager in Industry and Building;
- Ministry of Public Works and Housing Regulation No. 02/PRT/M/20 15 on Green Building

2017
- Presidential Regulation No. 22/2017 on National Energy Planning
- MEMR Reg. No. 41/2017 on The Second Amendment of Minister of EMR Regulation No. 28/2016 on Electricity Tariff Supplied by PLN (P ersero);
- Ministry EMR Regulation No. 57/2017 on MEPS and EE labeling for AC;

2013
- Minister of Manpower Decision No. 53/2018 on Establishment of In donesian National Working Competence Standard for Energy Audit

Energy Saving Potential

INDUSTRY

Consumption 2016: 217 MBOE
Energy saving potential
10-30 %

Programs:
- Energy Audit/ IGA/ ESCO
- Energy Management/ ISO 50001
- Online reporting system
- Energy manager&auditor certification
- Increase public awareness
- Pilot Project

COMMERCIAL

Consumption 2016: 40 MBOE
Energy saving Potential
10-30 %

Programs:
- Energy Audit / IGA/ ESCO
- Pilot Project
- Energy Efficiency Standard
- Online Reporting System for Government Building

TRANSPORT

Consumption 2016: 303 MBOE
Energy saving Potential
15-35 %

Programs:
- Mass transport (BRT/ MRT/ LRT)
- Fuel Switching (Fuel oil to Natural Gas & Biodiesel)
- Transport Management System

HOUSEHOLD

Consumption 2016: 115 MBOE
Energy saving Potential
15-30 %

Programs :
- EE Standard (Label/ MEPS)
- Public awareness

Reference : -. Excluding Biomass
-. Other sectors including agriculture, construction and mining
Source: Handbook of Energy & Economic Statistics of Indonesia 2017 Final Edition, KESDM