



MINISTRY OF ENERGY AND MINERAL RESOURCES REPUBLIC OF INDONESIA

**DIRECTORATE GENERAL OF ELECTRICITY**

# **POWER POLICY AND NATIONAL DEVELOPMENT PLAN IN INDONESIA**

Presented by:

**Jarman**

**Director General of Electricity**

Bangkok  
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**SYMPOSIUM ON SUSTAINABLE POWER SUPPLY MIX IN THE  
FUTURE**

# OUTLINE

**1** PRELIMINARY

**2** CURRENT CONDITION

**3** GENERAL PLAN FOR NATIONAL ELECTRICITY

**4** 35,000 MW PROGRAM

**5** CO<sub>2</sub> EMISSION REDUCTION – CLEAN COAL TECHNOLOGY

# 1. PRELIMINARY



# GOVERNMENT POLICY ON POWER SECTOR

[BASED ON LAW NO. 30/2009 ON ELECTRICITY ]

## OBJECTIVE OF ELECTRICITY DEVELOPMENT

Electricity development aims to ensure the availability of electric power:

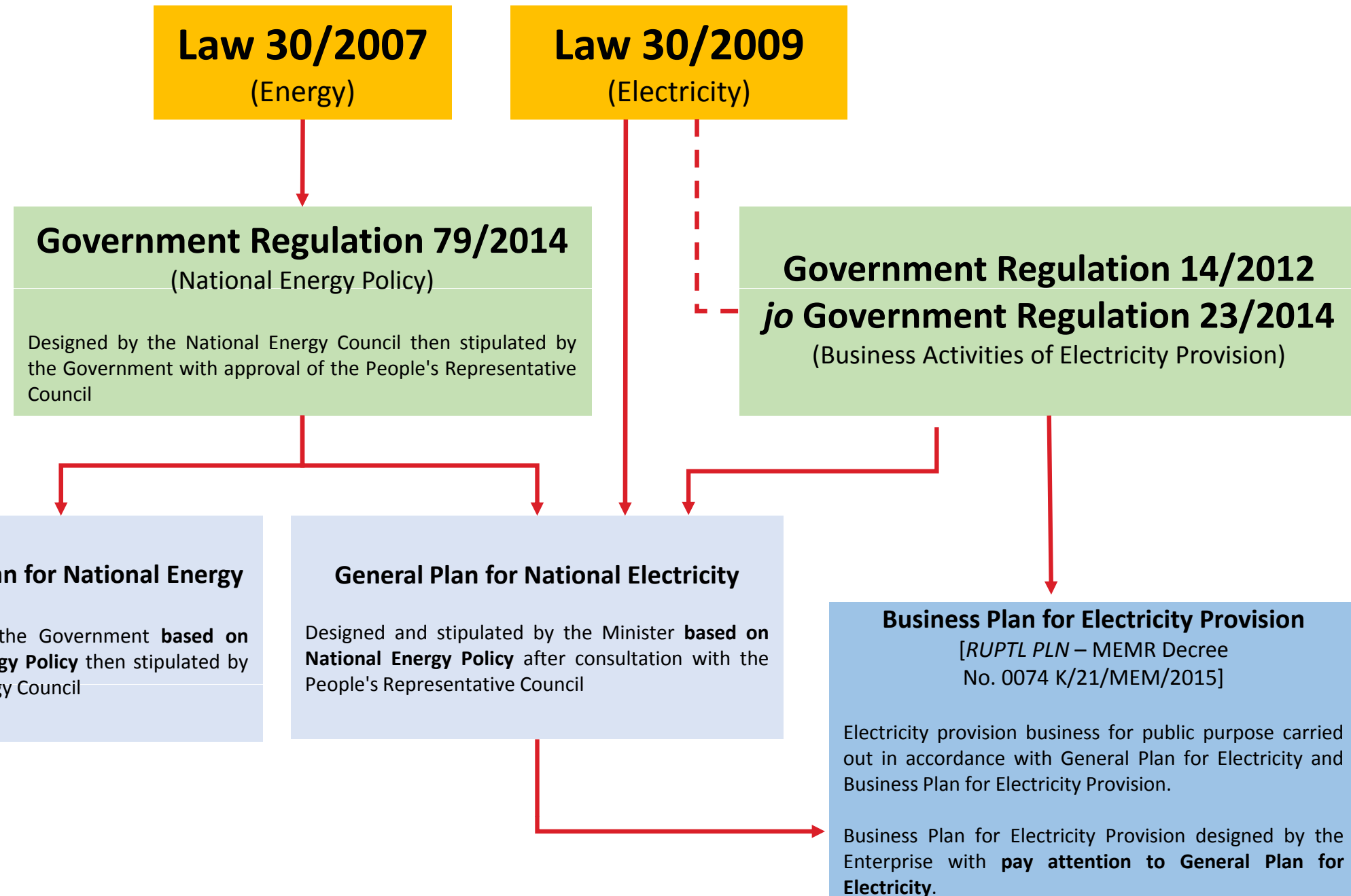
- in sufficient quantity
- good quality
- reasonable price

in order to improve the welfare and prosperity of the people in a fair and equitable and sustainable development.

## UTILIZATION OF PRIMARY ENERGY SOURCE

- Primary energy sources → shall be used optimally in accordance with the National Energy Policy → to ensure the sustainability of electricity supply
- Shall be carried out by prioritizing the new and renewable energy sources
- Domestic primary energy sources → shall be prioritized for national electricity interest.

# LEGAL BASE OF PLANNING AND DEVELOPMENT ON ENERGY AND ELECTRICITY



## **2. CURRENT CONDITION**



# 35,000 MW PROGRAM

Electricity Development of 2015-2019 to fulfill Electricity Growth 8.7% and Electrification Ratio 97.35% in 2019

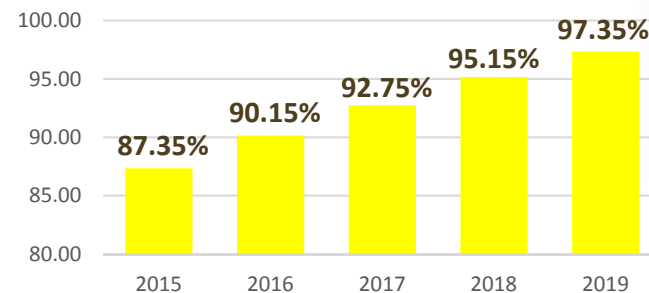
Currently the installed capacity just cover about **87,14%\*** household, lower than Singapore (100,0%), Brunei (99,7%), Thailand (99,3%), Malaysia (99,0%), and Vietnam (98,0%)

For the next 5 years, demand for electricity will grow up about **8,7%** per year in average, with a target of electrification ratio about **97,35%** at the end of 2019

## Electrification Ratio and Capacity

Current Condition	Unit	Total
Electrification	%	87,14*
Capacity	MW	54.453*

## Electrification Ratio



To fulfill electricity demand growth and to achieve electrification ratio target, it is required new additional capacity about 35,000 MW (exclude 7.4 GW on going project) for period 2015-2019

**35,000 MW PROGRAM**

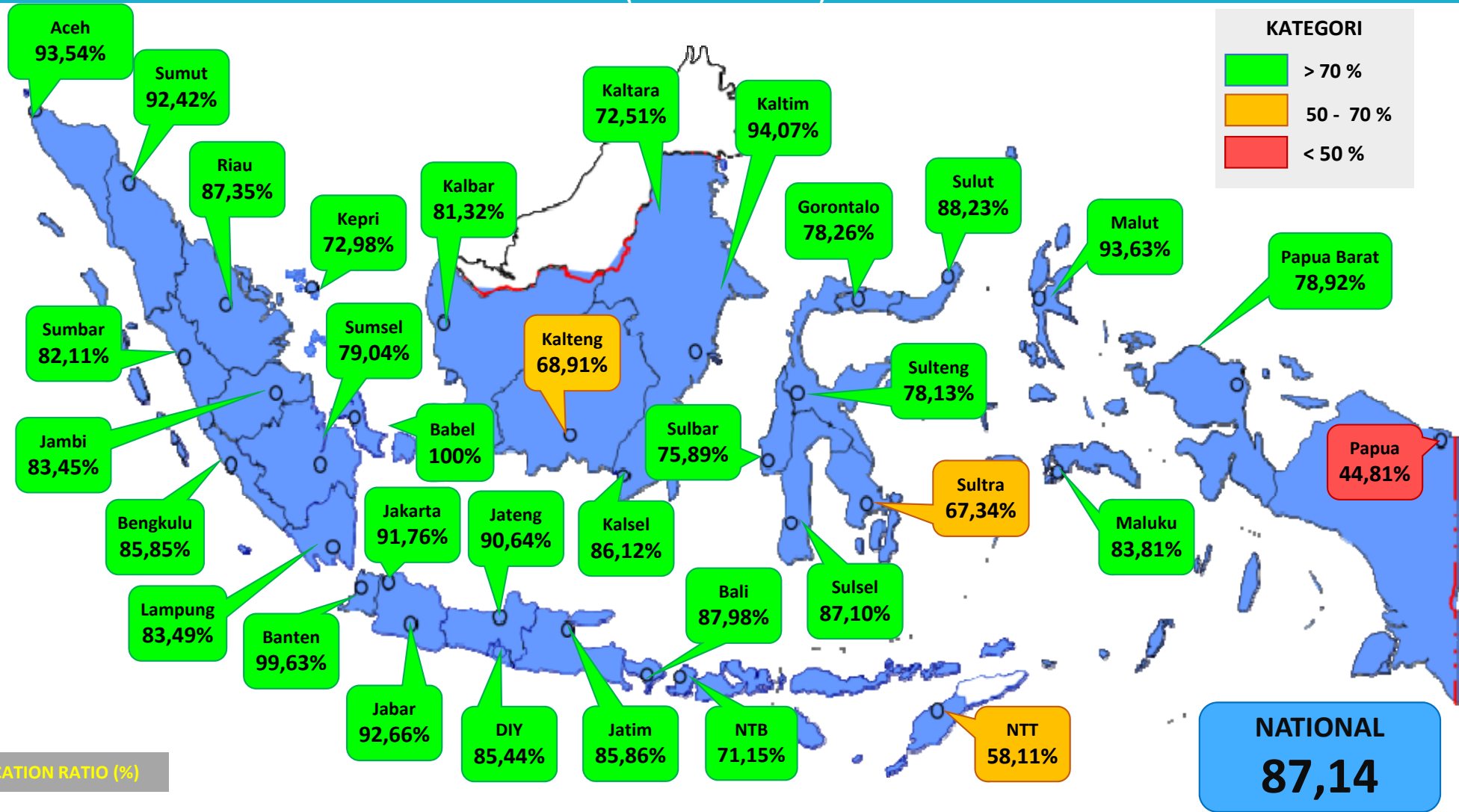
## External factor on the 35,000 MW program which is influence the goal:

- ① The change of assumptions which is affect to the change of annual electricity demand
- ② Demand availability to absorb of electricity supply to return of the investment

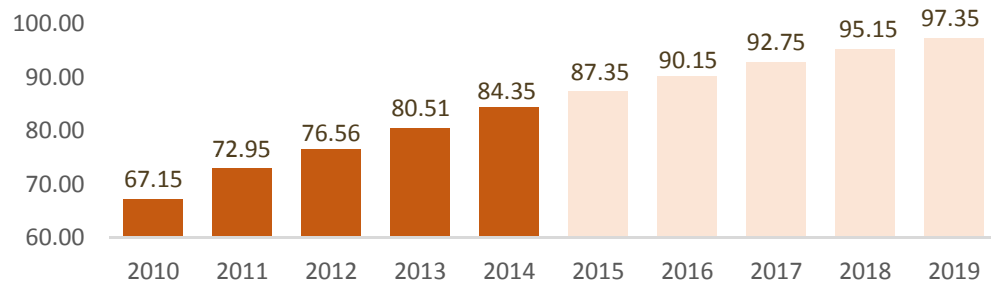
\*: September 2015

# ELECTRIFICATION RATIO

(SEPTEMBER 2015)



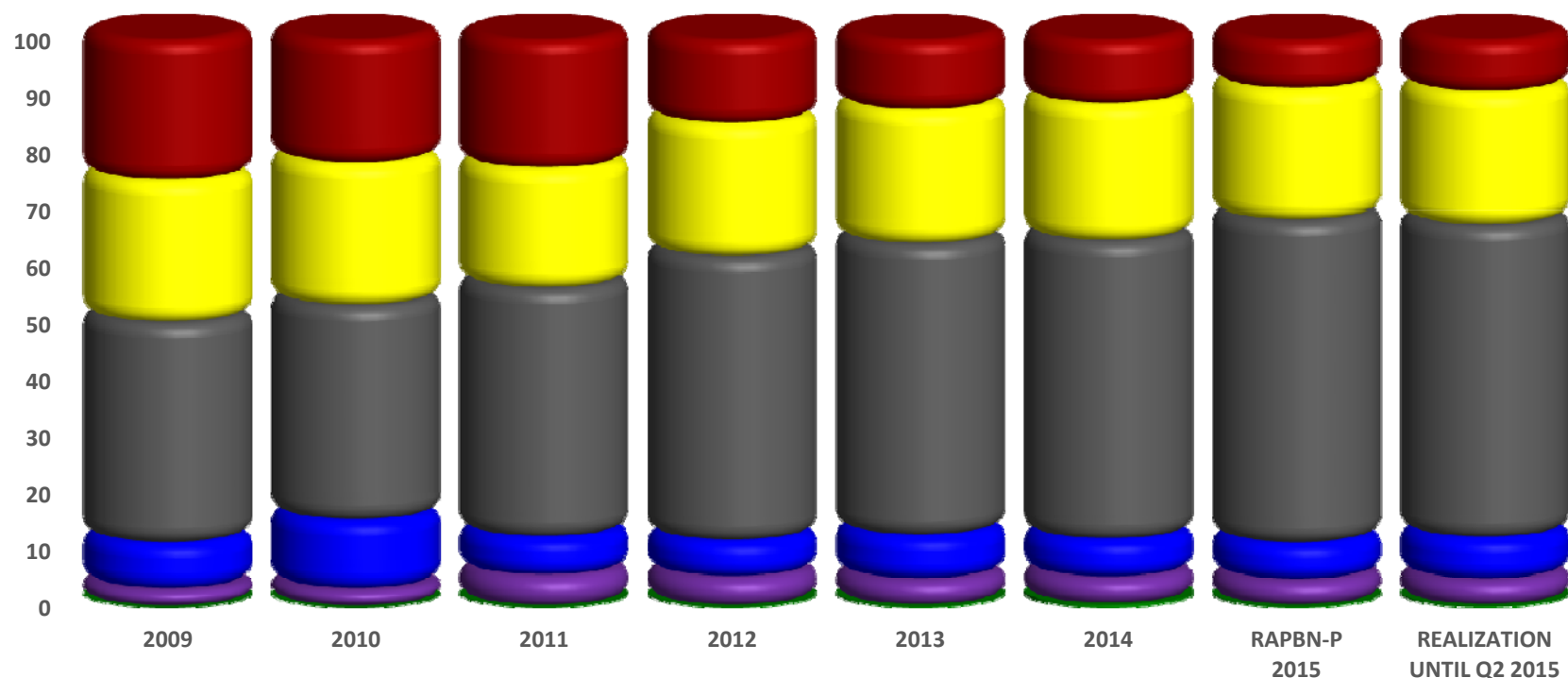
ELECTRIFICATION RATIO (%)



REALIZATION					TARGET BASED ON DRAFT RUKN				
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
67.15%	72.95%	76.56%	80.51%	84.35%	87.35%	90.15%	92.75%	95.15%	97.35%



# REALIZATION ENERGY MIX 2009 - 2015



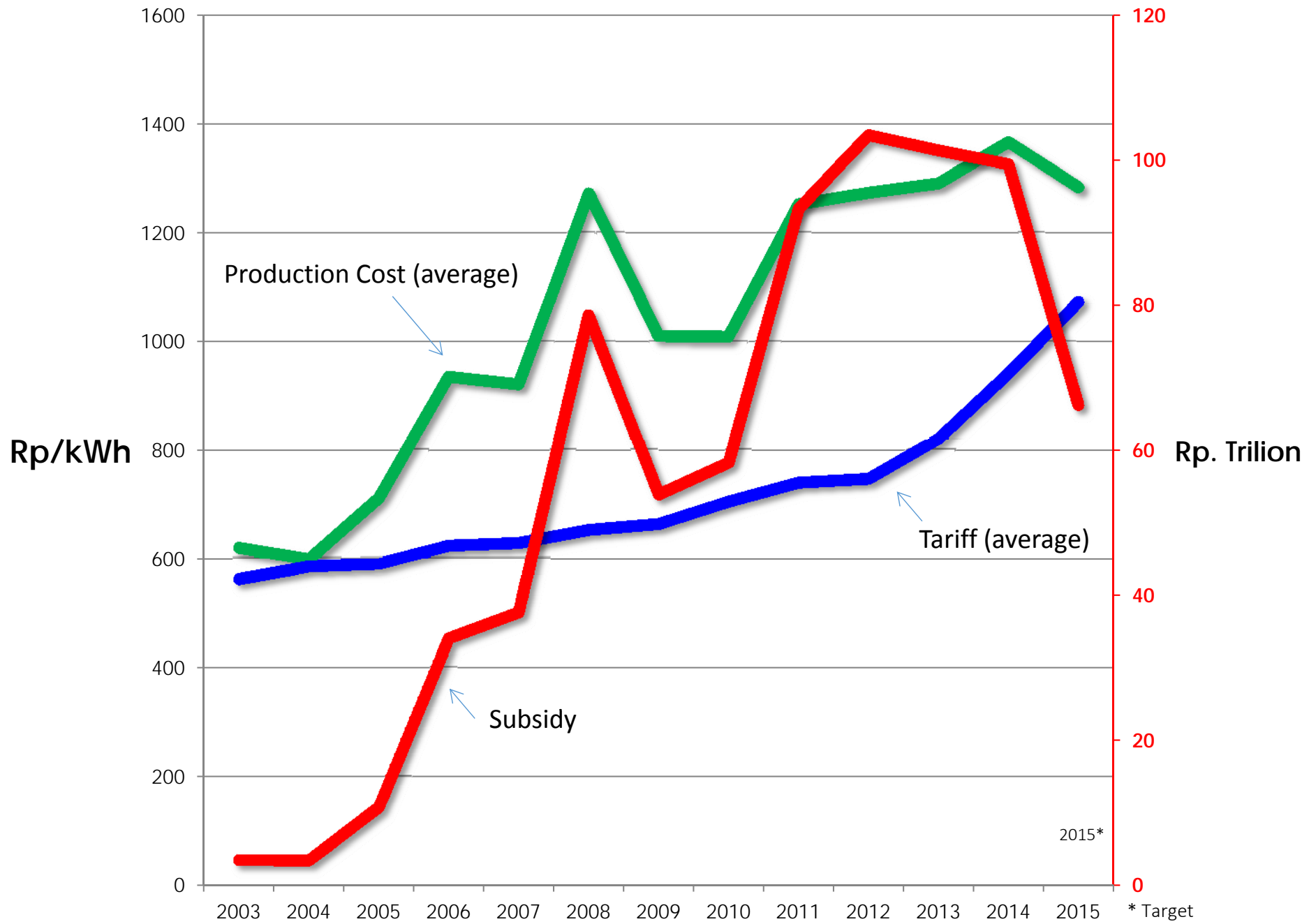
PRIMARY ENERGY SOURCE	PERCENTAGE OF ELECTRICITY PRODUCTION, GWH (%)							
	2009	2010	2011	2012	2013	2014	RAPBN-P 2015	REALIZATION UNTIL Q2 2015
Oil*)	25	22	22.95	14.97	12.54	11.49	8.85	9.34
Gas	25	25	21	23.41	23.56	24.07	23.15	23.45
Coal	39	38	44.06	50.27	51.58	52.87	57.03	55.32
Hydro	8	12	6.8	6.39	7.73	6.7	6.51	7.35
Geothermal	3	3	5.13	4.85	4.42	4.44	4.32	4.35
Other RE	0	0	0.07	0.11	0.16	0.43	0.14	0.19

\*) : Including biodiesel mandatory 20%

Source: Realization data until Quarter 2 of 2015



# ELECTRICITY PRODUCTION COST, TARIFF AND SUBSIDY

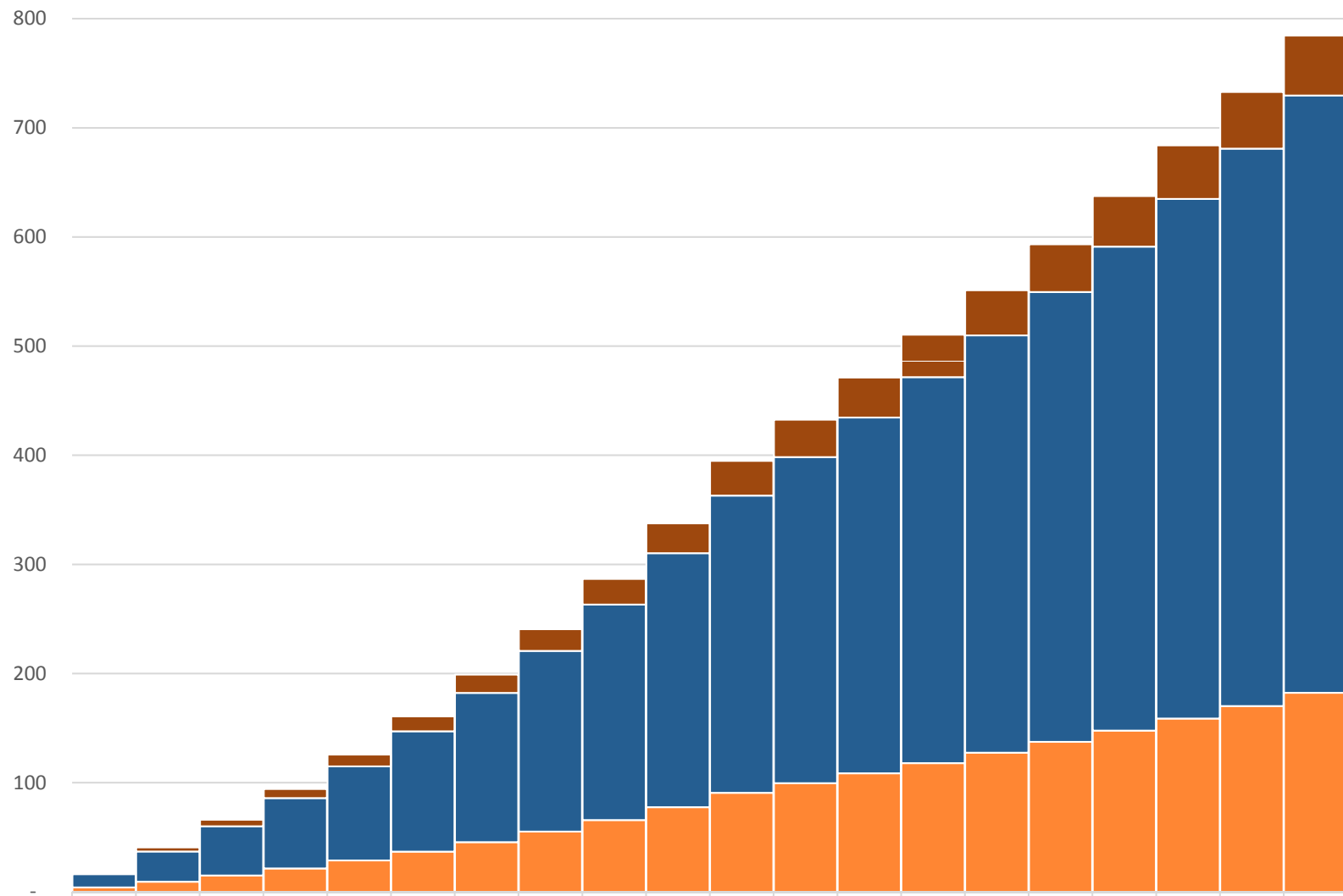


# **3. GENERAL PLAN FOR NATIONAL ELECTRICITY**



# POLICY FOR ADDITIONAL ELECTRICITY SUPPLY 2015-2034

TWh



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Additional of Non PLN System	2	4	6	8	11	14	17	20	23	27	32	34	37	39	41	44	46	49	52	55
Additional of IPP & Excess Power	12	28	45	64	86	110	137	166	197	233	272	299	326	354	382	412	443	476	511	547
Additional of PLN	4	9	15	21	29	37	46	55	66	78	91	100	109	118	127	137	148	159	170	182
Additional of PLN System	16	37	60	86	115	147	182	221	263	310	363	398	435	472	510	550	591	635	681	730
Total Additional (based on 2014)	18	41	66	94	126	161	199	241	287	338	395	433	471	511	551	593	637	684	733	784

PPU & Non-oil Captive Power

IPP & EXCESS POWER

75%

PLN Business Area

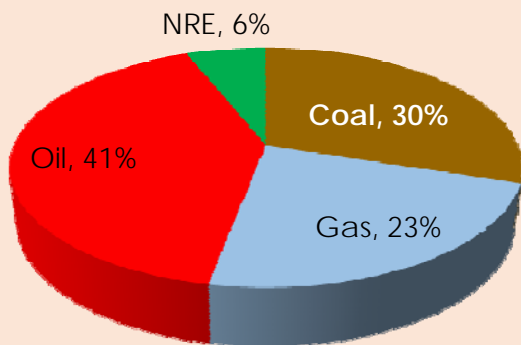
90%

PLN

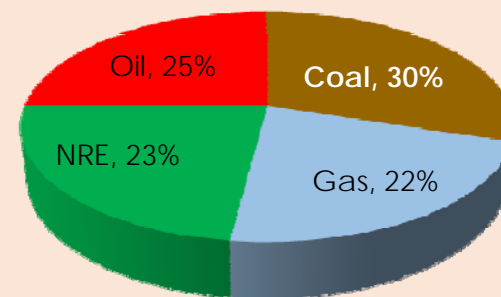
25%

# PRIMARY ENERGY MIX

## FINAL ENERGY MIX (National Energy Policy, Govt. Reg No.79/2014)

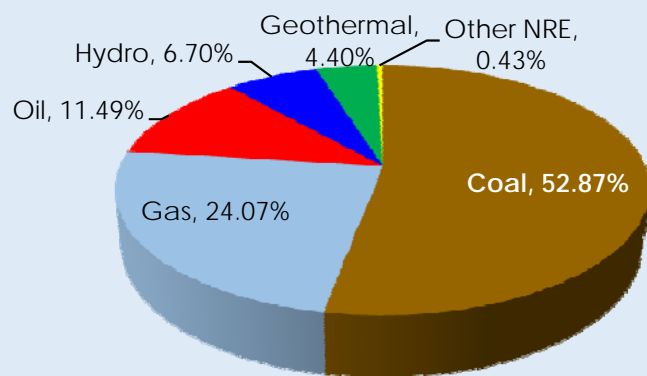


REALIZATION 2013

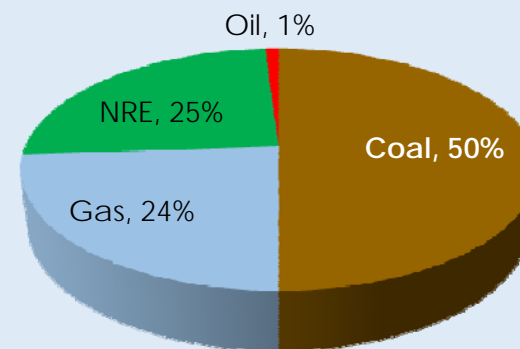


TARGET 2025

## ENERGY MIX OF POWER GENERATION (General Planning of National Electricity – RUKN Draft 2015-2034)



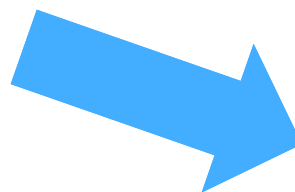
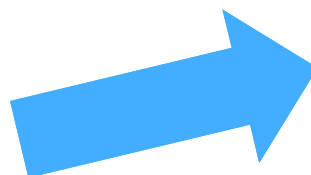
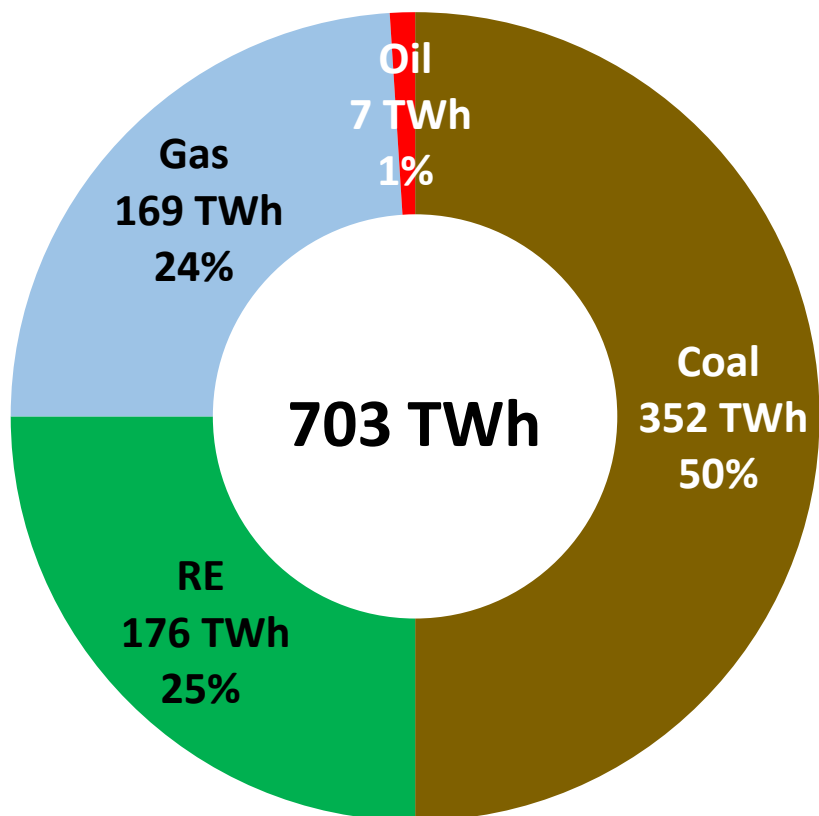
REALIZATION 2014



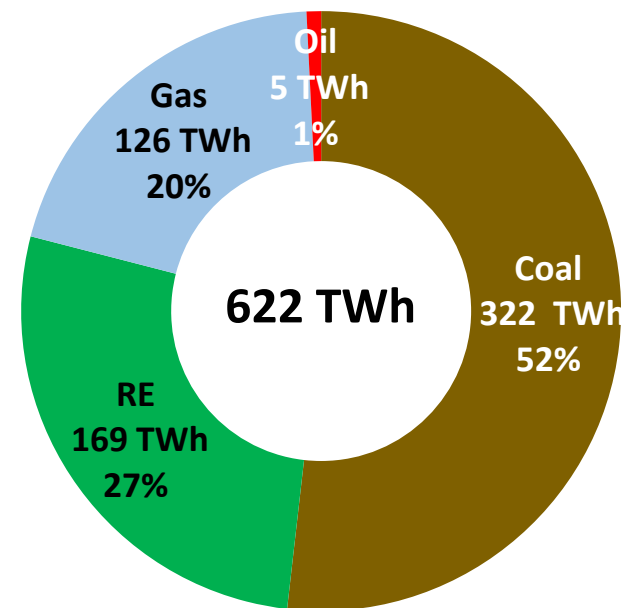
TARGET 2025

# PROJECTION OF POWER GENERATION ENERGY MIX 2025\*)

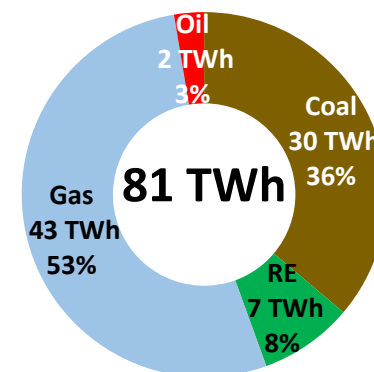
## National



## PLN's System



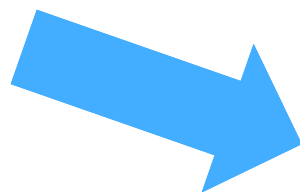
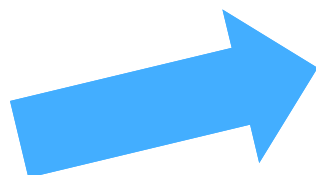
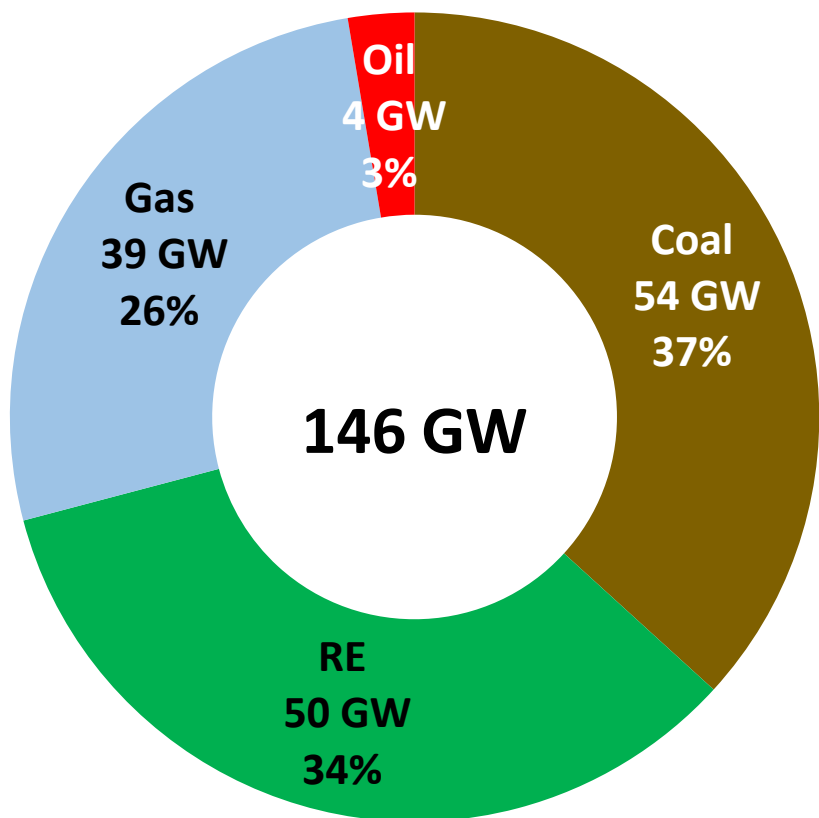
## Non PLN's System



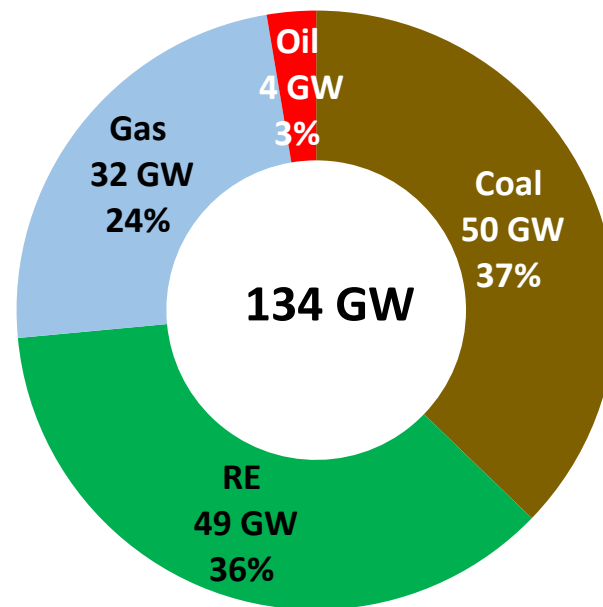
\*) based on draft RUKN 2015-2034

# PROJECTION OF POWER GENERATION CAPACITY 2025 \*)

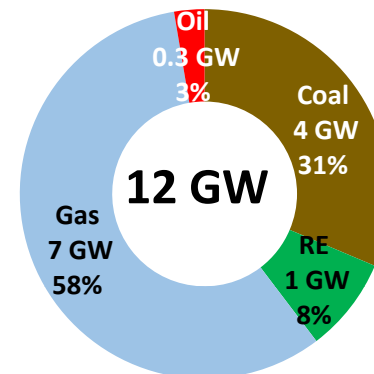
## National



## PLN's System

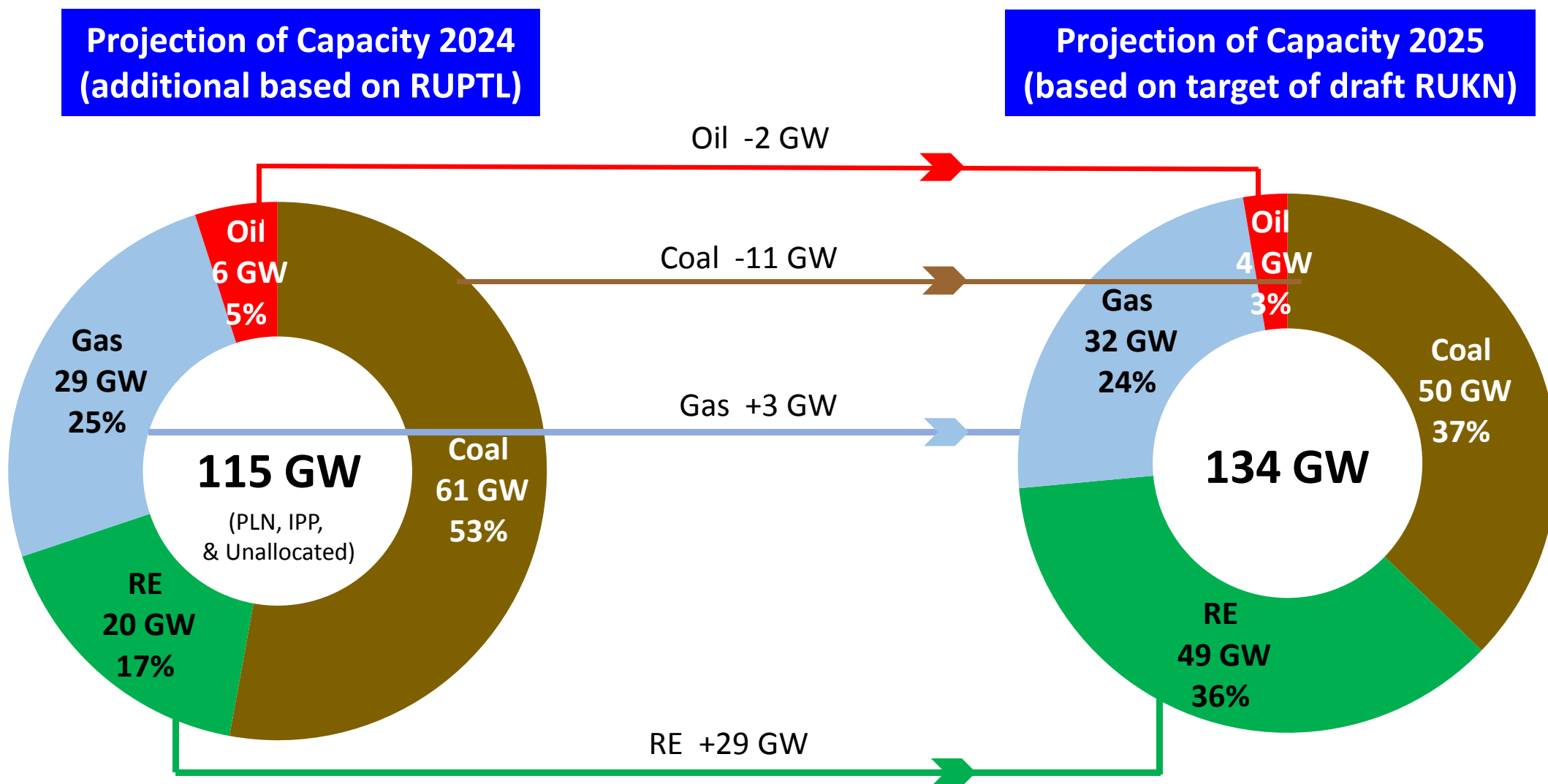


## Non PLN's System



\*) based on RUKN draft 2015-2034.  
Capacity means net capacity

## SIMULATION ON HOW TO ACHIEVE OF PLN'S SYSTEM POWER GENERATION ENERGY MIX 2025



One of the efforts that should be done is **to revise the plan of additional capacity 2020-2025**, due to the 35 GW project (2015 – 2019) is in procurement preparation process, procurement, financial close and construction.

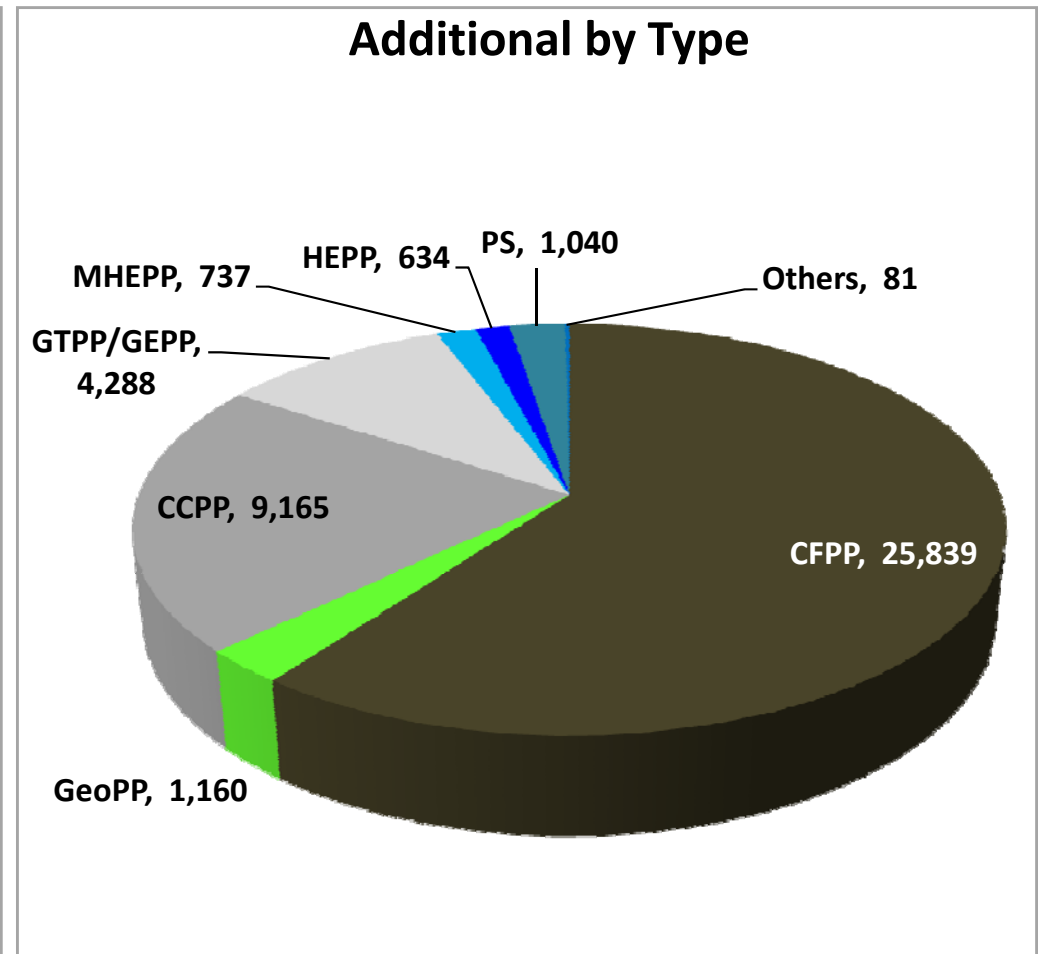
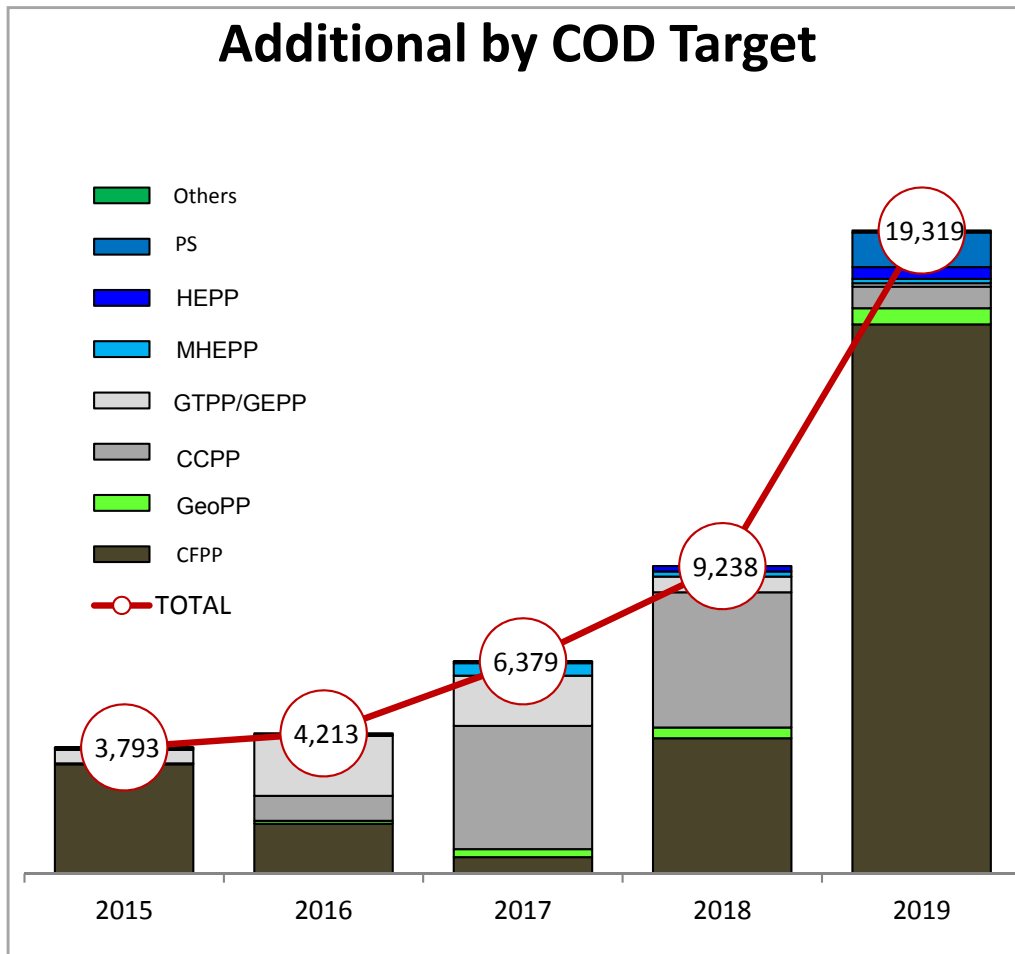
\*Capacity means net capacity



## **4. 35,000 MW PROGRAM**



# POWER PLANT ADDITIONAL REQUIREMENT 2015-2019



Total power plant additional requirement 2015 - 2019 is about 42.9 GW:

- 7.4 GW on going project (FTP 1, some of FTP 2 and regular project);
- 35.5 GW plan (35,000 program).

# DISTRIBUTION OF GENERATION, TRANSMISSION, SUBSTATION, AND FUNDING NEEDS

Sumatera		Million USD
11,327 MW	76 Gen	14,282
19,305 kmc	210 Trans	3,840
32,406 MVA	398 Subs	2,475

Kalimantan		Million USD
2,852 MW	40 Gen	4,000
7,883 kmc	68 Trans	1,122
3,910 MVA	115 Subs	324

Sulawesi & Nusa Tenggara		Million USD
4,159 MW	83 Gen	5,434
7,207 kmc	90 Trans	1,169
5,620 MVA	165 Subs	412

Total Indonesia		Million USD
42,940 MW	291 Gen	53,663
46,597 kmc	732 Trans	10,893
108,789 MVA	1.375 Subs	8,386
<b>Total</b>		<b>72,942*</b>

\*exclude funding needs for land, Interest During Construction (IDC) and taxes

Jawa-Bali		Million USD
23,863 MW	49 Gen	28,955
11,185 kmc	349 Trans	4,615
66,083 MVA	672 Subs	5,114

Maluku & Papua		Million USD
739 MW	43 Gen	992
1,017 kmc	15 Trans	148
770 MVA	25 Subs	61

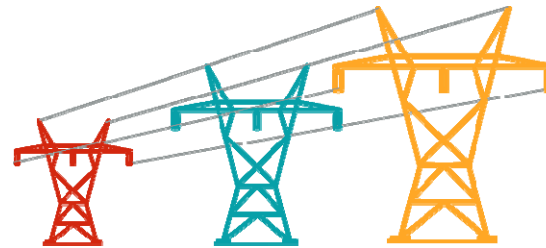
**Legend:** MW: Megawatt    kmc: Kilometer-circuit    MVA: Mega-volt ampere

# ECONOMIC ACTIVITIES OF 35,000 MW PROGRAM\*

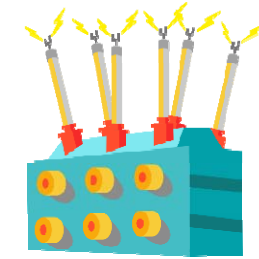
**INVESTMENT : 72,942 MILLION US**



**291 POWER PLANTS**



**732 SEGMENT TRANSMISSIONS  
75,000 SET TOWER**



**1375 UNIT  
SUBSTATION**

**301,300 KM ALUMINIUM CONDUCTOR  
2,600 SET TRANSFORMER  
3.5 MILLION TONS STEEL**



**LABOR**

**DIRECT: 650 THOUSAND  
IN DIRECT: 3 MILLION**



**LOCAL CONTENT**

**~40% OF INVESTMENT  
(~29.2 MILLION USD)**

\* Prediction

\*\* not include the funding requirements for land, Interest During Construction (IDC) and taxes

# 5. CO<sub>2</sub> EMISSION REDUCTION – CLEAN COAL TECHNOLOGY

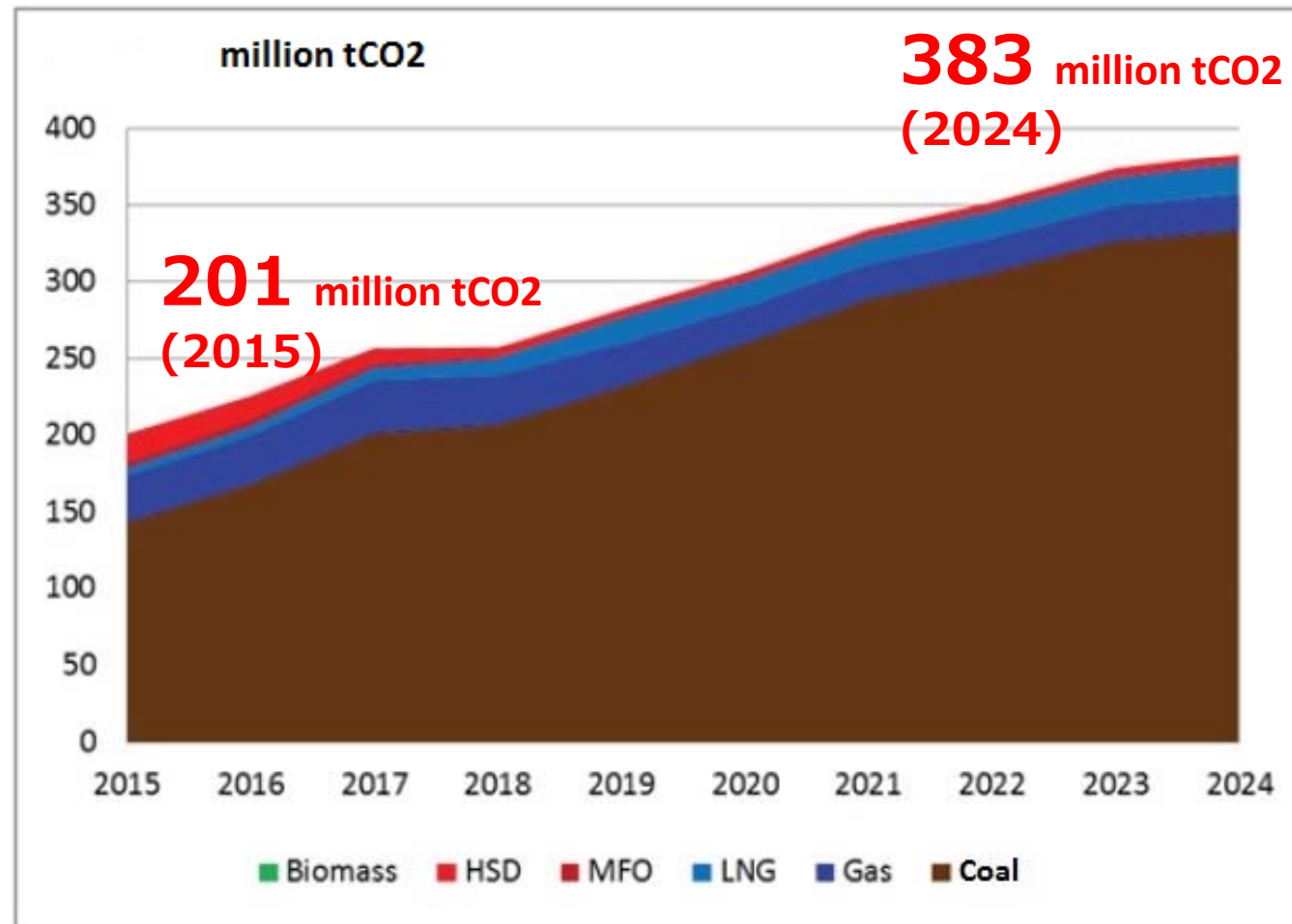
## BACKGROUND

- To meet the rapidly growing demand and address supply shortage, coal-based generation provides a quick and low-cost solution in Indonesia;
- Coal-based generation contributes to increased CO<sub>2</sub> emissions;
- GoI is keen on reducing greenhouse gas emissions while keeping expanding power production and enhancing energy security;
- CCT offers a potential solution to GoI's dual goal with respect to power sector development/energy security and environmental sustainability.

## CO<sub>2</sub> EMISSION

Indonesia power sector CO<sub>2</sub> emissions is projected to double in the period of 2015-24 primarily due to growth in coal-fired generation

Indonesia Power Sector CO<sub>2</sub> Emissions (2015-2024)



Source: RUPTL PLN  
2015-2024

## Rational for USC/IGCC introduction in Indonesia

### Technical availability

- ✓ Is USC & IGCC readily available ?  
→ **USC: readily available, IGCC: available in 2020**
- ✓ When can it be introduced in Indonesia?  
→ **USC: 2017, IGCC: 2025**

### Alignment with Indonesia's Policy

- ✓ Is it possible to use low rank coal (LRC) ?  
→ **Yes, LRC can be utilized**
- ✓ Does it contribute to GHG emission reduction ?  
→ **Yes, GHG emission amount will be reduced**

### Economic validity

- ✓ Is it economically viable ?  
→ **Yes, Generation cost will be lower than Sub-c or SC**



# CLEAN COAL TECHNOLOGY

## CCT Technology for Coal Fired Power Plants

### USC

#### Matured technology to achieve low electricity costs & low GHG emissions

- Proven and already commercialized technology
- Introduced all around the world
- Can utilize low rank coal with above average ash melting point
- Economic superiority to SC
- Lower GHG emission compared to SC

### IGCC\*

#### Promising technology to achieve low electricity cost, lower GHG emissions & LRC utilization

- Technology yet to be commercialized
- Will be introduced at the beginning of 2020s in commercial base in the world
- Promising technology for low rank coal with low ash melting point
- Economic superiority to SC and USC
- Lower GHG emission compared to SC & USC

## Target for introduction of USC and IGCC in Indonesia

- USC should be introduced for next new coal fired power plant project (2017)
- IGCC will be introduced around 2025, considering the development situation in the world

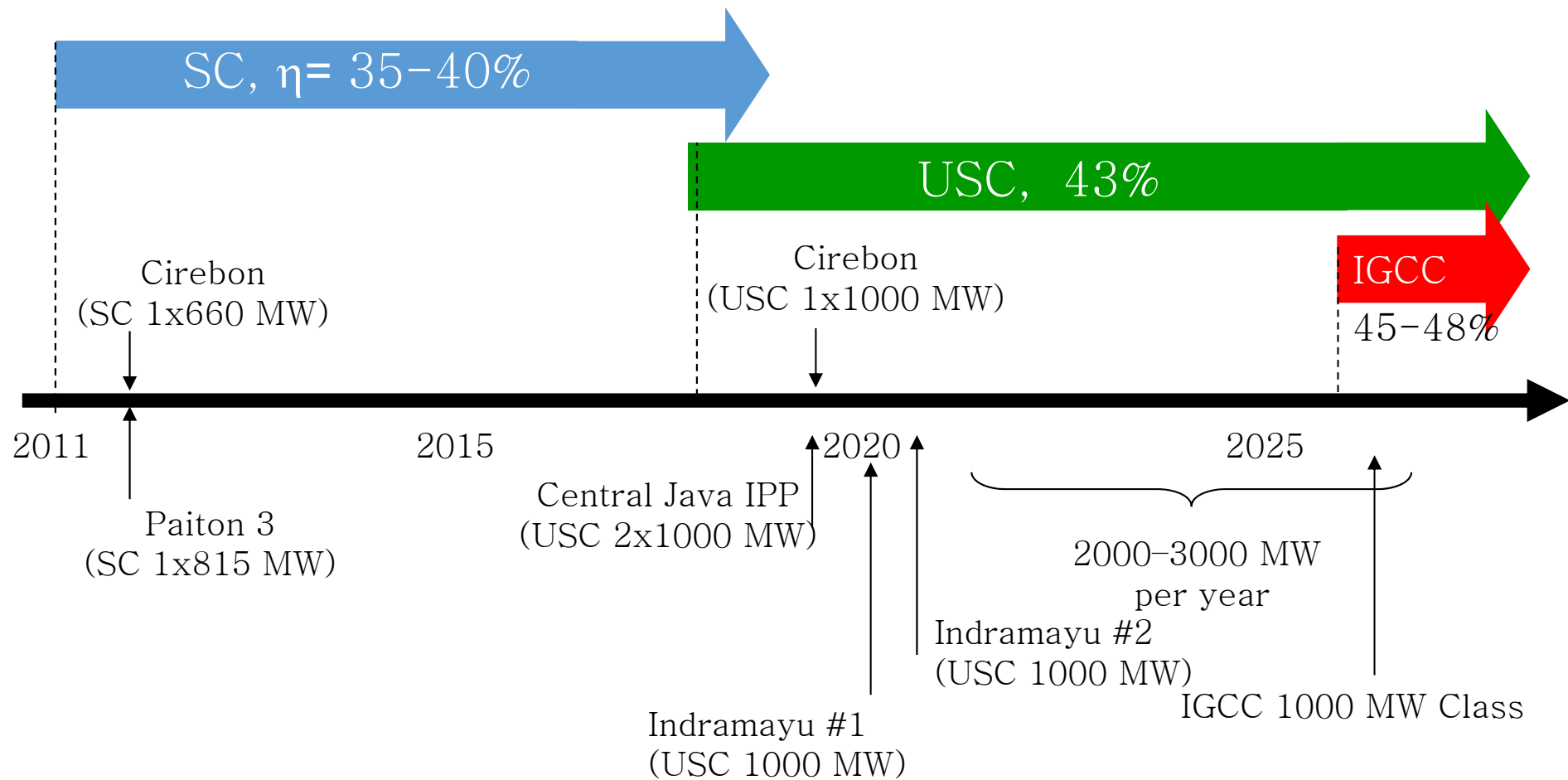
\*) Integrated Gasification Combined Cycle

## ROADMAP OF CCT IN INDONESIA \*)

- After assessing relevant factors (technical availability, low rank coal availability, economic viability, technical challenges in introducing CCT and contribution to GHG emission reduction), the CCT study concludes that the CCT technology that can be adopted by Indonesia are USC and IGCC.
- USC is commercially matured, already proven and well performed in many countries, can use low rank coal having above average ash melting point, has economic merit to SubC and SC, produces lower CO2 emissions.
- IGCC is a promising technology, yet not commercially matured, can use low rank coal with low ash melting point, its project cost is expected to drop and make it economical compared to SC and USC, lower CO2 emission than SC and USC.

\*) Source: *The Project for Promotion of Clean Coal Technology (CCT) in Indonesia*, Interim Report, October 2011, Jakarta, JICA Study Team.

## ROADMAP OF CCT IN INDONESIA \*)



\*) Source: *The Project for Promotion of Clean Coal Technology (CCT) in Indonesia*, Interim Report, October 2011, Jakarta, JICA Study Team, with modification



# THANK YOU

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Contact : [report@tky.ieej.or.jp](mailto:report@tky.ieej.or.jp)