



MINISTRY OF ENERGY AND MINERAL RESOURCES REPUBLIC OF INDONESIA

DIRECTORATE GENERAL OF ELECTRICITY

POWER POLICY AND NATIONAL DEVELOPMENT PLAN IN INDONESIA

Presented by:

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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

CO₂ EMISSION REDUCTION – CLEAN COAL TECHNOLOGY

1. PRELIMINARY

OBJECTIVE OF ELECTRICITY DEVELOPMENT

Electricity development aims to ensure the availability of electric power:

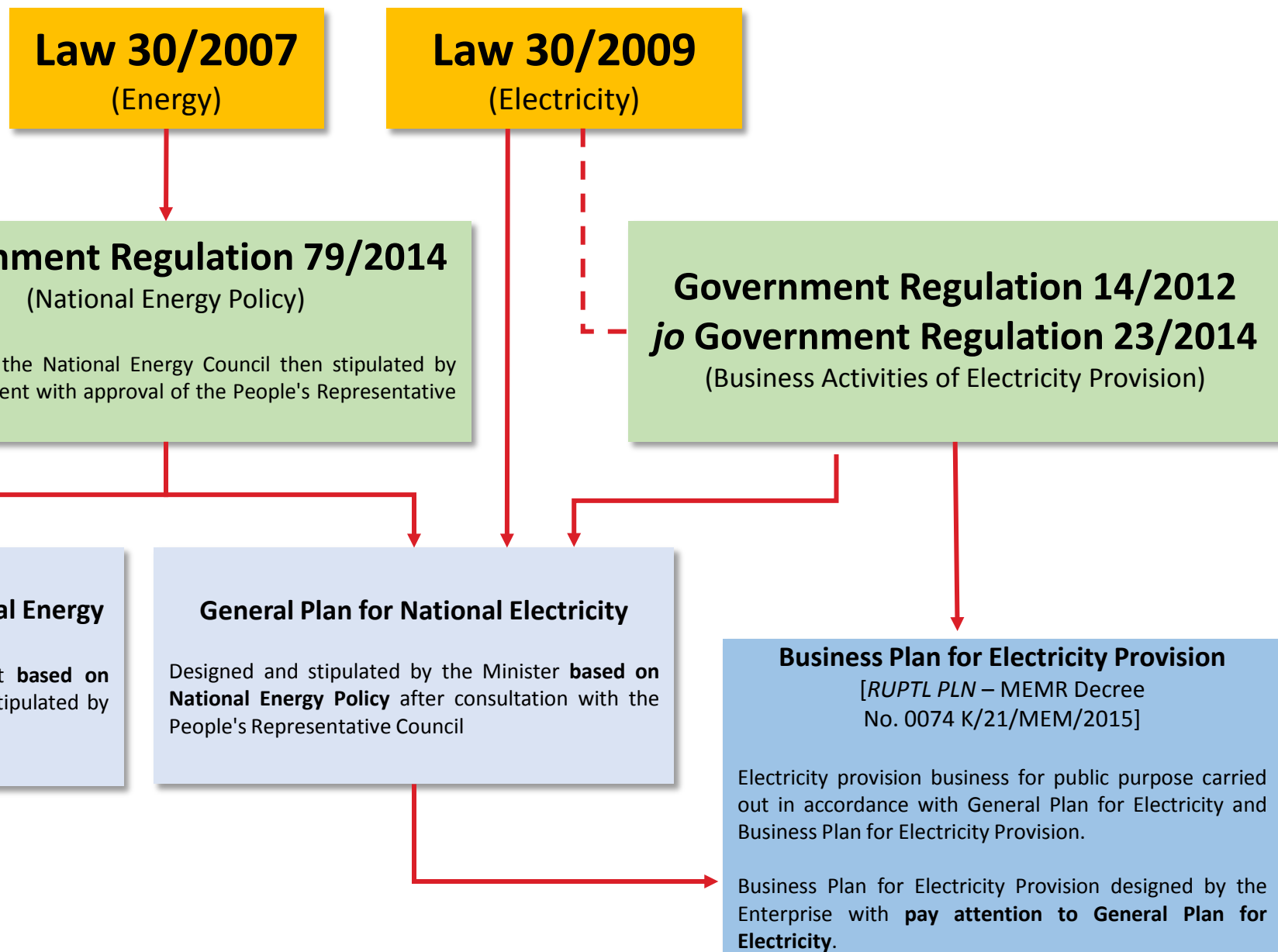
- in sufficient quantity
- good quality
- reasonable price

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

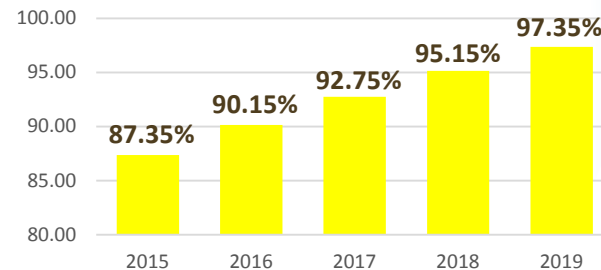
Currently the installed capacity just cover about **87,14%*** household, lower than Singapore (100,0%), Brunei (99,7%), Thailand (99,3%), Malaysia (99,0%), and Vietnam (98,0%)

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

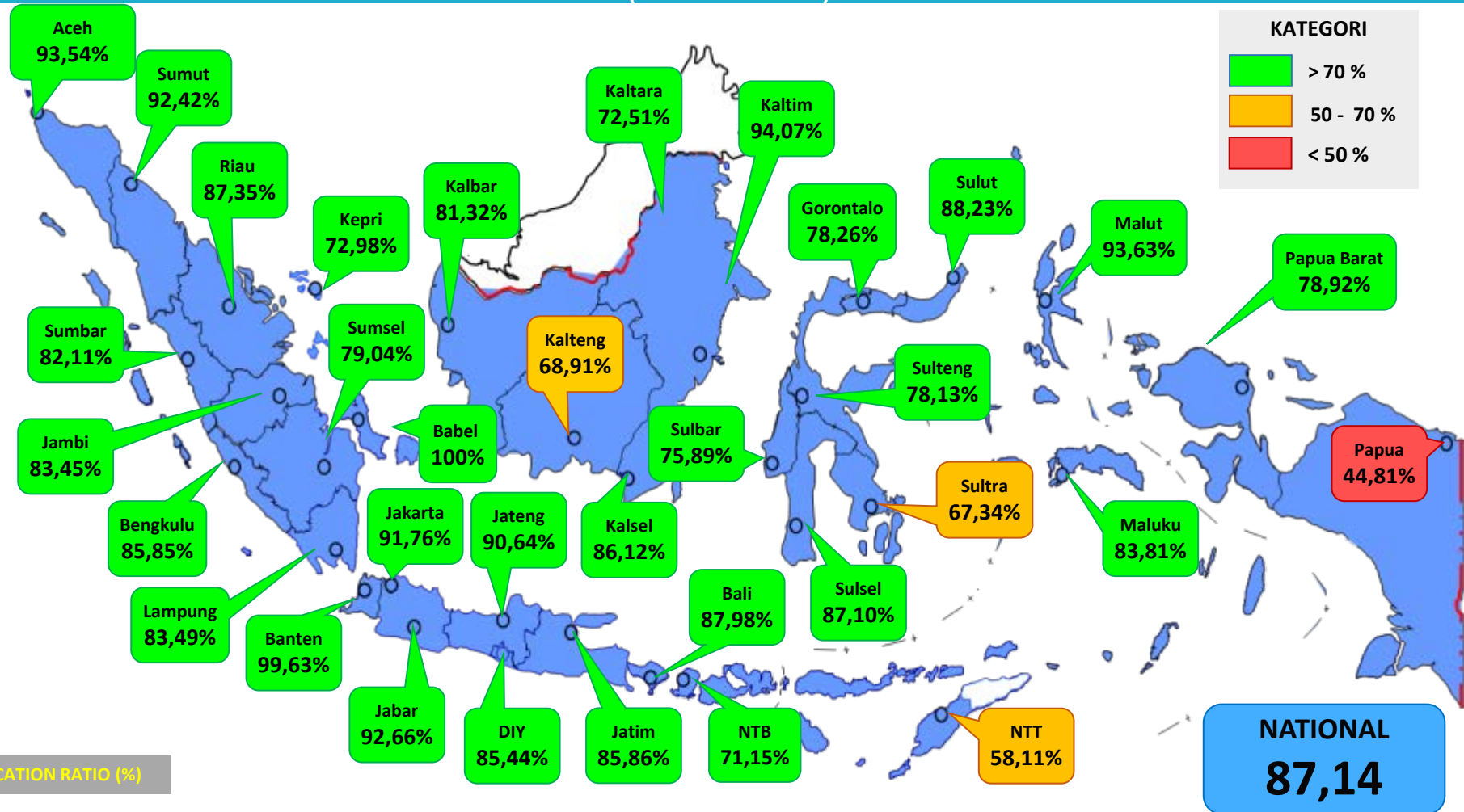
External factor on the 35,000 MW program which is influence the goal:

- 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

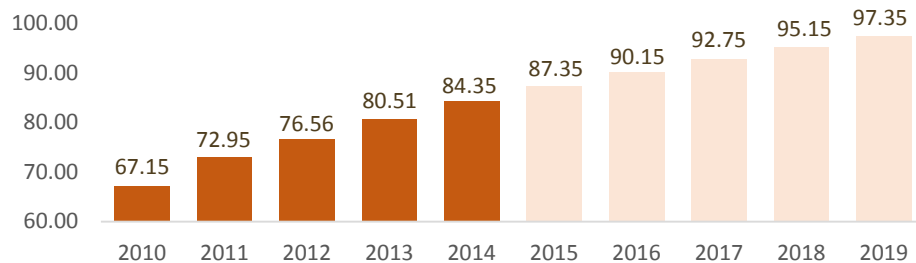
*: September 2015

ELECTRIFICATION RATIO

(SEPTEMBER 2015)

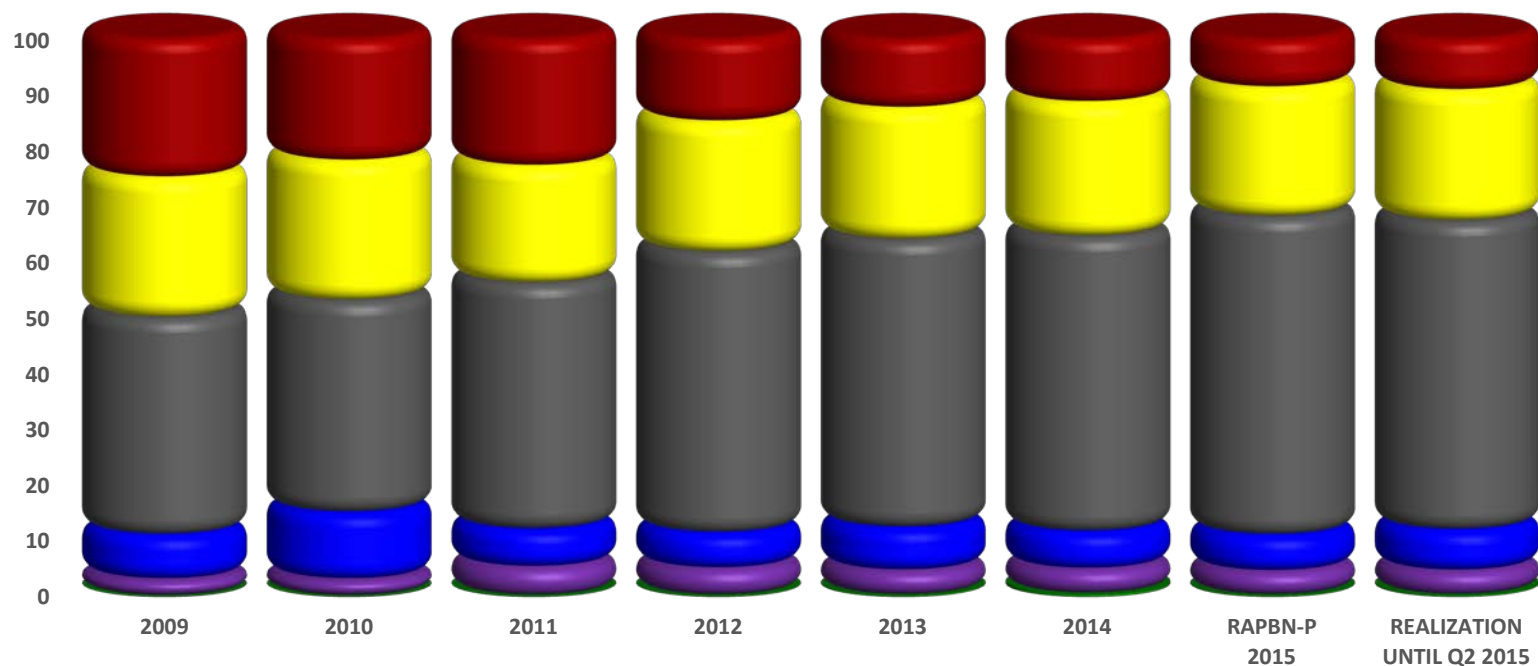


ELECTRIFICATION RATIO (%)



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

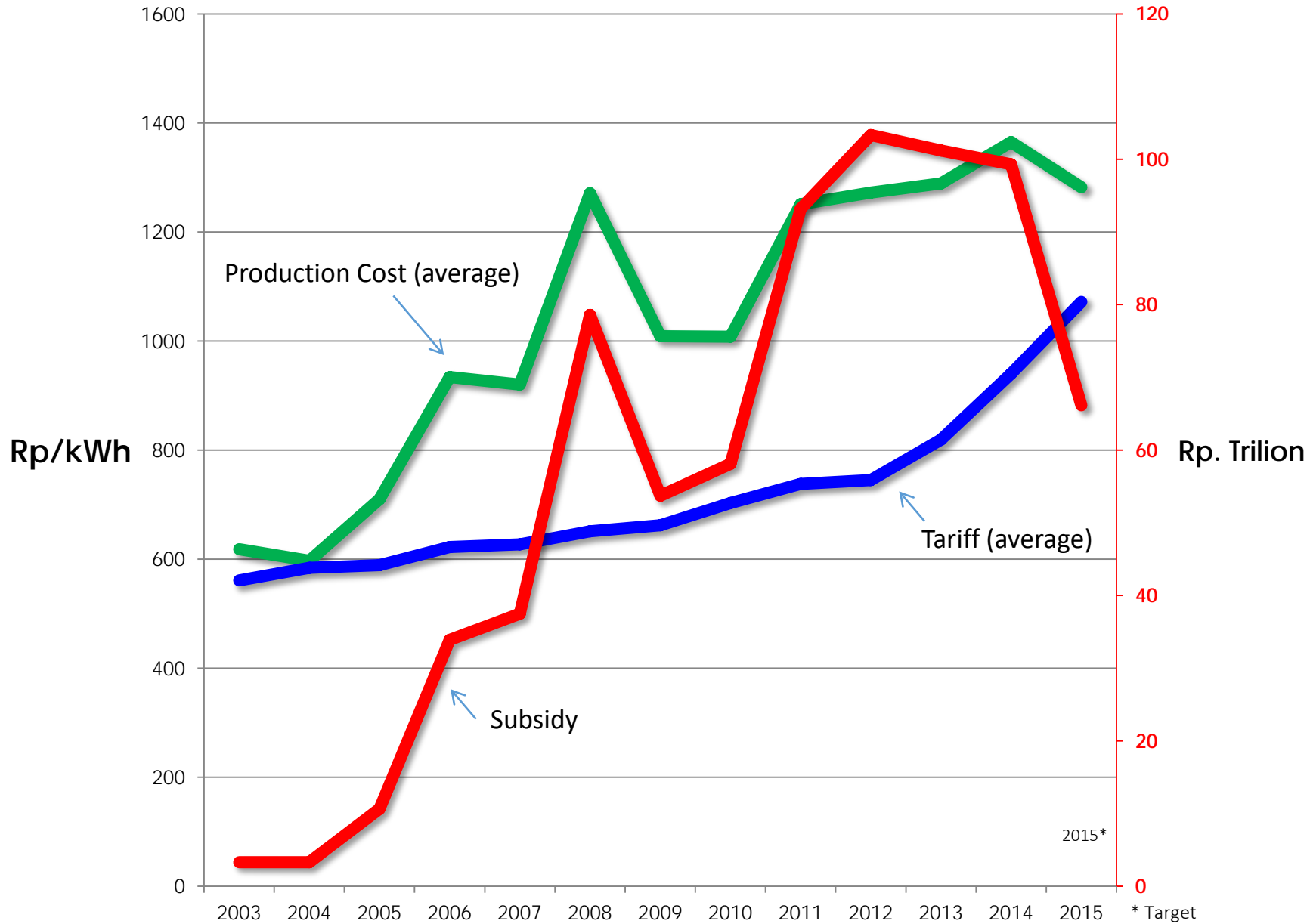


PRIMARY ENERGY SOURCE	PERCENTAGE OF ELECTRICITY PRODUCTION, GWH (%)							
	2009	2010	2011	2012	2013	2014	RAPBN-P 2015	REALIZATION UNTIL Q2 2015
Oil*)	25	22	22.95	14.97	12.54	11.49	8.85	9.34
Gas	25	25	21	23.41	23.56	24.07	23.15	23.45
Coal	39	38	44.06	50.27	51.58	52.87	57.03	55.32
Hydro	8	12	6.8	6.39	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

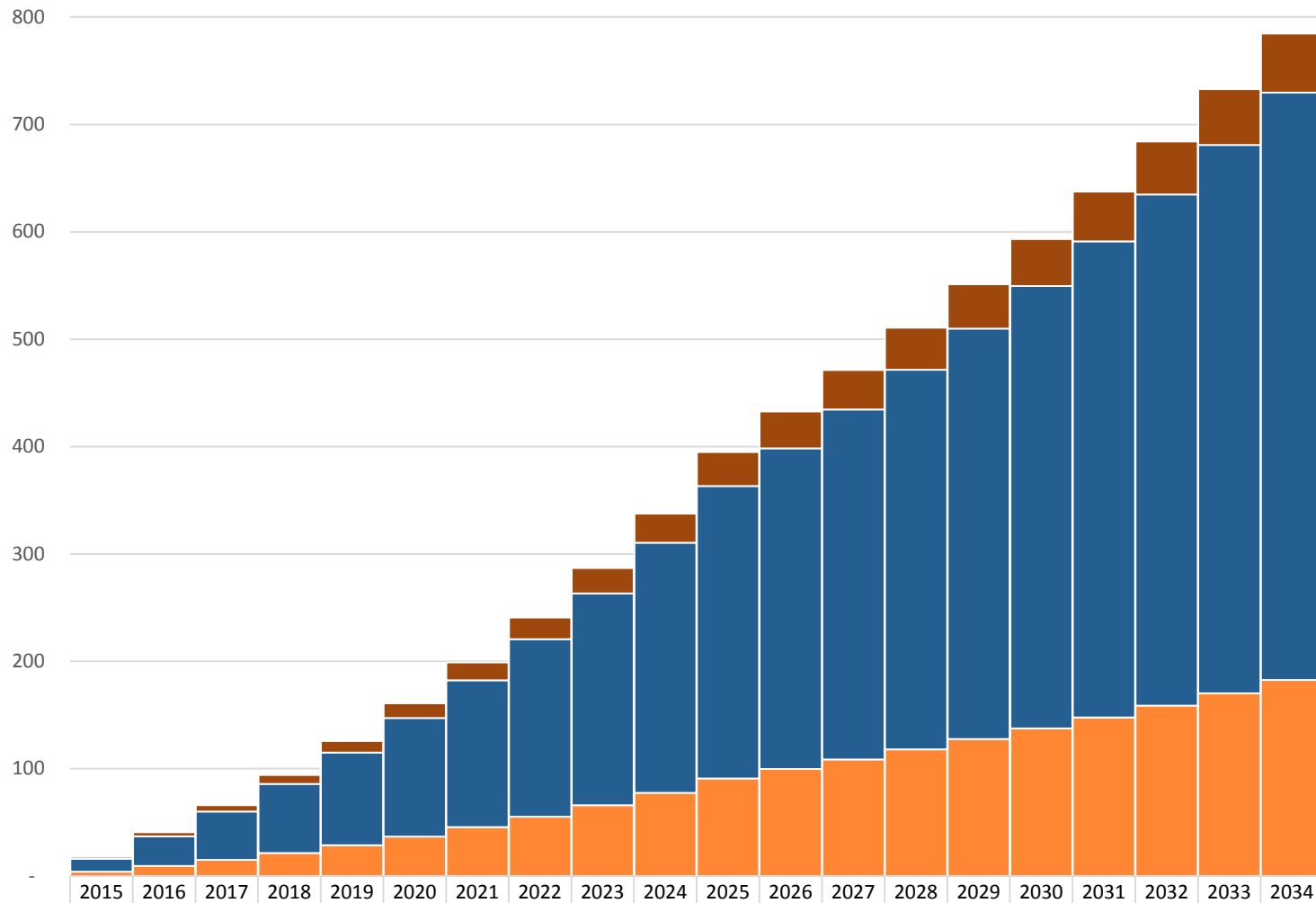
ELECTRICITY PRODUCTION COST, TARIFF AND SUBSIDY



3. GENERAL PLAN FOR NATIONAL ELECTRICITY

POLICY FOR ADDITIONAL ELECTRICITY SUPPLY 2015-2034

TWh



PPU & Non-oil Captive Power

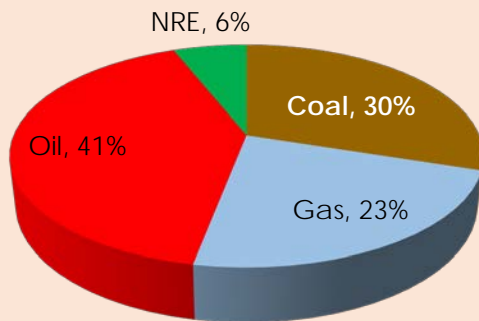
IPP & EXCESS POWER

75%
PLN Business Area
90%

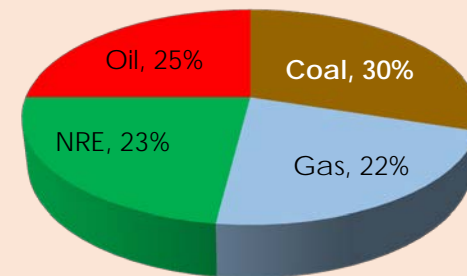
PLN
25%

PRIMARY ENERGY MIX

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

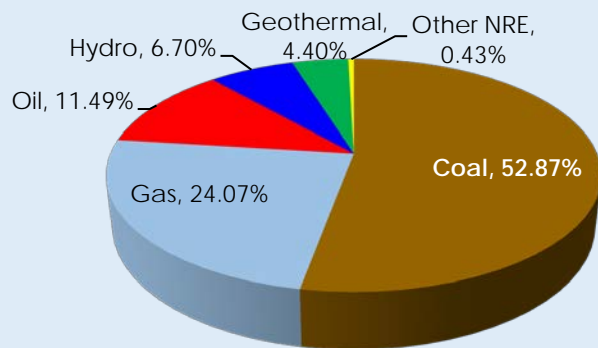


REALIZATION 2013

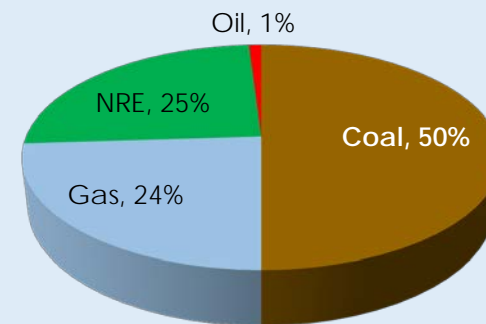


TARGET 2025

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



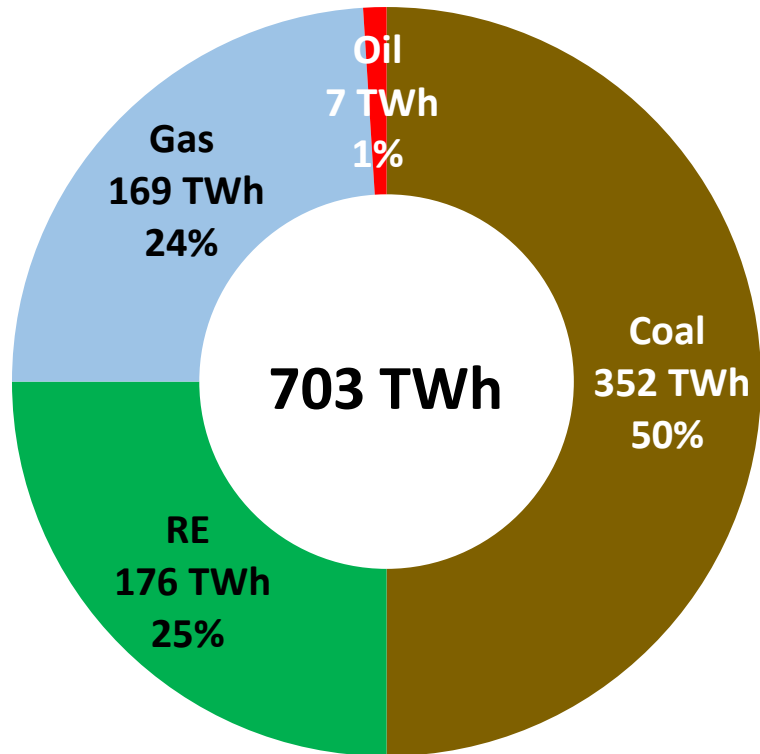
REALIZATION 2014



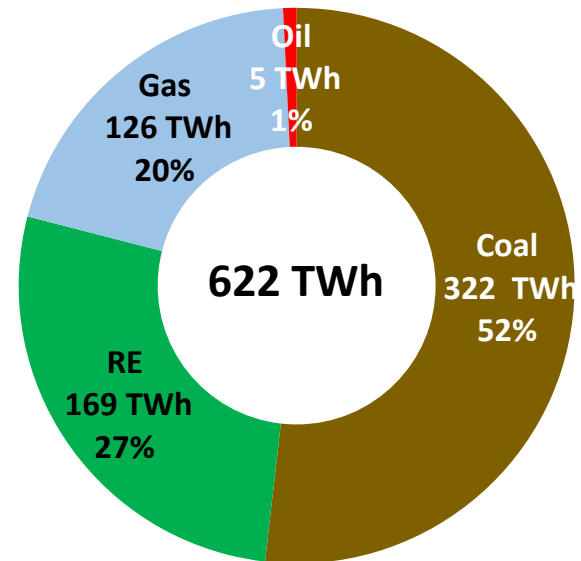
TARGET 2025

PROJECTION OF POWER GENERATION ENERGY MIX 2025^{*)}

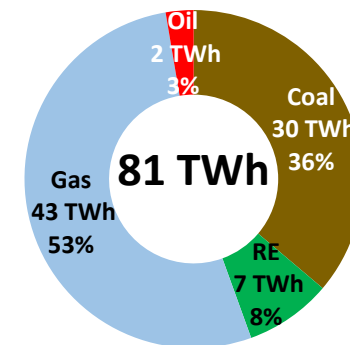
National



PLN's System



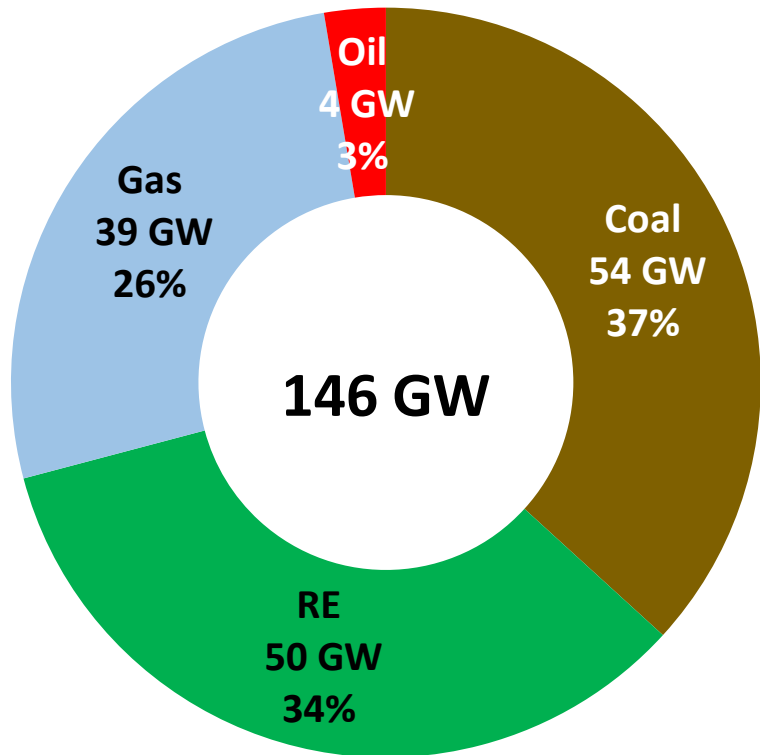
Non PLN's System



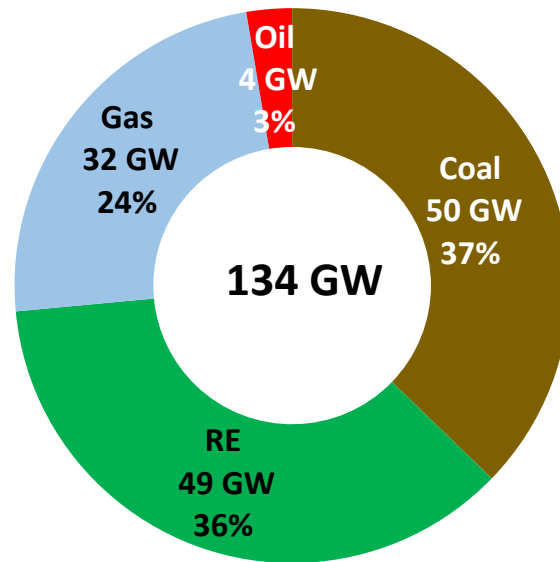
^{*)}based on draft RUKN 2015-2034

PROJECTION OF POWER GENERATION CAPACITY 2025 ^{*)}

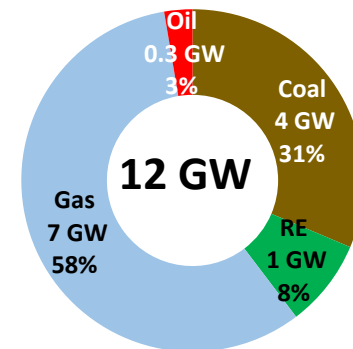
National



PLN's System

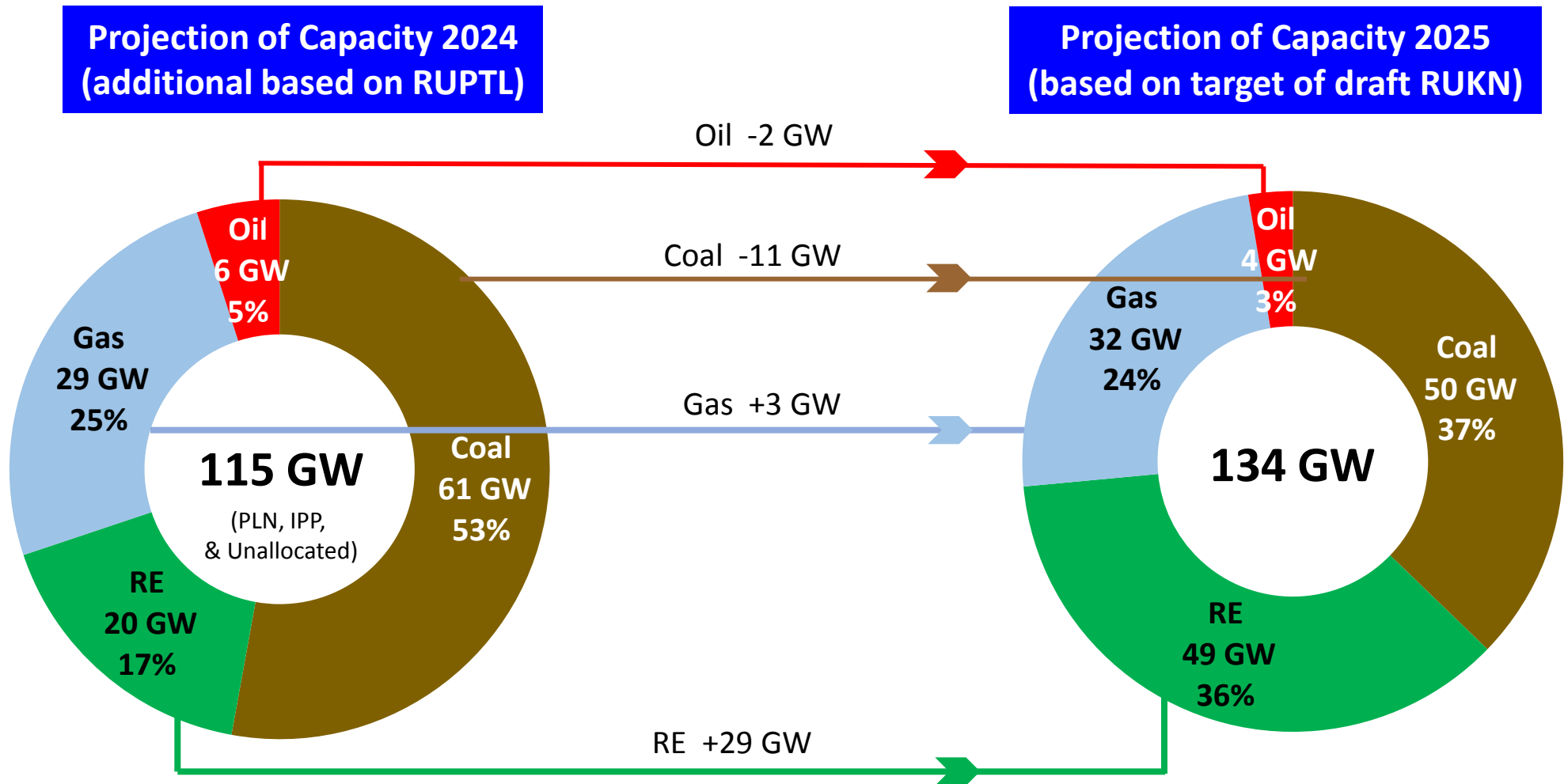


Non PLN's System



^{*)} based on RUKN draft 2015-2034.
Capacity means net capacity

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

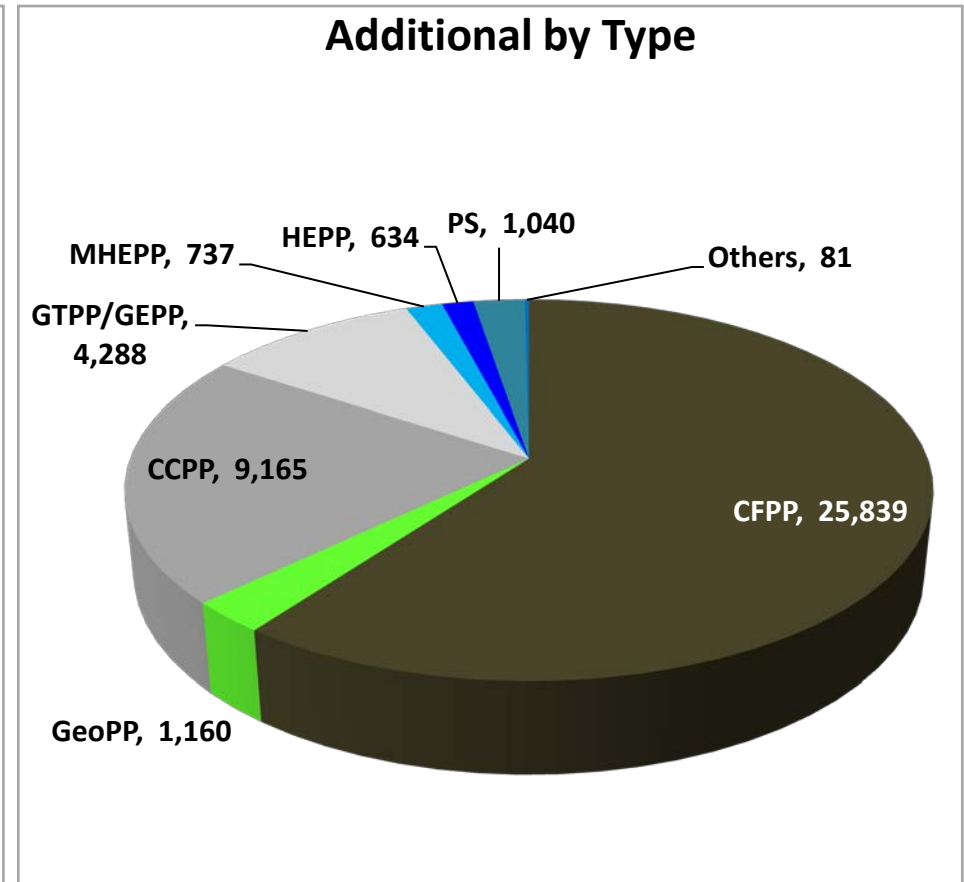
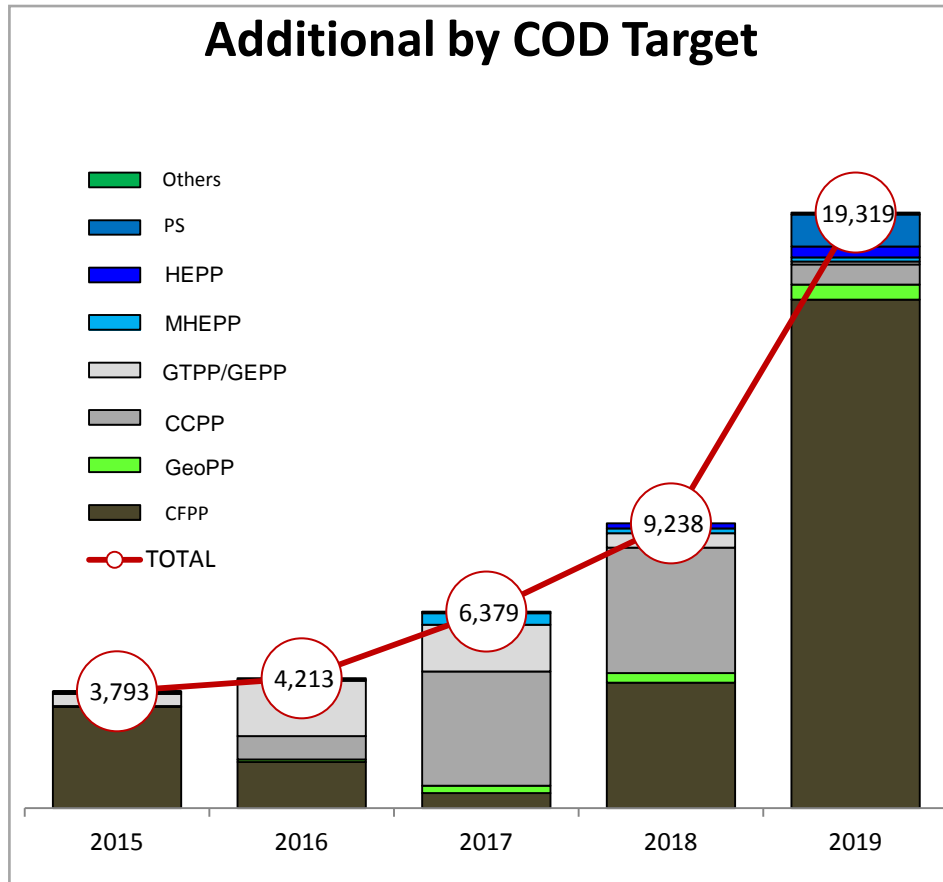


One of the efforts that should be done is **to revise the plan of additional capacity 2020-2025**, due to the 35 GW project (2015 – 2019) is in procurement preparation process, procurement, financial close and construction.

*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
Total		72,942*

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

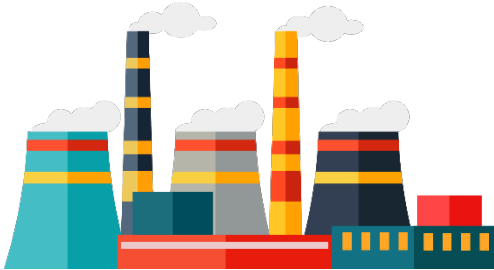
Jawa-Bali		Million USD
23,863 MW	49 Gen	28,955
11,185 kmc	349 Trans	4,615
66,083 MVA	672 Subs	5,114

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

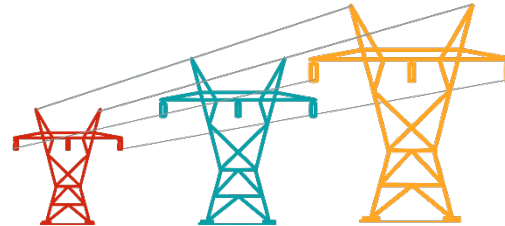
Legend: MW: Megawatt kmc: Kilometer-circuit MVA: Mega-volt ampere

ECONOMIC ACTIVITIES OF 35,000 MW PROGRAM*

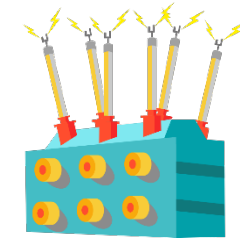
INVESTMENT : 72,942 MILLION USD



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

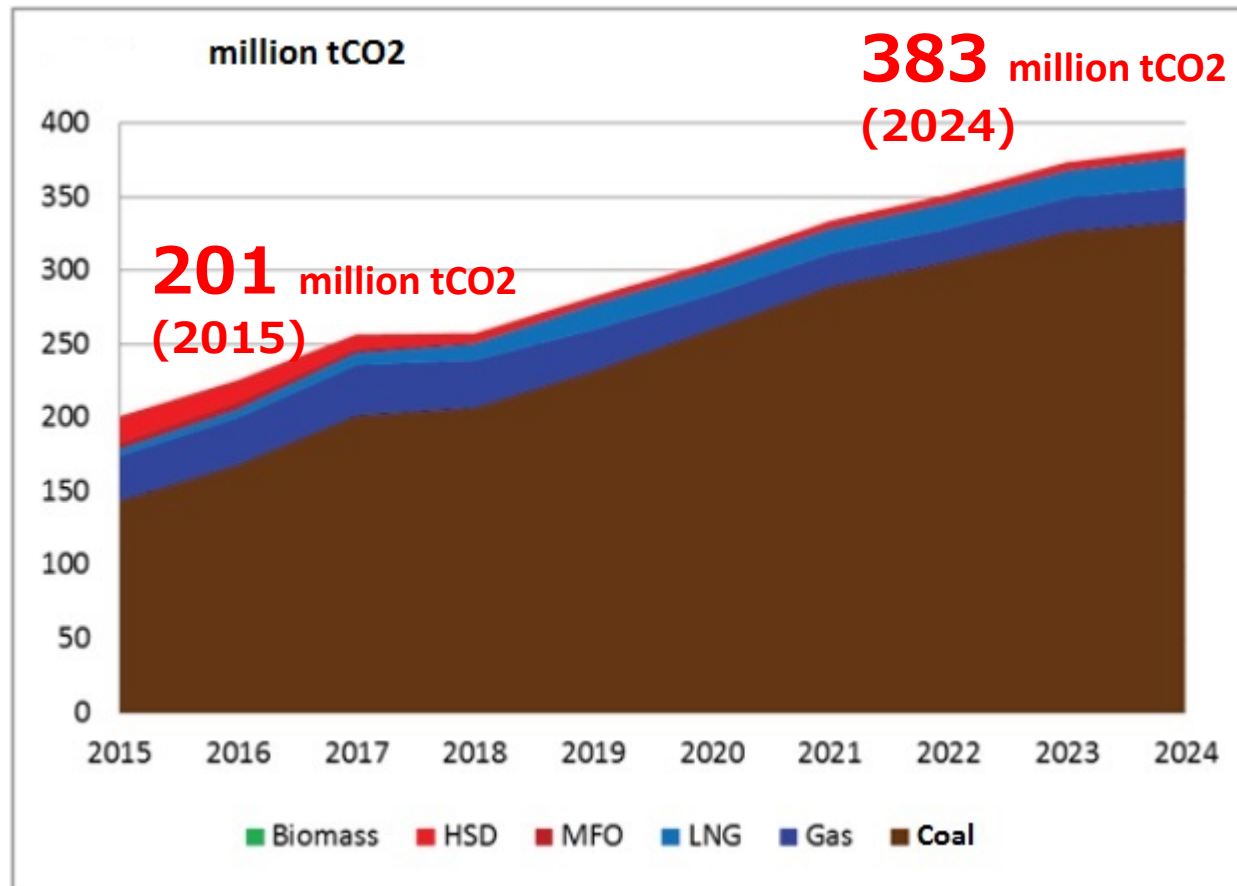
5. CO₂ EMISSION REDUCTION – CLEAN COAL TECHNOLOGY

- 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 CO₂ 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.

CO₂ EMISSION

Indonesia power sector CO₂ emissions is projected to double in the period of 2015-24 primarily due to growth in coal-fired generation

Indonesia Power Sector CO₂ 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**

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

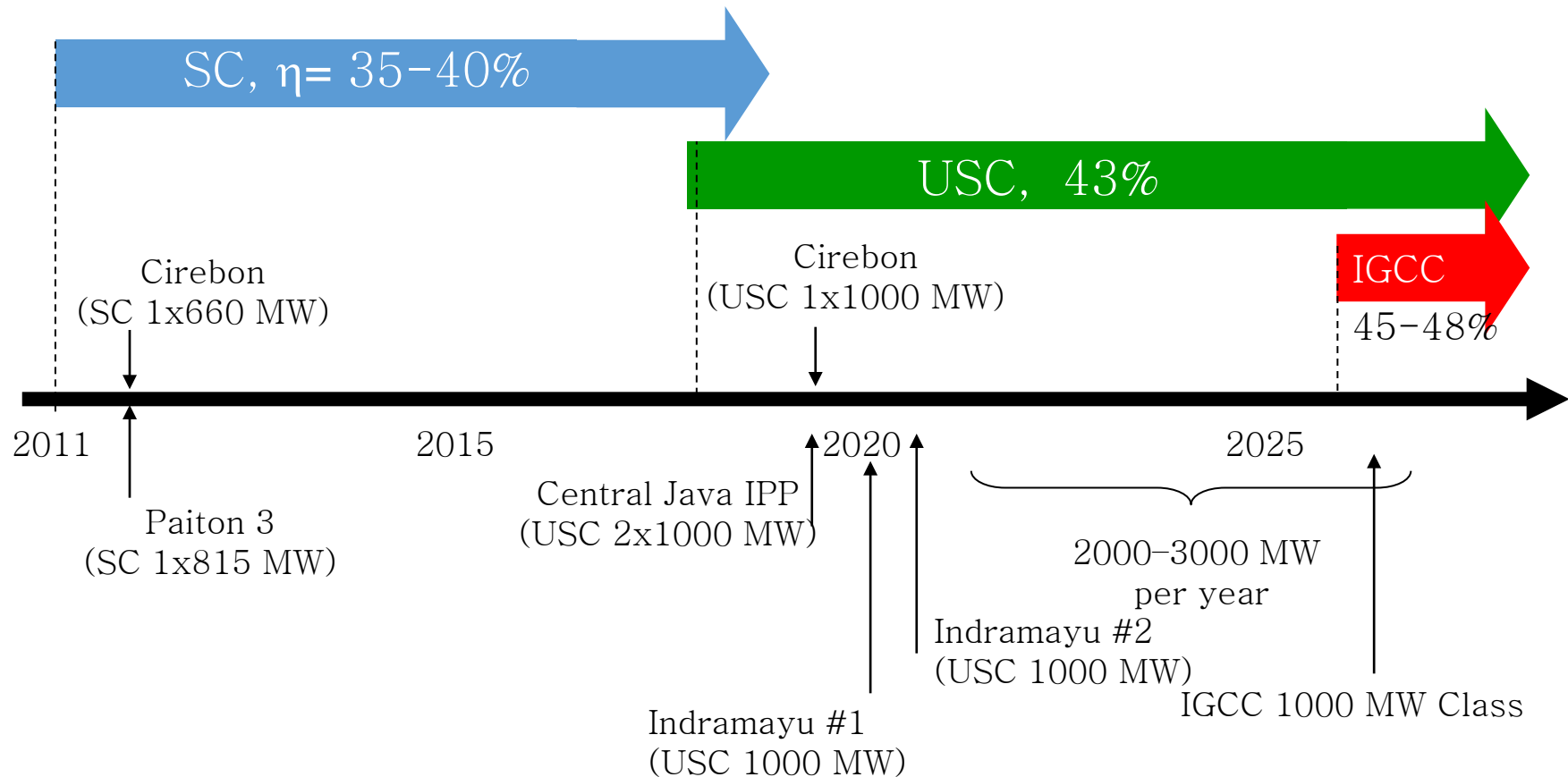
- USC should be introduced for next new coal fired power plant project (2017)
- IGCC will be introduced around 2025, considering the development situation in the world

*) Integrated Gasification Combined Cycle

- 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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