



DIRECTORATE GENERAL OF NEW, RENEWABLE ENERGY & ENERGY CONSERVATION
MINISTRY OF ENERGY AND MINERAL RESOURCES



CHALLENGES AND IMPACT FROM INDONESIA'S ENERGY TRANSITION

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International Experience of Carbon Pricing and Taxation

Session II From Coal to Clean:

Overcoming Barriers in the Shift Towards Low-Carbon Economies

Tuesday, October 3rd 2023

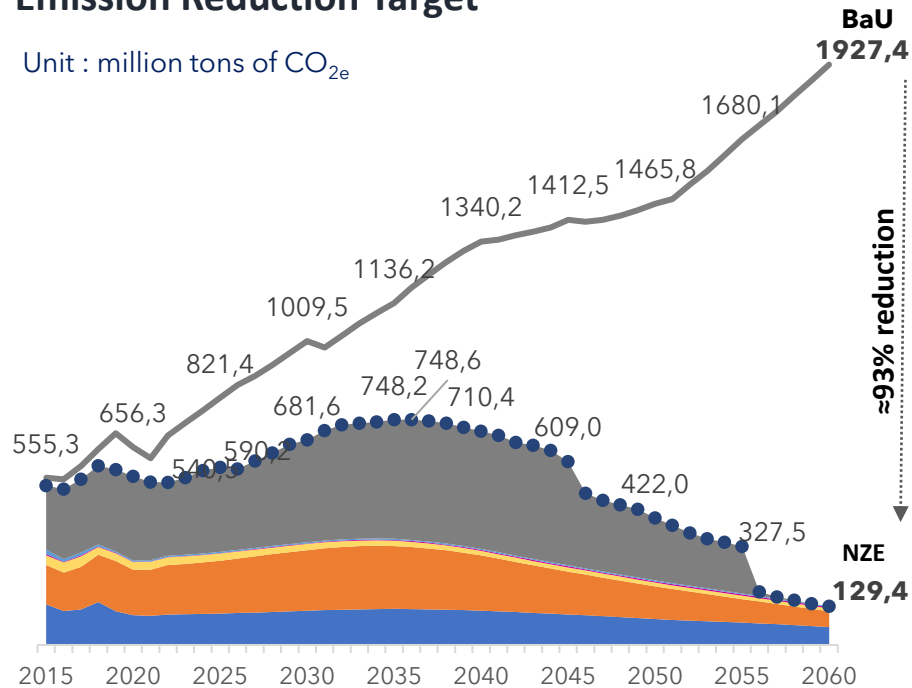


INDONESIA'S ENERGY SECTOR ROADMAP TOWARDS NET ZERO EMISSION 2060



Emission Reduction Target

Unit : million tons of CO_{2e}



Implementation Strategies:

1. Electrification (EV, electric stove, etc)
2. Renewable energy development acceleration (on grid, offgrid, biofuel)
3. Gradual retirement of coal-fired PP.
4. CCS/CCUS
5. Development of new energy (hydrogen, ammonia)
6. More efficient technology utilization.

Energy Sector Roadmap for NZE 2060 or sooner

Supply:

NRE Development based on RUPTL 2021-2030, cofiring on CFPP

Demand:

Induction stove, gas network, DME, B35 mandatory, EV.

2021-2025

2026-2030

Supply:

Green Hydrogen utilization begin in 2031 for transportation sector, BESS in 2034

Demand:

Induction stove, gas network, B40 mandatory, EV, energy management, & hydrogen for transportation sector

2031-2035

2036-2040

Supply:

Green Hydrogen utilization begin to substitute natural gas, NRE dominate the energy mix

Demand:

Induction stove, gas network, B40 mandatory, EV, & hydrogen for industry.

2041-2050

2051-2060

Supply:

NRE Development based on RUPTL 2021-2030, pump storage starts by 2025

Demand:

Induction stove, gas network, B40 mandatory, EV, energy management.

Supply:

Nuclear PP starting 2039, massive Solar PV development, along with onshore and offshore wind PP.

Demand:

Induction stove, gas network, B40 mandatory, EV, and CCS for cement and steel industry

Supply:

All electricity are generated by NRE PP. Remaining GHG emission level: 129 million tons CO₂.

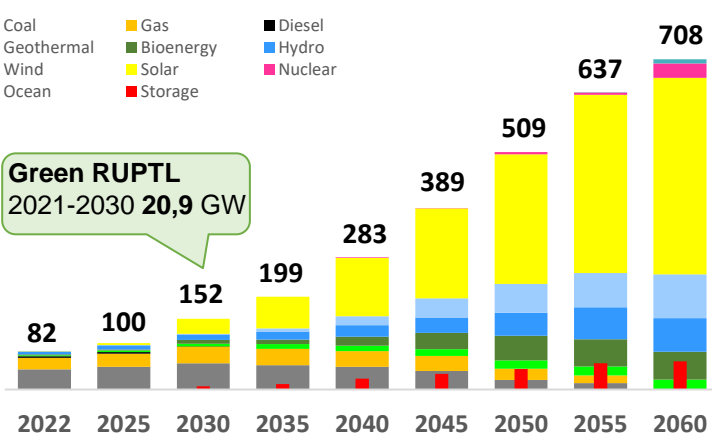
Demand:

Induction stove, gas network, EV, and CCS for industry

NZE 2060 IN ACCORDANCE WITH ENERGY SECTOR DEVELOPMENT

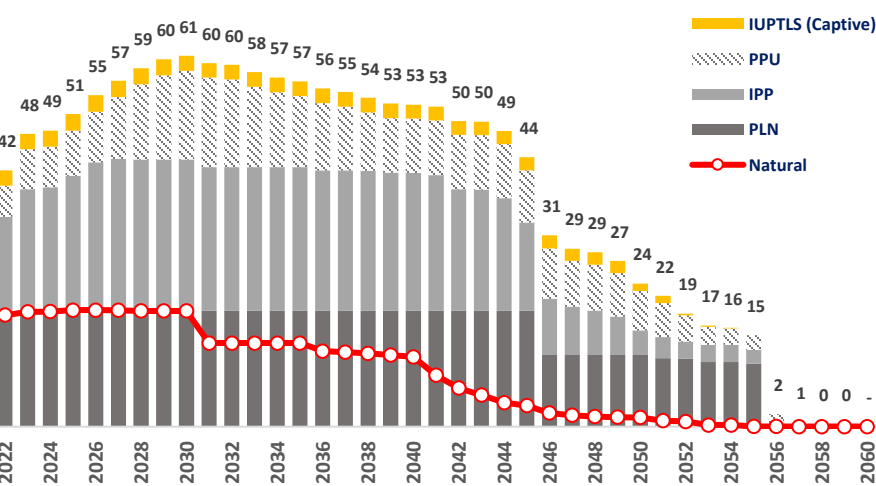
NZE Power Plant Development Roadmap

NRE PP Installed Capacity in 2060: 708 GW (NRE POTENTIAL 3,689 GW)
Solar 421 GW, Wind 94 GW, Hydro 72 GW, Bioenergy 60 GW, Nuclear 31 GW, Geothermal 22 GW, Ocean Energy 8 GW. 60,2 GW Storage: Pumped Storage 4.2 GW, BESS 56 GW.



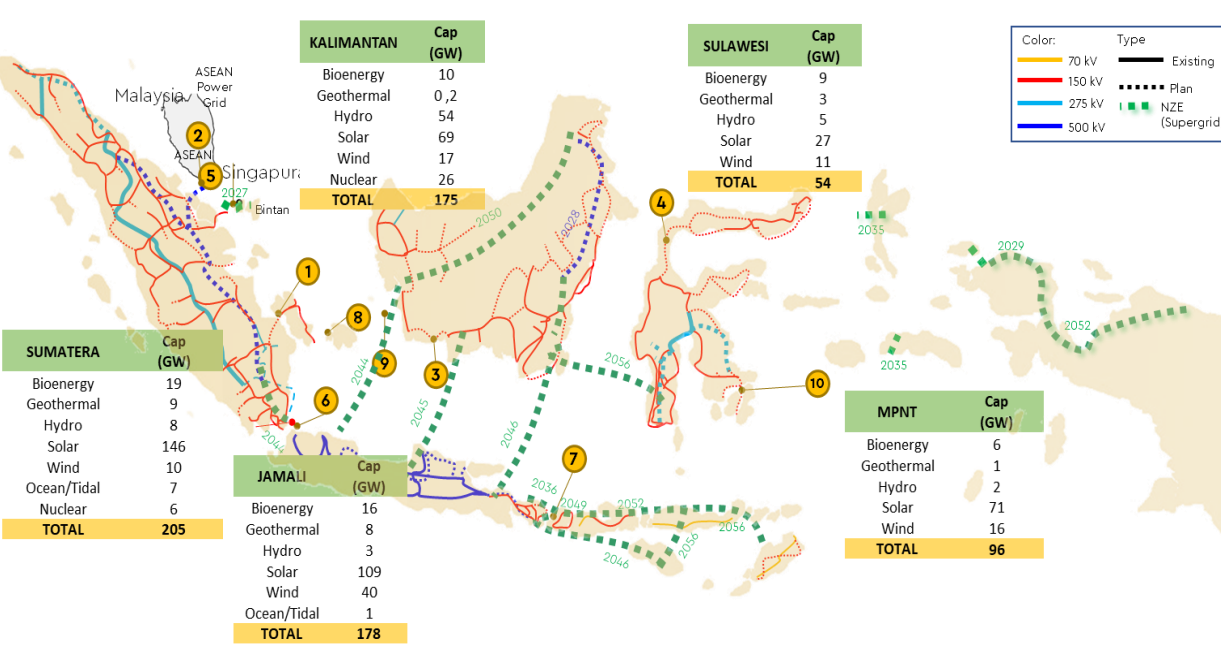
- The projected electricity demand reach **1,942 TWh** and electricity consumption per capita equal to **5,862 kWh/capita**.
- National power generation will be mainly sourced by VRE while optimizing other RE resources to help maintaining system stability.
- Nuclear PP will enter the system in 2039 to maintain system reliability. By 2060, up to 31 GW nuclear PP will be deployed.
- Total investment: **1,108 billion USD/28.5 billion USD p.a.** up to 2060.

CFPP Retirement Program



- Decarbonization Scheme - CFPP**
- Carbon Tax and Carbon Trading**
- Just Energy Transition Partnership (JETP)**
- Energy Transition Mechanism (ETM)**

Super Grid and RE Sharing Resources



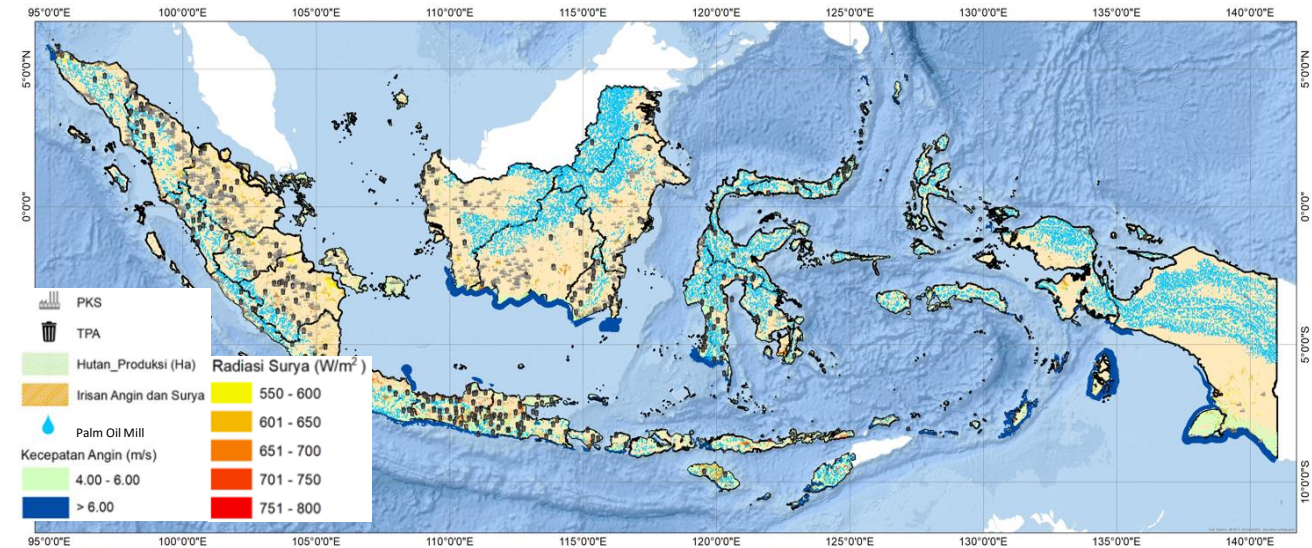
- In order to optimize Indonesia's unique circumstances as an **archipelagic country** in which **RE resources are widespread all over the country**, a modern and integrated super grid is required, to establish resilient and robust transmission infrastructure in Indonesia.
- Objectives:
 - Ramping up renewable energy development.
 - Maintaining the transmission stability and security.
 - Addressing mismatch between renewable energy resources and the location of high electricity demand area.
 - Providing and expanding energy access.








Interconnection investment will be reduced if REBID (Renewable Energy Based Industry Development) is implemented.

NRE UTILIZATION TO SUPPORT ENERGY TRANSITION

National NRE Potential and Utilization

Indonesia’s NRE resources are **abundant, diverse and spread** throughout the country. Currently, **only 0.3% of the total potential has been utilized**.








ENERGY	POTENTIAL (GW)	UTILIZATION (MW)
 SOLAR	3,294	322.6
 HYDRO	95	6,738.3
 BIOENERGY	57	3,118.3
 WIND	155	154.3
 GEOTHERMAL	23	2,373.1
 OCEAN	63	0
 COAL GAS.		30
TOTAL	3,687	12,737

- **Hydro:** all over Indonesia’s areas, particularly in North Kalimantan, NAD, North Sumatra and Papua.
- **Solar:** all over Indonesia’s areas, particularly in East Nusa Tenggara, West Kalimantan and Riau which has higher radiation.
- **Wind (>6 m/s):** particularly located in East Nusa Tenggara, South Kalimantan, West Java, NAD & Papua.
- **Ocean:** all over Indonesia’s areas, particularly in Maluku, East Nusa Tenggara, West Nusa Tenggara and Bali.
- **Geothermal:** in ring of fire areas, including Sumatra, Java, Bali, Nusa Tenggara, Sulawesi, & Maluku.
- **Bioenergy:** spread throughout Indonesia in the form of main products, forestry/plantation land waste, industrial waste. Types of bioenergy potential include biofuels, biomass and biogas

NRE PP Development Plan: Green RUPTL 2021-2030

- NRE additional capacity is targeted to reach 20.9 GW (51.6% of the power plant in RUPTL 2021-2030).
- NRE development has been carried out in accordance with the systems’ electricity balance.
- Another program, namely dedieselization, is also included on the plan.

2030 Additional Cap. Target

-  Solar: 4,680 MW
-  Hydro: 10,390 MW
-  Bioenergy: 590 MW
-  Wind: 597 MW
-  Geothermal: 3,355 MW
- NRE Base and Peaker: 1,310 MW

Sustainable Biofuel



- Last year the **B40 road test** was launched and conducted successfully.
- **B35 Mandatory** has started since February 2023, around 13 million kL are to be produced for domestic and export purposes.

The government has launched **Indonesian Bioenergy Sustainability Indicators (IBSI)** to enhance sustainability of biofuel production which is mainly sourced through CPO.

Cofiring and Biogas Program

- Both programs are substantial in realizing green and circular economy.
- Currently, 36 CFPPs have implemented cofiring commercially. In 2023, cofiring implementation produced 24 TWh of green energy.
- For Biogas, it is mostly used for domestic purposes. Until April 2023, more than 52 thousands of communal biogas are installed with production capacity reaching more than 9.6 million m³.

PRESIDENTIAL REGULATION NO 112 TAHUN 2022

Renewable Energy Development is carried out based on the RUPTL, which takes into account the target of the renewable energy mix, supply-demand balance, and the economic value of power plants

Ceiling Price (HPT) for 2-stage staging without escalation with location factors applies to stage 1, for each type of renewables:

Type	Stage 1 (cUSD/kWh)	Stage 2 (cUSD/kWh)
Geothermal	$7,65 - 9,76 \times F$	$6,5 - 8,30$
Hydro	$6,74 - 11,23 \times n \times F$	$4,21 - 7,02$
Excess Power Hydro	$5,80 \times 0,7$	
Solar PV	$6,95 - 11,47 \times n \times F$	$4,17 - 6,88$
Wind	$9,54 - 11,22 \times n \times F$	$5,73 - 6,73$
Biogas	$7,44 - 10,18 \times n \times F$	$4,46 - 6,11 \times n$
Biomass	$9,29 - 11,55 \times n \times F$	$7,43 - 9,24 \times n$

n: Technical Factor (0.7 – 1.0) F: Location Factor (1 – 1.5)

B to B (requires MEMR approval): Peaker Hydro; Biofuel PP; Ocean PP

- Presidential Regulation 112/2022 also mandates the Government c.q. The MEMR to prepare a roadmap to accelerate the retirement of the CFPP's operational life and limit the development of new CFPPs, except for those CFPPs that have been listed in the RUPTL and which are integrated with industry.
- Local content implementation (TKDN) is carried out in accordance with prevailing laws and regulations

(Draft) LAW ON NRE

As a comprehensive regulation to create a climate for EBT development that is sustainable and equitable

PRESIDENTIAL REGULATION NO 11 TAHUN 2023 on Additional Concurrent Government Affairs in the EMR Sector in the EBT Sub-Sector.

In order to support the use of NRE in the primary energy mix and achieve a reduction of global emissions, it is necessary to optimize the authority of coordination and synergy between the Central Government and Local Governments

Additional Concurrent Government Affairs for Local Governments:

- Supply management of Biomass and/or Biogas within the province
- Managing the utilization of Biomass and/or Biogas as fuel within the province
- management of Various New and Renewable Energy sourced from sunlight, wind, water flows and waterfalls, as well as the movement and differences in temperature of the sea within the province
- Management of Energy Conservation for activities whose business permits are issued by provincial regions
- Implementation of Energy Conservation in facilities and infrastructure managed by regional apparatuses that carry out government affairs in the field of energy and mineral resources
- Fostering and supervising the implementation of Energy Conservation carried out by stakeholders at the provincial level

(Revision) Ministerial Regulation on Solar Rooftop

Revisions is made to encourage the utilization of Solar PV Rooftop, where the potential reaches 32.5 GW, but the utilization has only reached 114 MWp. The revisions mainly on removing capacity limits, changing in export value, eliminating “parallel operation” costs, and implementation the PV Rooftop quota system

ENERGY CONSERVATION TOWARDS NZE 2060 PROGRAM & CHALLENGES

Energy Efficiency Program

Standardization and Energy Saving Labeling

Application of Energy Efficient Technology (electric vehicles and induction stoves)

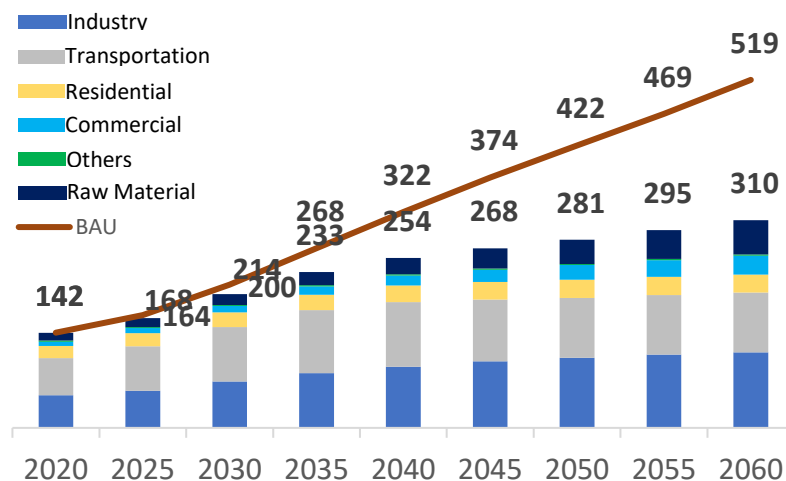
Energy Management Implementation (ISO: 50001).

Energy Conservation Business Development, through Energy Saving Companies (ESCO)

Awareness & Awards.

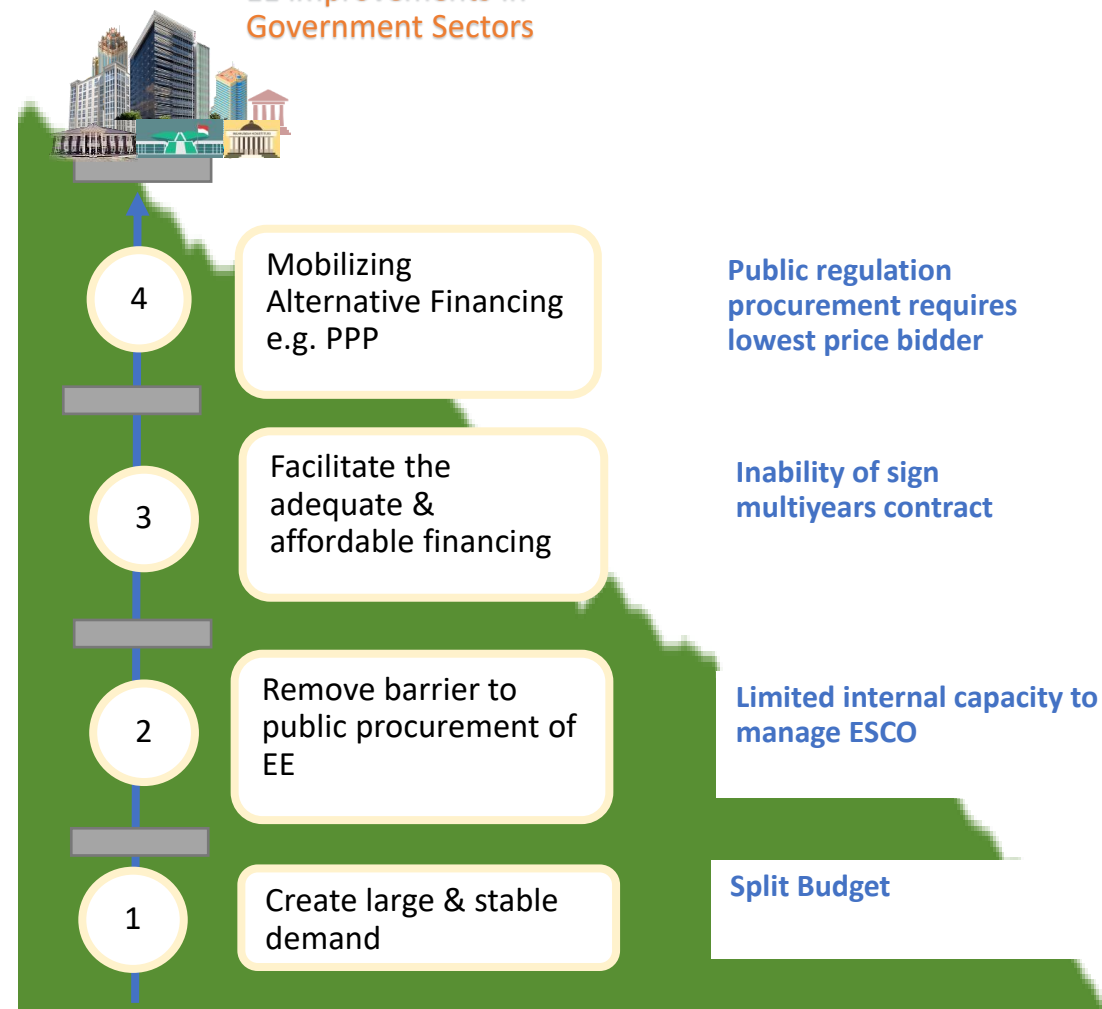
TOTAL PROJECTION OF DEMAND NZE 2060

- The energy demand growth rate is projected to rise by 1.8% per year. Energy demand is expected to increase from 142 MTOE in 2020 to 519 MTOE (BaU) in 2060.
- Through mitigation actions and energy conservation activities, it is estimated that there will be a decrease in energy demand by 209 MTOE (40%), so that energy consumption will be 310 MTOE in 2060.
- According to IEA report, nearly 300 billion USD was allocated for energy efficiency in 2021, illustrating high potential value for energy conservation globally.



Opportunities & Barrier EE Investment in the Public Sector

Large opportunity for EE improvements in Government Sectors

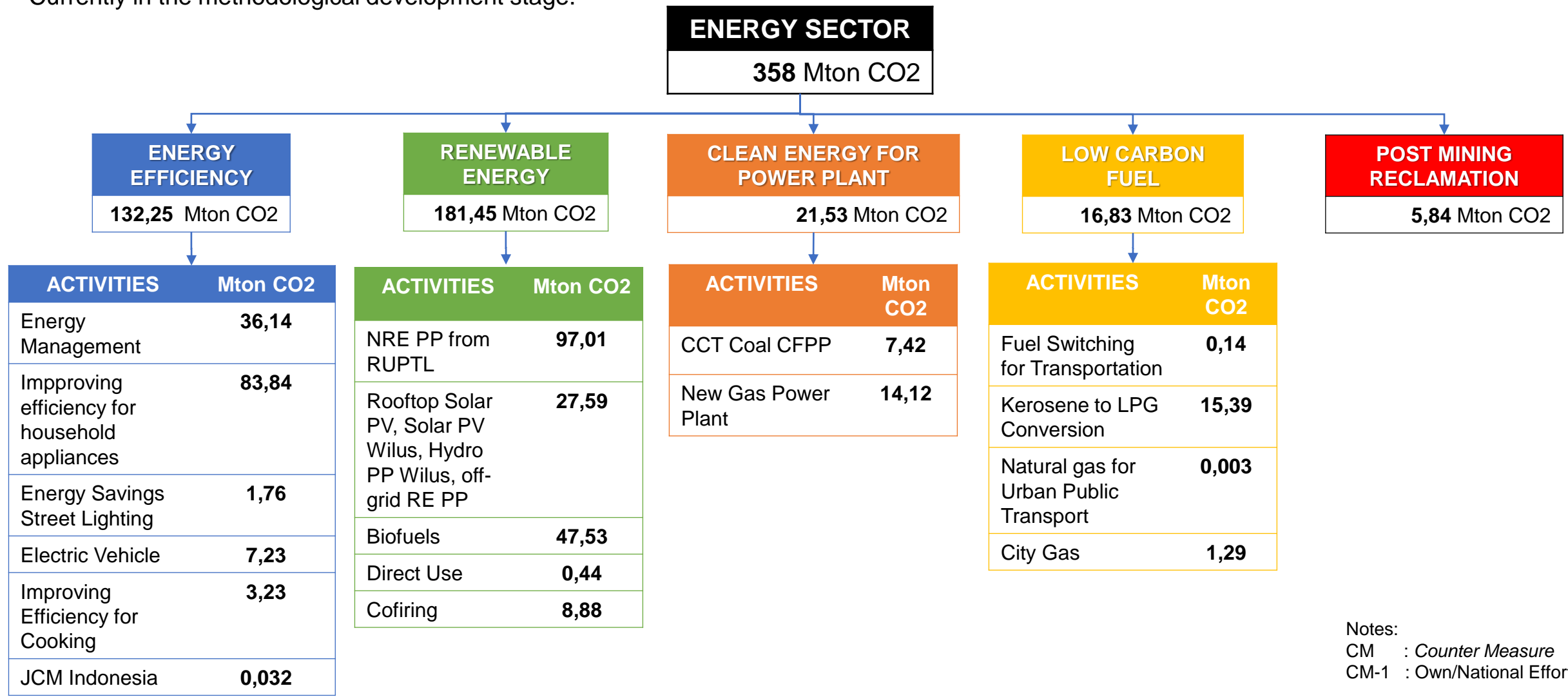


We need to open the access of elevator by knowledge and awareness

ENERGY SECTOR COMMITMENT FOR ACHIEVING E-NDC (CM-1) 2030



- Mitigation activities in the energy sector must be fulfilled from their own efforts and not to be traded abroad.
- Other potential activities outside the E-NDC include: CCS/CCUS, Gas Flare, and PLTU Early Retirement have not been taken into account. Currently in the methodological development stage.



Notes:
CM : Counter Measure
CM-1 : Own/National Effort

Carbon Pricing Mechanism

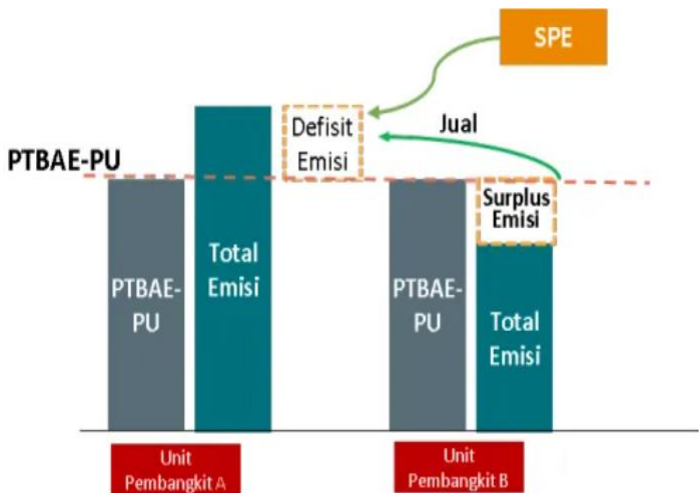
Based on Presidential Regulation Number 98 / 2021

Carbon Trading

- a. Emission Tading
- b. Emission Offset

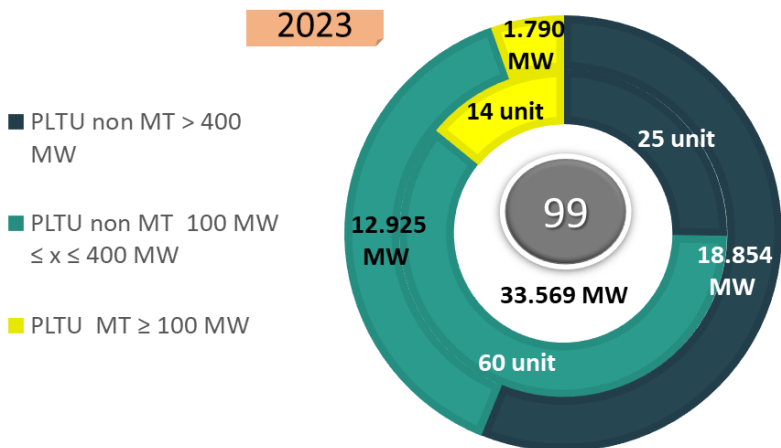
Result Based Payment

Carbon Tax



Carbon Trading in Power Generation

- On February 22nd 2023, Ministry of Energy and Mineral Resources – Indonesia has launched emission trading in power generation subsector.
- For the first phase in 2023, there are 99 coal-fired power plant that become emission trading participant with total installed capacity of 33,5 GW



Indonesia Carbon Exchange








- On September 26th 2023, Indonesia has launched Carbon Exchange
- Current registered project: PT Pertamina Geothermal Energy Tbk Lahendong Project Unit 5 and Unit 6 North Sulawesi
- Traded volume: 459.914 tCO₂e

CHALLENGES AND OPPORTUNITIES IN ENERGY TRANSITION

CHALLENGES IN ACHIEVING NZE

- Economy & Technology**
 Technological innovations and good engineering practices in the NRE and energy conservation sector encourage the safety, reliability of the electric power system and increasingly competitive prices.
- Infrastructure**
 Availability of supporting infrastructure in the development of NRE and energy conservation.
- Supply & Demand**
 The development of NRE and energy conservation for both power generation and non electricity purposes should consider the balance of supply & demand growth.
- Funding**
 High investment value, limited funding, and high development risk, etc.
- Social Dynamics**
 NRE and energy conservation management and governance that focus on social aspects of people centered development.

ENABLING FACTORS

	Supply	Demand
 Policy Support	<ul style="list-style-type: none"> Feedstock Carbon Prices Carbon Trading Power Wheeling 	<ul style="list-style-type: none"> Energy Management Minimum Energy Performance Standard (MEPS) & Labelling
 Infra-structure	<ul style="list-style-type: none"> Super Grid Power Wheeling 	<ul style="list-style-type: none"> EV and Charging Station City Gas Network Induction Stoves
 Funding Support	<ul style="list-style-type: none"> Fiscal and Non-Fiscal Incentives Grant and Loan Other Funding Facilities 	<ul style="list-style-type: none"> Fiscal and Non-Fiscal Incentives Grant and Loan Other Funding Facilities
 R&D and Technology	<ul style="list-style-type: none"> CCS/CCUS Hydrogen/Ammonia New Energy Sources 	<ul style="list-style-type: none"> Energy Efficiency Energy Conservation Innovation
		
Collaboration and participation from all stakeholders including human resources development is needed to accelerate energy transitions and meeting climate goals		

Thank you

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