KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA

INDONESIA ENERGY TRANSITION

Re-Invest Indonesia China 2024

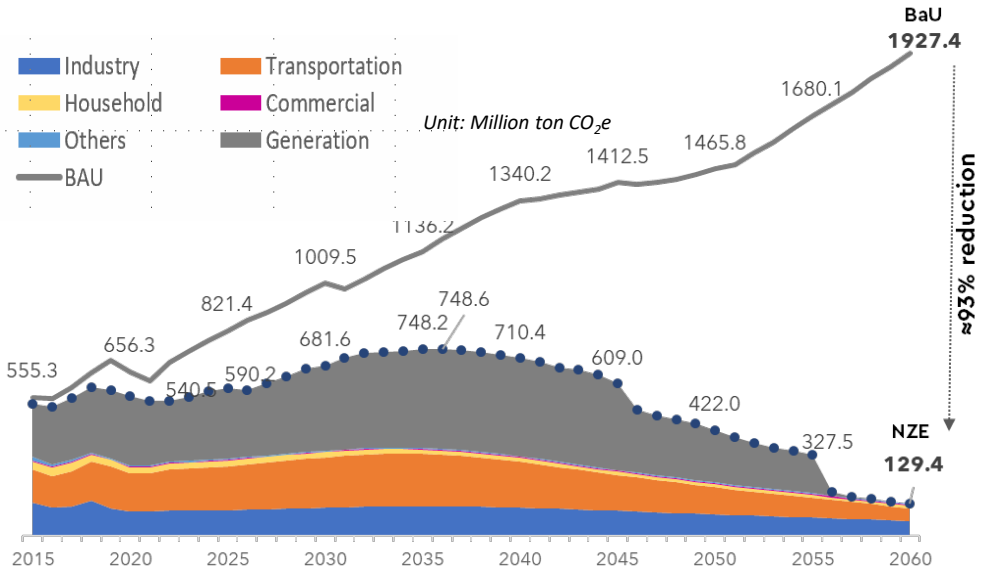
Cirata Floating Solar Power Plant, 192 MWp

Jakarta, 16 Januari 2024

Improving Sustainability Through NZE

Net Zero Emission 2060 in Indonesia

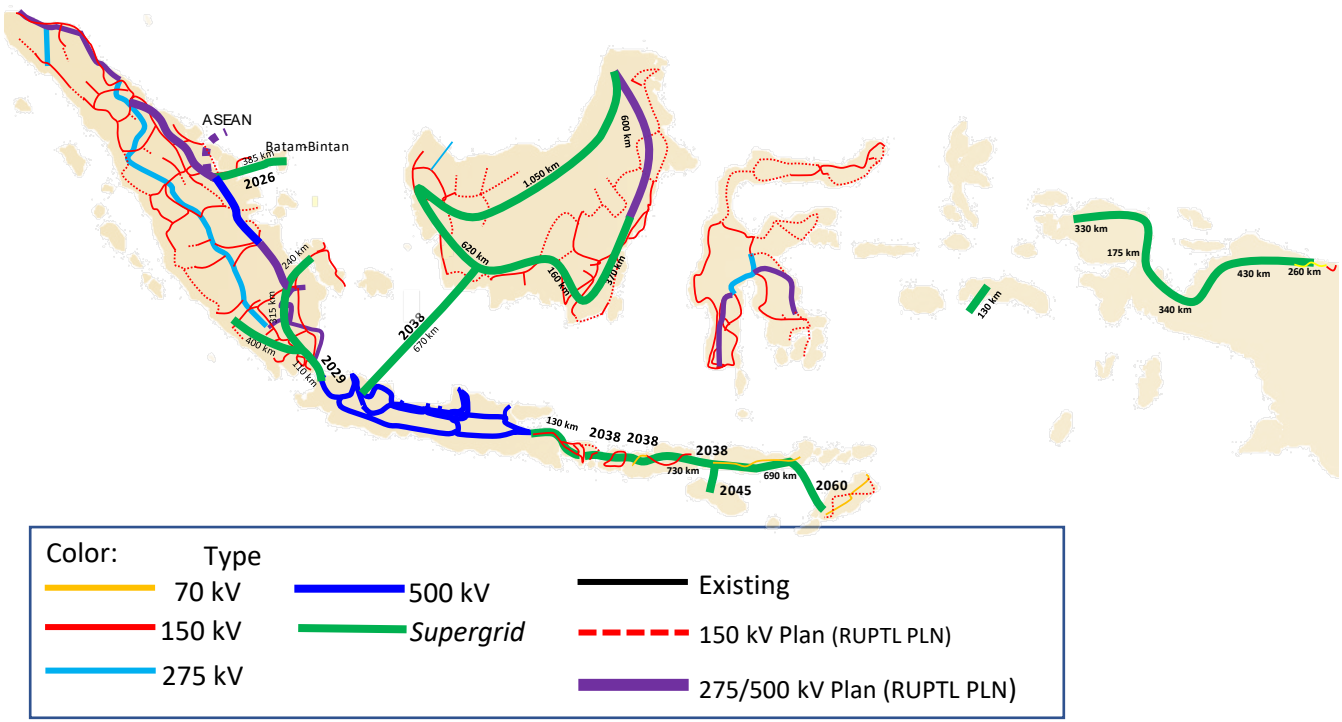
Emissions reduction in the NZE 2060 is **93% of BaU** by optimizing NRE resources for energy supply and demand, along with implementing energy efficiency programs.



NZE Strategies

1. **Demand Sector Electrification** (EV, induction stove, electrifying agriculture, etc)
2. **NRE Development** (offgrid, ongrid, biofuel)
3. **CFPP Moratorium & early retirement/phase down** of existing CFPPs
4. **New energy sources** (hydrogen and ammonia)
5. **CCS/CCUS**
6. **Energy efficiency application**

Super Grid and RE Sharing Resources

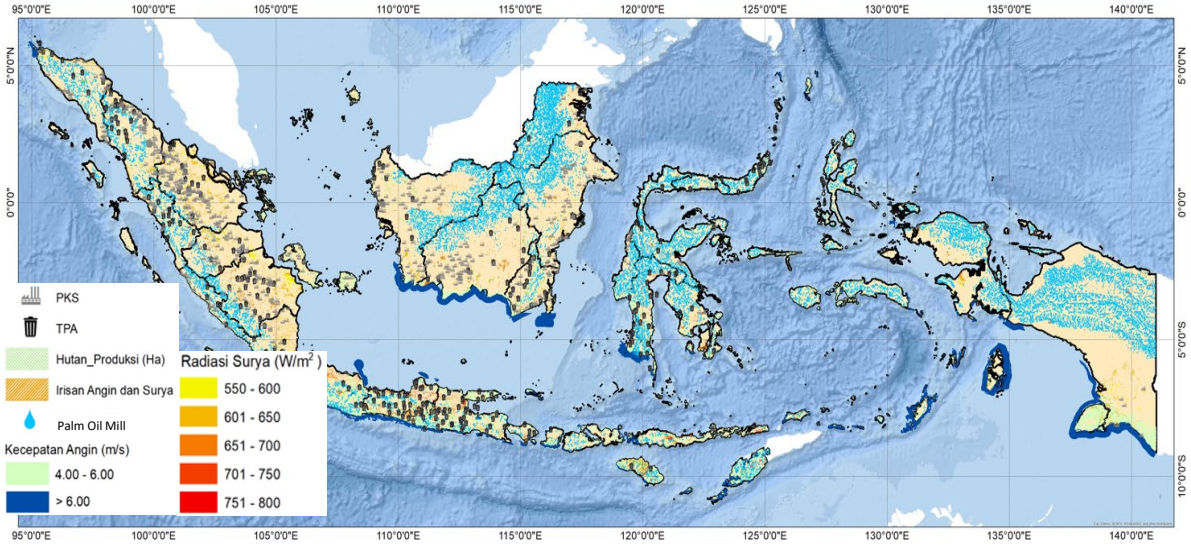


- As an **archipelagic country with the RE resources dispersed all over the country**, a modern and integrated super grid is required to establish resilient and robust energy transmission in Indonesia.
- Objectives:
  - Accelerate renewable energy development.
  - Maintain the transmission stability and security.
  - Connect large renewable energy resources areas with high electricity demand areas.
  - Provide and expand energy access.

NRE Potential to Support Energy Transition

National NRE Potential and Utilization

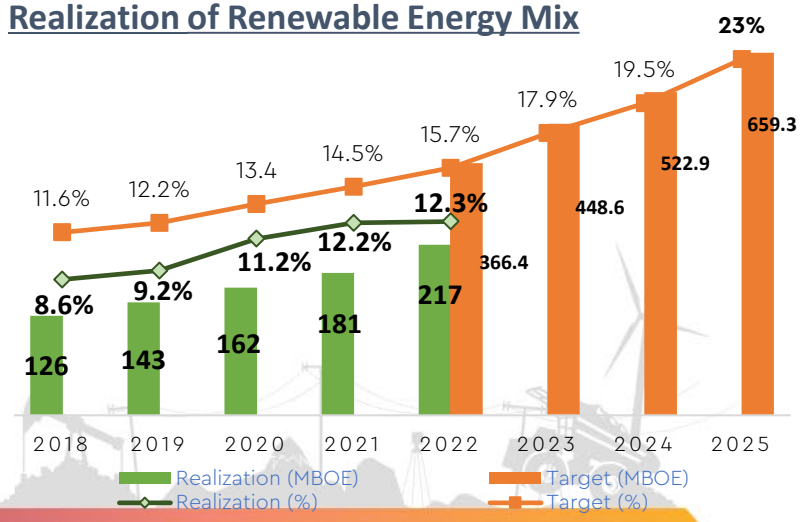
Indonesia's NRE resources are **abundant, diverse and spread** throughout the country. Currently**, only 0.3% of the total potential has been utilized.**



	POTENTIALS (GW)	UTILIZATION (MW)
SOLAR | available all over Indonesia, particularly in East Nusa Tenggara, West Kalimantan and Riau which has higher radiation	**3,294**	**345**
HYDRO | available all over Indonesia, particularly in North Kalimantan, NAD, North Sumatra and Papua	**95**	**6,774**
BIOENERGY | available all over Indonesia in the form of main products, forestry/plantation land waste, waste in industry. Potential types include biofuels, biomass and biogas.	**57**	**3,195**
WIND (>6 m/s) | available in East Nusa Tenggara, South Kalimantan, West Java, NAD & Papua.	**155**	**154**
GEOTHERMAL | located in the «Ring of Fire», including Sumatra, Java, Bali, Nusa Tenggara, Sulawesi, & Maluku.	**23**	**2,378**
OCEAN | **available** all over Indonesia, particularly in Maluku, East Nusa Tenggara, West Nusa Tenggara and Bali	**63**	**0**
COAL GAS.		**30**
TOTAL	**3,687**	**13,085**

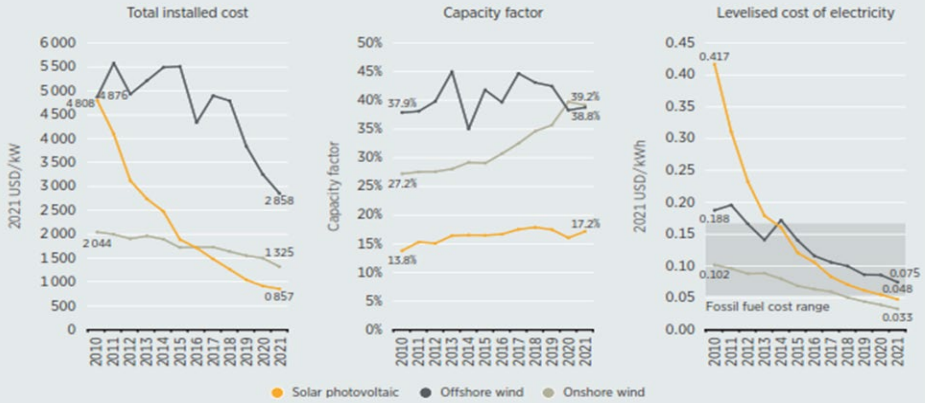
Note: (1) September 2023, total numbers are rounded up (2) Including "LTSHE" ;
Nuclear pot.: Uranium 89,483 tons - Thorium 143,234 tons

Realization of Renewable Energy Mix



NRE Development Opportunity → COST

The cost of NRE is decreasing over the last decade



- The investment costs (including integration costs) for new NRE power plants, especially Solar PV and Wind Turbine are cheaper and could compete with existing 800MW coal-fired power plants.
- The O&M costs of NRE power plants are relatively low. Reduction in taxes and fees on natural resources utilization can be an alternative incentive for more competitive NRE electricity prices.

Source: IRENA

Cirata Floating Solar Power Plant

The Green Power for Many Homes

Capacity:
145 MWac (192 MWp)
Biggest at South East Asia

Emission Reduction CO_2	➡	**214.000** ton per annum
Produce **Green energy** per annum	➡	More than **200 Million kWh**
Electified more than	➡	**50.000** Household

From Global to Local

Cooperation from

PLN — Masdar A MUBADALA COMPANY

Competitive Tariff ➡ **5,8 ¢USD/kWh**

Involve

1400
workers

Local worker and SME around project area

National Strategic Project

Designate as National Strategic Project that accelerated NRE implementation

Utilization of Biomass & Biofuel to Reduce Fossil Fuel Consumption

Implementation Of Biomass Cofiring

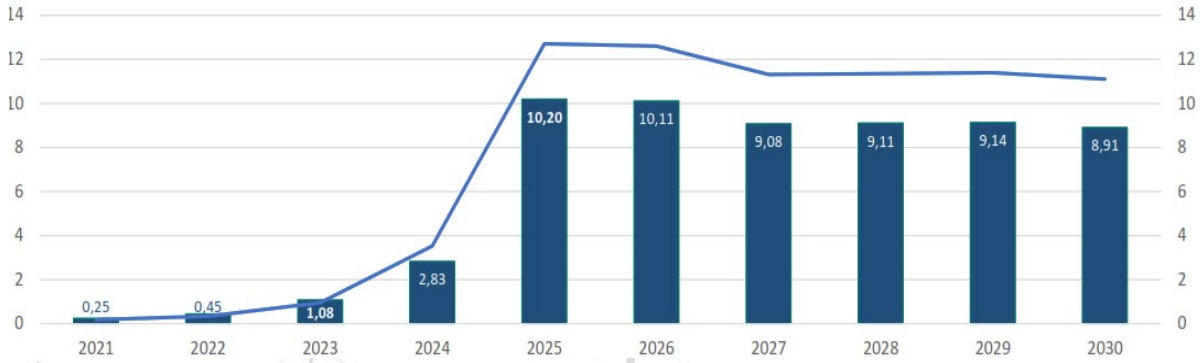
Biomass cofiring – mixing biomass with coal in existing CFPPs. Objective: increase NRE mix while reducing coal consumption.

TARGET 2025: **52 CFPP** -- Current Realization: **44 CFPP**

POTENTIAL BIOMASS FUEL FOR COFIRING

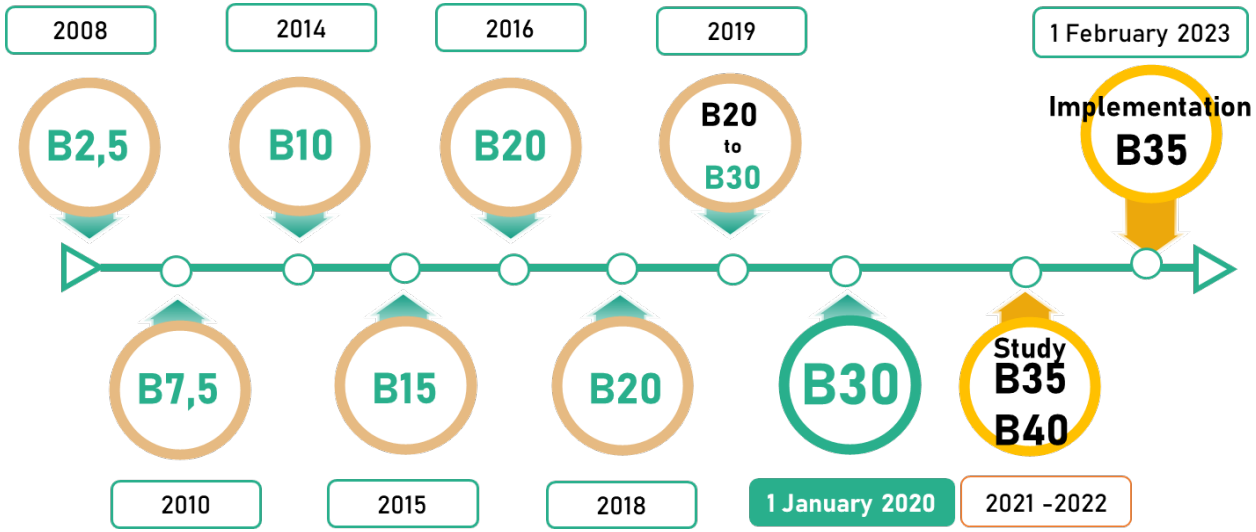
- Coconut Shell / Shell 425,978 ton
- Palm shells 12,850,976 ton
- Sawdust 2,427,638 ton
- Rice Husk 10,047,142 ton
- Wood chip 789,008 ton
- EFB 47,120,246 ton
- Energy Forests — Existing Potency: 49,578 Ha ≈ 991,560 ton; Development Potency: 27,223,454 Ha ≈ 544,469,073 ton
- Municipal Waste | 68,500,000 ton MSW ≈ 42,013,333 ton SRF

Roadmap of Biomass Cofiring

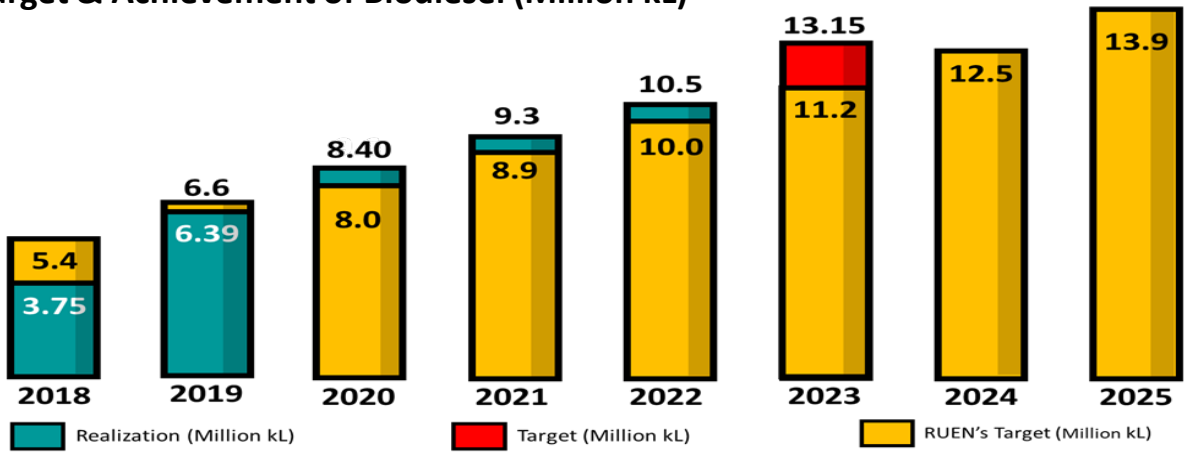


	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CFPP (Location)	25	36	42	52	52	52	52	52	52	52
TWh	0.18	0.59	0.95	3.12	11.71	11.60	11.31	11.35	11.39	11.10
Biomass (mio Ton)	0.25	0.57	1.05	2.83	10.20	10.11	9.08	9.11	9.14	8.91

Mandatory Biofuel Implementation



Target & Achievement of Biodiesel (Million kL)



NOTE: Road test of B40 with the fuel formula namely FAME 40% and FAME30% + HVO10%: Vehicle road tests, storage stability tests and filter resistance tests have been completed. Currently, the preparation of the final report on the implementation of the B40 road test is being carried out

Advancing New Energy

Hydrogen

Hydrogen will expand after 2030 with its vast utilization in hydrogen based vehicle (fuel cell and synthetic fuel, power generation and storage

Hydrogen will also be utilized as part of decarbonization efforts in hard to abate sectors (shipping, aviation, steel production, manufacture, long-haul vehicle).

SAF

(Sustainable Aviation Fuel)

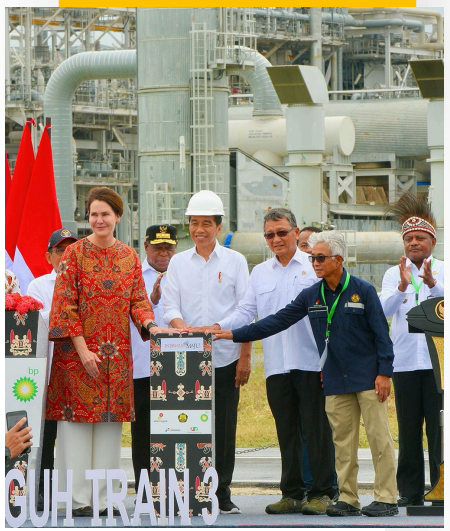
On October 27th, 2023, Indonesia has successfully conduct the first commercial flight in the world using (SAF) - bioavtur J2.4, produced from palm oil, flying Jakarta-Solo.

SAF is produced by mixing NRE fuel with conventionl jet fuel. This flight proven Indonesia's seriousness to achieve Net Zero Emission (NZE) 2060 or sooner.

Fakta: Pada 28 November 2023, Virgin Atlantic terbang dari London ke New York dengan 100% SAF.

Blue Ammonia

PT Kilang Pertamina International (KPI) has committed to transform 90 MMSCFD Tangguh gas to low emission *Blue Ammonia.*



The natural gas from Tangguh field is converted to *syngas* later processed with nitrogen to produce 875 tonne per annum Blue Ammonia.

Energy Transition Development Opportunities: Critical Minerals

Role of Minerals in Supporting the Energy Transition

POWER PLANTS

- Solar
- Wind
- Nuclear

Si	REE	U
Silicon	Rare earth elements	Uranium

TRANSMISSION AND DISTRIBUTION

- transmission
- distribution

CU	Al
Copper	Alumunium

ENERGY STORAGE

- Motors and Battery of EV
- Hydrogen (H_2) (electrolysers)

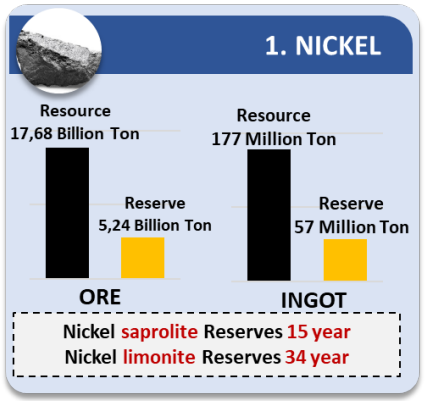
Li	Ni	Co	C	Mn	Zr
Lithium	Nickel	Cobalt	Graphite	Manganese	Zirconium

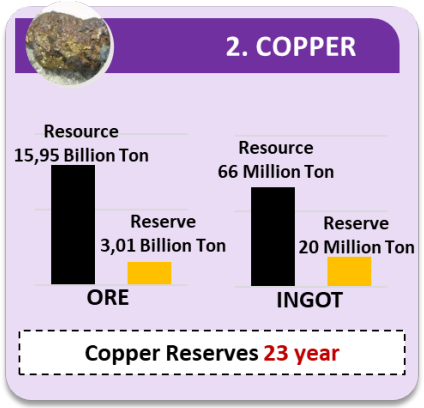
V	Ti	Pt	REE	Cr	CU
Vanadium	Titanium	Platinum	Rare earth elements	Chromium	Copper

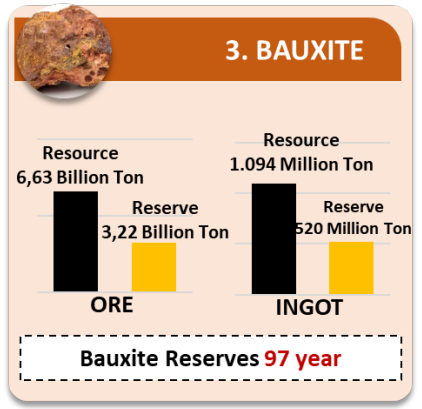
Available in Indonesia

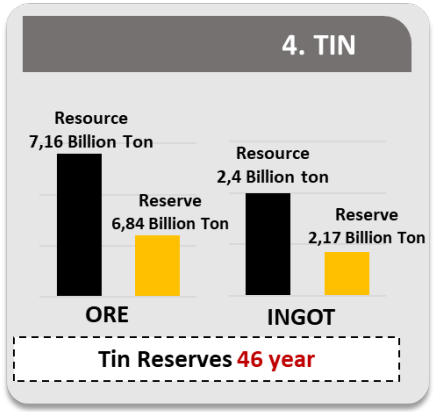
Mining plays a clear role in supporting the global transition to clean energy. Lack of rapid scale up on the discovery and delivery of essential minerals, will hamper the prospects for a large-scale energy transition.

Indonesian Mineral Mining in Statistics









Benefits of Mineral Processing for the Regions:

- Create Substantial Revenues Through Taxes and Royalties
- Create Local Job opportunists
- Grow Related Manufacturing Industries
- Infrastructure Development
- Improve the quality of The Local Workforce
- Empower Community

Groundbreaking Mentarang Induk Hydro Power Plant

The Mentarang Induk Power Plant is one of **National Strategic Project** in energy sector to support the development of green industry

Malinau, North Kalimantan

1.375 MW

USD 2,6 billion

2029 *(expected COD)*

PT Kayan Hydropower Nusantara, Joint Venture between PT Kayan Investama International and Sarawak Energy Berhad, Malaysia

PT Kalimantan Energi Lestari Indonesia (PT KELI), as the offtaker of PLTA Mentarang Induk, holder of electricity business area in **Tanah Kuning Industrial Park**

Thank You

- @kesdm
- @KementerianESDM
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- Kementerian ESDM
- Kementerian ESDM

NREEC REGULATION TO BOOST THE INVESTMENT

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 x F	6,5 – 8,30
Hydro	6,74 – 11,23 x n x F	4,21 – 7,02
Excess Power Hydro	5,80 x 0,7	
Solar PV	6,95 – 11,47 x n x F	4,17 – 6,88
Wind	9,54 – 11,22 x n x F	5,73 – 6,73
Biogas	7,44 – 10,18 x n x F	4,46 – 6,11 x n
Biomass	9,29 – 11,55 x n x F	7,43 – 9,24 x 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 that have been listed in the RUPTL and integrated with industry.
- Local content implementation (TKDN) is carried out in accordance with prevailing laws and regulations.

GOVERNMENT REGULATION 33/2023 – ENERGY CONSERVATION

The main points:

1. Lower the energy consumption threshold as a mandatory requirement for implementing energy management:
   a. Energy Supplier ≥ 6000 TOE
   b. Energy Users:
      1) Industrial Sector ≥ 4000 TOE
      2) Transportation Sector ≥ 4000 TOE
      3) Building/Commercial Sector ≥ 500 TOE
2. Stipulate the implementation of energy conservation within the central and regional governments.
3. Develop of energy conservation service business (ESCO)

4000 TOE/year

INDUSTRIAL SECTOR

Energy Savings Potential (TOE/year)	3.5 Million
Energy Savings Potential (Trillion IDR/year)	42.69
CO2 Emission Reduction (Ton/Year)	35.03 Million

4000 TOE/year

TRANSPORTATION SECTOR

Energy Savings Potential (TOE/year)	1.1 Million
Energy Savings Potential (Trillion IDR/year)	11.86
CO2 Emission Reduction (Ton/Year)	2.5 Million

500 TOE/year

BUILDING/COMMERCIAL SECTOR

Energy Savings Potential (TOE/year)	77.7 Thousand
Energy Savings Potential (Trillion IDR/year)	1.32
CO2 Emission Reduction (Ton/Year)	767 Thousand

NATIONAL COMMITMENT TO REDUCE GHG EMISSION

Enhanced NDC 2030

No	Sector	2010 GHG Emission (Million Ton CO_2e)	GHG Emission by 2030			Reduction	
			BaU	CM1	CM2	CM1	CM2
1.	**Energy**	**453.2**	**1,669**	**1,311**	**1,223**	**358**	**446**
2.	Waste	88	296	256	253	40	45.3
3.	IPPU	36	70	63	61	7	9
4.	Agriculture	111	120	110	108	10	12
5.	FOLU	647	714	217	-15	500	729
	TOTAL	**1,334**	**2,869**	**1,953**	**1,632**	**915**	**1,240**

Energy Sector
358 million ton CO2

ENERGY EFFICIENCY
132.25 million ton CO2

Activity	million ton CO2
Energy Management	36.14
Efficiency at Household Utensils	83.84
Energy Saving Solar Road Lamp	1.76
Electric Vehicle	7.23
Energy Efficiency Improvement for Cooking	3.23
JCM Indonesia	0.032

RENEWABLE
181.45 million ton CO2

Activity	million ton CO2
RUPTL NRE PP	97.01
Rooftop PV, Solar PP PPU, Hydropower PPU, Off Grid NRE PP	27.59
Biofuel	47.53
Direct Utilization	0.44
Cofiring	8.88

CLEAN POWER TECHNOLOGY
21.53 million ton CO2

Activity	million ton CO2
CCT for CFPP	7.42
New Gas PP	14.12

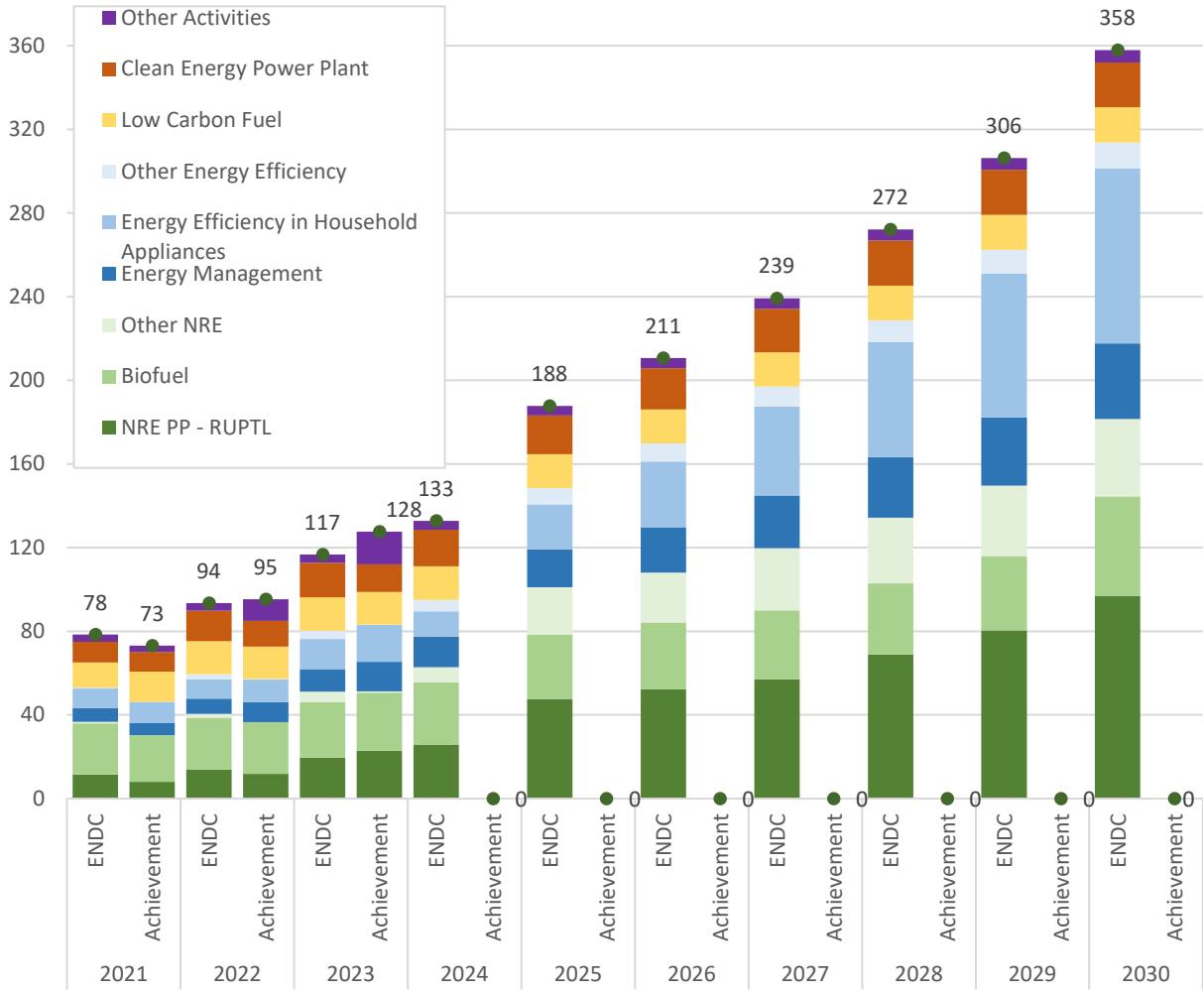
LOW CARBON FUELS
16.83 million ton CO2

Activity	million ton CO2
Fuel Switching on Transportation Sector	0.14
Oil to LPG Conversion	15.39
Natural Gas for local public transportation	0.003
City Gas Network	1.29

MINE RECLAMATION
5.84 million ton CO2

Note:
CM : Counter Measure
CM-1 : Self Effort

Emission Reduction Achievement



Next step to monetize emission reduction in energy sector:

- Propose BLU (Badan Layanan Umum – Public Services Institution) under MEMR to become Verification and Validation (LVV) institution
- Develop technical guidelines to prepare the Document of Mitigation Action Plan (DRAM) to obtain Emission Reduction Certificate

ENERGY TRANSITION CHALLENGES

CHALLENGES

Technology

Technological advancements in NRE, energy efficiency and low carbon technologies are still needed to successfully transition towards NZE

Supply Chain

Strengthening supply chain for NREEC development and utilization to allow rapid deployment

Infrastructure

Expanding and improving current energy infrastructure to accommodate large scale NRE while maintaining energy security dan safety

Funding & Incentives

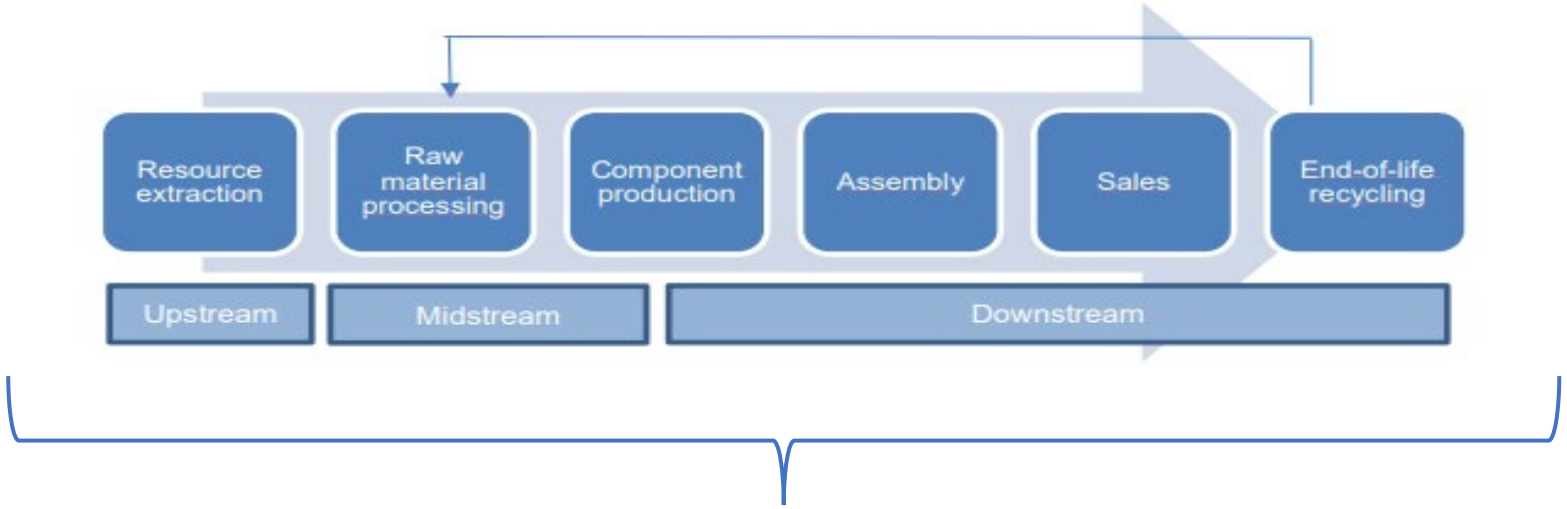
Provision of “cheap” and accessible fund or incentives for NREEC Projects

Just Energy Transition

Ensuring a just energy transition that benefit all parties by strengthening coordination and collaboration among stakeholders

IRENA's analysis shows that to achieve the 2050 target, energy mix should consist of 90% renewable energy in the form of direct use and electricity, energy efficiency implementation, green hydrogen and bioenergy utilization combined with carbon capture and storage (BECC).

Hence, the advancement in technology development must be followed by the increase in the renewable value chain, starting from mineral extraction and down streaming to components manufacturing industries.



The growth of renewable energy industries is dependent on all stakeholder's collaboration, which then fosters national research, development, innovation, and human capacity.