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

Renewable Energy Initiatives and Innovations

Prof. Eniya Listiani Dewi
Director General of New, Renewable Energy and Energy Conservation

at
Soft-Launch and Press Conference Indonesia Sustainable Energy Week (ISEW) 2024

Jakarta, 26 August 2024

Floating Solar, Cirata, 192 MWp,_ Biro KLIK

POTENTIAL & UTILIZATION OF NEW AND RENEWABLE ENERGY

Indonesia has **abundant, spread**, **and diverse NRE potential** to support national energy security and achieve the NRE mix target.

	Potential (GW)	Utilization (MW)*
SOLAR	3.294	675
WIND	155	152
HYDRO	95	6.697
OCEAN	63	0
BIO ENERGY	57	3.408
GEO THERMAL	23	2.597
COAL GASSIFICATION		250
TOTAL	3,687	13,781

Development Program

- Rooftop PV → Large Scale Ground Mounted PV → Floating PV
- On-shore Wind → Off-shore Wind
- Hybrid Dam → Pumped Storage
- Study of Ocean Energy in Eastern Indonesia
- Biodiesel and Bioethanol → Bioavtur → Biomass
- Government Drilling → Fiscal Incentives

0,3%

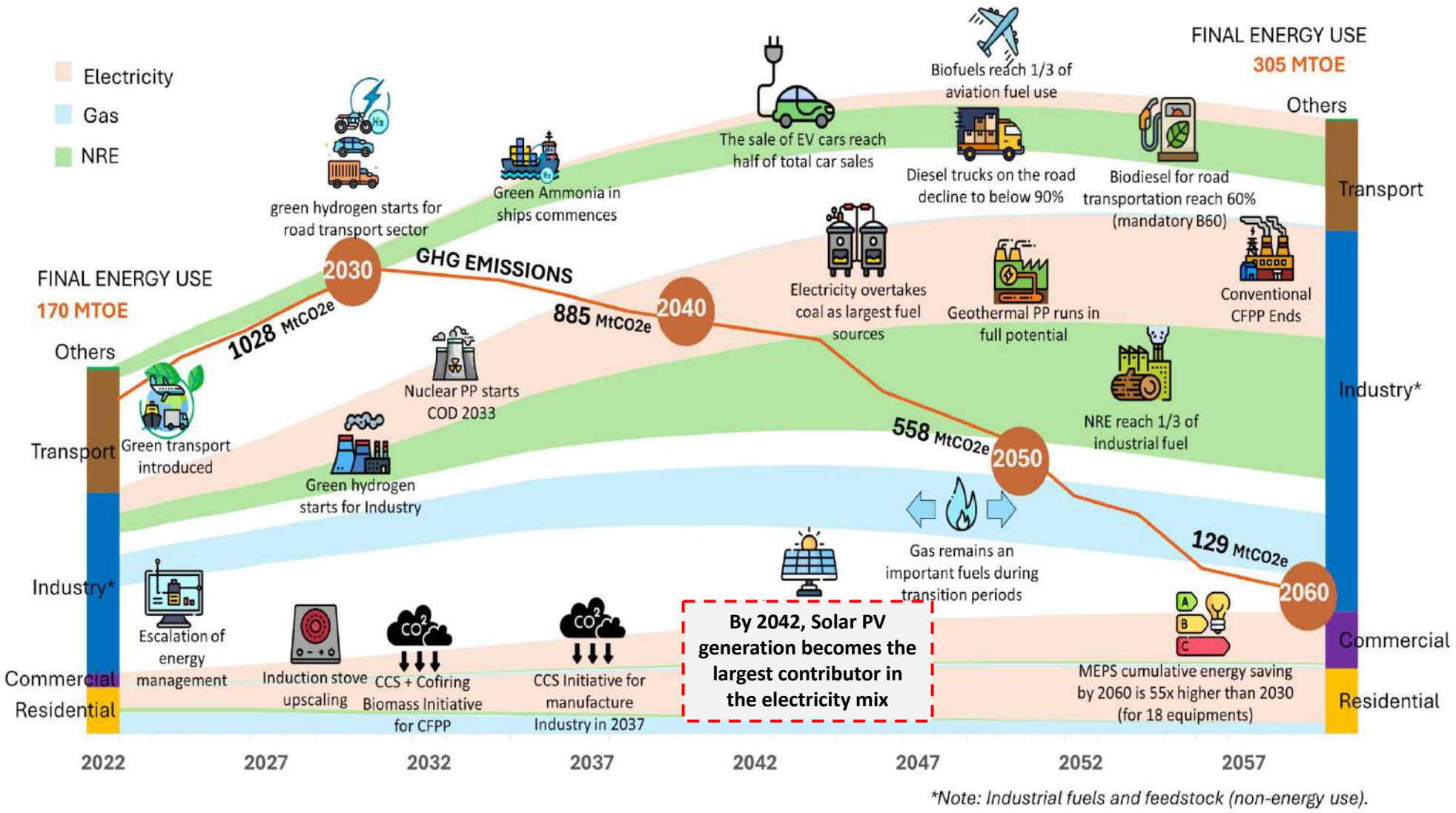
INSTALLED CAPACITY OF NRE

*) Implementation as of June 2024

Net Zero Emission

Cirata 1,000 MW Hydropower
in West Java

NZE ROADMAP FOR ENERGY SECTOR



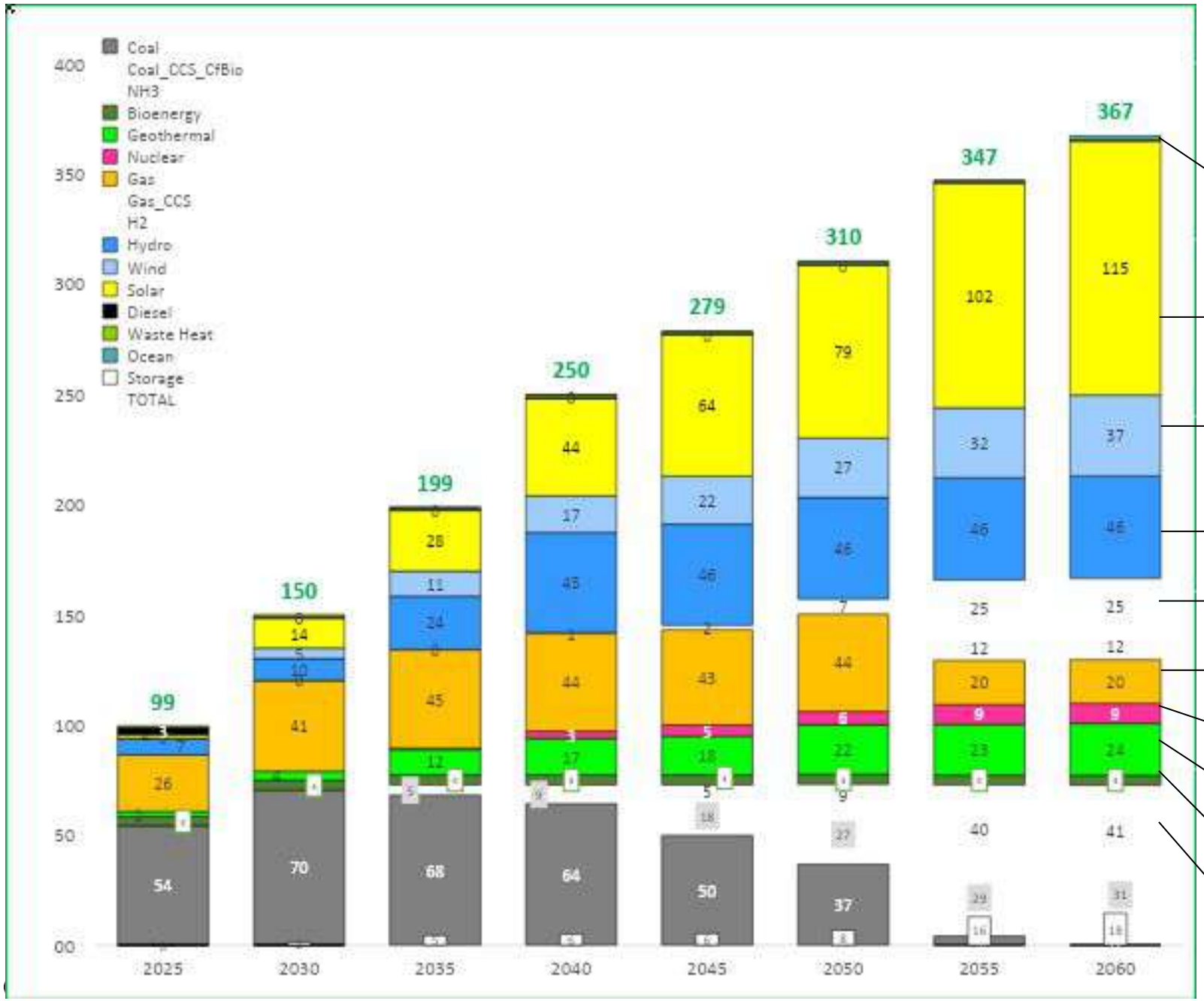
*Note: Industrial fuels and feedstock (non-energy use).

Source: Draft of Indonesia's Net Zero Emission (NZE) Roadmap for Energy Sector 2060

STRATEGIES TO ACHIEVE NZE 2060

1. **Energy Efficiency**
2. **Electrification** (EV, electric for cooking, agriculture, etc)
3. **Moratorium for New Coal-Fired Power Plant & coal phase down**
4. **Renewable energy** (on-grid, off-grid & biofuel)
5. **New Energy** (nuclear, hydrogen, ammonia)
6. **CCS/CCUS**

DRAFT ROADMAP OF ELECTRICITY SUPPLY



Installed Capacity (DMN) 2060 is 367 GW consist of

- **42% VRE** with **storage 18 GW**, and
- **58% Non VRE** (dispatchable)

Ocean (2 GW)

Solar (115 GW)

Wind (37 GW)

VRE **42%**

Hydro (46 GW)

H2 (25 GW)

Gas / Gas+CCS (25 GW)

Nuclear (9 GW)

Geothermal (24 GW)

Bioenergy (4 GW)

NH3 (41 GW)

Non VRE **58%**

Disclaimer: draft for discussion only

SUPERGRID AS KEY TO ENERGY TRANSITION TOWARDS NZE 2060

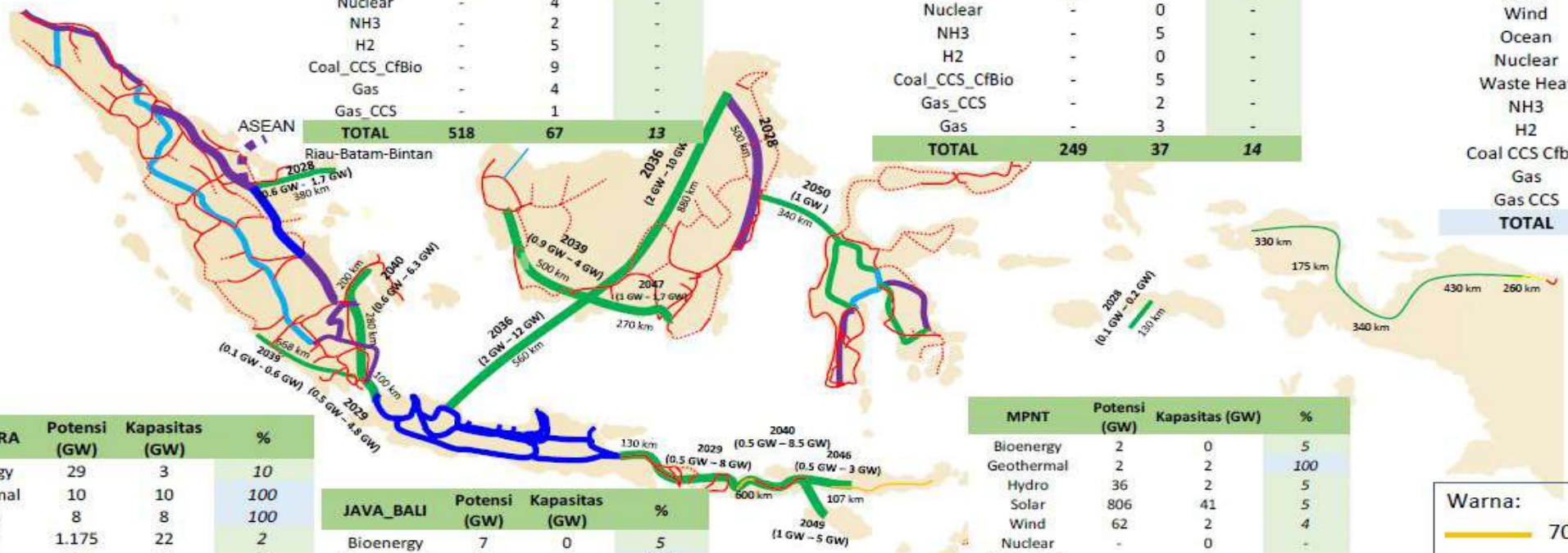
"The Supergrid would allow for more resource sharing between systems and higher penetration of VRE, including Solar"

KALIMANTAN	Potensi (GW)	Kapasitas (GW)	%
Bioenergy	13	1	*8*
Geothermal	0,2	0,2	*100*
Hydro	49	28	*57*
Solar	430	11	*3*
Wind	26	1	*5*
Nuclear	-	4	-
NH3	-	2	-
H2	-	5	-
Coal_CCS_CfBio	-	9	-
Gas	-	4	-
Gas_CCS	-	1	-
TOTAL	**518**	**67**	***13***

SULAWESI	Potensi (GW)	Kapasitas (GW)	%
Bioenergy	3	0	*4*
Geothermal	3	3	*100*
Hydro	5	5	*100*
Solar	223	11	*5*
Wind	15	3	*20*
Nuclear	-	0	-
NH3	-	5	-
H2	-	0	-
Coal_CCS_CfBio	-	5	-
Gas_CCS	-	2	-
Gas	-	3	-
TOTAL	**249**	**37**	***14***

Indonesia	Potensi (GW)	Kapasitas (GW)	%
Bioenergy	57	4	*8*
Geothermal	24	24	*100*
Hydro	95	46	*49*
Solar	3.295	115	*4*
Wind	155	37	*24*
Ocean	60	1,7	*3*
Nuclear	-	9	-
Waste Heat	-	0,5	-
NH3	-	41	-
H2	-	25	-
Coal CCS Cfbio	-	31	-
Gas	-	20	-
Gas CCS	-	12	-
TOTAL	**3.686**	**367**	***6***

Kapasitas *Storage : 18 GW*



SUMATERA	Potensi (GW)	Kapasitas (GW)	%
Bioenergy	29	3	*10*
Geothermal	10	10	*100*
Hydro	8	8	*100*
Solar	1.175	22	*2*
Wind	11	3	*28*
Ocean	1	0,9	*86*
Nuclear	-	5	-
NH3	-	6	-
H2	-	4	-
Coal_CCS_CfBio	-	5	-
Gas	-	6	-
Gas_CCS	-	2	-
TOTAL	**1234**	**74**	***6***

JAVA_BALI	Potensi (GW)	Kapasitas (GW)	%
Bioenergy	7	0	*5*
Geothermal	8	8	*100*
Hydro	4	4	*100*
Solar	652	30	*5*
Wind	41	27	*65*
Ocean	4	0	-
NH3	-	19	-
H2	-	15	-
Coal_CCS_CfBio	-	11	-
Gas	-	5	-
Gas_CCS	-	6	-
TOTAL	**716**	**125**	***17***

MPNT	Potensi (GW)	Kapasitas (GW)	%
Bioenergy	2	0	*5*
Geothermal	2	2	*100*
Hydro	36	2	*5*
Solar	806	41	*5*
Wind	62	2	*4*
Nuclear	-	0	-
Waste Heat	-	1	-
Ocean	16	0	*2,6*
NH3	-	10	-
H2	-	1	-
Coal_CCS_CfBio	-	1	-
Gas_CCS	-	1	-
Gas	-	2	-
TOTAL	**924**	**64**	***7***

Warna:	Tipe
70 kV	*Existing*
150 kV	Rencana 150 kV (RUPTL PLN)
275 kV	Rencana 275/500 kV (RUPTL PLN)
500 kV	
Supergrid	

The Efforts – Policies & Regulations

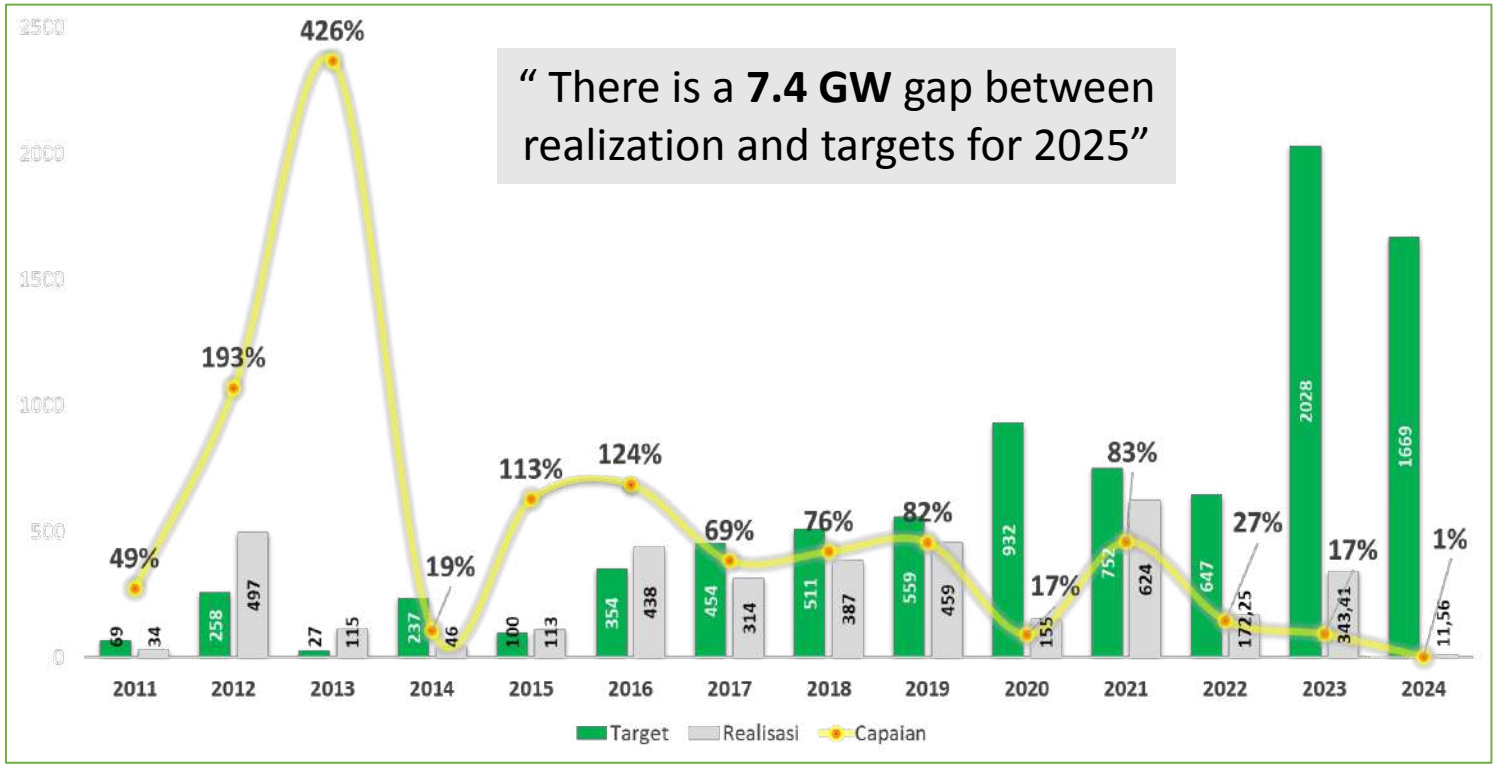
Sidrap 72 MW Wind Energy
in South Sulawesi

GREEN RUPTL PT PLN (PERSERO) 2021 – 2030

INVESTMENT TARGET & OPPORTUNITIES

RUPTL Targets and Achievements

Although NRE capacity increases every year, Indonesia still has to accelerate NRE implementation to meet development targets.



Policies to Boost Investment

- **Ease of permits**, ex: OSS & perizinan.esdm.go.id
- **Fiscal Incentives**, ex: Tax Allowance, Tax Holiday, Import Duty Exemptions
- **Non-Fiscal Incentives**, Ex: Biodiesel incentives through BPDPKS

RUPTL Targets and Required Investments

01 **HYDROPOWER**
Additional cap until 2030: **10.4 GW**
Emission Reduction: **46.46 million tons CO2e**
Investment required: **25.63 Billion USD**

02 **LARGE SCALE SOLAR**
Additional cap until 2030: **4,68 GW**
Emission Reduction: **6.97 million tons CO2e**
Investment required: **3.2 Billion USD**

03 **GEOTHERMAL**
Additional cap until 2030: **3.35 GW**
Emission Reduction: **22.4 juta tons CO2e**
Investment required: **17.35 Billion USD**

04 **BIOENERGY**
Additional cap until 2030: **590 MW**
Emission Reduction: **4.61 million tons CO2e**
Investment required: **2.2 Billion USD**

05 **WIND**
Additional cap until 2030: **597 MW**
Emission Reduction: **2.22 million tons CO2e**
Investment required: **1.03 Billion USD**

06 **OTHER NRE BASELOAD**
Additional cap until 2030: **1.01 GW**
Emission Reduction: **4.51 million tons CO2e**
Investment required: **5.49 Billion USD**

07 **PEAKER**
Additional cap until 2030: **300 MW**
Emission Reduction: **2.01 million tons CO2e**
Investment required: **0.28 Billion USD**

STRENGTHENING REGULATIONS TO ACCELERATE NRE INVESTMENT (1)

PRESIDENTIAL REGULATION NO 112 YEAR 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:

Jenis	*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: 1) CFPP that have been stipulated in the RUPTL (both PLN business areas and non-PLN business areas) before the enactment of Presidential Decree Number 112/2022; 2) CFPP that meets 3 requirements, namely: Integrated with the industry, Commit to reducing greenhouse gas emissions by at least 35% within 10 years, Operates until 2050.

ONLINE SINGLE SUBMISSION (OSS) □ oss.go.id

- Business License of Power Supply for Public Purpose
- Electricity Supporting Business Licensingz

NREEC Online Licensing □ perizinan.esdm.go.id

- Geothermal License
- Geothermal Goods Import Recommendation
- Geothermal Supporting Business Registration
- Business Permit for Biofuel
- Biofuel Export/Import Recommendation

DRAFT OF NEW ENERGY AND RENEWABLE ENERGY LAW

"One of the important roles of the NRE Law is as a legal umbrella for the energy transition. Meanwhile, the aim of the NRE Law is to provide legal certainty for NRE development, optimize natural resources, strengthen NRE institutions and governance, and create a conducive investment climate"

Strategic Aspect of Regulation: Government Concerns

1. Green economy and energy transition can be carried out through the development of NREEC.
2. Development of energy sources with low carbon emissions and sustainable.
3. Integrated management of nuclear energy and construction of nuclear power plants that based on proven technology.
4. The mechanism for determining NRE concession areas by the Government is through business licensing.
5. Strengthening research and technological innovation to optimize the utilization of NRE.
6. NRE economic price that considers the capacity and location of the development.
7. Support from the Central Government and Regional Governments in accelerating the development of EBT.
8. NRE development by prioritizing domestic products and potential.
9. Management of NRE funds by the Government.
10. Strengthening coordination and synergy between the Central Government and Regional Governments in the implementation of guidance and supervision.
11. The role of the community in maintaining, protecting and maintaining the sustainability of the area in NRE utilization activities.

STRENGTHENING REGULATIONS TO ACCELERATE NRE INVESTMENT (2)

MEMR Regulation No 2/2024

PV Rooftop Capacity

PV Rooftop capacity customer is not limited and follows the PV Rooftop quota

PV Rooftop Capacity Quota

IUPTLU holders are required to prepare a PV Rooftop development quota for each Electric Power System, prepared for a period of 5 years detailed for each year

Power Exports To The Grid

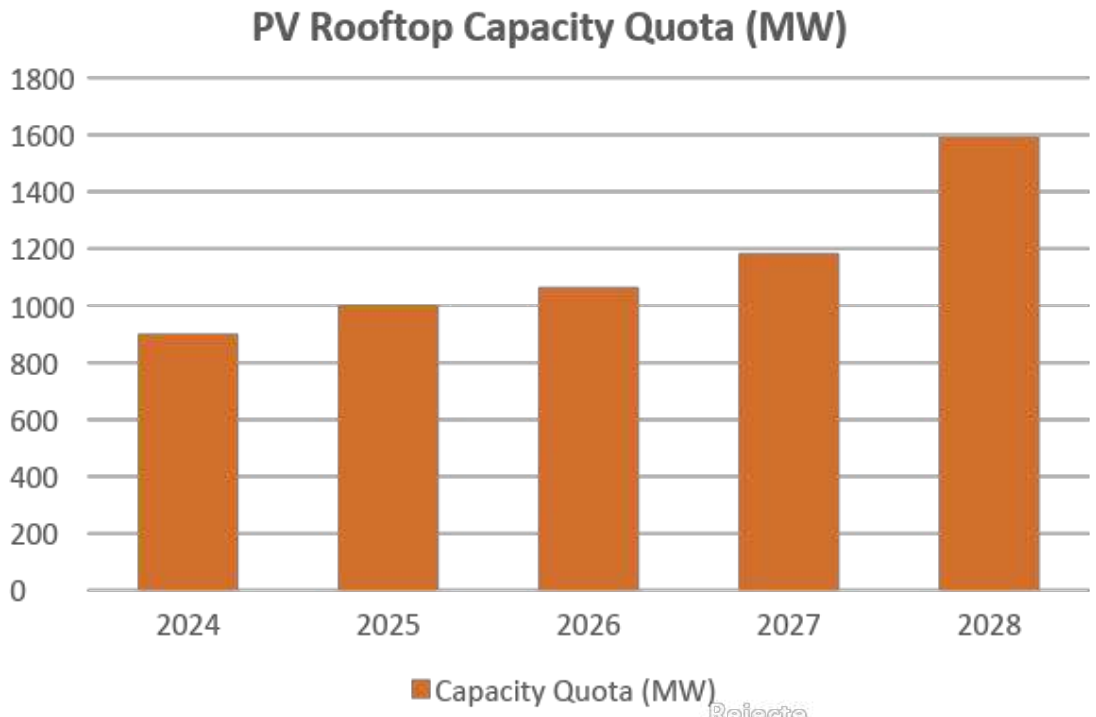
The capacity value of excess electrical energy from the customer's PV Rooftop to the IUPTLU Holder's Network is not taken into account in determining the amount of the Customer's electricity bill

Capacity Charge

PV Rooftop systems for all customer tariff groups are not subject to parallel operating costs

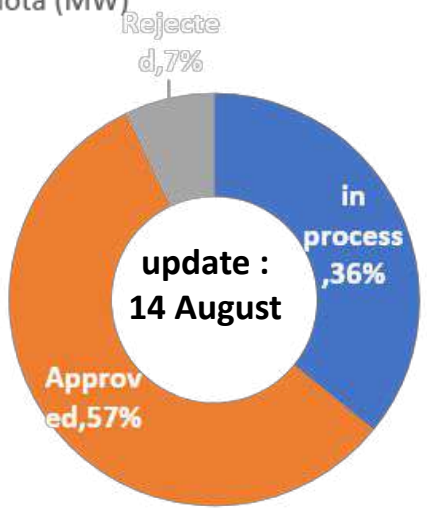
Application

The application system for the construction and installation of PV Rooftop uses an application



UPDATE APPROVAL PV ROOFTOP BY CAPACITY (MW)

application for the construction and installation of PV Rooftops in July 2024, from the quota of 901 MWp there is a remaining quota of **72,4 MWp**

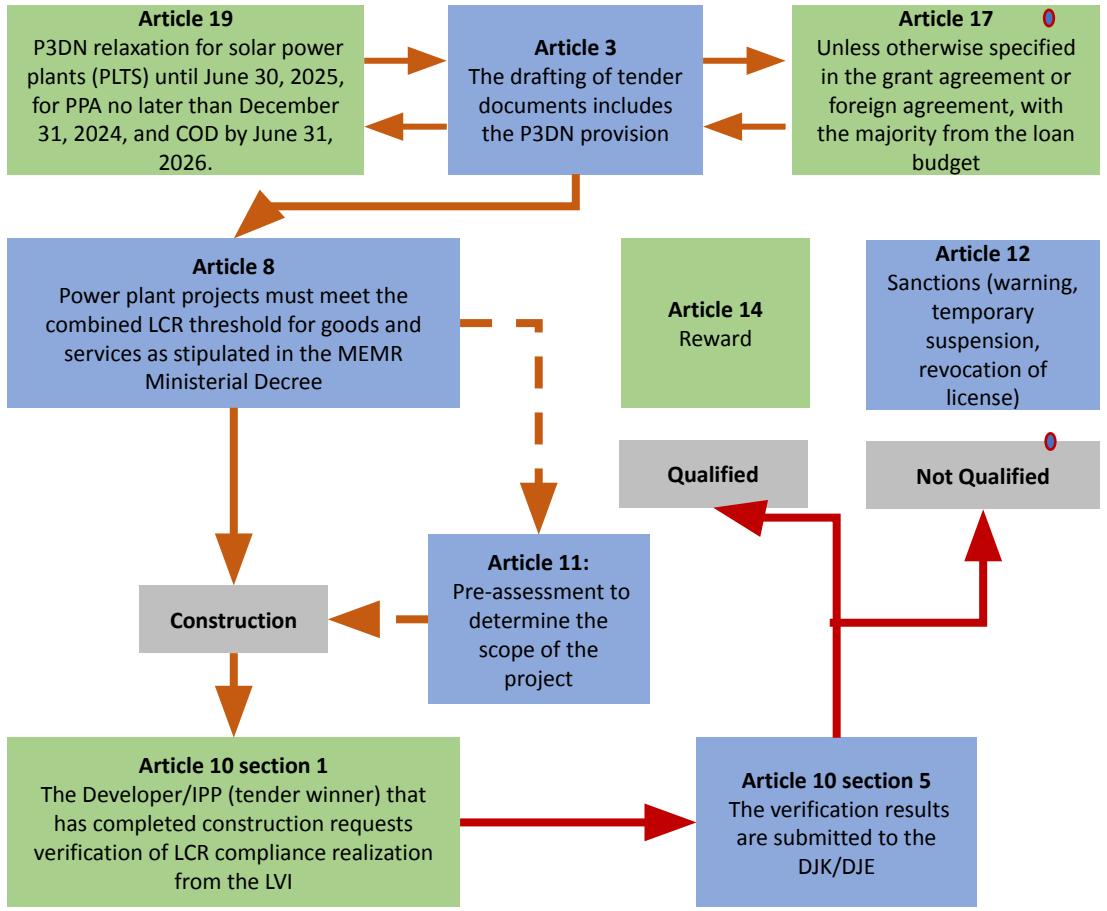


STRENGTHENING REGULATIONS TO ACCELERATE NRE INVESTMENT (3)

MEMR REGULATION NO 11/2024 ON THE USE OF DOMESTIC PRODUCTS FOR THE DEVELOPMENT OF ELECTRICITY INFRASTRUCTURE

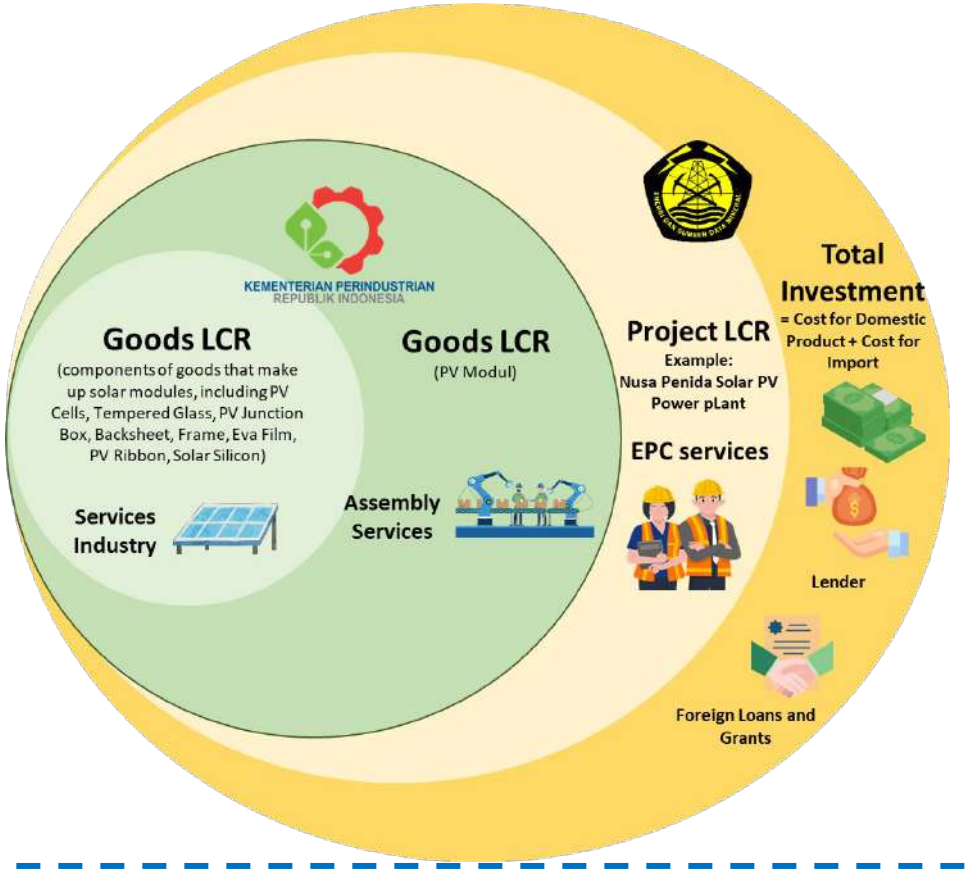
"to accelerate the development of electricity infrastructure while still prioritizing the use of domestic products, it is necessary to regulate the use of domestic products for the development of electricity infrastructure"

BUSINESS PROCESS IN MEMR REGULATION



- MoI regulation no 54/2012, which previously served as the legal basis for the guidelines on the use of domestic products for electricity infrastructure development, has been repealed through MoI regulation no 33/2024
- The guidelines for the LCR (Local Content Requirement) threshold for electricity infrastructure development projects are regulated in the MEMR Ministerial Decree

ILLUSTRATION OF AUTHORITIES OF MEMR AND MOI



- On July 31, 2024, MOI regulation No. 34 of 2024 regarding the Procedures for Calculating the LCR Value of Solar Module Products was promulgated, replacing MOI regulation No. 4 of 2017.
- Based on MEMR Ministerial Decree 191.K/EK.01/MEM.E/2024, **the combined LCR threshold of goods and services in the solar power plant project is 20%**

Investment Opportunity

Jangkang 1,2 MWp Biogas in Bangka Belitung

OPPORTUNITIES FOR INVESTMENTS IN NRE

HYDRO

HYDRO PP

Additional Capacity until 2030: **10.4 GW**
Investment Required: **25.63 Billion USD**
Investment opportunity through:
Development of Large Scale, Mini, Micro Hydro, including existing Dam and reservoir owned by PUPR with the potential around 619 MW, and *Pump storage*

SOLAR PV

LARGE SCALE SOLAR PP

Additional Capacity until 2030: **4.68 GW**
Investment Required: **3.2 Billion USD**

SOLAR PV ROOFTOP

Additional Capacity until 2025: **3.61 GW**
Investment Required: **3 Billion USD**
Implementation opportunities:

- Solar PV Rooftop on **Buildings**
- Solar PV Rooftop in **Industries**

FLOATING SOLAR PV

Potential at 109 existing dam : **13,898.72 MW** (20% of the dam surface area)

BIOENERGY

BIOENERGY PP

Additional Capacity until 2030: **590 MW**
Investment Required: **2.2 Billion USD**
Investment opportunity through: Development of Biomass, Biogas, and WtoE PP

B35 MANDATORY

Blending of biodiesel and diesel on 35% v/v. Currently conducting trial **B40, bioethanol, and bioavtur.**

COFIRING

Blending biomass and coal in existing CFPP Utilization potential: 8.06 mio ton biomass, which can be supplied from waste, wood chips, and other biomass types

GEOTHERMAL

GEOTHERMAL PP

Additional Capacity until 2030: **3.35 GW**
Investment Required: **17.35 Billion USD**
Investment opportunity through:

- Offering Working Area and Preliminary Survey and Exploratory Assignment (PSEA) Area of Geothermal. Geothermal Areas Offering Plan 2022 – 2024 :
  1. 5 Working Areas with the total capacity of 316 Mwe;
  2. 3 Preliminary and Exploration Survey Assignment Area, with total capacity of 101 MWe
- Implementation of geothermal industry and supporting services

WIND POWER

ONSHORE WIND PP

Additional Capacity until 2030: **597 MW**
Investment Required: **1.03 Billion USD**
Investment opportunity through:
Development of Wind PP through auction by PT PLN (Persero)

OFFSHORE WIND:

Offshore Wind Power Plant is still in the research and development stage. The Bandung Institute of Technology (ITB) has conducted pre-feasibility study regarding **offshore wind** potential in **Papua**, resulted in potential capacity **7,527 MW**

GREEN HYDROGEN / AMMONIA

GREEN HYDROGEN PLANNING

1. Green Hydrogen will support the massive development of Solar PV in 2031 – 2060 with around **52 GW**, as planned in the Net Zero Emission Roadmap (NZE) 2060.
2. The investment required: **25.2 Billion USD**

INCENTIVES AND GREEN PRODUCTS AS A STIMULUS TO ENCOURAGE THE UTILIZATION AND DEVELOPMENT OF RENEWABLE ENERGY BUSINESSES

Tax Allowance

- Reduction in income tax 5% for 6 years
- Regulation : PP 78/2019, BKPM Regulation No. 4/2021, PMK No. 11/2020 jo. PMK No. 96/2020

Import Duty Exemption

- 2-year import duty exemption for machinery and equipment.
- Additional 2-year exemption on raw materials for companies using local machinery and equipment (min.30%)
- Regulation: PMK No.176/2009 jo. PMK No. 188/2015, PMK No. 66/2015, BKPM Regulation No. 4 of 2021

Tax Holiday

- Tax relief 5-20 years
- Maximum income tax reduction of 100%
- Minimum investment IDR 500 billion
- Regulation: PMK No. 130/2020, BKPM Regulation no. 7/2020

Mini Tax Holiday

- 5-year tax relief
- Maximum income tax reduction of 50%
- Minimum investment IDR 100 - 500 billion
- Regulation: PMK No. 130/2020, BKPM Regulation No. 7/2020

Renewable Energy Certificate (REC)

- A REC is a certificate attesting to the production of Electric Power per megawatt-hours (MWs) from a Power Plant, which certificate represents 1 MWs of energy production.
- PLN RECs are issued by an electronic tracking system that ensures that RECs that have been used by their owners cannot be traded again. The entire process has been verified and meets international standards.
- The environmental attributes attached to RECs such as carbon attributes cannot be sold and used in other market instruments.

Purpose of

- Fulfill Consumer Demands
- Encouraging more Renewable PP Development
- Attracting more sustainable investment to Indonesia

Role of REC

- As an instrument of recognition for the use of renewable energy
- As a procurement option for transparent fulfillment of RE usage targets
- Encourage the growth of the national RE market

Technology Innovation

Cirata 149 MWp Floating Solar PV in West Java

Advancing Innovation and New Energy Development

Hydrogen

Hydrogen is projected to start growing after 2030, with wider uses including hydrogen vehicles (fuel cell or synthetic fuel), power generation, and as energy storage.

Hydrogen will also be used as part of decarbonization efforts in hard to abate sectors (shipping, aviation, steel production, manufacturing, long distance transportation).

SAF

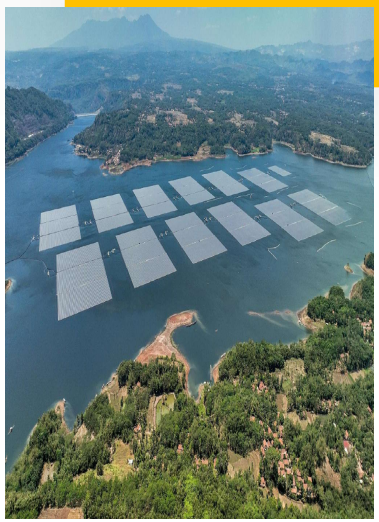
(Sustainable Aviation Fuel)

Indonesia successfully conducted the world's first commercial flight using Sustainable Aviation Fuel (SAF) *bioavtur* J2.4 based on palm kernel oil on October 27, 2023 on the Jakarta-Solo route.

The SAF is produced by blending bio-based fuel and conventional JET fuel. This flight is a form of Indonesia's seriousness to realize Net Zero Emission (NZE) 2060 or sooner.

Floating PV

Last year, Indonesia has officially developed 193 MW floating solar PV in Cirata Dam, making it the third largest globally.



The success of Cirata floating solar PV project opens wide opportunities to be replicated. In Indonesia, the total potential for floating solar PV on dams and lakes is estimated to reach more than 89 GW in 293 locations

Cirata Floating Solar Power Plant

The Green Power for Many Homes

Capacity:

145 MWac (192 MWp)

The Biggest at Southeast Asia

Emission Reduction CO_2	→	**214.000** ton per annum
Produce **Green energy** per annum	→	More than **200 Million kWh**
Electrified more than	→	**50.000** Households

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

Designated as National Strategic Project that accelerates NRE implementation

Challenges and Partnership

Mataredi 95 kWp Solar PV in NTT

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

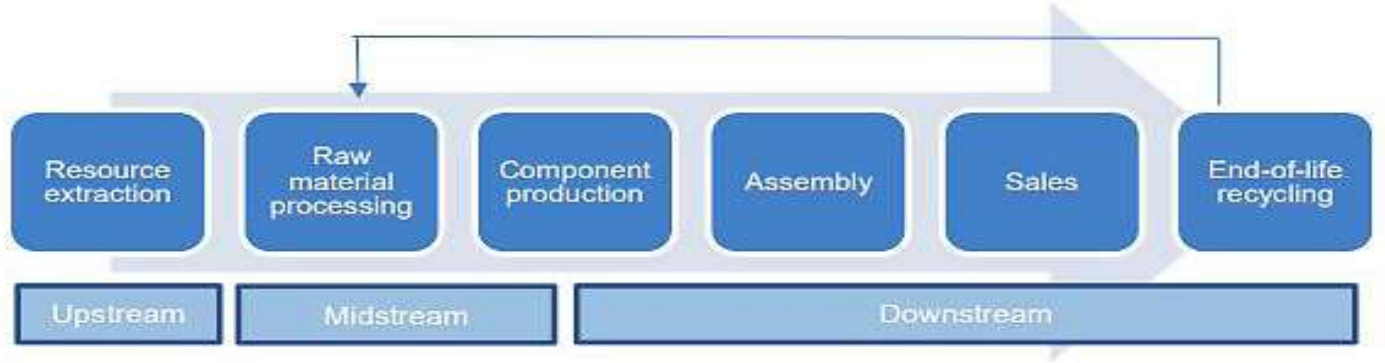
Provision of “cheap” and accessible fund or incentives for NREEC Projects

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.

Mahasiswa program MBKM Gerilya

SYNERGIES TOWARDS ENERGY TRANSITION

Collaboration and participation from all stakeholders, including **human resource development**, are needed to achieve a **Just Energy Transition** and meet **Climate Change Mitigation Goals**.

JUST ENERGY TRANSITION

ENTERPRISE

Engaging in power generation and fuel business activities, support services, job creation, contributions to state revenue, and economic activities.

Community & NGOs

NGOs play a role as a balance and partner to the government, providing advocacy/support for communities, conducting positive campaigns, and actively participating in the development of renewable energy.

MEDIA

Mengedukasi masyarakat akan pentingnya NRE serta menyebarluaskan program pemerintah kepada masyarakat

GOVERNMENT

Educating the public about the importance of renewable energy and disseminating government programs to the community.

ACADEMIC

Creating innovations in the field of renewable energy that can be directly utilized by the community, improving the quality of human resources, and promoting technology transfer.

POTENTIAL COOPERATION ON ENERGY TRANSITION

- **Exchange programs** for researchers, engineers, and technology experts between Indonesia and Germany to enhance mutual understanding on advanced technology for energy transition (hydrogen production, offshore wind/solar, floating wind, CCS)
- Collaboration in **developing clean hydrogen production supply chain** technologies, such as water electrolysis, refuelling infrastructure, fuel cell vehicles (FCVs)
- Collaboration in **marketing and promoting renewable energy** in international markets
- **Joint investment** partnerships for renewable energy industry's supply chain.

Terima Kasih

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Alamat

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