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

TERUS MELAJU UNTUK INDONESIA MAJU

ASEAN INDONESIA 2023

Country Report

Energy Report in Indonesia

JICA Knowledge Co-Creation Program
Energy Policy

25 June – 22 July

COUNTRY PROFILE: INDONESIA

Largest Archipelago Nation

17.001 islands (5 main islands, 6.000 islands inhabited)
Capital City: Jakarta
Region: Southeast Asia
Neighboring Country: Singapore, Malaysia, Philippines, Brunei Darussalam, Timor Leste, Papua New Guinea, Australia

Approximately **275 million** population with
88 million household
Population growth 1,17% per year

JAKARTA

A Vast, Huge, Diverse and Polyglot Nation

500 ethnic groups with more than **700 languages** and dialects.
Bahasa Indonesia is the official language

Economic Figure

USD 1.245 billion
(GDP 2022)

USD 4.513,4
(GDP Per Capita 2022)

5,3%
(GDP Growth 2022)

4,4%
(Inflation Rate 2022)

USD 292 billion
(Export 2022)

USD 237,4 billion
(Import 2022)

23,45%
(Export to GDP 2022)

Currency: IDR
Indonesian Rupiah
1 Yen = 107 IDR
1 USD = 14.500 IDR

Energy Reserves and Potency

4,17 billion barrels
Proven Reserves

54,83 TSCF
Proven Reserves

35.054 million ton
Proven Reserves

3,6 GW
Technical Potential

Source: MEMR, HEESI 2022 and BPS, Statistic Yearbook 2023

THE ENERGY SECTOR POLICY, IMPLEMENTATION AND DEVELOPMENT

Ministry of Energy and Mineral Resources

The Ministry of Energy and Mineral Resources has the task of organizing government affairs in the field of energy and mineral resources.
the Ministry of Energy and Mineral Resources carries out the following functions: formulation, stipulation and implementation of policies in the field of guidance, control, and supervision of oil and gas, electricity, minerals and coal, new energy, renewable energy, energy conservation, and geology

National Research and Innovation Agency

organizing government duties in the field of research, development, assessment, and application as well as invention and innovation, the implementation of nuclear power, and the implementation of space nationally integrated.
The agency functions to implement the research, development, assessment, and application as well as invention and innovation which cover also the development of energy sector

State-Owned Enterprise in Energy Sector

PLN
Power Generation and Electricity Utility

PERTAMINA
Oil and Natural Gas Utility

MIND ID
Mining Industry Indonesia
Mineral Resources Mining

PAST ENERGY DEMAND AND SUPPLY (1/4)

Primary energy supply by source

Unit: ktoe

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Production	378.955	394.964	428.869	440.719	432.059	432.231	460.533	489.855	450.555	480.879	455.535
Import	39.589	44.164	48.713	51.180	49.261	47.479	48.888	41.489	40.283	48.530	51.692
Export	(219.672)	(232.033)	(245.139)	(274.253)	(264.231)	(243.569)	(246.002)	(291.386)	(260.497)	(279.689)	(245.932)
Stock Change	9.836	4.955	(9.125)	26.795	(14.892)	(22.802)	(48.686)	(13.062)	(21.247)	(33.342)	(4.869)
Total	**208.708**	**212.049**	**223.318**	**244.441**	**202.197**	**213.440**	**214.733**	**226.896**	**209.095**	**216.378**	**256.427**

Primary energy supply by energy source

Unit: ktoe

Year	Coal	Crude Oil & Product	Natural Gas & Product	Hydro Power	Geothermal	Solar PP & Solar PV	Wind	Bioenergy PP (inc. MSW)	Solar Powered Public Street Lighting & Energy Saving Lamp	Solar Water Heater	Direct Use of Geothermal	Biofuel	BioGas	Traditional Biomass	Industrial Biomass	Total
2012	48.300	82.508	36.324	4.090	2.118	-	-	-	-	-	-	608	-	13.914	-	187.861
2013	42.377	82.271	37.819	5.389	2.134	-	-	-	-	-	-	952	-	13.352	-	184.295
2014	44.794	80.876	37.993	5.314	2.267	-	-	-	-	-	-	1.675	-	13.002	-	185.921
2015	51.047	71.328	39.149	4.845	2.287	-	-	-	-	-	-	1.173	17	11.890	0	181.752
2016	53.243	74.499	40.397	6.643	2.455	-	-	-	-	-	-	2.888	20	11.209	26	191.379
2017	57.054	77.437	39.985	6.664	2.836	-	-	-	-	-	-	2.933	2	10.314	3	197.270
2018	67.667	79.407	40.364	5.629	3.646	50	65	4.269	1	-	-	3.964	23	9.964	48	215.096
2019	81.390	76.301	40.402	5.506	3.667	65	166	4.187	2	-	-	6.430	23	9.421	78	227.637
2020	77.549	65.940	35.160	6.329	4.047	10	163	4.254	2	-	-	7.772	25	10.382	89	211.812
2021	78.229	69.080	33.890	6.433	4.135	110	150	5.239	2	-	-	9.179	25	10.378	183	217.034
2022	104.401	77.346	34.302	7.109	4.337	239	122	7.292	7	131	1	10.412	29	10.066	633	256.427

Source: MEMR, HEESI 2022

PAST ENERGY DEMAND AND SUPPLY (2/4)

Final energy consumption by sector

Unit: ktoe

Sector	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	*2022*
Industrial	51.759	39.699	40.771	40.428	37.252	38.371	46.163	54.402	47.840	44.712	74.865
Households	20.668	20.890	21.365	20.874	20.917	20.739	21.271	21.505	22.146	22.634	22.608
Commercial	5.199	5.493	5.635	5.500	5.792	5.933	6.104	6.376	5.909	6.153	6.951
Transportation	46.133	47.797	47.989	48.374	47.774	50.929	55.953	57.850	50.983	54.379	60.005
Other	4.719	4.355	4.017	3.039	2.781	2.380	1.901	1.556	1.434	1.510	1.549
Final Energy Consumption	128.478	118.234	119.777	118.214	114.516	118.351	131.392	141.689	128.312	129.388	165.978
Non Energy Utilization	4.081	3.972	3.986	4.190	3.522	3.520	3.579	3.577	3.446	4.213	4.423

Final energy consumption by energy source

Unit: ktoe

Year	Traditional Biomass	Industrial Biomass	Solar Water Heater	Direct Use of Geothermal	Coal	Natural Gas	Oil Fuel	BioGasoil			BioGas	Briquette	LPG	Electricity	Total
								Gasoil	Biodiesel	Blending Product					
2012	13.893	-	-	-	17.223	13.652	5.446	7.684	61	8.292	-	18	6.004	14.932	128.478
2013	13.340	-	-	-	5.982	13.796	52.927	8.432	952	9.384	-	18	6.692	16.095	118.234
2014	12.985	-	-	-	7.709	13.638	50.920	8.526	1.675	10.202	-	8	7.272	17.044	119.777
2015	11.850	17	-	-	9.832	13.350	45.266	12.025	831	12.857	17	7	7.611	17.408	118.214
2016	11.159	26	-	-	8.891	10.841	46.073	8.294	2.732	1.103	20	15	7.928	18.538	114.516
2017	10.314	26	-	-	82	12.464	46.404	108	2.335	13.143	22	15	8.582	19.149	118.499
2018	9.964	48	-	-	14.071	13.547	4.490	14.833	3.406	18.239	23	5	9.026	21.567	131.392
2019	9.421	78	-	-	23.438	13.415	36.676	21.055	5.809	26.864	23	4	9.283	22.487	141.689
2020	10.382	89	-	-	15.878	13.745	31.127	17.473	7.629	251	25	26	96	22.362	128.312
2021	10.378	183	-	-	1.229	12.538	33.032	18.727	8.441	27.168	25	-	9.975	23.793	129.388
2022	10.066	633	131	1	41.887	10.441	37.039	20.366	9.490	29.856	29	-	10.218	25.678	165.978

Source: MEMR, HEESI 2022

PAST ENERGY DEMAND AND SUPPLY (3/4)

Electricity generation by energy source

Unit: GWh

Year	Coal	Oil	Gas	Renewable	Hybrid	Total
2012	102.166	21.583	54.077	22.515	-	200.341
2013	111.252	20.362	58.050	26.528	-	216.192
2014	119.532	23.039	60.537	25.448	-	228.556
2015	124.657	30.911	54.137	24.278	-	233.983
2016	135.381	20.800	61.789	29.950	-	247.920
2017	147.964	18.848	55.830	32.016	-	254.658
2018	160.013	17.946	57.447	48.361	5	283.772
2019	174.493	10.582	62.319	48.050	5	295.449
2020	180.869	6.764	51.276	52.916	5	291.830
2021	189.958	6.648	56.265	56.476	5	309.352
2022	205.308	6.089	56.126	66.014	-	333.537

- After a sharp decline in 2020 due to the Covid-19 pandemic, final energy consumption went up in 2021. Final energy consumption was 123 million TOE in 2021, an increase of approximately 1.6 percent due to economic recovery along the year.
- In the last ten years, electricity consumption has increased from 174 TWh in 2012 to 255 TWh in 2021. After witnessing a dip in power usage in 2020 owing to the Covid-19 pandemic, it leads to electricity gaining the biggest growth compared to other types of energy.
- Although the recent recovery plan after the pandemic yet to make impact for RE development since the many of RE PP projects put on halt due to oversupply issue in some area distribution. But PLN try to compensate the pushing target of RE share in electricity by established the Cofiring biomass project in their CFPP.

Source: MEMR, HEESI 2022 and NEC, Inonesia Energy Outlook 2022

PAST ENERGY DEMAND AND SUPPLY (4/4)

CO2 emission by sector

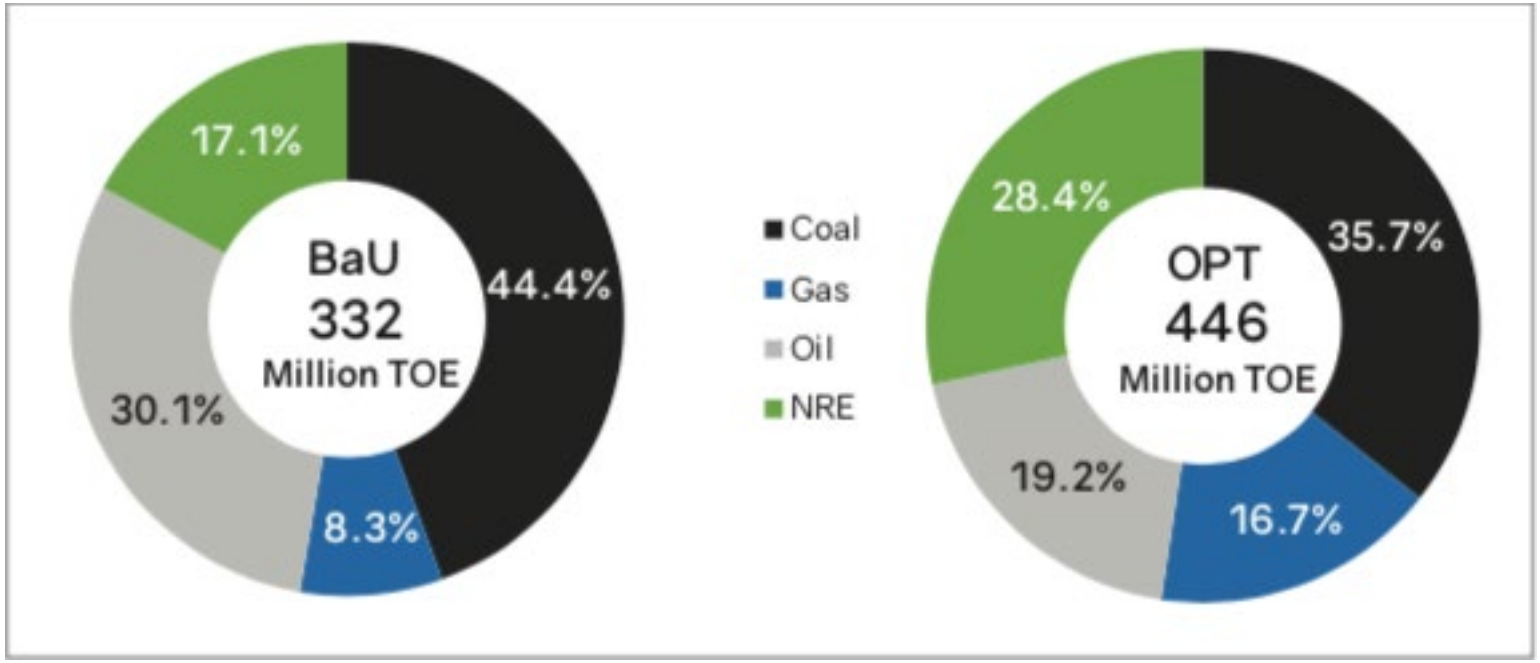
Unit: MtCO2e

Source of GHG Emissions	Emission (Gg CO2e)																				
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
By Type of Fuel																					
1. Liquid Fuels	164.914	174.125	182.003	181.234	204.341	199.636	183.869	185.707	186.400	188.125	210.441	243.878	262.190	255.883	271.569	223.560	220.606	215.526	234.188	225.682	199.590
2. Solid Fuels	52.911	67.199	69.334	93.076	85.518	97.997	118.121	145.745	118.057	135.904	150.024	162.633	170.858	154.837	187.476	205.753	214.607	226.794	272.744	328.057	312.577
3. Gas Fuels	83.909	90.847	97.907	104.927	100.795	83.393	87.199	65.831	76.452	101.482	85.083	85.797	85.302	90.935	96.795	101.106	105.334	99.018	100.853	89.390	78.180
Total by type of fuel	**301.734**	**332.171**	**349.244**	**379.238**	**390.655**	**381.025**	**389.190**	**397.283**	**380.908**	**425.511**	**445.548**	**492.308**	**518.349**	**501.655**	**555.840**	**530.420**	**540.547**	**541.338**	**607.786**	**643.129**	**590.347**
By Sector/ Sorces																					
1.A1. Energy Industries	**89.716**	**110.764**	**119.793**	**130.188**	**129.518**	**127.816**	**137.094**	**124.026**	**124.485**	**136.599**	**144.526**	**173.803**	**187.631**	**189.860**	**223.213**	**226.278**	**246.851**	**258.041**	**276.242**	**289.001**	**293.143**
1.A.1.a Electricity Generation	62.030	76.614	80.964	90.946	93.516	101.948	108.930	121.696	121.940	136.058	130.886	160.771	174.873	177.294	203.671	211.916	231.370	243.629	261.427	273.523	279.334
1.A.1.b Oil and Gas	27.686	34.151	38.829	39.242	36.002	25.867	28.049	2.211	2.442	395	13.449	12.988	12.672	12.529	14.503	14.331	15.469	14.341	14.791	15.459	13.683
1.A.1.c Coal Processing	-	-	-	-	-	-	115	119	103	146	192	44	86	37	39	31	71	71	24	19	126
1.A.2 Manufacturer	**83.369**	**83.555**	**83.034**	**99.575**	**93.449**	**95.040**	**104.245**	**132.982**	**118.579**	**112.972**	**114.542**	**96.171**	**80.028**	**92.072**	**96.422**	**100.174**	**79.484**	**79.663**	**103.167**	**136.179**	**105.641**
1.A.2.a Iron and Steel																3.591	1.991	1.780	5.241	25.093	32.606
1.A.2.c Chemical																9.716	10.517	10.431	10.557	10.539	9.365
1.A.2.d Pulp, Paper, and Print																12.574	12.735	10.819	12.296	12.910	6.485
Tobacco																25.038	14.223	14.225	14.224	14.224	14.224
1.A.2.f Non-Metallic Minerals																14.539	18.620	21.306	20.916	20.357	21.222
1.A.2.m Non-specified Industry																33.916	21.398	21.102	39.853	53.056	21.738
1.A.3 Transportation	**59.659**	**63.555**	**64.921**	**66.805**	**76.295**	**76.191**	**71.924**	**74.226**	**78.860**	**89.426**	**108.264**	**117.570**	**139.271**	**143.243**	**141.520**	**128.010**	**136.405**	**147.230**	**157.522**	**157.771**	**135.217**
1.A.3.a Civil Aviation	3.010	3.683	3.997	4.821	6.092	5.806	6.070	6.440	6.817	6.855	9.899	8.900	9.730	10.385	10.554	10.832	12.178	13.408	14.279	12.560	6.928
Railways)	56.266	59.484	60.556	61.675	69.893	70.147	65.659	67.498	71.741	82.337	98.136	108.465	129.343	132.732	130.870	117.092	124.108	133.689	143.127	145.116	128.216
1.A.3.c Water-Borne Navigation	384	388	368	309	311	237	195	288	281	234	228	206	197	126	96	86	109	132	116	95	74
1.A.4.a Commercial	**4.419**	**4.501**	**4.446**	**4.237**	**4.731**	**4.497**	**3.997**	**3.695**	**3.406**	**3.287**	**3.793**	**3.462**	**4.306**	**4.103**	**3.834**	**4.413**	**2.918**	**3.182**	**2.653**	**2.163**	**1.735**
1.A.4.b Residential	**38.315**	**38.193**	**37.152**	**37.725**	**37.989**	**36.723**	**34.244**	**34.758**	**32.597**	**29.462**	**28.299**	**28.674**	**29.663**	**31.313**	**32.303**	**32.720**	**33.164**	**34.863**	**25.341**	**25.700**	**26.543**
1.A.5 Non-Specified	**12.765**	**13.366**	**13.105**	**13.823**	**13.822**	**12.667**	**11.290**	**11.035**	**10.936**	**11.027**	**12.505**	**11.848**	**14.670**	**13.501**	**12.443**	**14.258**	**8.853**	**9.095**	**7.031**	**5.130**	**3.664**
1.A Fuel Combustion	**288.243**	**313.935**	**322.452**	**352.353**	**355.806**	**352.933**	**362.794**	**380.722**	**368.862**	**382.772**	**411.929**	**431.529**	**455.570**	**474.092**	**509.736**	**505.852**	**507.674**	**532.073**	**571.956**	**615.945**	**565.943**
1.B Fugitives	**29.366**	**27.984**	**27.034**	**25.697**	**24.630**	**24.055**	**23.306**	**22.267**	**22.942**	**22.881**	**22.786**	**22.955**	**22.280**	**21.938**	**21.408**	**21.250**	**21.901**	**21.901**	**21.071**	**20.508**	**18.341**
1.B.1 Fugitives Solid Fuels Mining	336	404	451	498	577	666	845	946	1.048	1.117	1.200	1.541	1.684	2.069	1.993	2.013	1.990	1.990	2.433	2.688	2.459
1.B.2 Fugitives Oil/Gas	29.030	27.580	26.583	25.199	24.053	23.389	22.461	21.321	21.894	21.763	21.586	21.414	20.596	19.869	19.410	19.237	19.912	19.912	18.638	17.821	15.883
1.B.3 Other Emission from Energy Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sectoral	**317.609**	**341.919**	**349.485**	**378.050**	**380.434**	**376.988**	**386.100**	**402.989**	**391.784**	**405.653**	**434.715**	**454.484**	**477.850**	**496.030**	**531.142**	**527.103**	**529.576**	**553.974**	**593.027**	**636.453**	**584.284**

Source: MOEF, GHG Emission Report 2021

OUTLOOK OF ENERGY DEMAND AND SUPPLY (1/3)

National Primary Energy Supply



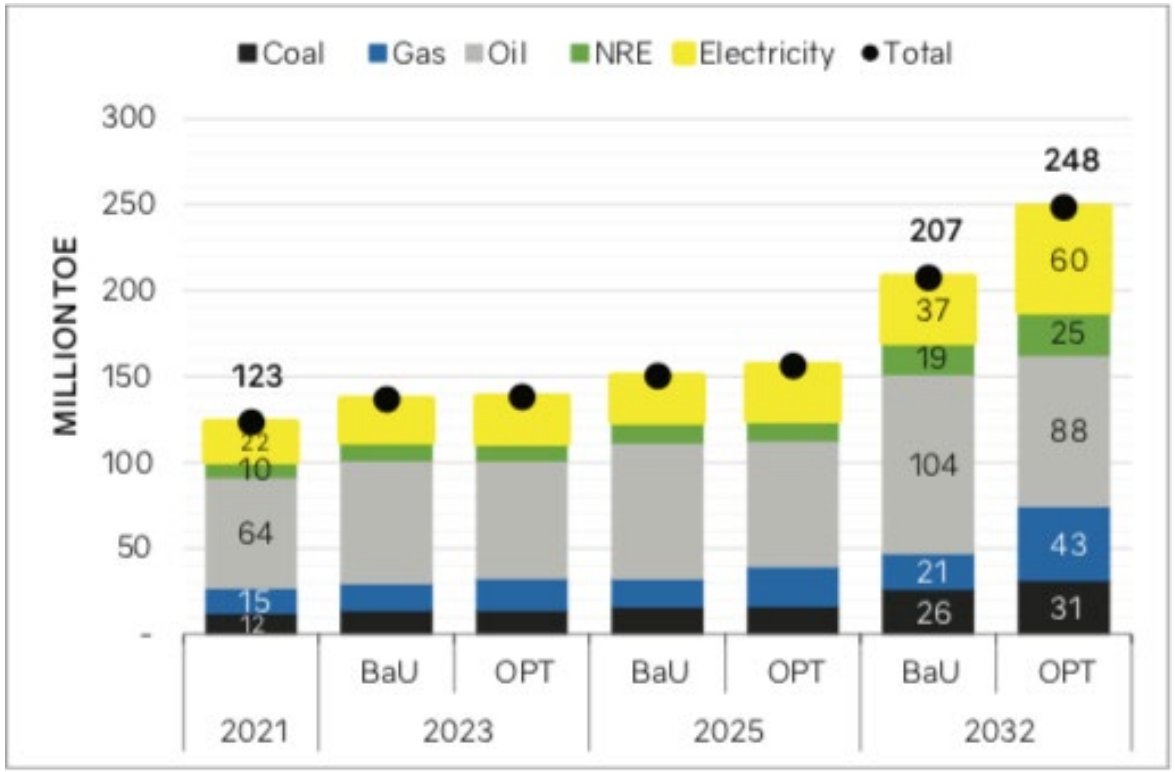
Primary energy supply grows on average of 5% in BaU scenario and 7.8% in OPT scenario that it will reach 332 million TOE (BaU) and 446 million TOE (OPT). At the end of the projection year, the share of coal still dominates at 44.4% (BaU) and 35.7% (OPT). Meanwhile, the share of NRE in OPT scenario is projected to increase to 28.4% as a result of the use of biomass (NRE) to reduce coal use and increase the use of biofuels.

Source: NEC, Inonesia Energy Outlook 2022

OUTLOOK OF ENERGY DEMAND AND SUPPLY (2/3)

Final energy consumption by sector

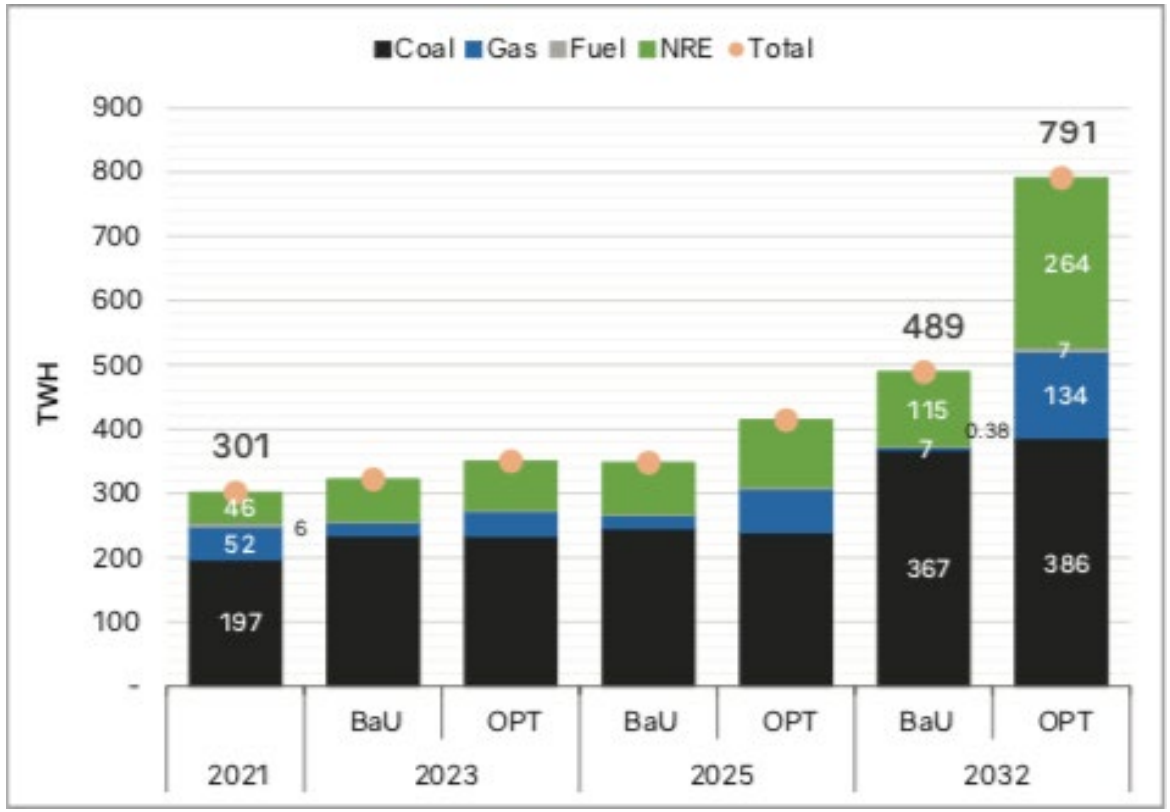
Final energy consumption by energy source



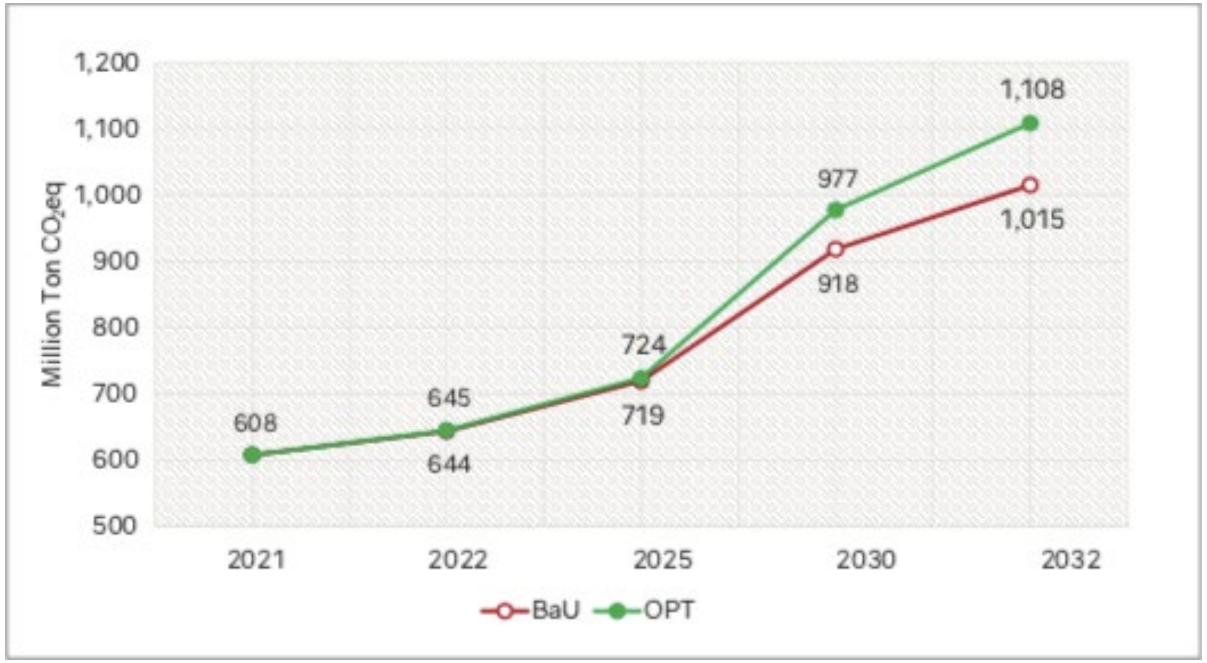
Source: NEC, Inonesia Energy Outlook 2022

OUTLOOK OF ENERGY DEMAND AND SUPPLY (3/3)

Electricity generation by energy source



CO2 Emission Projection



Source: NEC, Inonesia Energy Outlook 2022

RENEWABLE ENERGY CHALLENGES

LOW TARIFF

Making RE investments not attractive in many case

HIGH COLLATERAL REQUIREMENTS AND ABSENCE OF PROJECT FINANCE

Making it difficult to raise debt financing for RE investments

BUILD-OWN-OPERATE-TRANSFER (BOOT) IN PPA

Instead of Build-own-operate model

HIGH INTEREST LOAN

Reducing the returns of typically capital-intensive RE investments

SMALL-SIZED PROJECT

Related to risks in relation to investment costs which reduce options in financial structuring and arrangement

LOCAL CONTENT

Challenging to design projects in a cost-efficient way

LIMITED CAPACITY OF PROJECT DEVELOPERS AND FINANCIAL INSTITUTION

Challenging to develop high-quality projects and evaluating projects and structuring finance

PERMIT AND LICENSE

Uncertainty related to requirements, timelines and outcomes of licensing and permitting procedures create unreasonably high risk for project developers

TRAINING EXPECTATION

Course of Interest:

- Scenario Analysis
- Energy Demand Modelling

Institution expectation:

- It is expected that the results of this training will increase the level of competence of trainees and provide new views or ways of preparing policies that are in accordance with the rules for preparing an energy policy.

- It is hoped that the output of this training will be the first step in preparing a better new energy policy, especially in this case the utilization and development of a more massive bioenergy sector.

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

ASEAN INDONESIA 2023

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THANK YOU

ENERGY PRICES (1/2)

Year	Gasoline[2] (Ron 88)		Gasoline (Ron 92)		Avtur		Kerosene		Gasoil CN 48		Gasoil CN 53		LPG (3 Kg)		LPG (12 Kg)		LPG (50 Kg)	
	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE	Thousand Rp/BOE	US$/ BOE
2012	772	80	1,614	178	1,591	165	422	35	694	72	1,595	176	499	52	686	71	1,316	136
2013	954	78	1,678	185	1,694	139	422	35	775	64	1,721	190	499	41	747	61	1,569	129
2014	1,157	93	1,859	205	1,524	123	422	34	885	71	1,920	212	499	40	1,211	97	1,548	124
2015	1,238	90	1,517	167	1,562	113	422	31	1,052	76	1,673	184	499	36	1,440	104	1,428	104
2016	1,129	84	1,305	144	1,227	91	422	31	815	61	1,290	142	499	37	1,361	101	1,247	93
2017	1,110	82	1,413	156	1,418	105	422	31	794	59	1,318	145	499	37	1,410	104	1,461	108
2018	1,110	79	1,613	178	1,713	122	422	30	794	57	1,622	179	499	36	1,457	104	1,612	115
2019	1,110	80	1,695	187	1,664	120	422	30	794	57	1,804	199	499	36	1,457	105	1,612	116
2020	1,110	79	1,547	171	1,664	118	422	30	794	56	1,572	173	499	35	1,457	103	1,612	114
2021	1,110	78	1,544	170	1,664	117	422	30	794	56	1,621	179	499	35	1,457	102	1,612	113
2022	1,716	122	2,084	230	1,664	106	422	27	794	50	2,411	266	499	32	2,361	150	2,289	145

Source: MEMR, HEESI 2022

ENERGY PRICES (2/2)

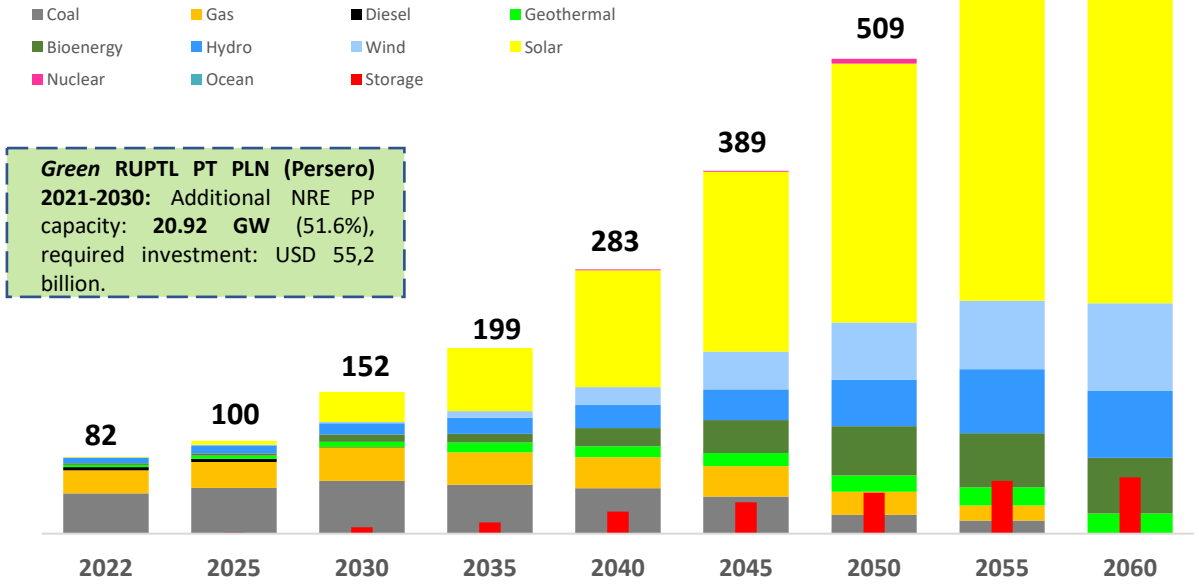
Year	Coal		Electricity (Average)		Electricity (Average)			
			Household		Industry		Commercial	
	Thousand Rp/ BOE	US$/BOE	Thousand Rp/ BOE	US$/BOE	Thousand Rp/ BOE	US$/BOE	Thousand Rp/ BOE	US$/BOE
2012	174	18	1,030	107	1,158	120	1,575	163
2013	219	18	1,129	93	1,299	107	1,822	149
2014	235	19	1,237	99	1,595	128	2,065	166
2015	155	11	1,365	99	1,864	135	2,095	152
2016	143	11	1,376	102	1,716	128	1,959	146
2017	183	14	1,723	127	1,776	131	2,032	150
2018	179	13	1,798	128	1,770	126	2,029	145
2019	179	13	1,793	129	1,796	129	2,053	148
2020	214	15	1,618	115	1,780	126	2,022	143
2021	192	13	1,670	117	1,772	124	2,014	141
2022	213	14	1,841	117	1,763	112	2,048	130

Source: MEMR, HEESI 2022

NZE 2060 IN ACCORDANCE WITH ENERGY SECTOR DEVELOPMENT

NZE Power Plant Development Roadmap

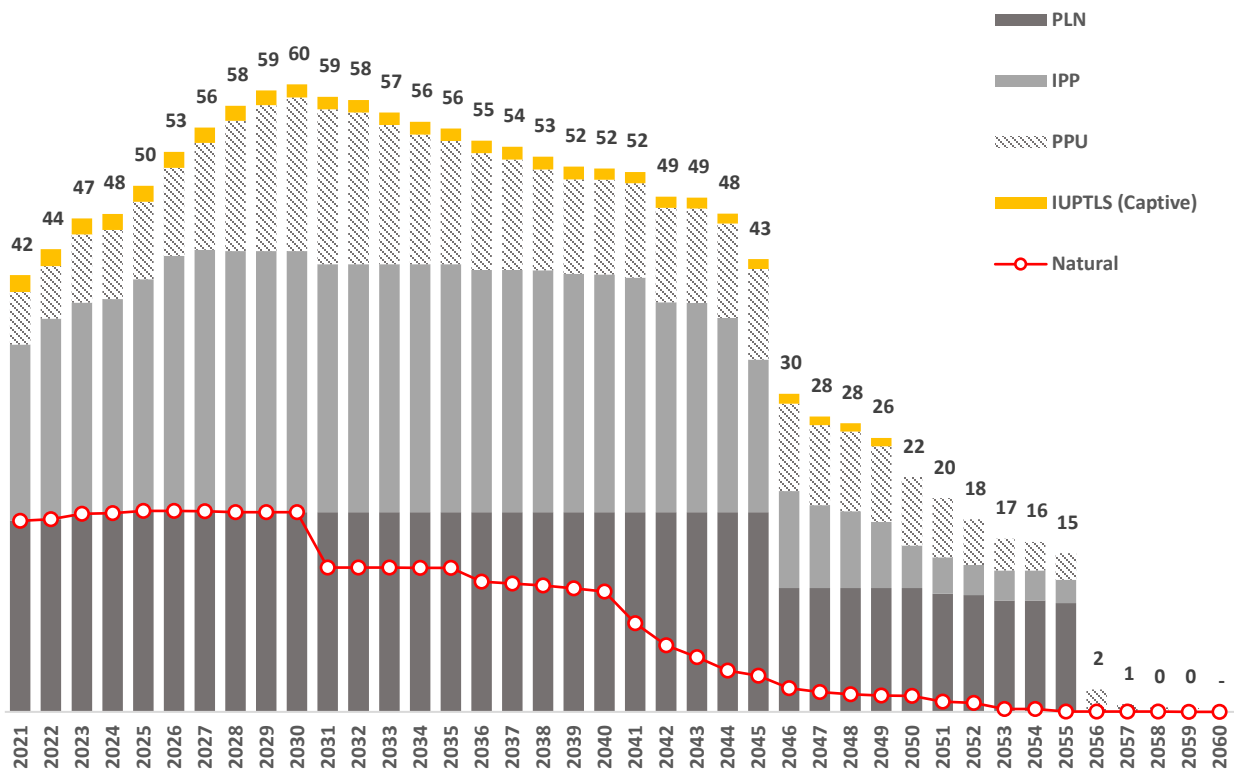
NRE PP Installed Capacity in 2060: 708 GW
Solar 421 GW, Wind 94 GW, Hydro 72 GW, Bioenergy 60 GW, Nuclear 31 GW, Geothermal 22 GW, Ocean Energy 8 GW.
60,2 GW Storage: *Pumped Storage* 4.2 GW, BESS 56 GW.



***Green* RUPTL PT PLN (Persero) 2021-2030:** Additional NRE PP capacity: **20.92 GW** (51.6%), required investment: USD 55,2 billion.

- 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.
- Pump storage enters the system in 2025, Battery Energy Storage System (BESS) to be massively utilized in 2031.
- Nuclear PP will enter the system in 2039 to maintain system reliability. By 2060, up to 31 GW nuclear PP will be deployed.

CFPP Retirement Program



1. By retiring the coal, it is expected that power generation sector will have zero emission in 2060, while the remaining energy sector emission (129 Mio tons CO_2) will be emitted in the industry and transportation sectors.
2. Coal PP capacity includes **existing and on-going Coal PPs for all business areas**, both PLN and non-PLN.
3. Coal PP capacity increase in accordance with the project in the RUPTL.
4. The lifetime of PLN's Coal PP is **in accordance with asset revaluation and maximum 30 years of PPU and 25-30 years of IPP** (according to PPA).

NZE INVESTMENT AND THE ROLE OF INTERNATIONAL FUNDING

NZE 2060 Investment Requirement for Energy Sector

The huge investment of NRE development to realize Indonesia NZE 2060 requires substantial support from stakeholders, including private sectors & international parties.

POWER PLANTS/ *STORAGE*	INVESTMENT REQUIREMENT (MIO USD)	CAPACITY @ 2060 (GW)
HYDRO	168,568	72
NUCLEAR	216,210	31
SOLAR	159,879	421
WIND	156,393	94
GEOTHERMAL	71,270	22
OCEAN/TIDAL	24.205	8
BIOENERGY	122,347	60
COAL	21,693	-*
GAS	13,614	-*
OIL	207	-*
Storage		
BESS	37,218	56
PUMP STORAGE	2,989	4
TOTAL	**994,593**	**768**

- Generation: **USD 994.6 billion**
- Transmission: **USD 113.4 billion**

Total investment: **1,108 billion USD** or **28.5 billion USD/year**

JUST ENERGY TRANSITION PARTNERSHIP (JETP)

FUNDING
20 Billion USD

support the energy transition of the electricity sector in Indonesia which is ambitious and fair to keep global temperature rise below 1.5˚C

TARGET

- **Peaking in the electricity sector's emissions is projected to occur in 2030**, faster than the initial projection;
- **The maximum emission from the electricity sector is 290 million tons of CO2 in 2030**, lower than the baseline value of 357 million tons of CO2;
- Set a target **to achieve net zero emissions in the electricity sector by 2050**, 10 years faster than the initial projection;
- Accelerate the use of renewable energy so that by **2030 it is hoped that at least 34% of electricity generation will come from RE.**

JETP secretary has been established in February 2023 and the Government is currently discussing on the workplan under JETP Comprehensive Investment Plan (CIP) which is targeted to finish in the next six months.

ASIA ZERO EMISSIONS COMMUNITY (AZEC) → 500 Million USD funding

The AZEC Ministerial Meeting was conducted on March 4, 2023 and delivered a Joint Statement and Policy Statement to collectively commit to maintaining stable energy supply and decarbonizing the energy sector.

Commitments

- Address **climate change** while ensuring **energy security**.
- Promote **energy transition** in line with **economic growth**.
- **Utilize a wide range of energy sources and technologies** with the understanding that each country has a different strategy/road to achieve carbon-neutrality/ NZE.

ENERGY TRANSITION ROADMAP TOWARD CARBON NEUTRAL

1) Timeline of strategic achievements to achieve net zero emission in the energy sector
2) This Roadmap will be a form of joint commitment between the government and stakeholders to achieve NZE 2060

2021 – 2025

2025: Emission Reduction 198 Mill ton CO_2

Supply:
- Implementation of 3.6 GW solar roof top
- Construction of NRE Plant capacity 10.6 GW
- Gasification gas generator 1.7 GW
- Take out 8.8 GW PLTU at RUPTL
- Convert Gasoil Plant to NRE
- Gas and Steam Power Plant 0.8 GW as a replacement for Steam Power Plant

Demand:
- Decreasing LPG imports by using Induction stove for 8.2 mill HH.
- Electric vehicles 400K cars and 1.7Mill motorcycles
- Gas network for 5.2 million homes.
- CNG Car 100k
- Application of Energy Management and MEPS

2026 – 2030

NDC TARGET ACHIEVED

Supply:
Construction of NRE Plant capacity 10.3 GW to replace coal power plant

Demand:
- Decreasing LPG imports by using Induction stove for 18.2 mill HH.
- Electric vehicles 2Mill cars and 13Mill motorcycles
- Gas network for 10million homes.
- CNG Car 300k
- DME usage to subtitute LPG for 20,4Mill HH
- Application of Energy Management and MEPS

2030: Emission Reduction 314 Mill ton CO_2

2031– 2035

2035: Emission Reduction 475 Mill ton CO_2

Supply:
- No additional Fosil Power Plant
- No Gasoil Power Plant
- Retirement Coal Power Plant 6 GW*)
- NRE Plant: Solar PV 99 GW, Hydro 3,1 GW, Bioenergy 3,1 GW dan Geothermal 5,6 GW
- **Hydrogen 328 MW**
- Battery use 7 GW

Demand:
- Induction Stove for 28,2 Mill HH.
- EV 5,7Mill Car and 46,3Mill motorcycles
- Gas network untuk 15,3Mill homes.
- CNG Car 800K

2036 – 2040

Supply:
- Retirement Coal power plant 3 GW*)
- NRE Construction: solar PV 68,5 GW, Wind power plant 9,4 GW, Hydro 3,7 GW, Bioenergy 7,8 GW, and geothermal 1 GW
- **Hydrogen use 332 MW**
- Battery use 46 GW

Demand:
- Induction Stove for 38,2 Mill HH.
- EV 12,3 Mill Car and 105Mill motorcycles
- Gas network untuk 20,3Mill homes.
- CNG Car 2Mill

2040: Emission Reduction 796 Mill ton CO_2

2041– 2050

2050: Emission Reduction 956 Mill ton CO_2

Supply:
- Retirement Coal Power Plant 31 GW*)
- NRE Plant : Solar PV 180,2 GW, Wind power plant 17,5 GW, Hydro 13,7 GW, Bioenergy 23 GW, Geothermal 3 GW, **Ocean Current 1,3 GW and Nuclear 5 GW**
- **Hydrogen 9 GW**
- Battery use 151 GW

Demand:
- Induction Stove for 48,2 Mill HH.
- EV 38,2 Mill Car and 205Mill motorcycles
- Gas network untuk 23,4Mill homes.
- CNG Car 2,8Mill

2051 – 2060

Supply:
- Retirement Coal power plant 8 GW*)
- Retirement Gas and Steam Power Plant 8 GW
- NRE Construction : Solar PV 8,2 GW, Wind power plant 11,6 GW, Hydro 37,9 GW, Bioenergy 2,1 GW, geothermal 3 GW, **Ocean Current 12,1 GW and Nuclear 30 GW**
- **Hydrogen use 52 GW**
- Battery use 140 GW

Demand:
- Induction stove for 58Mill HH.
- EV 69,6Mill Car and 229Mill motorcycles
- Gas Network 23,9Mill HH.

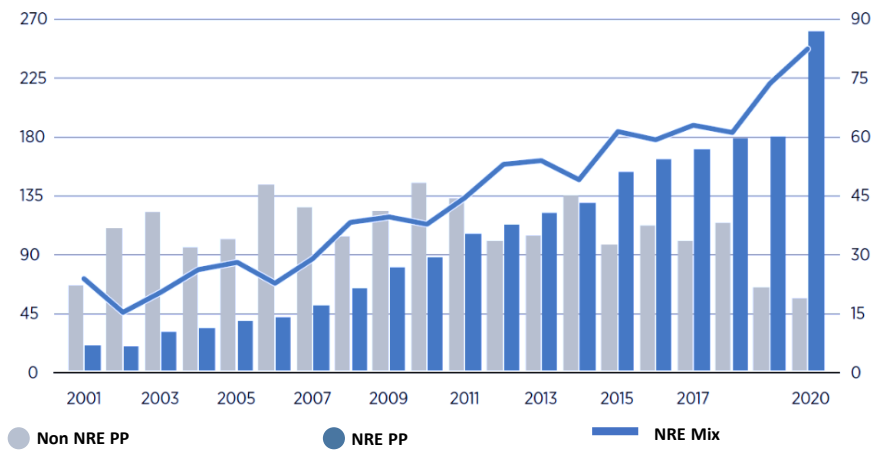
2060: Emission Reduction 1.526 Mill ton CO_2

Innovative low emission technology such as CCS/CCUS technology in some extent could be implemented in existing fossil power generation to accelerate the emission reduction while transitioning to a cleaner and greener energy

*) Coal Power Plant & Power Private Utility (PPU) maximum 30 years and IPP 25-30 years (as in PPA)

CURRENT DEVELOPMENT OF GLOBAL AND INDONESIA NRE

NRE Portion in Annual Capacity Addition (Global)

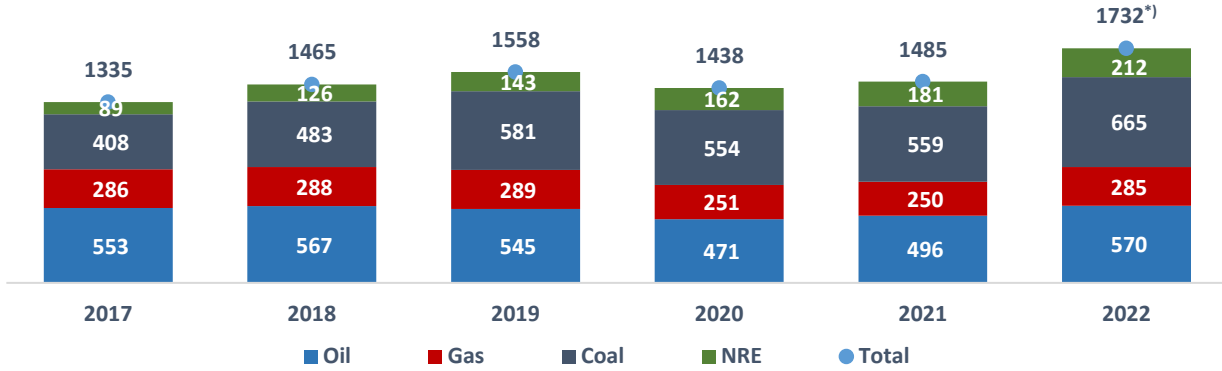


In the last decade, the addition of NRE PP capacity globally has become more dominant than the addition of fossil generators

GLOBAL OIL & GAS COMPANY TO RENEWABLE ENERGY

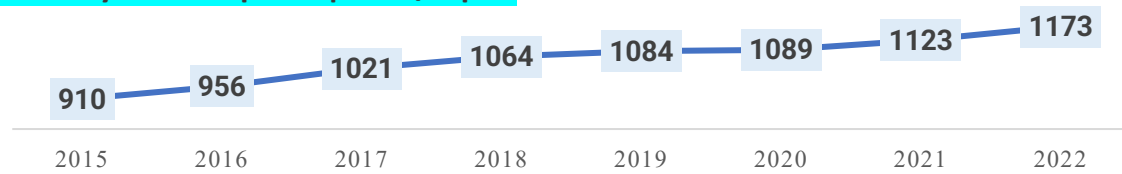
TOTAL ~$5,800 Mn	Acquisition Acquisition Acquisition	adani Renewables eren SAFT	bp ~$900 Mn	Acquisition Acquisition	lightsource bp chargemaster
equinor ~$1,760 Mn	Acquisition Partner	e·on Masdar Clean Energy	eni ~$5 Mn	Partner Dev	Progetto Italia
~$2,400 Mn	Acquisition Partner	Silicon Ranch Marathon Oil Corporation	PETRONAS N/A	Acquisition Partner	AMPLUS SOLAR AHB

National Primary Energy | MBOE



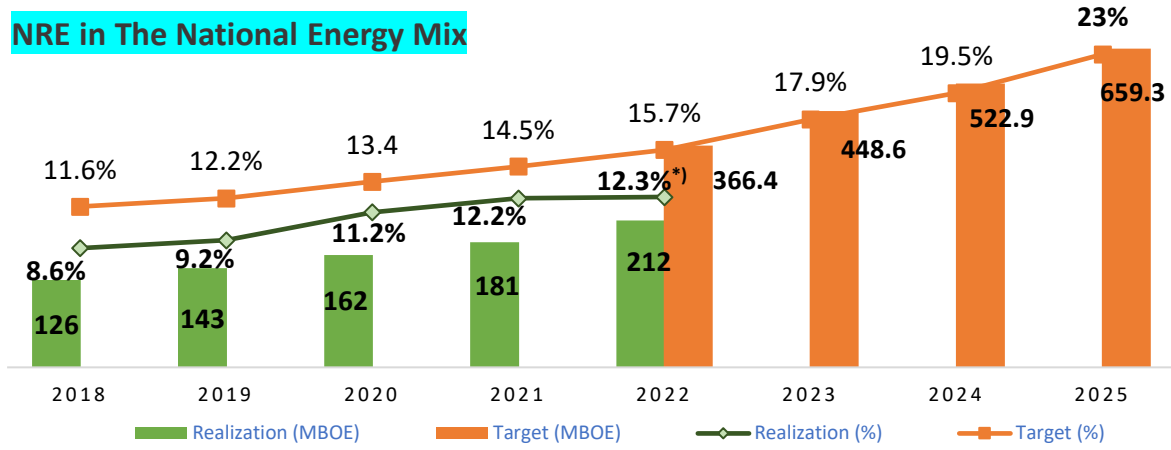
NRE utilization in 2022 increased by 18% (212,48 MBOE) compared to 2021 level

Electricity Consumption | kWh/capita



National electricity consumption in 2022 amounted to **1,173 kWh/capita**, lower than the average electricity consumption in ASEAN of **3,600 kWh/capita**.

NRE in The National Energy Mix



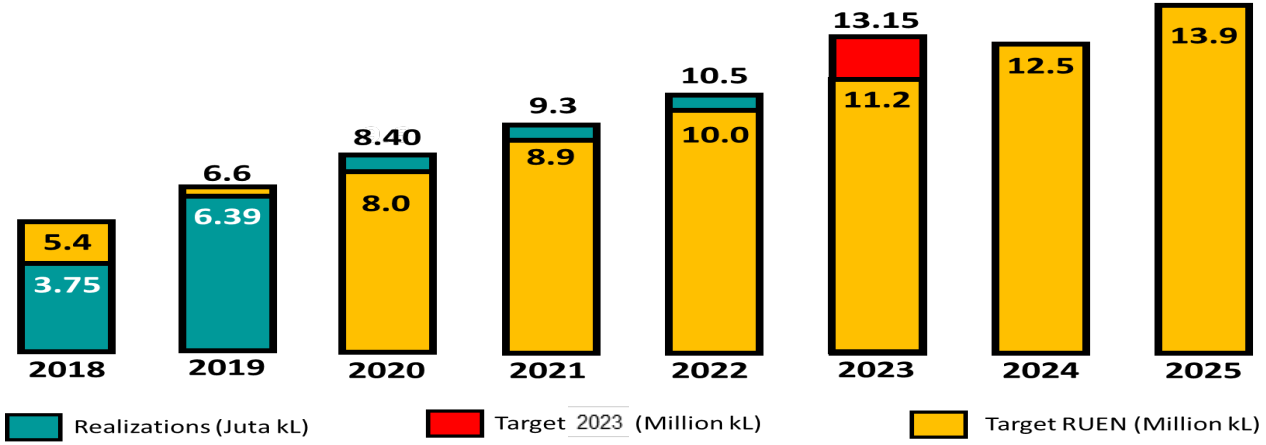
Source : Company Annual Reports and Websites, BNEF, PEI Analysis

Biodiesel Policy and Implementation

Stages of Biodiesel Blending Mandatory (Based on MEMR Regulation 12/2015)

SECTOR	APRIL 2015	JANUARY 2016	JANUARY 2020	JANUARY 2025
Micro Business, Fishery, Agriculture, Transportation, and Public Service (PSO)	15%	20%	30%	30%
TRANSPORTATION NON-PSO	15%	20%	30%	30%
POWER GENERATION	25%	30%	30%	30%
INDUSTRY AND COMMERCIAL	15%	20%	30%	30%

BIODIESEL IMPLEMENTATION (TARGET & REALIZATION)



Biodiesel Plant Installed Capacity

REGION	CAPACITY (kL)
Sumatera	7,791,295
Jawa	5,371,474
Kalimantan	5,608,649
Sulawesi	475,862
TOTAL	19,247,280

BIODIESEL MANDATORY SUPPORT

Sufficient Production Capacity
(Installed Cap. 17.2 Million kL)

Incentives
(Government provides incentives from CPO Fund)

Regulatory Framework
(Supporting regulations to ensure the sustainability of the mandatory program)

Monitoring & Evaluation
(The government conducts periodic monitoring & evaluation)

National Standard
(National standard and technical guideline to maintain quality)

Infrastructure
(Infrastructure readiness to support blending and distribution systems)

MANDATORY STAGES OF BIODIESEL UTILIZATION