

The Adequacy of Indonesian Energy Resources For Future Electricity Supply

Dr. Herman Darnel Ibrahim
Chairman of ICEES

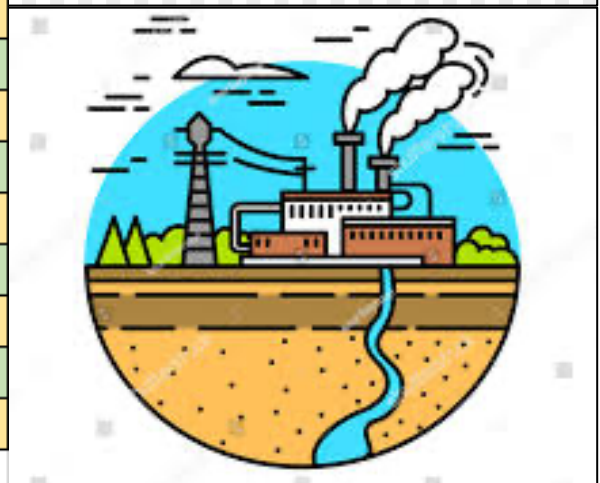
MAREM and IESR Webinar
“Menimbang Risiko PLTN di Indonesia”

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Supply Scenario To 2050 [Revised]

					In Terrawatthours	
Production and Energy Sources	2018 * Actual	2020	2030	2040	2050	2050 Plant Capacity [MW]
Produksi [KEN]		374	898	1521	2081	NA
Produksi Revisi	284	300	600	1000	1300	NA
Renewable						
Geothermal	15	16	30	80	150	20000
Hydro	23	24	50	100	200	50000
Wind	0,6	0,6	8	20	30	10000
Solar	0,2	0,4	30	80	120	80000
Biomass+Biogas	9	10	50	110	175	25000
Non Renewable						
Gas	59	59	120	200	240	35000
Coal	159	172	300	400	400	55000
Diesel [BBM]	18	18	12	10	5	1000
Total	284	300	600	1000	1320	276000
RE Percentage	17	17	28	39	51	67

* Source: Energy Outlook 2019 DEN



- Actual electricity consumption by 2018 is much below the KEN projection.
- Electricity Consumption in 2030 is estimated at 600 Twh [900] and in 2050 will be around 1300 Twh [2100]

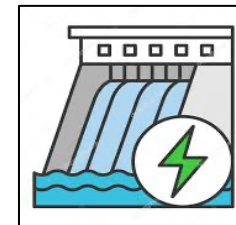
Energy Resources and Potential

No	Energy Source	Reserve and Resource*			Approximate Supply Capability [Practical]			
		Reserve [C]	Resource [S]	Unit	C [%]	S [%]	MTOE PE	Eq. MWe
1. Renewable Energy								
1.1	Biomass [Biofuel]	30	175	10^6 kliter		60	95	NA
1.2	Geothermal	2300	28000	Mwe		90	85	25000
1.3	Hydro	6000	75000	MWe		80	30	60000
1.4	Ocean	NA	48000	MWe		25	5.4	12000
1.5	Solar	NA	1200	GWe		10	18	120000
1.6	Biomass [Waste]	NA	50000	MWe		60	55	30000
1.7	Wind	NA	15000	MWe		70	4.8	10000
2. Fossil Energy								
2.1	Petroleum	7990	56600	10^6 Barrel	100	50	5298	NA
2.2	Coal	21130	104940	10^6 Ton	100	30	26324	NA
2.3	Natural Gas	159.6	334.5	TCF	100	50	8242	NA
2.4	CBM	0	453.3	TCF	100	20	2286	NA
2.5	Nuclear	NA	34112	Ton U		50	1835	NA
3. Total 1.1-1.7 [RE]							293	265000
4. Total 2.1-2.5							43985	NA

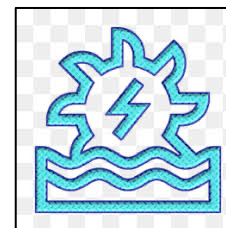
* Most of the data is from Ministry of Energy and Mineral Resources



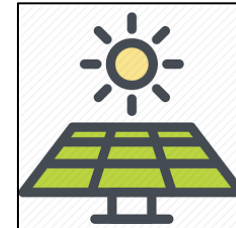
25 GWe



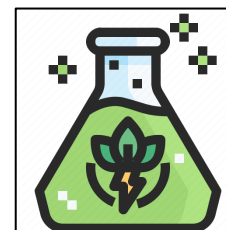
60 GWe



12 GWe



120 GWe



30 GWe



10 GWe



28 Milyar
Barrel
5,300
MTOE



31,5 Milyar
Tons
26,300
MTOE



168 Terra
Cubic Feet
8,200
MTOE

Location of Energy Resources



Indonesia Has Sufficient Energy Sources

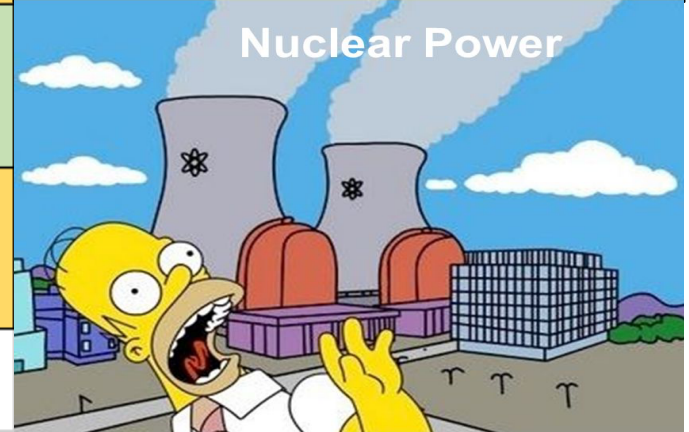
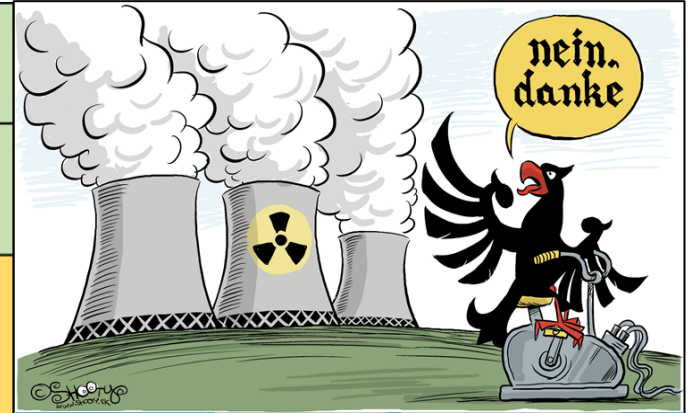
Primary Energy Source	Unit	Reserve or Potential	Practical Exploitable To 2050	Projected Consumption To 2050
Hydro Power	MWe	75,000	60,000	55,000
Geothermal	MWe	29,000	25,000	20,000
Solar	MWe	1,200,000	120,000	80,000
Wind	MWe	15,000	15,000	10,000
Biomass	MWe	50,000	30,000	25,000
Natural Gas	TCF	334	167	50
Coal	Million Tons	105,000	31,500	5000
Petroleum	Million Barrels	56,000	28,000	625

Our energy resources not very rich but more than adequate to supply domestic demand until 2050.

Nuclear Power Investment Is Very High

Region and Country	Overnight Cost USD per kilowatt	Investment Cost: Overnight+Financing [USD per kilowatt]			
		On Time 4 Years	1 Year Delay	2 Years Delay	3 Years Delay
Asia: China and South Korea	3500	4550	4800	5100	5400
Europe: EU and United Kingdom	5500	7150	7600	8000	8500
North America: USA and Canada	5000	6500	6900	7300	7700

Sourcer: International Energy Agency [IEA] and Nuclear Energy Association [NEA] : "Nuclear Energy Road Map 2015" Interest Rate 6% per annum



Special Notes:

- The investment to build 3000 MW NPP [Nuclear PP] can build 12000 MW Coal SPP or 18,000 MW Gas CCPP
- So far all Nuclear Power Plant were built by Government [No NPP of IPP]
- Most of NPP Construction experienced Cost Overrun [Cost Increase]

Being Smart, From Largest Coal Exporter To Future Domestic Energy Security

					2018 In Million Tons	
No	Country	Reserves [Ranking]	World Top 10 Producers	Export	Consumption	Per Capita [Ton]
1	China	138,819 [4]	3,523.20	-838	4361	3.1
2	India	101,363 [5]	716	1.1	714.9	0.5
3	United States	250,219 [1]	702.3	96.9	605.4	1.8
4	Australia	147,435 [3]	481.3	417.7	63.6	2.4
5	Indonesia	37,000 [6]	474	429.4	103.5	0.4
6	Russia	160,364 [2]	411.2	209.6	201.6	1.4
7	South Africa	9,893 [12]	252.3	92.2	160.1	2.7
8	Germany	36,103 [7]	175.1	1.8	173.3	2.1
9	Poland	26,479 [9]	127.1	8.2	118.9	3.1
10	Kazakhstan	25,609 [10]	111.1	5.9	105.2	5.5

Source: Reserves: wikipedia.com; Production: worldatlas.com; Consumption: wordometer.info

Indonesian Coal Status:

Export World No 1

Production World No 5

Reserve World No. 6

Domestic Consumption World No. 12 Dunia, below Japan and South Korea

Per Capita Consumption Among Top Consumers [No 20 of 20]



Masih Sangat Cukup Ruang Untuk Memanfaatkan Coal Dalam Produksi Listrik

Closing

- Our energy resources not very rich but more than adequate to supply domestic demand.
- Indonesian coal consumption per capita is the lowest among top 20 coal producers.
- Use Coal to secure domestic supply. Exporting coal provides cheaper power to other countries.
- Development of NPP will increase Country Debt [Utility Debt] and Cost of electricity production
- It is not rational to build NPP, while keep exporting large amount of coal and natural gas.

Terima Kasih Thank You

Email: hermandarnel@gmail.com

Twitter: [@HermanDarnel](https://twitter.com/HermanDarnel)