

# INDEPENDENT OBSERVER

JAKARTA - INDONESIA



FRIDAY,  
SEPTEMBER  
13-19, 2024  
www.observerid.com

“  
**People will throw stones  
 at you. Don't throw them  
 back. Collect them and  
 build an empire**

– Anonymous

ECONOMY BUSINESS  
**Gov't strategies to meet the Rp2,189.3  
 trillion tax revenue target in 2025**  
 [p.09]

SOCIAL CULTURE  
**Further Threats to Banda's Coral Reefs  
 and Bio-Diversity**  
 [p.12]

# Indonesia-Singapore Solar Power Deal

The groundbreaking agreement marks the beginning of a transformative era in which the two nations collaboratively establish an intricate network of cross-border energy connectivity, bringing sustainable and renewable power sources to their citizens while fostering stronger diplomatic ties and advancing the global movement towards cleaner energy solutions

By Putu Rusta Adijaya

In the recent Indonesia Sustainability Forum (ISF) – which brought together key global stakeholders to discuss urgent decarbonization strategies and the path toward sustainable growth – a memorandum of understanding (MoU) on cross-border electricity interconnection was signed between Indonesia and Singapore. The agreement stipulates that Indonesia will export 3.4GW of solar power worth US\$20 billion (Rp308 trillion) to the city-state, effective in 2028.

Last year, the Energy Market Authority (EMA) of Singapore granted conditional approval to five companies to import 2GW of low-carbon electricity from Indonesia, namely: Pacific Medco Solar (0.6GW), Adaro Solar International (0.4GW), EDP Renewables APAC (0.4GW), Vanda RE (0.3GW), and Keppel Energy (0.3GW). An additional 1.4GW will be carried out by Singa Renewables (1GW) and Shell Eastern Trading (0.4GW).

According to a press release by TotalEnergies on September 5, the deal is expected to foster new and renewable energy (NRE) cooperation in the Southeast Asian region, advance NRE initiatives in the region, while harnessing solar power resources in Indonesia to contribute to Singapore's sustainable development goals. Furthermore, Singa Renewables Pte Ltd will supply solar energy to meet domestic consumption demand in Indonesia, and spur eco-industrial parks in Riau Province, which in turn will support Indonesia in increasing its NRE share, moving from 13 percent in 2023 to 31 percent in 2050, as well as achieving its net zero emission target by 2060 (or sooner). In essence, this cooperation can serve as a model of sustainable energy initiative in Asean.



Meanwhile, Coordinating Maritime Affairs and Investment Minister Luhut Binsar Pandjaitan was quoted by several media as observing that the Indonesia-Singapore energy cooperation will secure a supply of renewable energy through battery energy stor-

age systems and solar photovoltaic (PV) power produced in Indonesia. According to him, this is also significant because Indonesia has an abundance of silicon (naturally found in silicate compounds and quartz sand), the primary raw material for solar panel production.

The cross-border power trading partnership is a concrete manifestation of energy cooperation to mitigate climate change. The two countries have signed a letter of intent (LoI) concerning cross-border carbon capture and storage (CCS) in a bid to achieve net zero emissions. CCS technologies play an essential role in the decarbonization of the energy sector by supporting sustainable industrial activities and creating new economic opportunities.

Indonesia has huge renewable energy potential, chief among them

being geothermal, bioenergy, wind energy, hydropower, solar energy and nuclear energy. Table 1 lists the potential of renewable energy sources, according to the draft bill on New and Renewable Energy.

According to the 2023 National Energy Balance report by the National Energy Council, in 2022 Indonesia had geothermal energy potential of 23,060MW, of which only around 2,360.3MW (10 percent) had been utilized. Proven reserves are distributed in several regions, primarily in Java (58 percent) and Sumatra (52 percent). Sumatra has the largest potential with 40 percent, followed by Java (34 percent) and Sulawesi (10 percent). Meanwhile, the bioenergy potential amount to 57GWe, comprised of biomass (52.1GWe), Palm Oil Mill Effluent/POME (1.3GWe) and biogas

(2.3GWe). Riau is the province with the largest bioenergy potential, estimated to be 10.4GWe, while West Java has waste (0.25GWe) and biogas (0.46GWe)

Meanwhile, wind energy potential (offshore and onshore) in Indonesia increased by 155.61 percent, moving from 60.6GW in 2021 to 154.9 GW in 2022. The top five regions with the highest potential are Maluku (22.5GW), Papua (21.3GW), West Java (12.7GW), East Nusa Tenggara (12GW) and Central Kalimantan (11.8GW). As for hydropower, Papua tops the chart with 34.63 percent, followed by North Kalimantan (23.26 percent), Central Kalimantan (12.1GW) and East Kalimantan (10.4GW).

Solar energy capture is quite realistic, as Indonesia lies on the equator. In the western part, Riau

has the largest potential with 290.4GWp, followed by South Sumatra with 285.2GWp). In the east, NTT has the most potential with 369.5 GWp, followed by Papua with 252.3GWp. Therefore, it is not at all surprising that the electricity exported to Singapore would come from solar power plants (PLTS) based in Riau.

As for nuclear energy, Indonesia has uranium and thorium reserves of 89,483 tons and 143,234 tons, respectively, scattered across Sumatra, Kalimantan and Sulawesi. As the heat from the fission of one gram of Uranium-235 is equivalent to the heat produced by two to three tons of coal, 89,483 tons of uranium is equivalent to 1.88 billion tons of coal. Thus, nuclear energy may be used to replace coal in energy-intensive industrial sectors.

Table 1. Indonesia's NRE potential in 2022

Type	Unit	Total Potential
Geothermal	MW	23,060
Bioenergy	GWe	57
Wind power	GW	154.9
Hydropower	GW	95
Solar energy	GWp	3,294.4
Nuclear energy	Ton Uranium	89,483
	Ton Thorium	143,234

SOURCE: ANALYSIS REPORT OF NATIONAL ENERGY BALANCE 2023, NATIONAL ENERGY COUNCIL. MW DENOTES MEGAWATT, GW GIGAWATT, GWE GIGAWATT ELECTRICAL, GWP GIGAWATT PEAK.



FAISAL RAMADHAN/IO



A maintenance officer checks the solar panels installed on the roof of the Istiqlal Mosque, Jakarta.

### Indonesia's energy transition

Broadly speaking, energy supply and demand play a significant role in driving the performance of other sectors. For example, when there is an increase in demand for renewable energy, assuming everything else remains constant (*ceteris paribus*), the government will try to accommodate demand from the community through favorable policies, by creating new green industries or developing existing green industries, such as the construction of solar power plants, hydro-power plants or wind power plants (Adijaya, 2024). However, this is not as easy as it may sound, because there are many factors at play in formulating an effective energy policy, including climate policy in relation to carbon emissions, energy sources for electricity, other energy sources needed by different sectors, and so on (Braun & Glidden, 2014).

In addition, these are intertwined with domestic energy policies highly-influenced by the state of the global energy market, in the region and globally. For example, the energy transition policy going on in various parts of the world, including Indonesia, is driven by multiple global agreements, notably the Paris Agreement which replaces the Kyoto Protocol as a legal instrument in reducing greenhouse gas (GHG) emissions and combating climate change. The urgency of the ancillary elements of the energy transition policy is to differentiate between the energy transition of several decades ago and that which is happening today, driven especially by environmental activism, spearheaded by the younger generation (Millennials and Gen Zers).

The energy transition process in Indonesia is underway, with the implementation of several energy policies. However, fossil fuels are still the most widely used energy sources, a reality hindering the ongoing energy transition. Let's look at Indonesia's energy mix in Table 2.

Fossil fuels (coal, oil, gas) have played, and continue to play, a dominant role in global energy systems. If we look at the average realization from 2019-2023, coal accounted for 39.3 percent, petroleum 32.54 percent, natural gas 16.51 percent, while renewables only counted for 11.65 percent. Coal is widely used to generate electricity in Indonesia, with the realization to be always above the target in said period. This is also the case with petroleum. Table 3 shows average annual growth rate by energy type and sector over two periods: 2014-22 and 2019-22.

Adijaya (2024) noted that the annual average growth rate (AAGR) of coal consumption in the industrial sector was 23.56 percent from 2014-

22 and 7.53 percent from 2019-22. Coal is the most widely-used fossil fuel by the industrial sector, which includes energy-intensive subsectors, such as iron and steel, machinery and equipment, and chemicals. This is because coal has a relatively high energy density that can meet the needs of such energy-hungry industries. The industrial use of coal, which continues to climb, especially in developing countries, is hard to replace with other energy sources. The more viable options are reducing its consumption through co-firing with biomass or nuclear power generation. Traditional biomass is also used in the industrial sector (AAGR of 2.83 percent from 2019-22; 2.15 percent from 2014-22), where it is increasingly appropriate in cofiring with coal, to reduce coal

consumption and GHG emissions.

In addition, despite the use of LPG, there is a trend toward a more dominant use of natural gas, from 2019-22 with AAGR of 5.72 percent compared to 1.21 percent for LPG. The increased use of natural gas for cooking began with the policy of gas network provision for households to reduce LPG consumption and widen energy access to the community. It is hoped that this policy can save LPG subsidies and reduce LPG imports.

In the transportation sector, although in general the growth rate of fuel oil is still positive, due to the enormous amount of fuel oil consumed from 2019-2022 (AAGR of 0.46 percent), the increase in electricity consumption in the transportation sector has indicated a

Table 3. Average annual growth by energy type and sector, 2014-22 and 2019-22

2014-2022	Industry	Household	Commercial	Transportation
Coal	23.56%	-	-	-
Fuel oil	-5.85%	-6.98%	-11.15%	2.84%
Natural gas	-3.26%	15.54%	-7.55%	-13.15%
Electricity	7.04%	4.15%	4.5%	10.49%
LPG	4.34%	4.34%	4.35%	-
Traditional biomass	2.15%	-11.74%	-0.5%	-
2019-2022	Industry	Household	Commercial	Transportation
Coal	7.53%	-	-	-
Fuel oil	3.78%	-1.17%	1.26%	0.46%
Natural gas	-3.07%	5.72%	-5.69%	-12.67%
Electricity	2.35%	1.44%	1%	1.66%
LPG	1.21%	1.21%	1.2%	-
Traditional biomass	2.83%	-3.76%	-0.19%	-

SOURCE: ADIJAYA, 2024.

Table 2. Indonesia's energy mix, 2019-23

		Coal	Fossil fuel	Natural gas	NRE
2019	Target	36.38%	30.35%	21.06%	12.2%
	Actual	37.3%	34.97%	18.51%	9.22%
2020	Target	36.49%	28.84%	21.25%	13.42%
	Actual	38.5%	32.74%	17.46%	11.31%
2021	Target	35.46%	28.12%	21.9%	14.52%
	Actual	37.85%	33.43%	16.4%	12.32%
2022	Target	34.5%	27.27%	22.53%	15.69%
	Actual	42.38%	31.4%	13.92%	12.3%
2023	Target	-	-	-	17.87%
	Actual	40.46%	30.18%	16.28%	13.09%

SOURCE: NATIONAL ENERGY MIX 2022, NATIONAL ENERGY COUNCIL, 2023. ENERGY AND MINERAL RESOURCES MINISTRY, JANUARY 18, 2024 IN ADIJAYA (2024).



Coordinating Maritime Affairs and Investment Minister Luhut Binsar Pandjaitan gave a presentation on Indonesia-Singapore energy cooperation at the Indonesia International Sustainability Forum (ISF) 2024, Jakarta Convention Center (JCC), Senayan (5/9).

a reduced volume.

Thus, it is hoped that the Indonesia-Singapore cooperation for low-carbon electricity trade will mark a new milestone in meeting the electricity needs of both countries, and become a role model in the pursuit of decarbonization, by reducing fossil fuel consumption to accelerate the target of reaching net zero emissions.

### Green transition vs. economic freedom

In a theoretical and empirical framework, economic freedom has a significant positive effect on economic growth, through the ease of international trade, innovation that drives productivity of economic agents, and even reduction of bureaucratic red tape. Nevertheless, Indonesia's energy cooperation with Singapore and other prospective developed countries in the energy transition drive must also ensure economic freedom for at least two reasons.

First, meaningful economic freedom is reflected in strong protection of property rights, where individuals, including foreign investors who want to invest in Indonesia to fund renewable energy infrastructure,

slow but steady shift towards electric vehicles (AAGR of 1.66 percent). However, the majority of electricity generated still comes from coal-fired power plants.

Although an energy transition process in Indonesia is already underway, there are several issues that warrant attention, especially with regard to *energy justice* in the energy trilemma. For example, there are indications of a co-firing policy that is detrimental to the environment resulting in deforestation, land conflict in the community, and continued dependence on coal, despite

can feel secure, and foster competitive environment for individuals and economic agents to produce goods and/or services that support the energy transition, which will eventually lead to affordability, because of economies of scale.

Second, a country with proven economic freedom is open, transparent, accountable, fair and trustworthy, with clear rules and streamlined procedures, a necessity which makes it compelling for developed countries to establish collaboration, especially in the development of technology, knowledge, and human resources through projects and training. Moving forward, it is hoped that the Indonesian government can further strengthen economic freedom in order to successfully attain the energy transition target and the Golden Indonesia Vision 2045. [10](#)



**Putu Rusta Adijaya** is an economic researcher at The Indonesian Institute's (TII) Center for Public Policy Research. He graduated from Atma Jaya Catholic University's Faculty of Economics and Business, majoring in Development Economics, in 2019. Before joining TII, he was involved in an array of research projects on energy, market, sustainability and media. In line with his research experience, his areas of interest and focus center on the political economy, energy, environmental economics and sustainability.