

2022 Japan RE Invest Indonesia Potential markets of solar energy in Indonesia

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Indonesia's solar technical potential amounts to 3~20 TWp, with 4,000~27,000 TWh of annual electricity generation potential, sufficient to power the entire country



Source: IESR. (2021). Beyond 207 GW: Unleashing Indonesia's Solar Potential, IESR. (2021). Beyond 443 GW: Indonesia's infinite renewable energy potential

Despite solar PV development was still modest until 2021 but more solar projects in pipelines with higher potential grow ahead



Solar power plant installed capacity in 2018-2021 (MWp)



Planned solar capacity addition in RUPTL 2021–2030 and announced development Installed capacity, GWp

- 1. Increased planned solar capacity addition in RUPTL 2021–2030: 4.7 GWp (5x the previous RUPTL 2019 at 0.9 GWp)
- 2. Declared project pipeline development from ISS declarators: 2.3 GWp by 2023 (primarily captive C&I and rooftop solar projects)
- 3. Announced development for electricity export to Singapore in the Riau Islands province (~10 GWp)
- 4. Solar PPA prices have declined by -86% from 2015 to 2020 (from \$0.25/kWh to below \$0.04/kWh)
- 5. Rooftop solar target in national strategic projects (PSN): 3.6 GWp by 2025
- 6. Rooftop solar's net-metering scheme revision to 1:1 (MEMR 26/2021)

Source: Indonesia Energy Transition Outlook 2022, IESR analysis. Notes: Captive power is defined as power supply that is generated by an individual firm for its own use (via an operational license), or by a "Wilayah Usaha" holder other than PLN—a private power utility (PPU)—to be ultimately sold to its tenants (in an industrial estate or a special economic zone).

By the end of 2021, Indonesia has 3.2 GWp of solar project pipeline (mainly utility-scale); rooftop solar is also growing albeit at a slower pace..



Installed rooftop solar capacity and user growth (PLN consumer only), 2018–2022-Q1

Announced utility-scale solar project pipeline in Indonesia

- In 2021, three new floating solar development (2.6 GWp) came from outside PLN's business concession (wilayah usaha), one (2.2 GWp) is actually for export oriented project
- Rooftop solar has grown from 1.6 MWp at the end 2018 to 54 MWp in Q1-2022. User growth has multiplied by 8x since 2018.

Source: IESR. (2021). Indonesia Energy Transition Outlook 2022.

Total committed project pipeline at Indonesia Solar Summit 2022 totaled 2.3 GWp (from 31 companies), with about 60% being C&I solar projects



Committed project pipeline from ISS 2022, by installation category Capacity, MWp



Committed project pipeline from ISS 2022, by installation type Capacity, MWp

- Committed project pipeline includes contracted projects or projects nearing (90%) contracting at least by 2023.
- Committed project pipeline totals 2.31 GWp from 31 companies, ranging from C&I consumers, PV manufacturers, developers and EPCs.
- By installation type, rooftop accounts for the largest share (41%) in the pipeline, followed by mixed/unclassified¹ (37%) and ground-mounted (20%)
- While about one-third is unclassified, project development is likely classified as C&I projects rather than project from PLN's RUPTL

Source: Indonesia Solar Summit 2022, IESR analysis. ¹Mixed/unclassified refers to, presumably, both rooftop and ground-mounted installations

With projected demand for solar PV set to increase, Indonesia must prepare a long-term industrial policy to foster its domestic PV value chain



Source: Ministry of Industry, APAMSI, BloombergNEF; IESR analysis. Note: Production capacities include plants that have been commissioned, are under construction, or have been announced.

- Current domestic PV module production (assembly) stands at 620 MWp, while its utilization only reaches 10% annually due to low demand
- Local content requirements (LCRs) on solar projects, as imposed by Mol 5/2017, also add various challenges for utility-scale solar development:
 - No single domestic supplier who can supply a >100 MWp project with 40% LCR of PV modules.
 - No Tier 1 PV module supplier locally (bankability issues)
 - Based on Mol 5/2017, PV modules LCR should be increased to 60% since January 2019. It is unclear how this is being implemented.

Source: IESR. (2021). Indonesia Energy Transition Outlook 2022.

Challenges of Indonesia's Local Content Requirements on Solar Energy

Existing condition:

- 1. The downstream PV mini-grid industry (especially large-scale PV mini-grid/IPP) still relies on imported solar panels for the economy and bankability of a project
 - Quality: Lower efficiency and size (power rating) of local solar panels
 - Price: Local solar panels are more expensive (30–45%) than imported panels
 - Delivery time: The production capacity and economies of scale of domestic manufacturers are still low (the largest capacity is only 100 MWp/yr, 1 factory)
 - Tiering: No domestic manufacturers have Tier-1 criteria yet
- 2. Domestic solar panel manufacturers (21 manufacturers) are still in the panel/module assembly stage (still importing their solar cells)
- 3. The upstream solar panel industry (ingot and wafer) is still not available
- 4. Supporting industries (such as wiring, glass, and special aluminum frames for solar panels) are still not available (and do not fulfill international criteria)

Desired condition:

- 1. Local industry of solar panels required to improve the quality of their products
 - Increase machine production capacity for panel specifications of 500
 Wp/unit
 - **Purchase** high-quality solar cells (min. 21% cell efficiency) for high-quality solar panel assembly
 - Increase production capacity to ensure delivery time for COD target
- 2. Competitive pricing (no more than 25% compared to imported solar panels) for domestic solar panels
- 3. Domestic solar panel manufacturers to complete Tier-1 criteria through collaboration between local manufacturers and foreign investment from Tier-1 manufacturers
- 4. Producing solar cell manufacturer with competitive production capacity

Source: EBTKE Analysis

So what has been hindering Indonesia's gigawatt-order solar deployment?

Utility-scale solar (IPP)

- 1. Not quite ambitious power system planning in previous RUPTLs
 - > RUPTL 2019-28: 908 MW PLTS
 - > RUPTL 2021-30: 4.68 GW PLTS—improved, but implementation is key
- 2. Nonoptimal procurement practice: sporadic auction (tender), infrequent*, and relatively small auction volume

*Note: due to minimum planned addition (low auction demand)

- 3. Limited project development
 - Land (site) selection coupled with market/auction uncertainty often remains a big risk and challenge
- 4. Regulations that are hindering development:
 - Local content rules: Not in accordance with industry readiness (in terms of scale and quality), at least for solar PV module
- 5. Lack of (a fairly allocated risks) PPA standard

In a **competitive bidding scheme**, the **ceiling price** is only an initial benchmark, **not a prerequisite** for a competitive (cheap) bid to occur.

Auction design such as auction volume (demand) and supportive regulations would be key to achieving the most competitive bid price and large-scale deployment

Rooftop solar:

• MEMR 26/2021's implementation! (revision of MEMR 49/2018)

In residential segment:

- Rooftop solar economics:
 - Fundamentally, electricity tariffs in Indonesia are relatively cheap (10 cents/kWh), hence are more difficult to get maximum (cost savings) benefit compared to in developed markets/countries (can reach 20~25 cents/kWh)—this does not mean that it cannot be attractive, however.
 - Previous net metering scheme was suboptimal (now 1:1)

In commercial & industrial segment:

- In general, viable business model exists for C&I sector (with leasing scheme, for instance)
- However, still often hit by red tape for industrial consumers in some areas (with large capacity)

In government segment: limited budget allocation



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