



# **Gigawatt Scale of Solar Power By 2025**

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# Solar Power Technology and Characteristic

## Solar PV



- Technology already well developed
- Low investment cost USD 600 – 1000 per kWp
- Competitive production cost USD 40-100 per MWh
- Availability: Every where but intermittent
- Capacity Factor 10-25%

## Solar Thermal



- Technology is developing
- Still high investment cost USD 3500 – 9000 per kWp
- High production cost USD 120-500 per MWh
- Availability: Intermittent
- Capacity Factor 11-50%

# Solar Energy Is The Most Readyble RE For Implementation In Indonesia

## Non Solar RE Has More Limitations and Handycap

- Hydro and minihidro, potential 94 Gigawatt, site specific and mostly available in remote location, Papua, and North Kalimantan. Readyness up to 15 GW.
- Geothermal potential 28 Gigawatt, site specific, high exploration risks, and has been saturated in Java as the largest energy consumer. Readyness up to 5 GW.
- Wind Power, potential 60 GW, site specific, Sulawesi Nusa Tenggara, other outside Java. Readyness up to 3 GW.
- Biomass Power, potential 32 Gigawatt, “conflicting with biofuel and food”, Readyness up to 6 GW.

## The Only Handycap of Solar Power Is Its Intermittency

- Largely available almost in all islands and places
- Easier to harvest and to implement [simple technology]
- Low investment cost and competitive production cost [bankable price]
- Can be developed from rooftop scale up to hundreds of Megawatts scale
- Simpler and faster construction

# Revised Electricity Supply Scenario With Gigawatt Solar Power By 2025

Resources and Production	2020		2025		2030	
Unit	MW	TWh	MW	TWh	MW	TWh
Production [KEN 79]	NA	374	NA	589	NA	898
<b>Production Revised**</b>	<b>NA</b>	<b>300</b>	<b>NA</b>	<b>383</b>	<b>NA</b>	<b>537</b>
<b>Renewables [RE]</b>						
<b>Geothermal</b>	<b>2100</b>	<b>16</b>	<b>2500</b>	<b>20</b>	<b>3.700</b>	<b>28</b>
Hydro	5500	24	7000	30	11.000	45
Wind	140	0,6	600	3	2.400	7
<b>Solar</b>	<b>500</b>	<b>0,75</b>	<b>10000</b>	<b>15</b>	<b>20.000</b>	<b>30</b>
Biomass+Biogas	1600	10	4000	25	6.500	40
<b>Non RE</b>						
Gas	6000	59	7000	66	15.000	105
Coal	41000	172	53000	210	57.000	270
BBM	2800	18	2600	14	2.400	12
<b>Total</b>	<b>59.640</b>	<b>300</b>	<b>86.700</b>	<b>383</b>	<b>118.000</b>	<b>537</b>
<b>RE Share [%]</b>		<b>17</b>		<b>24</b>		<b>28</b>
<b>Intermittent Penetration [%]</b>	<b>1,1</b>		<b>12,2</b>		<b>19,0</b>	<b>6,9</b>

\* Energy Outlook 2019 DEN + Estimate

\*\* Scenario assuming the growth 2020-2025, 5% per year, 2025-2030, 7% per year.

# Advantages of Grid Connected Solar Rooftop

- Cheaper investment, installed on the roof, no need to buy or rent the land.
- Directly connected to the distribution grids, needs no new transmission and distribution.
- Small scale, everyone may invest, enables crowd investment, benefits the small and medium businesses.
- Scattered, smaller intermittency impact than large scale in one location.

# Implementing 20 Gigawatts Solar Power To 2030

- Focus location
  - Java, as 75 % of electricity consumption is in Java.
  - Sumatera, 15% of electricity consumption is in Sumatera.
  - The solar rich region such as Sumba Nusa Tenggara.
- Scheme Priority:
  - Roof top large building [airport, harbor, stadium, large industrial and commercial building]
  - Residential roof top, more than 60million PLN's residential customers.
  - Solar farm in non productive land and water surface, and in solar rich area.
  - Solar farm with storage for peaker plant. [pump storage is much cheaper than battery storage]

## Capacity Target

- Target Java to 2030:
  - Residential Rooftop 10000 MW
  - Non Residential Rooftop 3000 MW
  - Solar Farm 2000 MW
- Target Outside Java:
  - Residential Rooftop 3000 MW
  - Non Residential Rooftop 1000 MW
  - Solar Farm 1000 MW [Sumba, NTT applying REBID concept]

# Government Support: Improved Policy and Regulations

- A comprehensive study of solar power project candidates , and its inclusion in detail [scheme, capacity and location by city or district] in RUKN and PLN's RUPTL.
- Improved policy and regulation to make the connection of solar rooftop [and other RE] to the grid easier and cheaper.
- Improved regulation for more attractive scheme or price in exporting electricity to the grid [current scheme very limited and accounted to 65% of energy only]
- Regulation to facilitate simpler and easier scheme and access for bank credit [Now some Banks already initiated it]
- Government support [subsidy] to allocate cheaper financing for solar power rooftop and projects.

# To Close

- Solar is the most attractive and readyble RE [less limitations and handicap] to be implemented.
- 10 to 15 GW solar power can be implemented up to 2025 and another 10 to 15 GW from 2025 to 2030.
- Focus area for implementation is Java and Sumatera [85%+ of electricity consumption is in Java and Sumatera]
- Priority of implementation: House rooftop; Big building roof top; and Solar Farm with storage [pump storage] for peaker.
- Large and attractive solar resources such as in Sumba nad NTT, should be developed with REBID concept. [To be utilized locally for renewable energy based industry].].



## **Pernyataan [Disclaimer]**

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Terima Kasih  
Thank You