Smart Grid Progres in Indonesia

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PRAKARSA JARINGAN CERDAS INDONESIA
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Application of Smart Grid in Indonesia

In Indonesia, there are several Smart Grid applications such as:

1. Integration in operations to increase efficiency
2. Increasing the intermittent in the use of renewable energy
3. Improve Smart Meter service for Beyond KWH services
4. Improving Power Quality in the Industrial Sector

01

Potential Smart Grid in Indonesia

Indonesia **Potential**

Indonesia has 278.8 milion people with that increase of population growth of 1.49%. With the increase in population, it has several impacts, such as:

- Increasing number of buildings
- Increasing energy requirements
- Increasing the number of other needs.

On the other hand, Indonesia also has abundant natural resources both from fuel oil, mining products such as nickel, and large renewable energy potential. Indonesia is an archipelagic country consist of 17 thousand island. Spreading 8.514 km along the equator.

Nusantara **Super Grid**

Many of renewable enery resource are located far from load center, therefore increase the need of having interconnection grid among varios island.

The Nusantara Super Grid is an interconnection of islands in Indonesia to realize equitable electricity and to maximize the potential of EBT in Indonesia.

Nusantara Super Grid has the following objectives:

- Energy diversification
- Avoid using expensive peak power plants
- Absorb new renewable energy with a larger capacity
- Improve the security of energy supply

Building **Efficiency**

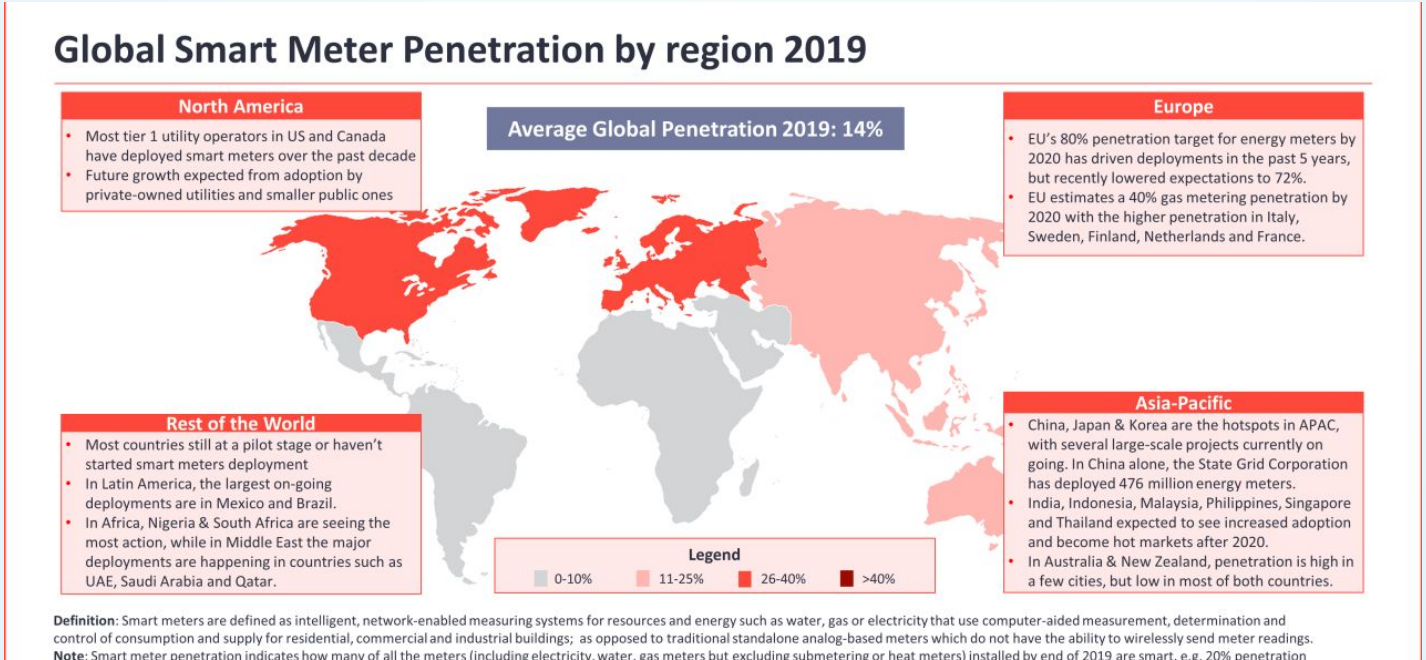
The pressure of population growth give rise to increasing number of urban dwellers which in turn require of increasing number of high-rise building and emergence of mega-city in Indonesia. Cities becoming a large energy consumer and an efficience use should be achieve.

In Indonesia, green building certification provides many benefits for building owners apart from being cost-effective. For this certification, 6 aspects of assessment are used, including:

- Appropriate Site Development.
- Energy Efficiency and Conservation
- Water Conservation
- Material Resources and Cycle.
- Indoor Health and Comfort
- Building Environment Management

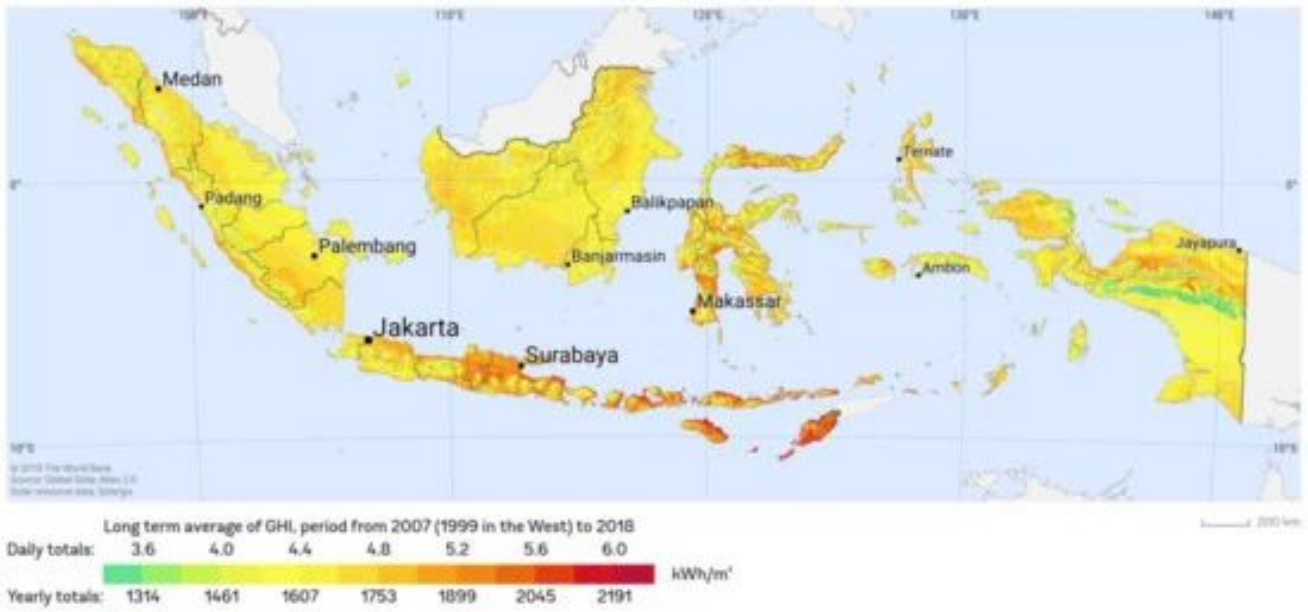
Energy **Efficiency & Monitoring**

To improve energy efficiency, PLN has planned to deploy Advanced Meter Infrastructure Technology and implement Proof of concept in some areas such as Jakarta, Bogor, and Bali. Currently PLN does not reveal the Grand Plan on how to deploy AMI for their 7 million customers, but the pilot project for 4 million customers is on pipeline.



Solar Farm in **3T areas (Frontier, Outermost, and Disadvantages)**

The 3T area is an area that is very difficult to get electricity because the location of the area is not strategic and difficult to reach. This causes the affordability of electricity is very low. Therefore, Solar Park is one solution to be able to help provide electrical energy in the area.



This picture shows that most areas in Indonesia have high solar irradiance, so solar farm and battery is a suitable solutions.

Hydrogen to Become a Contributor of Indonesia's Energy Transition

There are five main pillars that need to be developed as the main considerations in the development of green hydrogen, namely energy efficiency, energy sufficiency, renewable energy, electrification, and green molecule (PtX). With abundance of solar energy, development of green hydrogen is seen as a potential game changer and many parties are now looking at the possibilities of developing green hydrogen project in various island.

With the presence of Hydrogen, it is expected that national energy needs can be fully served, where as now with a fossil energy supply only 75% can be served. Without this new energy the ability of energy supply will decline within only 28% in 2045.

02

Smart Grid Plan & Development In Indonesia

Smart Grid Development **based RUPTL (Electricity Supply Business Plan)**

Strategy **Smart Grid** Development

The strategy used uses three main objectives, including:

1. Increase efficiency, reliability and resilience through automation and digitization along the electricity system chain (digitalization)
2. Increase customer engagement to become "PROSUMER" (decentralization)
3. Increase the penetration of renewable energy through a flexible grid (de-carbonization)

GREEN BOOSTER

Project Improvement by:

- **PV floating**
- **Co-firing Biomass**
- **Smart Micro grid**

LEAN THROUGH DIGITALIZATION

Project Improvement by:

- **Digital Procurement**
- **T&D Digitalization**
- **Power plant Digitalization**

INNOVATIVE PRODUCT

- **EV charging station**
- **PV rooftop**
- **Total Power Solution**

CUSTOMER ENGAGEMENT

- **PLN Mobile**
- **Charge.in for EV customer**
- **AMI**

Source: PLN (2020)

The **Role of Private Parties** in Power Plant Development Plans

- PLN plans that 51.6% of the power plants will be NRE power plants
- PLN supports the participation of the private sector in the development of electricity infrastructure, of which 64.8% of the power plant portion is planned to be developed by the private sector.
- 56.3% of NRE power plants planned to be developed by the private sector
- For PLTS, 63.7% will be developed by the private sector.
- Specifically for on-grid Solar Power Plant, 54.4% will be developed by the private sector.

Electricity Resource	MW	Porsi
Renewable Energy	20.923	**51,6%**
Non RE	19.652	**48,4%**
Total	**40.575**	

Owner	MW	Porsi
PLN	**14.269**	**35,2%**
Renewable Energy	9.144	
Non RE	5.125	
Private Parties	**26.306**	**64,8%**
Renewable Energy	11.779	
Non RE	14.527	
Total	**40.575**	

RE	MWp	Porsi
PLN	9.144	**43,7%**
Private Parties	11.779	**56,3%**
Total	20.923	

Solar PV	MWp	Porsi
PLN	**1.701**	**36,3%**
Private Parties	**2.979**	**63,7%**
Total	4.680	

Solar PV On-Grid	MWp	Porsi
PLN	**1.476**	**45,6%**
Private Parties	**1.760**	**54,4%**

Development of **Electricity Infrastructure**

Electricity Sales Growth based on RUPTL 2021-2030 increased by 4.9%

Additional Power Generation Capacity in 2021-2030 as much as 40.6 GW

Energy Mix (*Low Carbon*) Target

EBT	**2025**	**Tahun 2030**
Gas	**15,6 %**	**24,8 %**
Batubara	**61,0 %**	**15,4 %**
BBM	**0,4 %**	**59,4 %**
		0,4 %

Additional Transmission Network 2021-2030 reaches 47.7 thousand kms

Additional Substation Capacity 2021-2030 reaches 76.7 thousand MVA

Additional Distribution Network 2021-2030 reaches 456.5 thousand kms

Additional Number of Subscribers in 2021-2030 will reach 24.4 million

Smart Grid Development **based on RIPIN (NATIONAL INDUSTRIAL DEVELOPMENT MASTER PLAN)**

NATIONAL INDUSTRIAL DEVELOPMENT MASTER PLAN (RIPIN) **2015-2035**

Stage 1: 2015-2019

Increasing the added value of natural resources in the upstream agro-based industry, minerals and oil and gas, followed by selective development of supporting and mainstay industries through the preparation of skilled and competent human resources in the industrial sector, as well as increasing mastery of technology

Stage 2: 2020-2024

Achieving competitive advantage and being environmentally friendly through strengthening industrial structures and mastering technology, as well as being supported by qualified human resources

Stage 3: 2025-2035

Making Indonesia a formidable industrial country characterized by a strong and deep national industrial structure, highly competitive at the global level, and based on innovation and technology.

Diesel Plant Replacement Program

Conversion of existing Diesel Plants to Hybrid Renewable Energy Plants, this is a program develop by PLN to reduce dependency to costly and non-environmental friendly diesel fuel. It consist of 3 phase, and Phase I divided into 3 batches consisting of:

- Batch 1 has 2 Clusters, the progress currently waiting for the submission of tender on June 2022.
- Batch 2 has 3 Clusters, planned to be tender at the end of July-August 2022.
- Batch 3 there are 3 Clusters, planned for tender at the end of the year.

03

Existing Project

Smart Grid In Indonesia

Smart Grid for **IKN (Ibu Kota Nusantara)**

Indonesia plans to move the nation's capital from Jakarta to East Kalimantan or what is known as IKN (Capital of the Archipelago).

In integration with the smart grid to make IKN Smart City, PLN and the government design electricity infrastructure in accordance with the Smart City and Smart Grid concepts.

In accordance with the Electricity Supply Business Plan (RUPTL) for the supply of EBT electricity in the State Capital, PLN will prepare:

- Solar Power Plants (PLTS) with a spread of 50 megawatts (MW)
- 70 MW Wind Power Plant (PLTB) in Tanah Laut in the early stages
- A hydroelectric power plant (PLTA) of around 1,000 MW will also be ready to support the IKN area.

Acceleration of the **Battery-Based Electric Vehicle Program**

To support this program the government issued regulations “**Peraturan Presiden Nomor 55 Tahun 2019** on the Acceleration of the Battery-Based Electric Vehicle (KBLBB) Program for Road Transportation”

There are several electric vehicle manufacturers that have entered Indonesia:
ViarGesit, Selis, MIGO, United, Tomara, ECGO, Volta, Unifly, Electro, Sunrace, Artas, Gelis, Benelli, Keeway, Kymco

With a production capacity of 877 thousand units/year

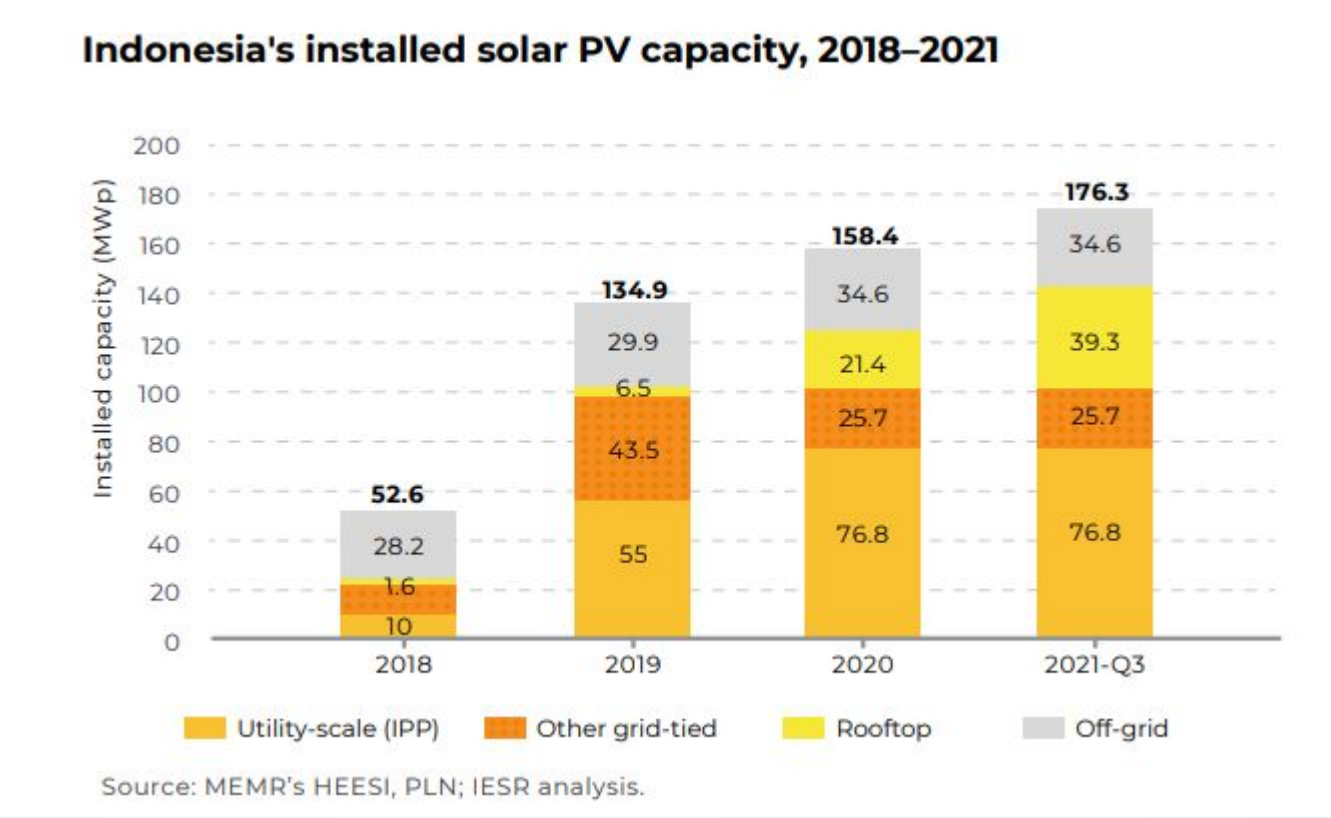
04

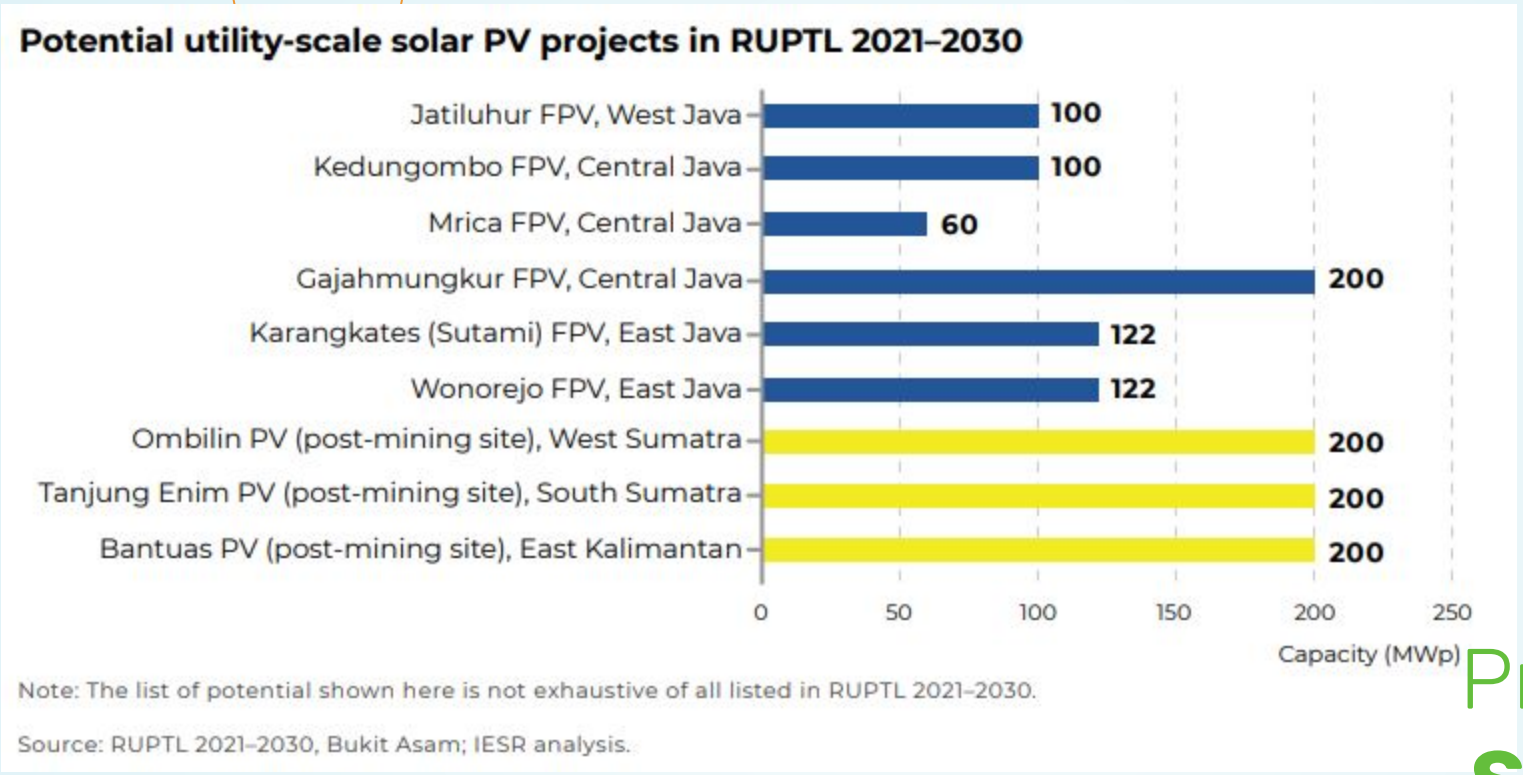
Smart Grid Problem Landscape

Number **Solar PV Usage**

Capacity addition from utility-scale (IPP) solar PV stagnated this year due to the lack of projects being commissioned.

Outside PLN's concession, it is estimated that there were more rooftop solar PV installations that have not been recorded at around 20~30 MWp per year (primarily from the C&I sector).





Project in **Solar PV**

Based on RUPTL data, most PLTS projects are still mostly in the Java-Bali area. This is also an obstacle in developing the use of renewable energy.

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thank you