



# How Renewables can power Indonesia?

Agora Webinar Series by:

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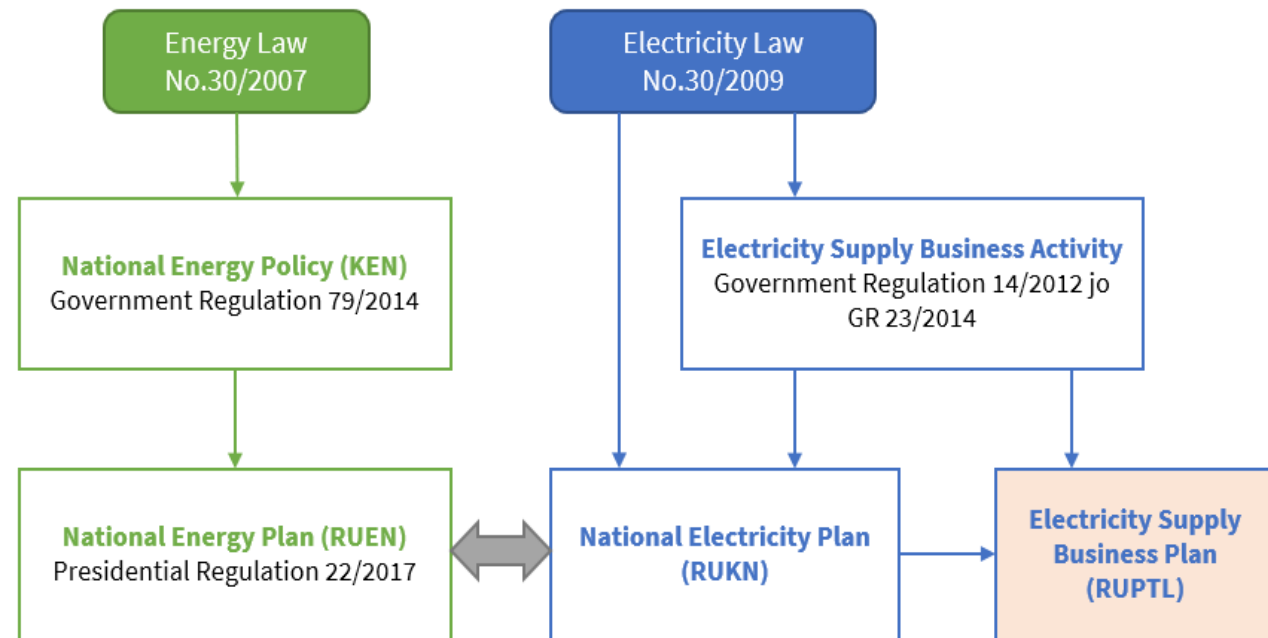


**Indonesian power  
system at a glance**

## PLN as a utility company and government's representative

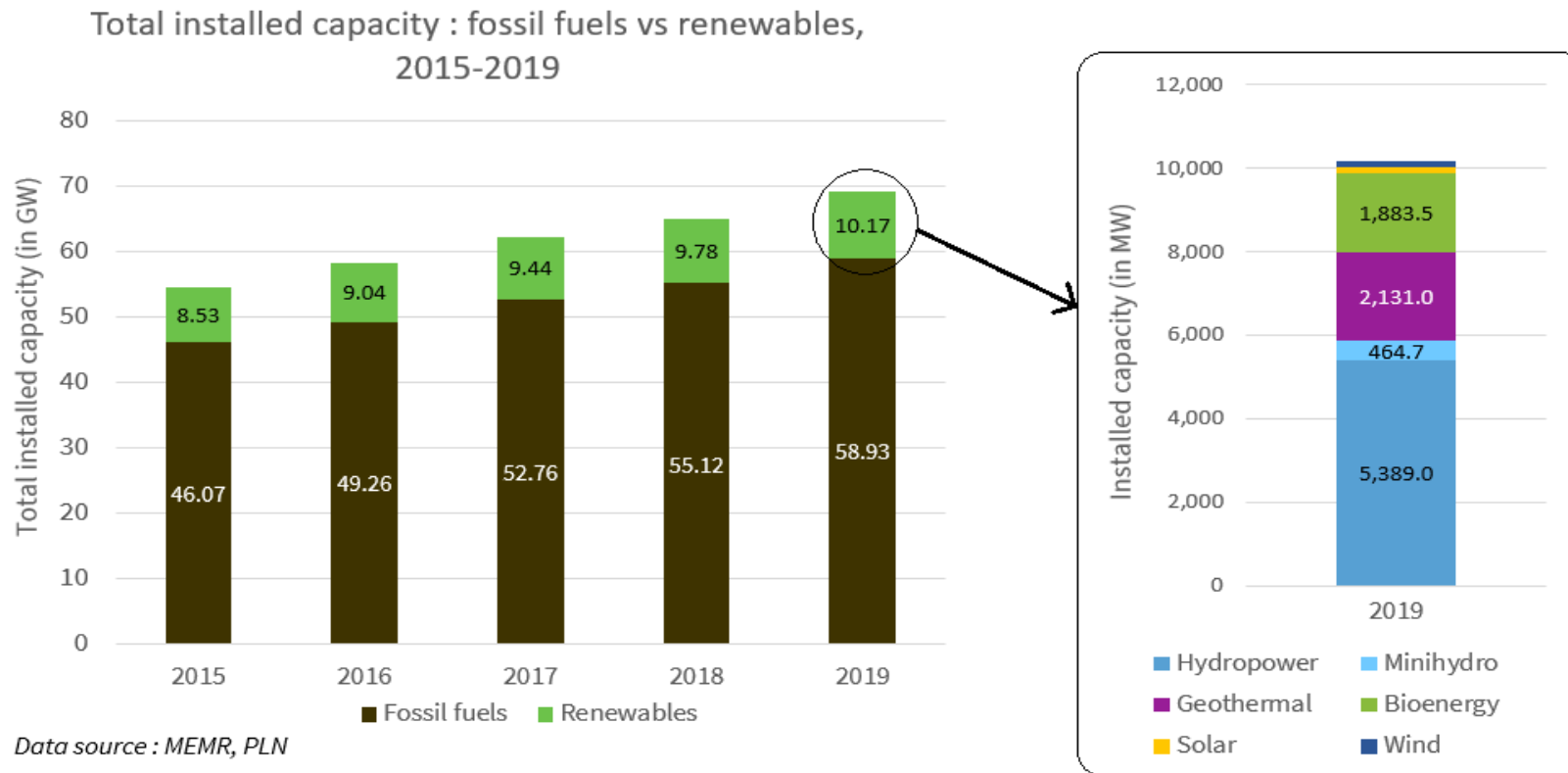
→ As Indonesian National Utility Company, PLN owns the largest electricity supply business area (there are another 50 business areas, mostly industrial area). PLN has the largest power plants (generation) and almost all transmission and distribution lines.

→ As a **state-owned enterprise**, PLN is the **government's representative** for the supply of electricity. Therefore, the process of preparing the RUPTL is not exclusive to PLN only, but shall be consulted to the **public**.



Source: MEMR (redrawn)

# Indonesia missed its 2019 energy target. How about 2025?

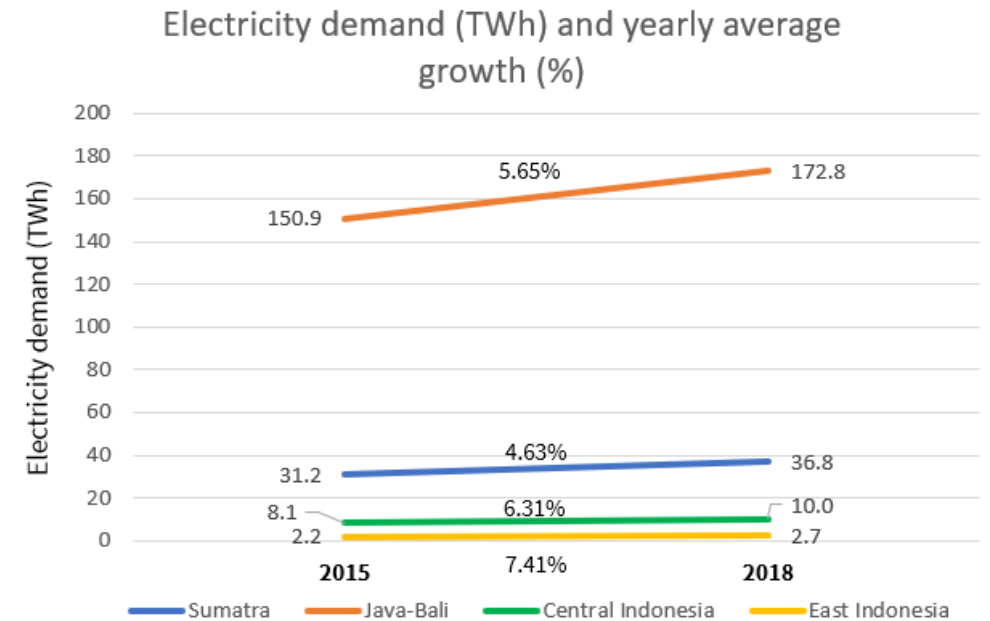


- Indonesia National Energy Plan (RUEN) sets target of **23% share of renewable energy in the primary energy mix by 2025**.
- In terms of installed capacity, this is equivalent to **45.2 GW by 2025** (or 13.9 GW by 2019).
- Renewables share accounts to an average of 15.2% of total installed capacity from 2015-2019.
- Renewable generation shares in 2019 was 12.2% and had been stagnant at that number since 2011. **Hydropower and geothermal have been the main contributors to the mix.**

# Indonesia's electricity demand still focuses on Java-Bali

→ Indonesia is a country with thousand islands which has around 38 electrical systems

→ Electricity demand grew more in central and eastern parts of Indonesia compared to western part

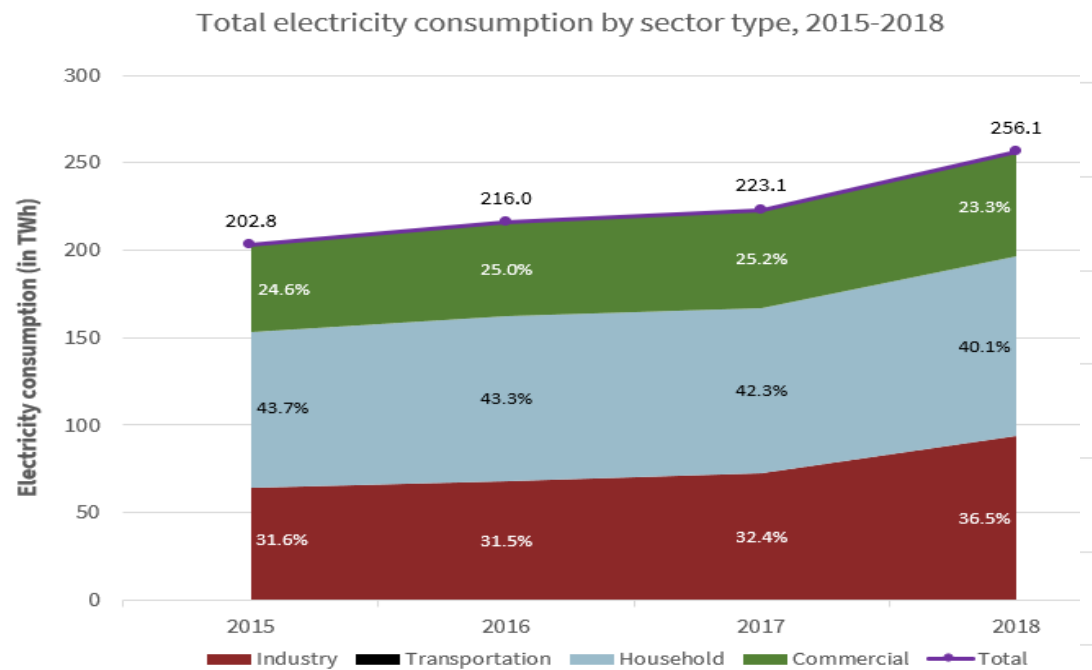


Data source : DGE MEMR

Note: Electricity demand is only for PLN's supplied electricity

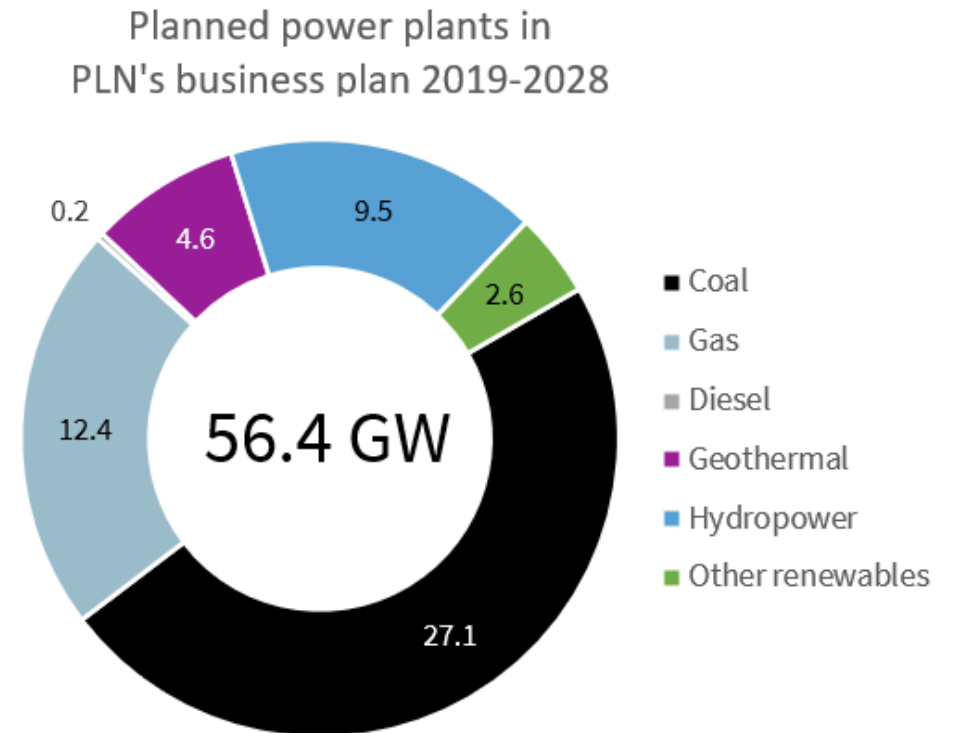
# Electricity demand is likely to keep growing and coal is preferred to supply it


→ Residential and commercial (building sector) consume more than 60% of the total Indonesia's electricity generation, followed by the industrial sector



Data source : Handbook of Energy Economics and Statistic Indonesia (processed)  
 Note: Electricity demand is NOT ONLY for PLN's supplied electricity

→ Almost 50% planned installed capacity in the next 10 years are coal-fired power plants





**How renewable  
energy can power  
Java-Bali and  
Sumatra**



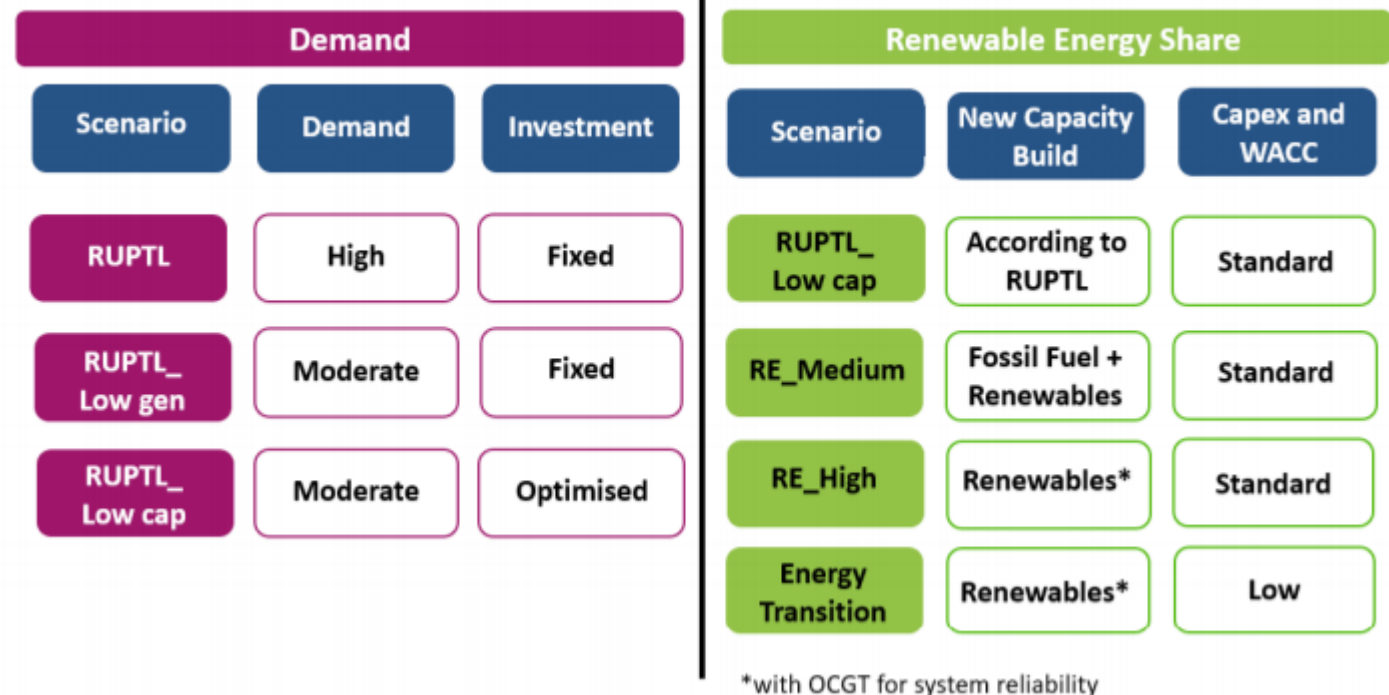
- Study by Agora, IESR, and Monash University, launched in 2019.
- Modelling was performed using PLEXOS.
- The study used the 2018 RUPTL as a baseline.
- The power system was modeled for a 10 year time-span, for the period 2018 to 2027, with hourly time steps. It takes into account supply and demand on a provincial level as well as inter-provincial transmission capacity restrictions.



## Set up of the study

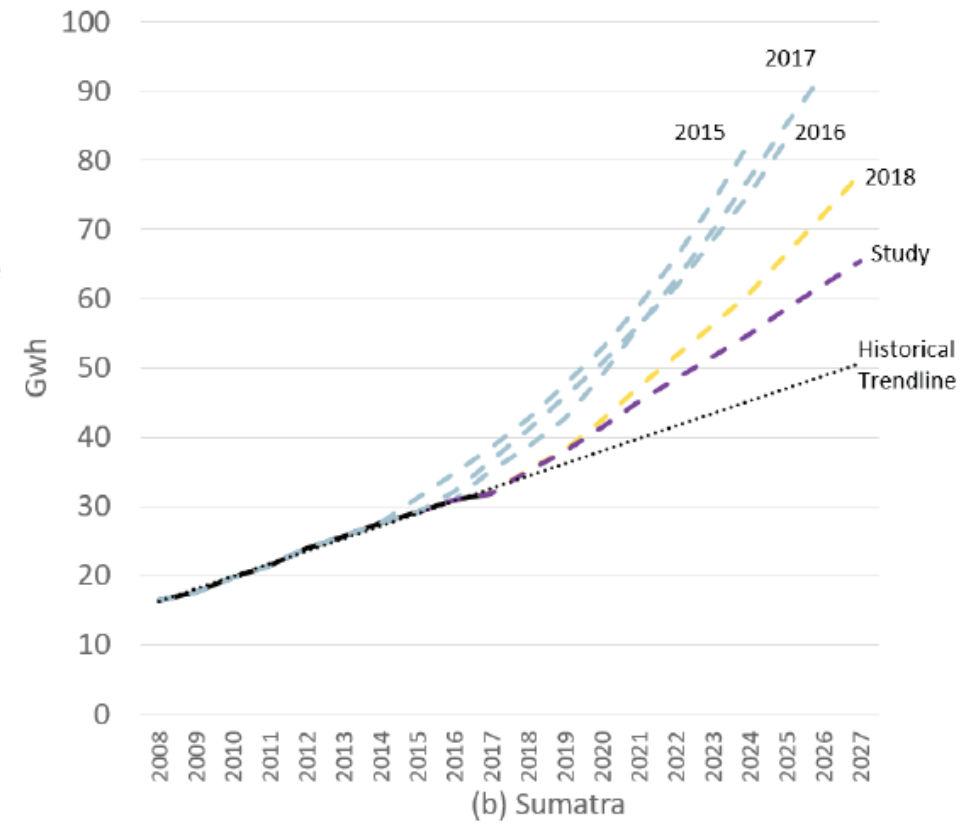
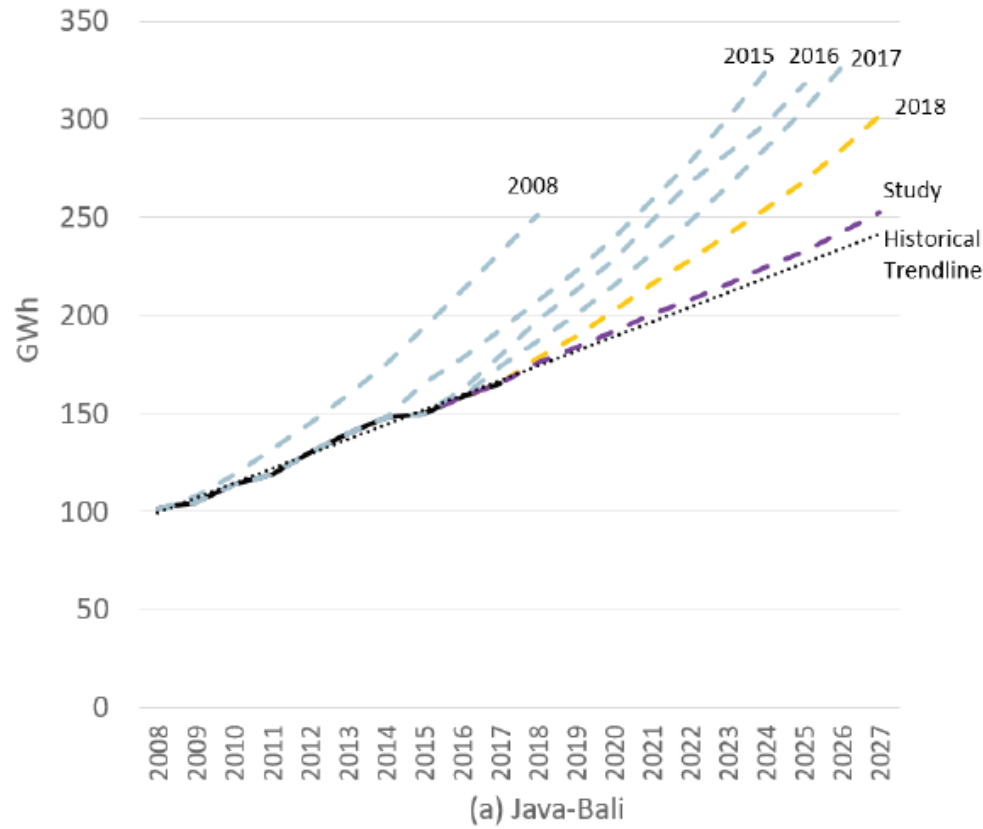
Objective of the study:

- identify the impact of reduced demand on investment, utilisation and power system costs and
- assess the impact of adding considerable shares of wind and solar capacity to the system.

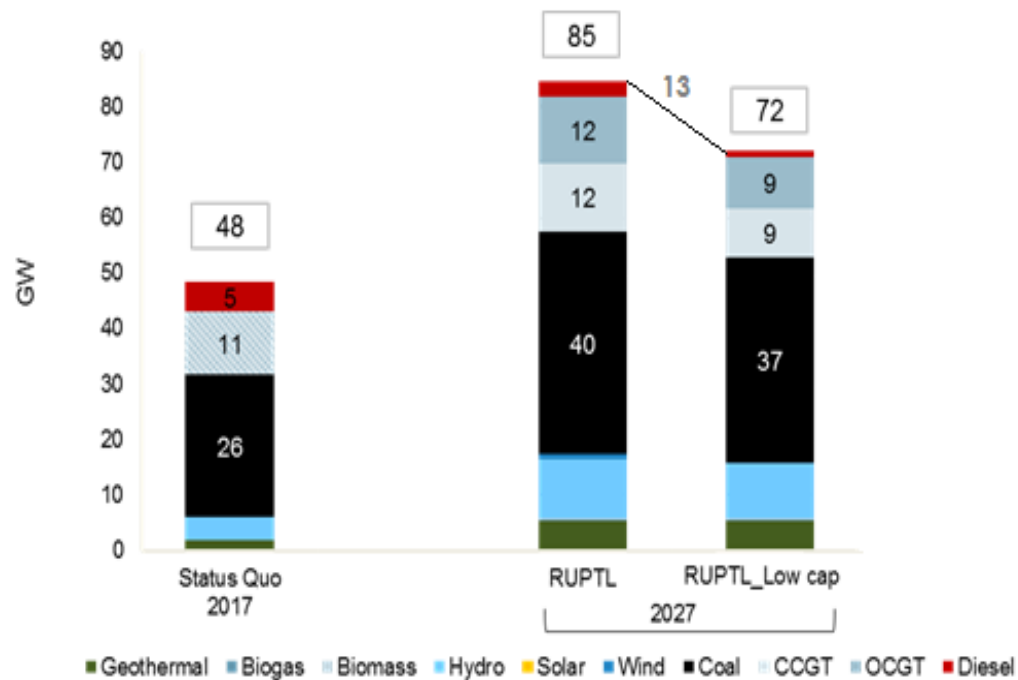


Scenarios of the study

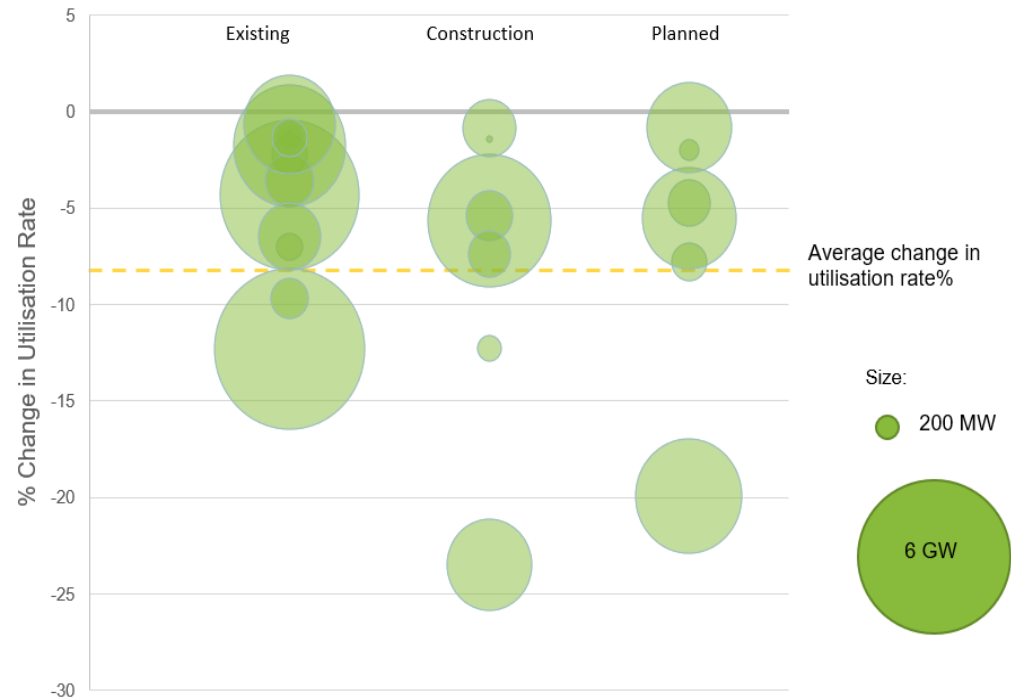
# #1: Past and current electricity plan has always overestimated the electricity demand in Java-Bali and Sumatra



# #2 Overestimating demand growth and underestimating the potential of energy efficiency increase the risk of stranded assets

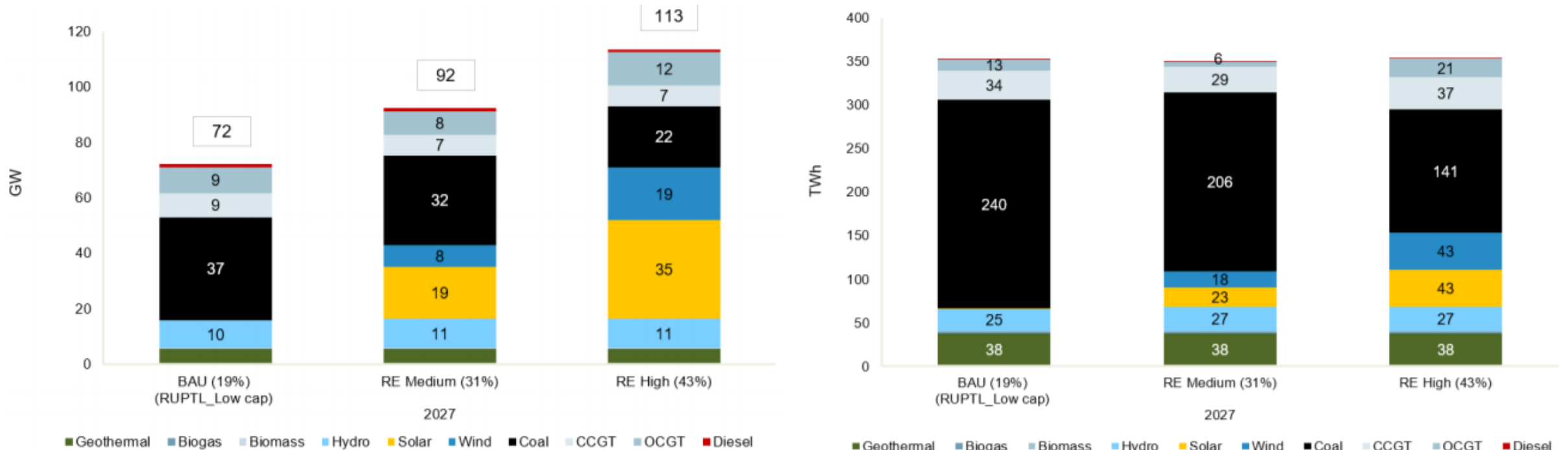


Building these extra 13 GW of plants would require unnecessary investment of about 12.7 billion USD

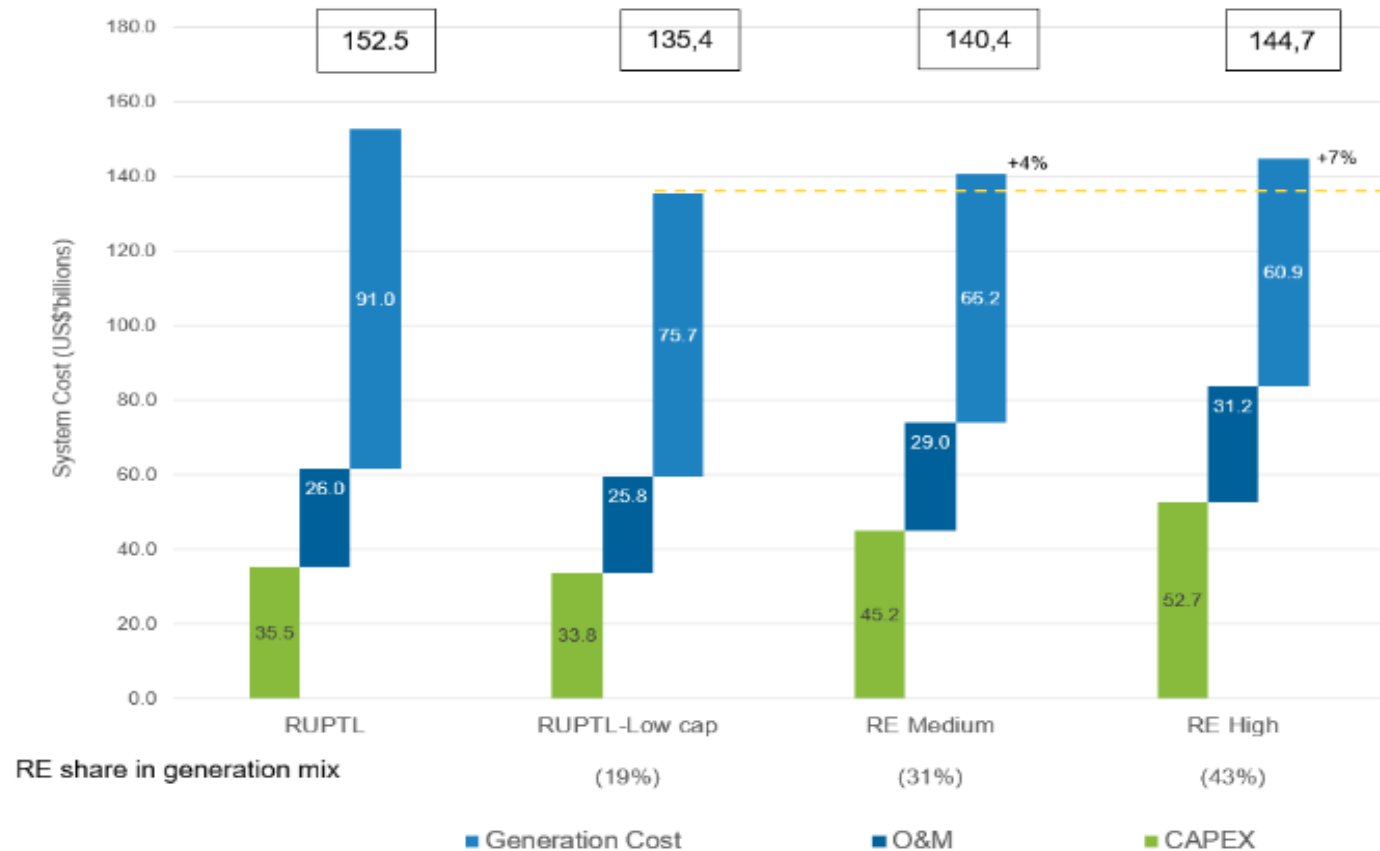


Still excluding the impact of higher RE generation, the utilisation of existing and new coal power generation drops by 10-20%

# #3 Indonesia has diverse renewable energy sources, which easily allows for doubling renewables shares

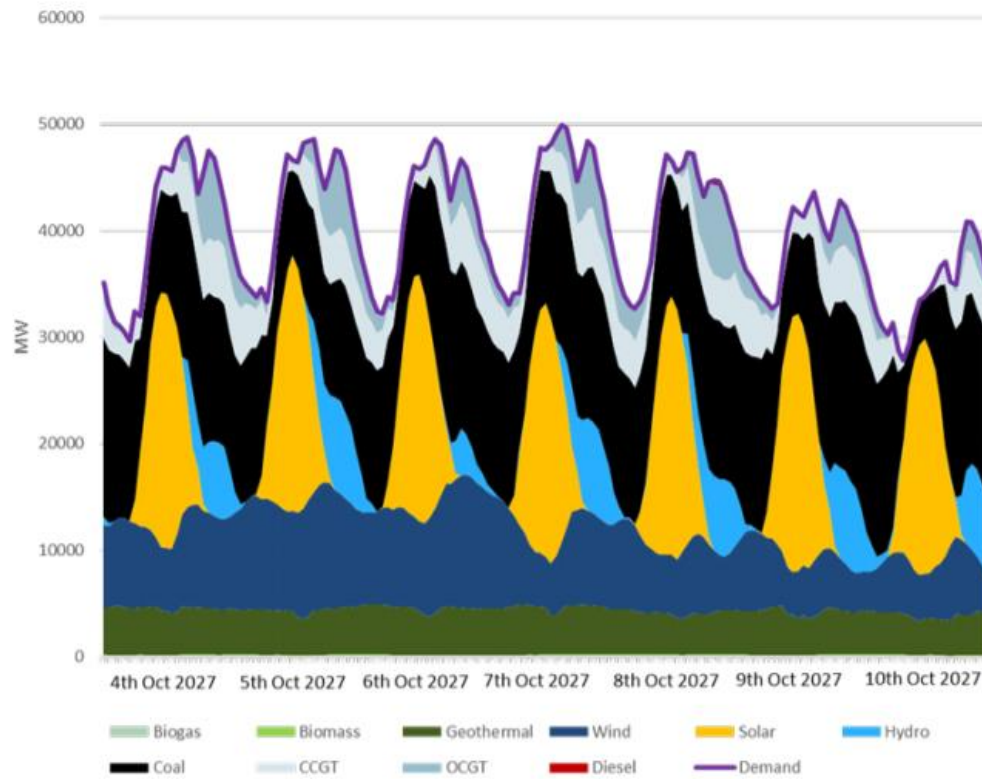


# #4 Higher renewable deployment enable Indonesia to reach its climate goals with lower cost

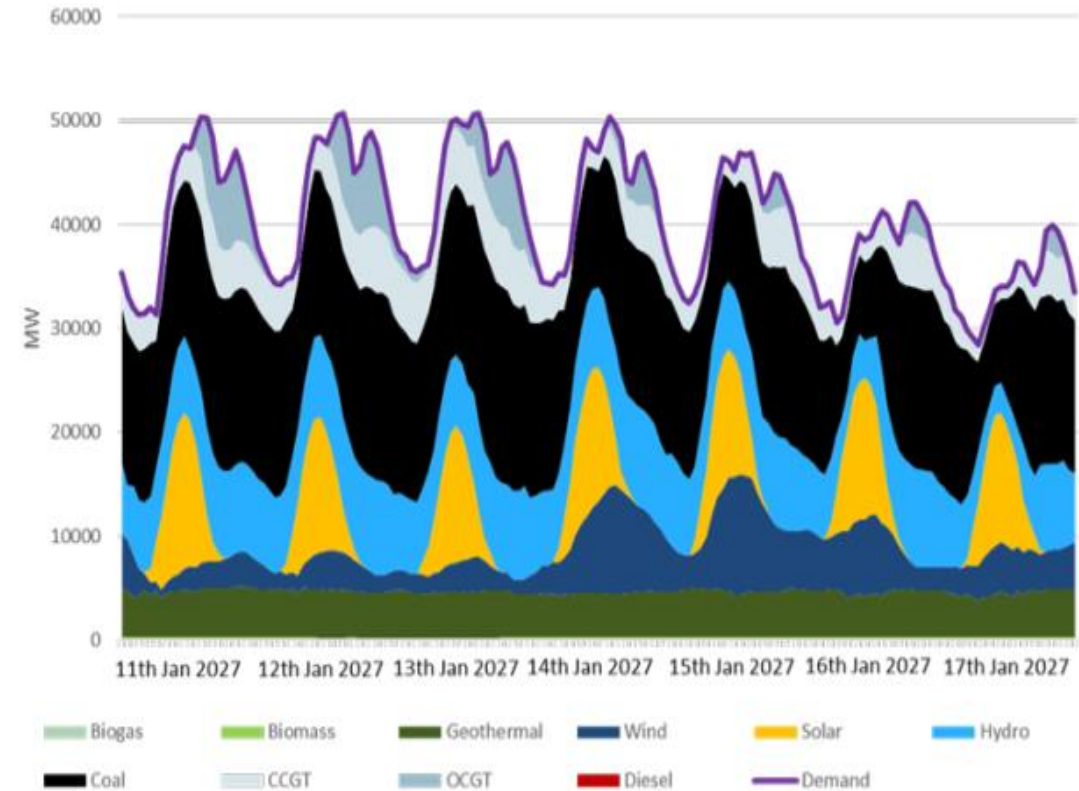


- Due to higher non-thermal output, the emission intensity in the renewables scenario go down by 16% and 36% respectively compared to RUPTL.
- A high renewables scenario coupled with realistic energy savings could result in a cost saving of US\$10 billion over ten years.
- Conducive investment environment is key to enabling higher renewable penetration and reducing overall costs.

# #5 Even with high shares of wind and solar, security of supply of the Indonesian power system can be guaranteed



Sample week with high solar and wind



Sample week with low solar and wind

## So, what's next?

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# Recommendations

- 1 Review best practice approaches and techniques in demand forecasting around the world and implement such an approach in Indonesia
- 2 Integrate the potential of energy efficiency for forecasting future electricity demand
- 3 Review current proposals for new coal-fired power stations in the Java-Bali and Sumatra
- 4 Assess the role and feasibility of storage (pump hydro energy storage, battery, etc.) and its function in a system with higher renewable energy penetration to ensure system reliability



## Recommendations

5

Develop regulation on renewable energy that will introduce a Feed-in Tariff policy (with an attractive level) to attract investments in the renewables sector.

6

Adopt an ambitious long-term strategic plan with clear intermediate targets for renewable energy expansion, supporting policies and a streamlined implementation at national, provincial and local levels.

7

Develop and assess alternative scenarios and low carbon electricity pathways in the energy and electricity planning which integrate medium and higher renewable energy penetration in various electricity systems.

## Latest update?

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- No more new coal-fired power plants in RUPTL 2020-2029?
- Latest policy or statements from Indonesian government:
  - Phase-out old (>15-20 years) power plants : 1.8 GW diesel, 5.7 GW coal, and 5.9 GW combined-cycle
  - After the 35 GW program finished, Indonesia will focus on building RE
- Response to corona in the electricity sector:
  - Free electricity for 450 VA households and 50% tariff discount for 900 VA subsidized households

## Others and upcoming....



<http://iesr.or.id/pustaka/iceo2020/#>



<http://iesr.or.id/pustaka/>



100%  
Renewables  
Indonesia

Rencana Umum  
Energi Nasional  
**(RUEN)**

RUEN  
Alternative  
Scenarios

**Thank you for  
your attention!**

Questions or Comments? Feel free to contact me:

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