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Reform

A Roadmap for Indonesia's Power Sector

How Renewable Energy Can Power
Java-Bali and Sumatra

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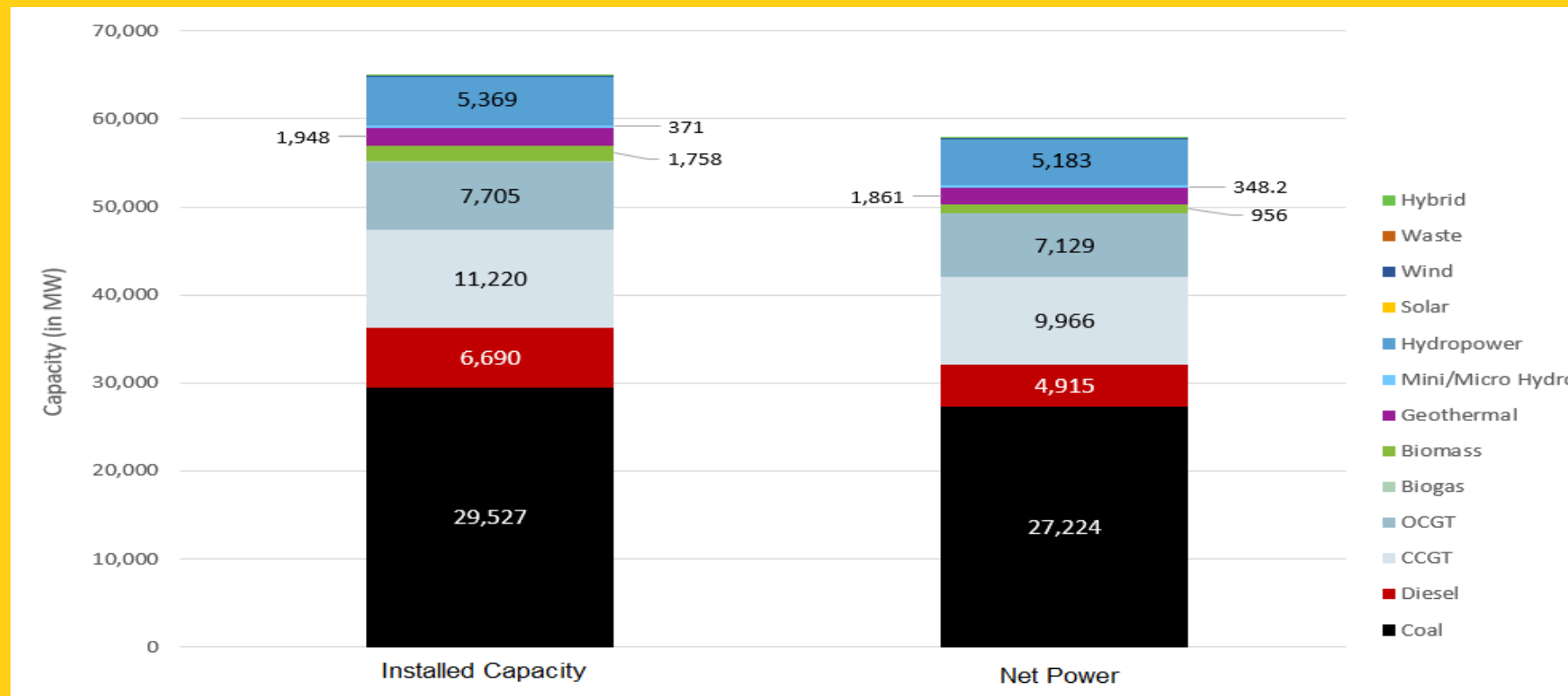
SIEW

Singapore, 31 October 2019

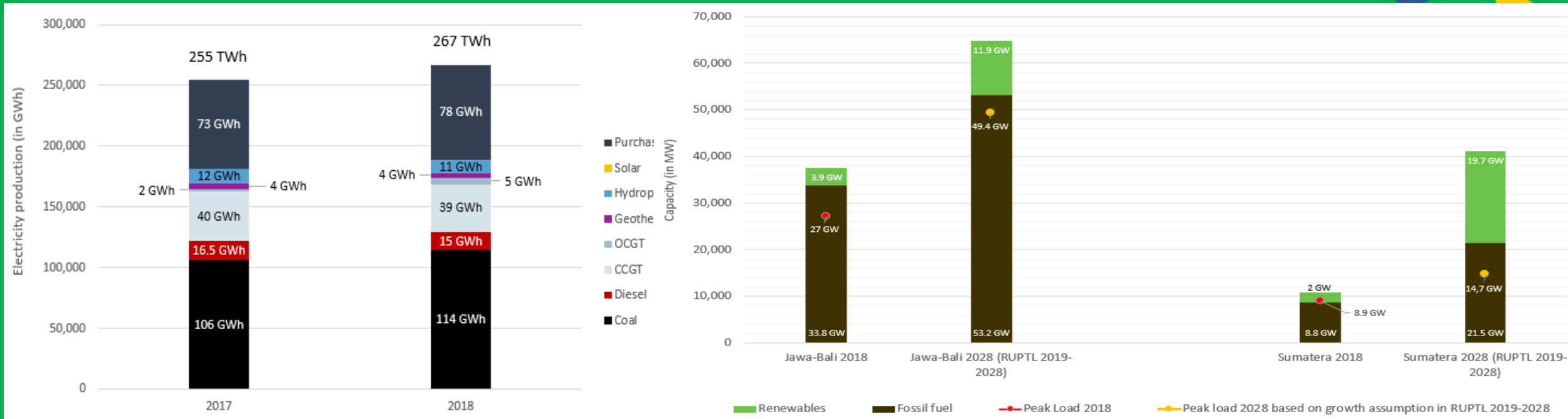
90% of Indonesia's power generation capacity in Java-Bali & Sumatra systems, the remaining are distributed in different system



- In 2018, total installed capacity in Indonesia is 64,925 MW, but only 89 percent or 57,864 MW of it is net power (Daya Mampu Neto/DMN).
- More than 60% total installed capacity belongs to Java-Bali electricity system, while the rest distributed within several other electricity systems in Indonesia (Sumatra, Sulawesi, Kalimantan, Nusa Tenggara, Papua)



Fossil fuels expected to continue dominating the power system in Java-Bali but strong renewables growth in Sumatra in 10 years

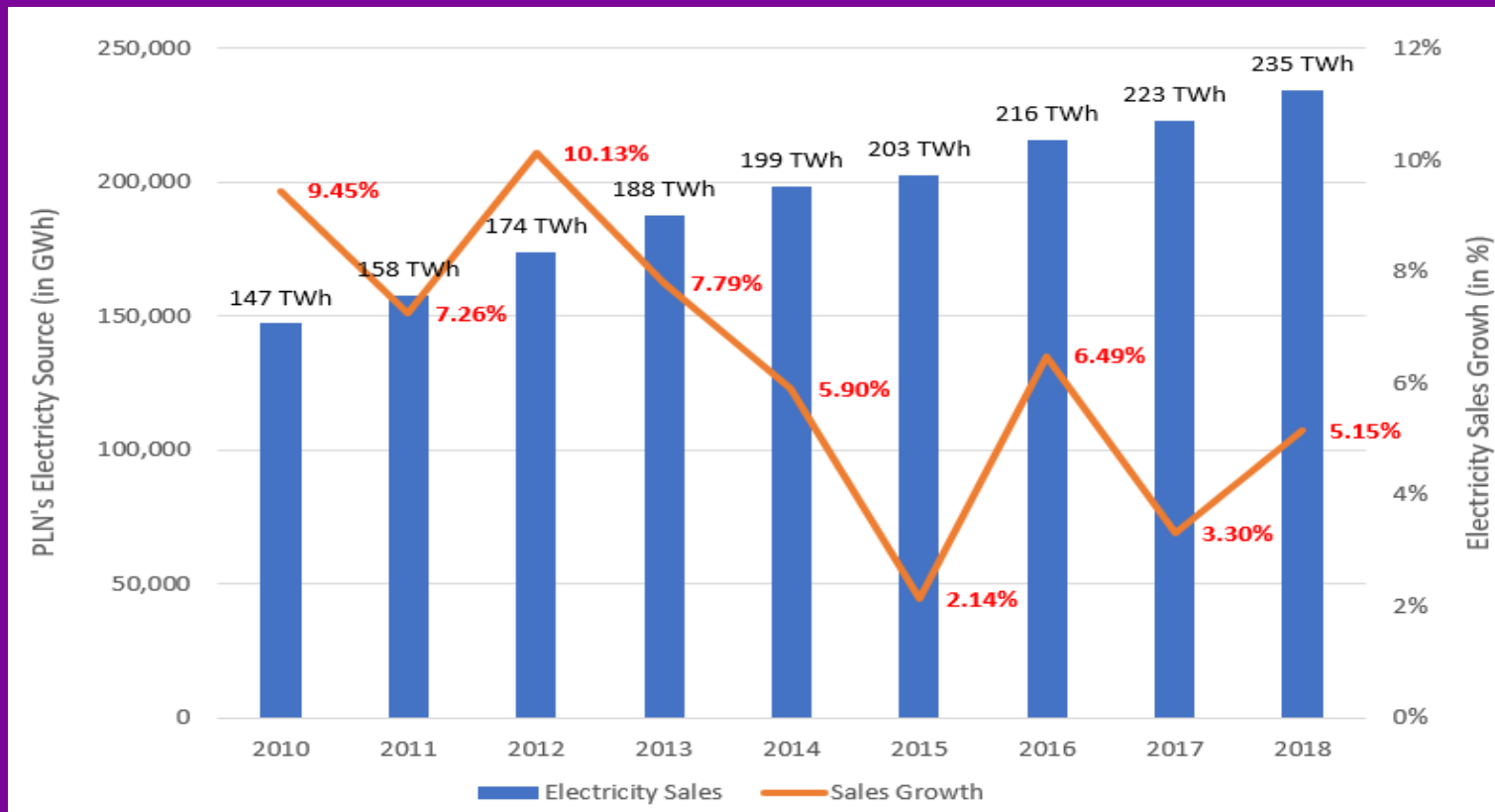


- Renewables capacity in Sumatra are expected to be supplied by geothermal, hydro and biomass.
- In Java, government limits to add new coal plants after 2025.

Source: Statistik Ketenagalistrikan DJK 2018 & 2019

89% of the electricity generated are consumed in Java-Bali and Sumatra

- Electricity sales grow at an average 6.4% from 2010-2018, within 2015-2018 the average growth of sales is 4.2%
- Java-Bali and Sumatra contribute the most to the electricity sales, with Java-Bali at 73.7 percent and Sumatra at 15.6 in 2018 (in total 89.3 percent).



Source: Statistik PLN 2018

A Roadmap for Indonesia's Power Sector:

How Renewable Energy Can Power Java-Bali and Sumatra

**Summary for
Policy Makers**

Study by Monash University, IESR, and
Agora Energiewende in 2018

This study modeled RUPTL 2018-2027
with several scenarios

Modelling is conducted using Energy
Exemplar's PLEXOS

We modelled demand growth based
on historical and future projection,
supply, transmission, investment and
system cost, emission, and capacity
factor and optimized by the PLEXOS

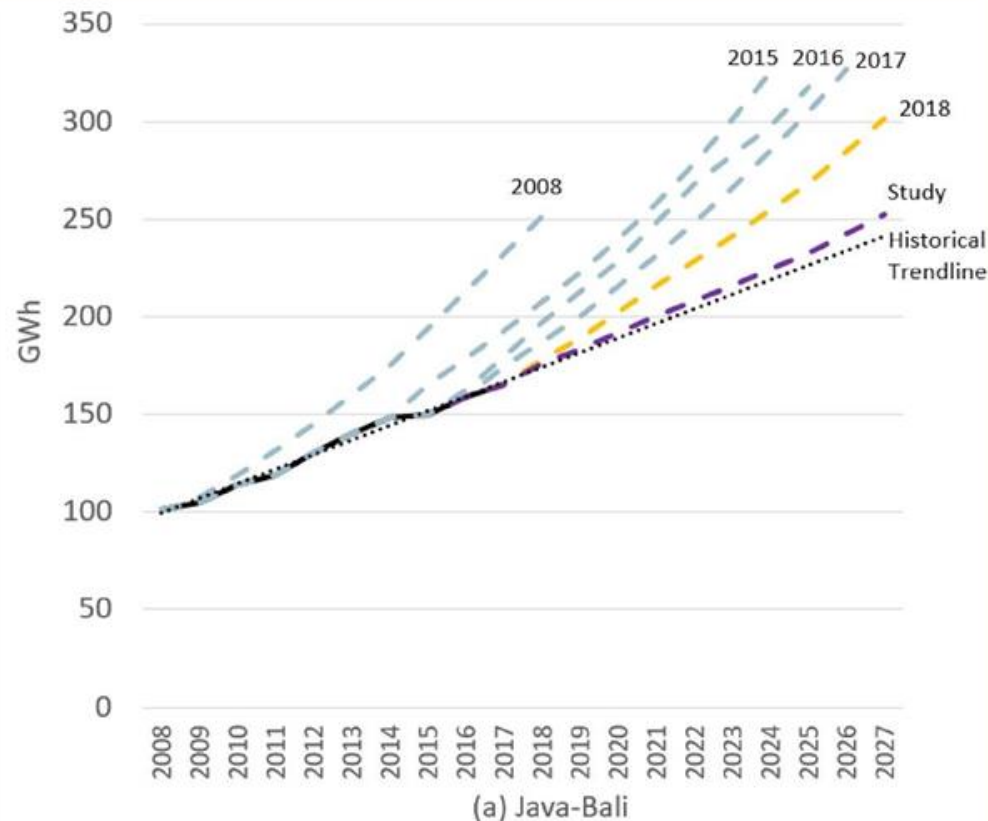
#1

History and current electricity plan has always overestimated energy demand in Java-Bali and Sumatra

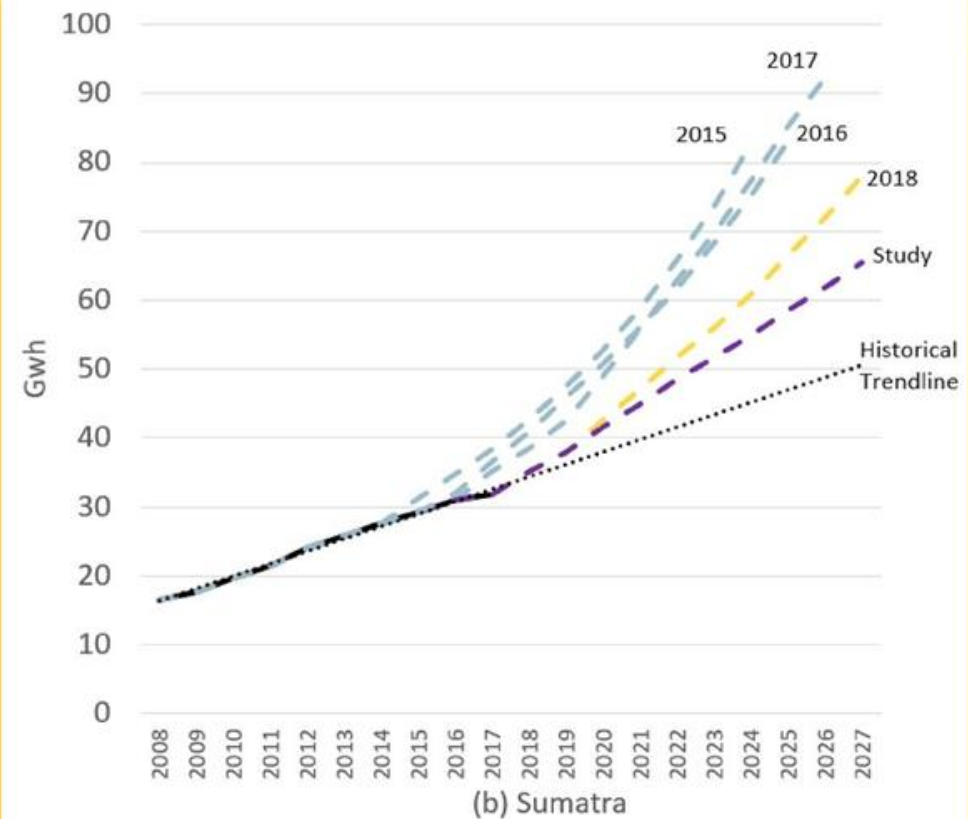


Electricity demand growth in Java-Bali and Sumatra is always higher compared to historical data

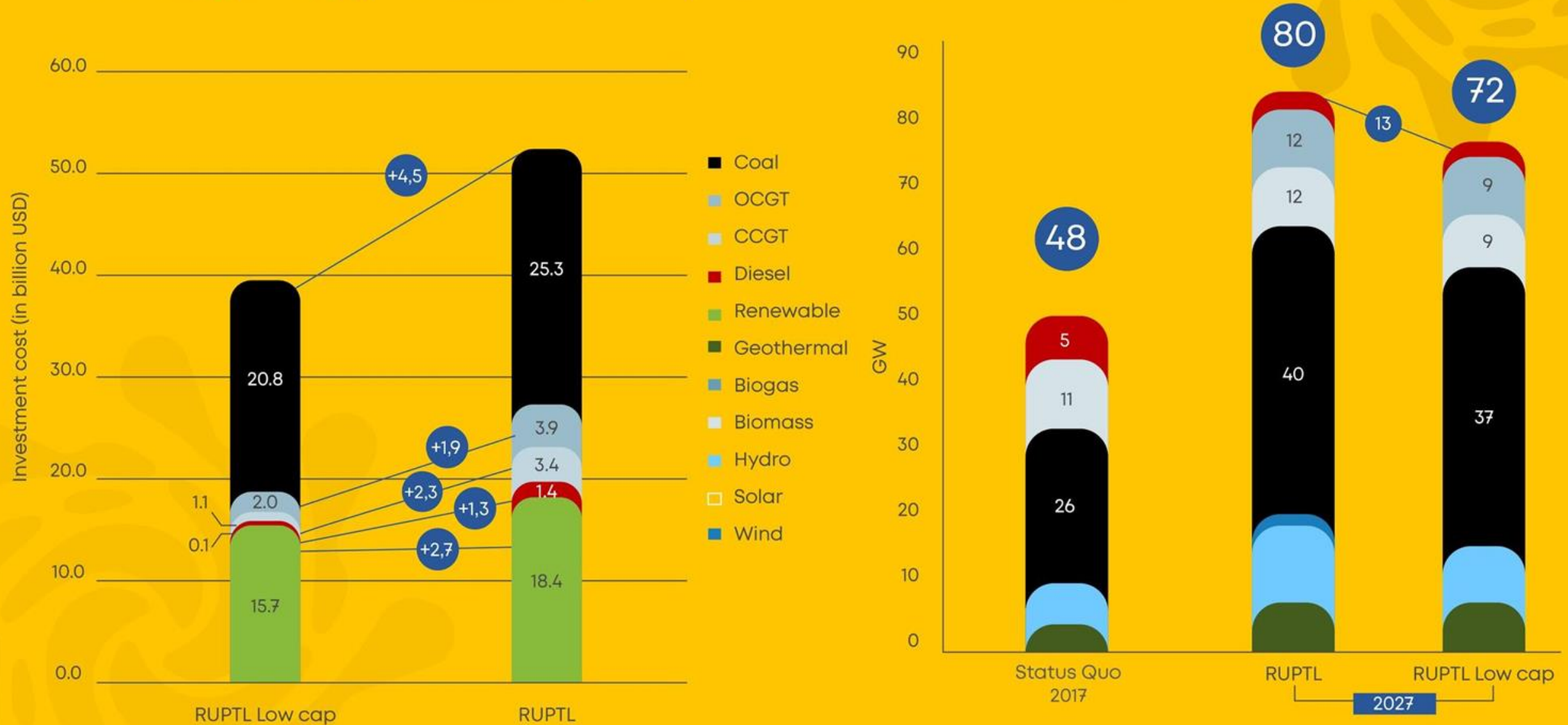
Historical demand growth (2012-2017) in Java-Bali is 4.9%.
Electrical demand growth in Java-Bali based on RUPTL
2018-2027 is 6 %



Historical demand growth (2012-2017) in Sumatra is 5.8%.
Electrical demand growth in Sumatra based on RUPTL
2018-2027 is 9.2 %



There is likely to be an overbuild of 12.5 GW of coal, gas and diesel, resulting in approximately US\$12.7 billion in wasted investment



#2

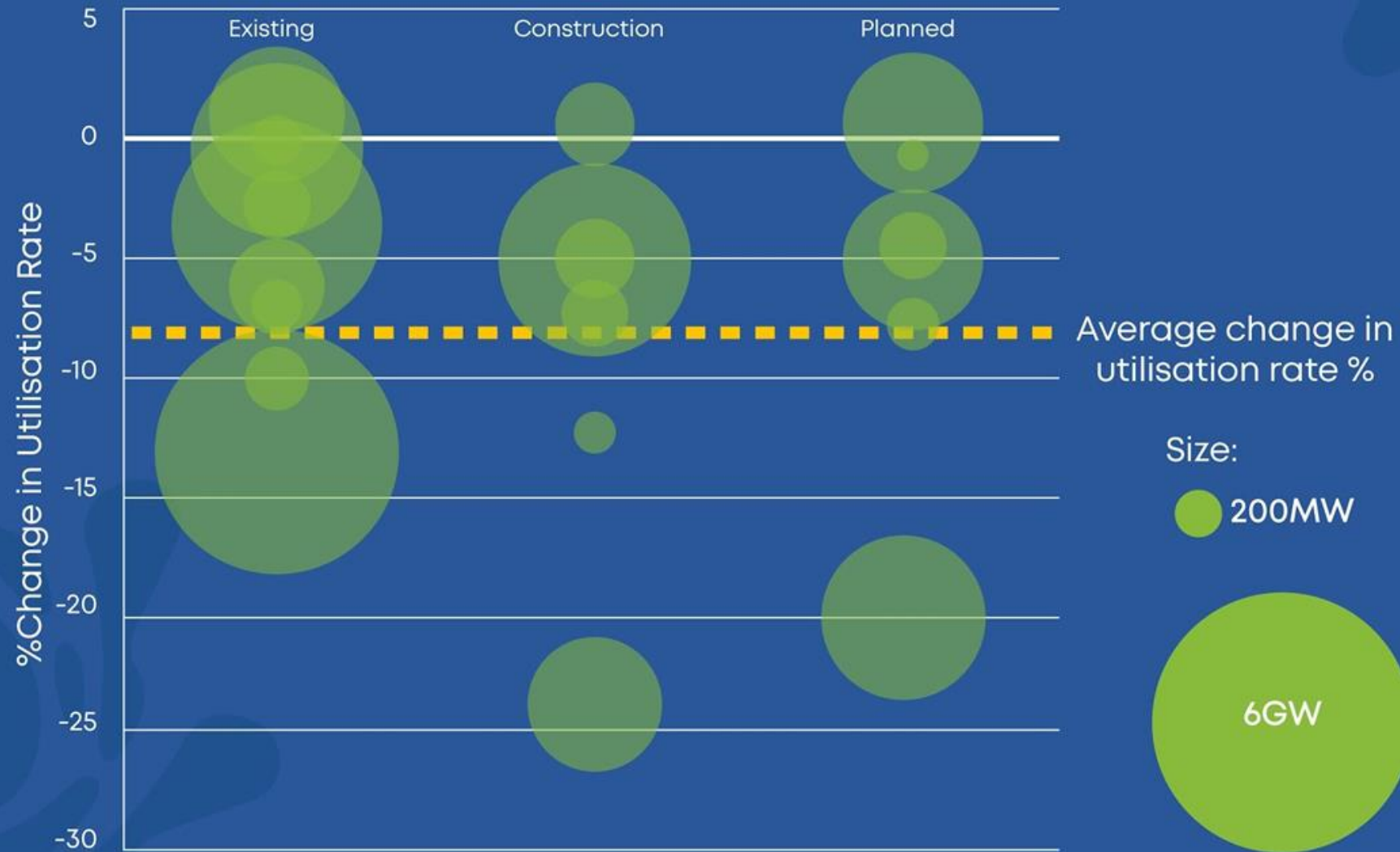
Overestimating electricity demand increases the risk of lower thermal power plant's capacity factor, moreover with lower prices of renewable energy



There are differences in installed capacity and generated energy in 2027 between RUPTL and modified RUPTL scenarios



Thermal power plant's utilization rate will be lower than planned, hence increasing stranded assets risk

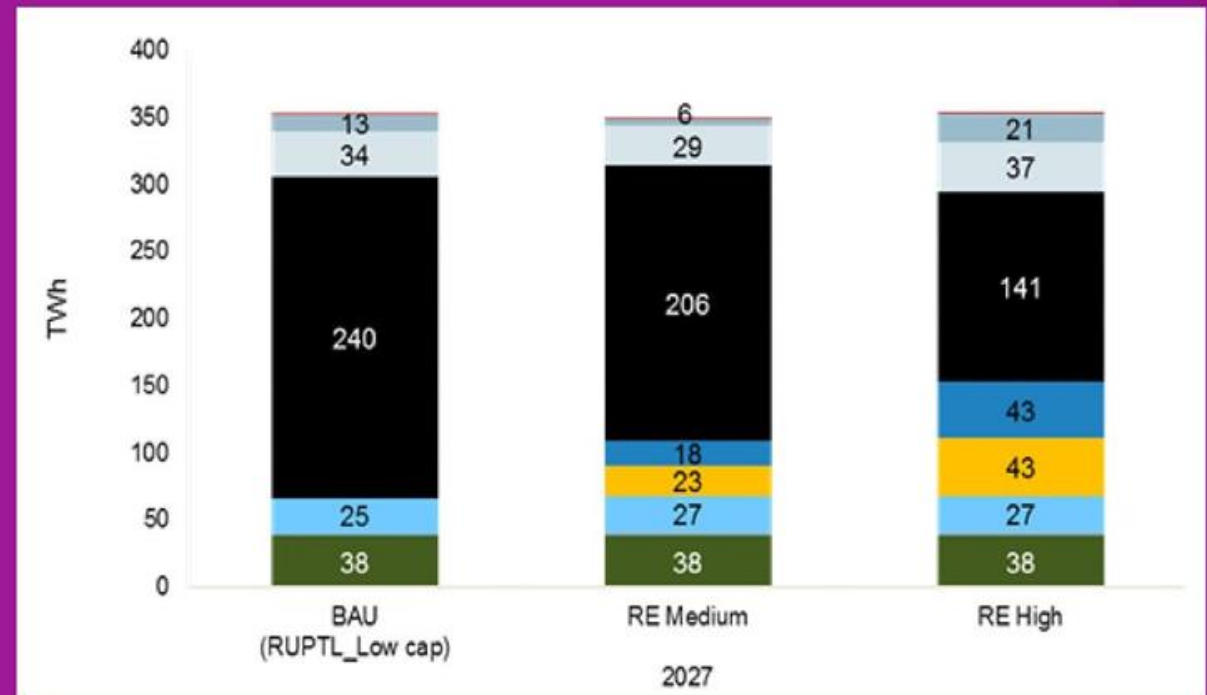
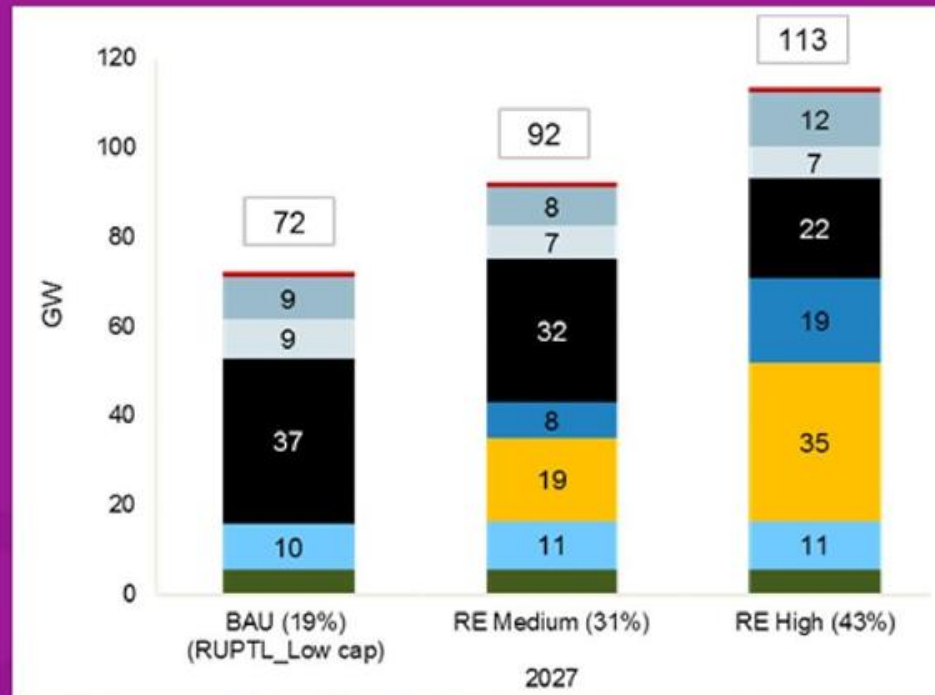


#3

Java-Bali and Sumatra could reliably meet growing electricity demand in the next 10 years through a doubling of the share of renewable energy



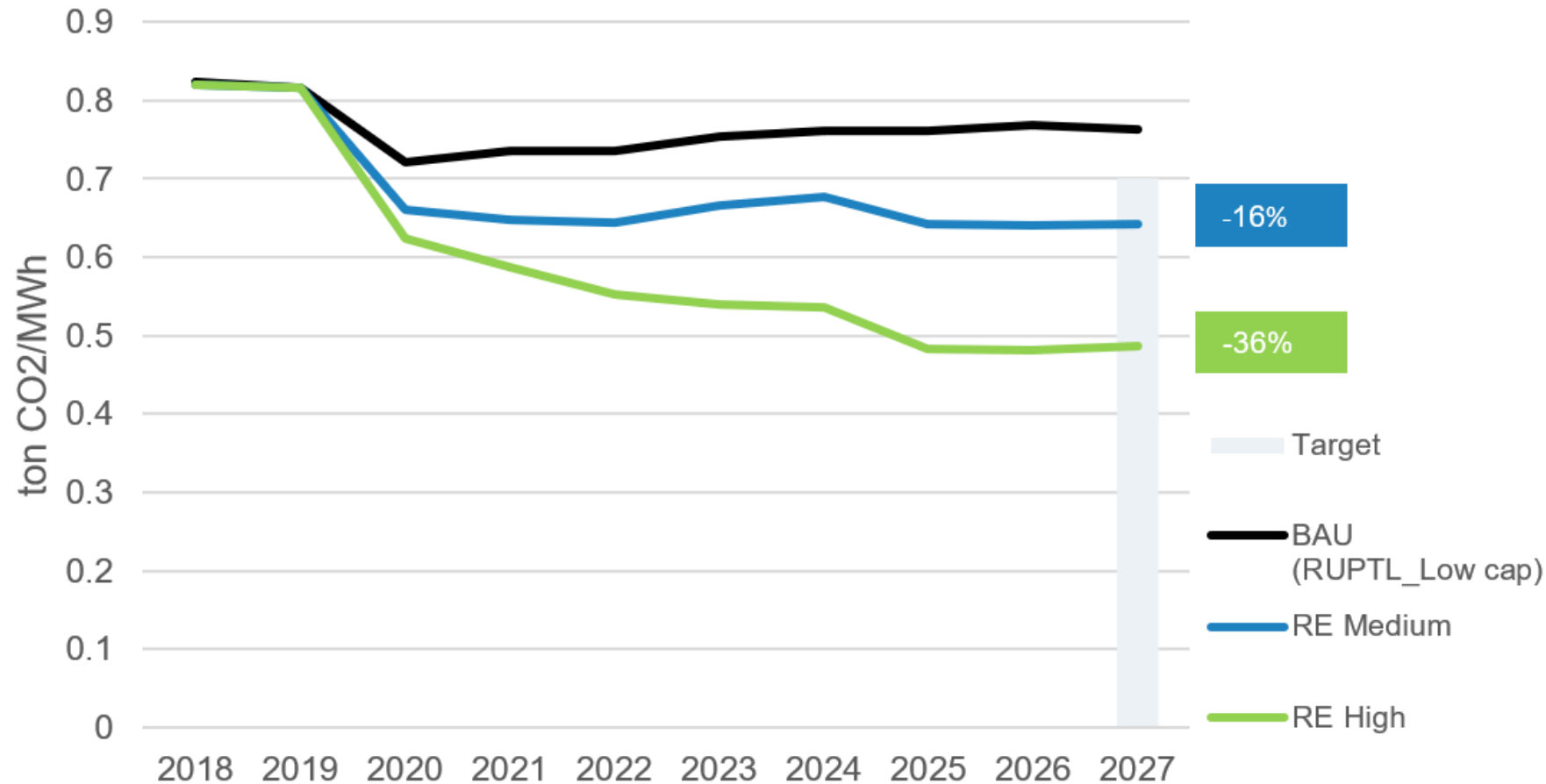
Indonesia has **abundant renewable energy potential** from a variety of resources that could be maximized to double its renewable energy mix in the next decade



■ Geothermal ■ Biogas ■ Biomass ■ Hydro ■ Solar ■ Wind ■ Coal ■ CCGT ■ OCGT ■ Diesel



Increasing renewable energy mix in electricity sector will contribute significantly to reducing emissions from the energy sector

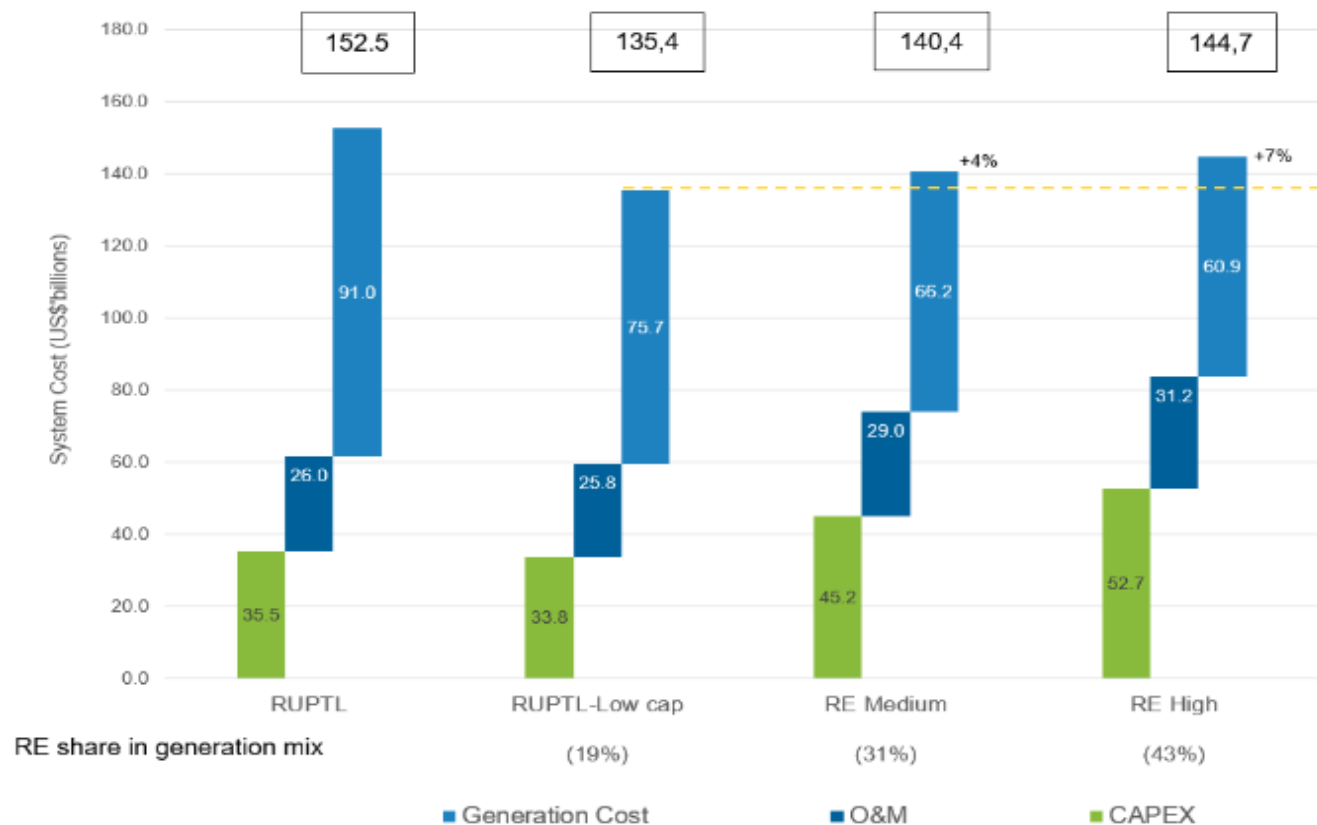


#4

A high renewables scenario coupled with realistic energy savings would result in a cost saving of **US\$7.8 billion** over ten years as compared with the current RUPTL plan



High renewable energy scenario for Java-Bali and Sumatra system is not only realistic, but also affordable and cost effective



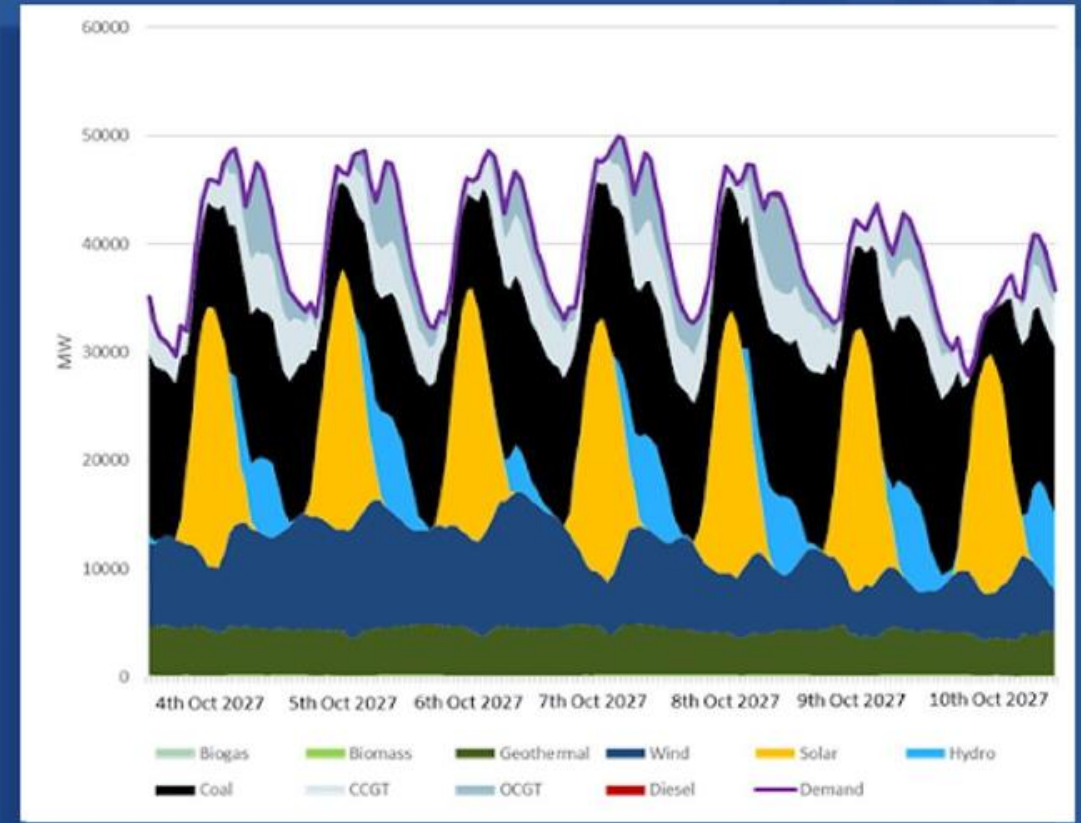
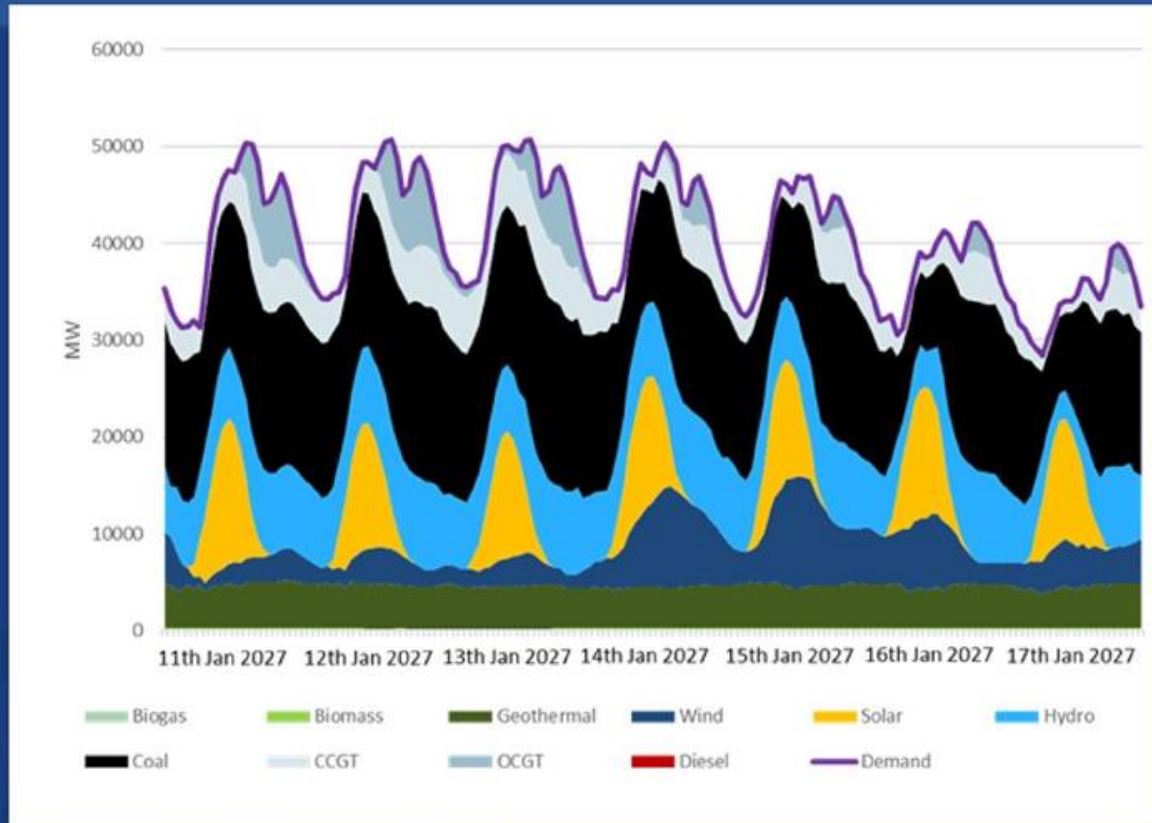
- A stable policy in renewables is a key to make renewables to become competitive and drive higher renewable penetration in the long-run.
- As solar and wind are still infants investor wary about the risks and expected higher rate of return, that turn into higher cost of capital.

#5

Even with **43%** renewables, the security of supply of the power system is maintained.



Even with high shares of wind and solar, the security of supply of the Java-Bali and Sumatra system can be **guaranteed**





Recommendation and the Way Forward

- Review best practice approaches and techniques in demand forecasting around the world and implement such an approach in Indonesia;
- Integrate the potential of energy efficiency for forecasting future electricity demand;
- Review current proposals for new coal-fired power stations in the Java-Bali and Sumatra;
- Assess the role and feasibility of storage (PHES, battery, etc.) and its function in the higher renewable energy penetration to ensure system reliability.
- Assess the battery application in the case of medium and high-scenario of distributed rooftop solar in Java-Bali system, to create virtual power plant.
- Develop and assess alternative scenarios and low carbon electricity pathways in the National Electricity Plan (RUKN) which integrate medium and higher renewable energy penetration in various electricity systems; and
- Adopt an ambitious long-term strategic plan with clear intermediate targets for renewable energy expansion, supporting policies and streamlined implementation at national, provincial and local levels.

Thank You!

Accelerating
Low Carbon
Energy Transition

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