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ELECTRIFYING THE INDONESIAN ARCHIPELAGO

BUSINESS MODELS FOR SOLAR PV PROJECTS

Indonesia's Solar PV Landscape

- 23% renewable energy mix by 2025
- Government targets of 6.5GW of solar;
- High potential for solar PV integration
- Opportunity for diesel fuel reduction
- Diverse commercial and legal framework that allow different business models

Indonesia's Installed Generation Capacity (2017)

Java-Bali and Sumatra

(36GW+9GW)

45GW

Total Indonesian Renewable Energy potential at 23% penetration

(12.9GW)

Rest of Indonesia

(11 GW)

Source: PLN

Current Renewable Energy power mix : 12%

7.4GW of renewable energy to be installed by 2025

Almost 1GW of renewable per year

Source: PLN

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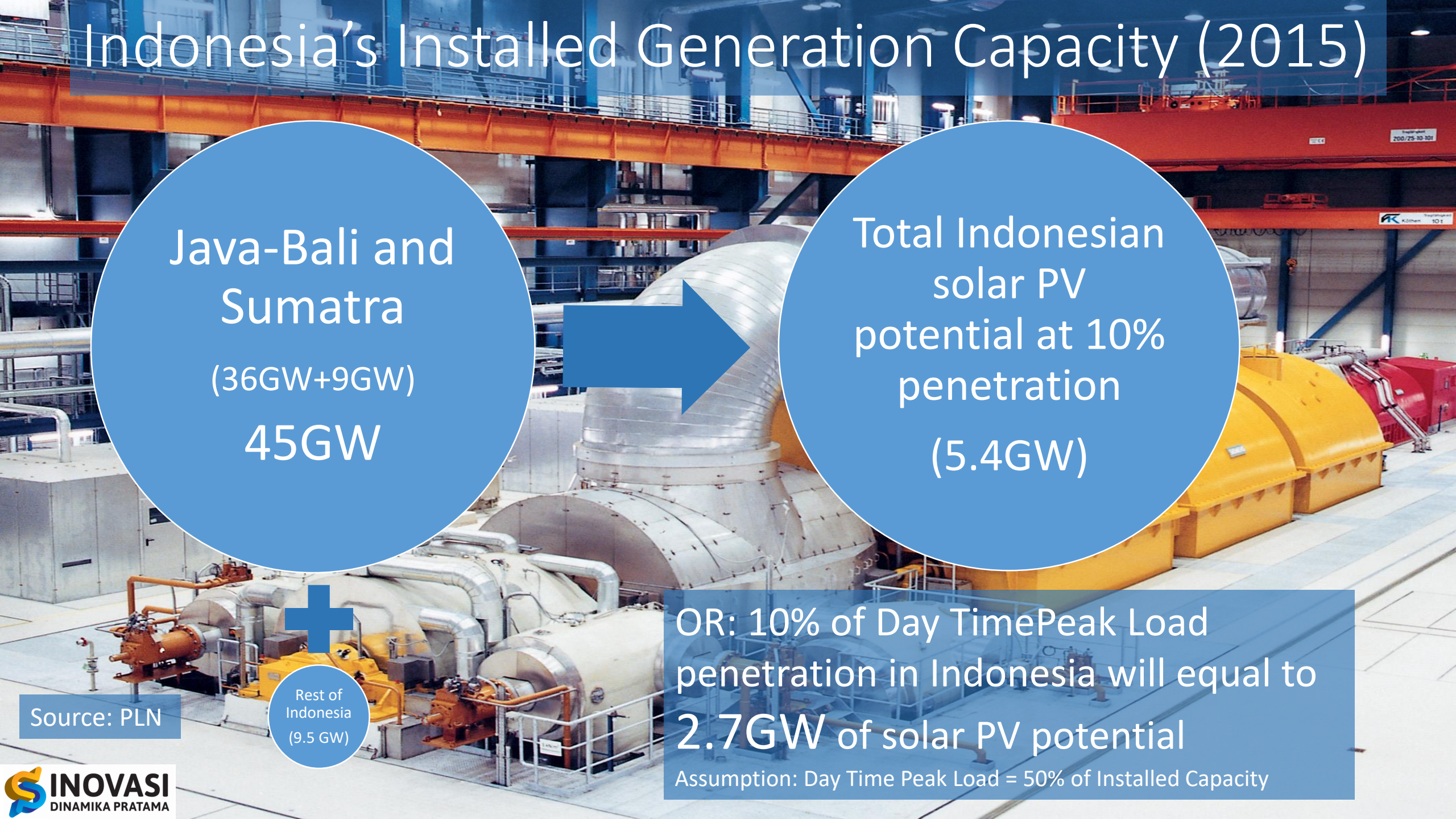
Indonesia's Installed Generation Capacity (2015)



Java-Bali and Sumatra

(36GW+9GW)

45GW

Rest of Indonesia

(9.5 GW)

Total Indonesian solar PV potential at 10% penetration

(5.4GW)

OR: 10% of Day TimePeak Load penetration in Indonesia will equal to

2.7GW of solar PV potential

Assumption: Day Time Peak Load = 50% of Installed Capacity

Source: PLN

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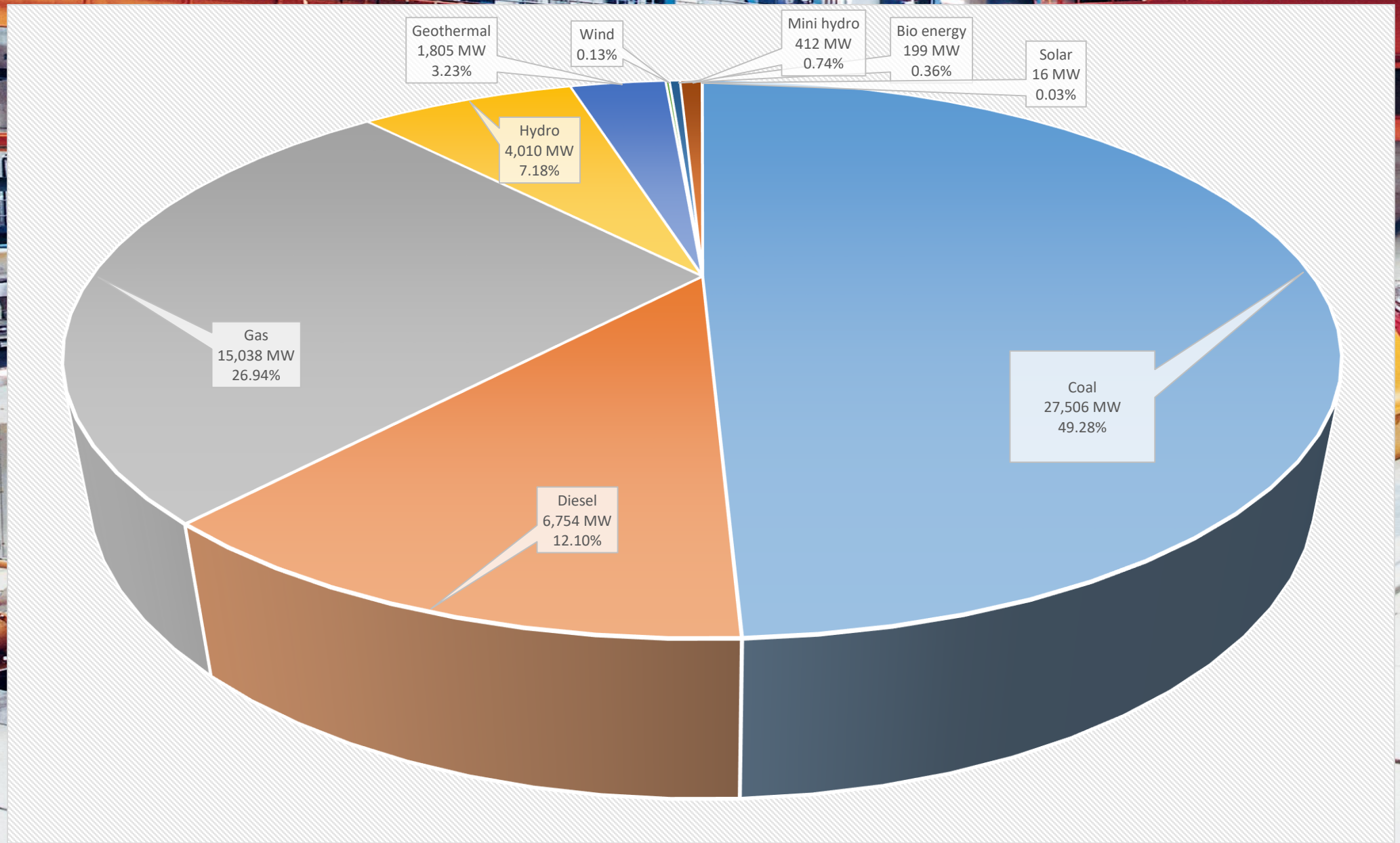
Indonesia's Installed Generation Capacity (2018)



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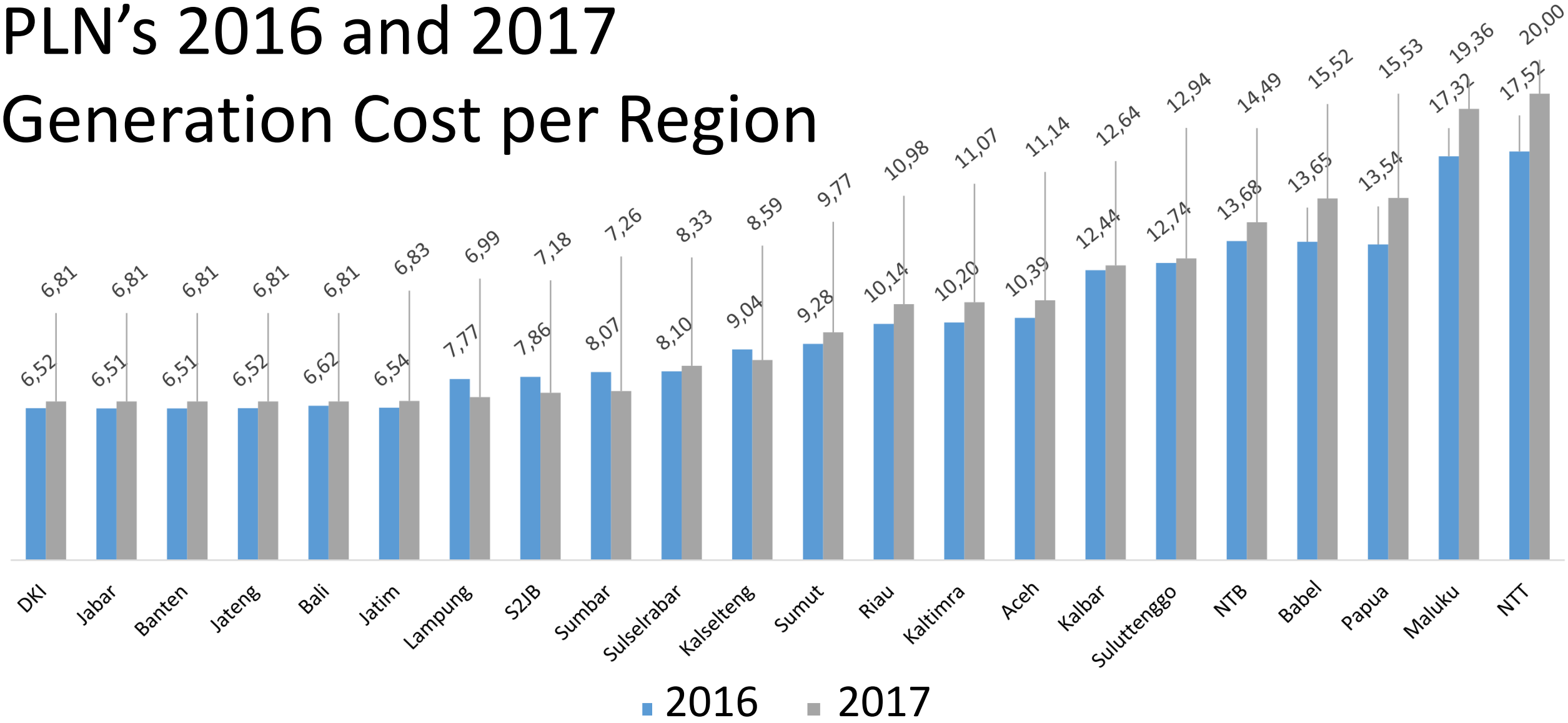
PLN's 2016 and 2017 Generation Cost per Region



National Average Generation Cost 2016 : **7.39 cUSD/kWh**

National Average Generation Cost 2017 : **7.66 cUSD/kWh**

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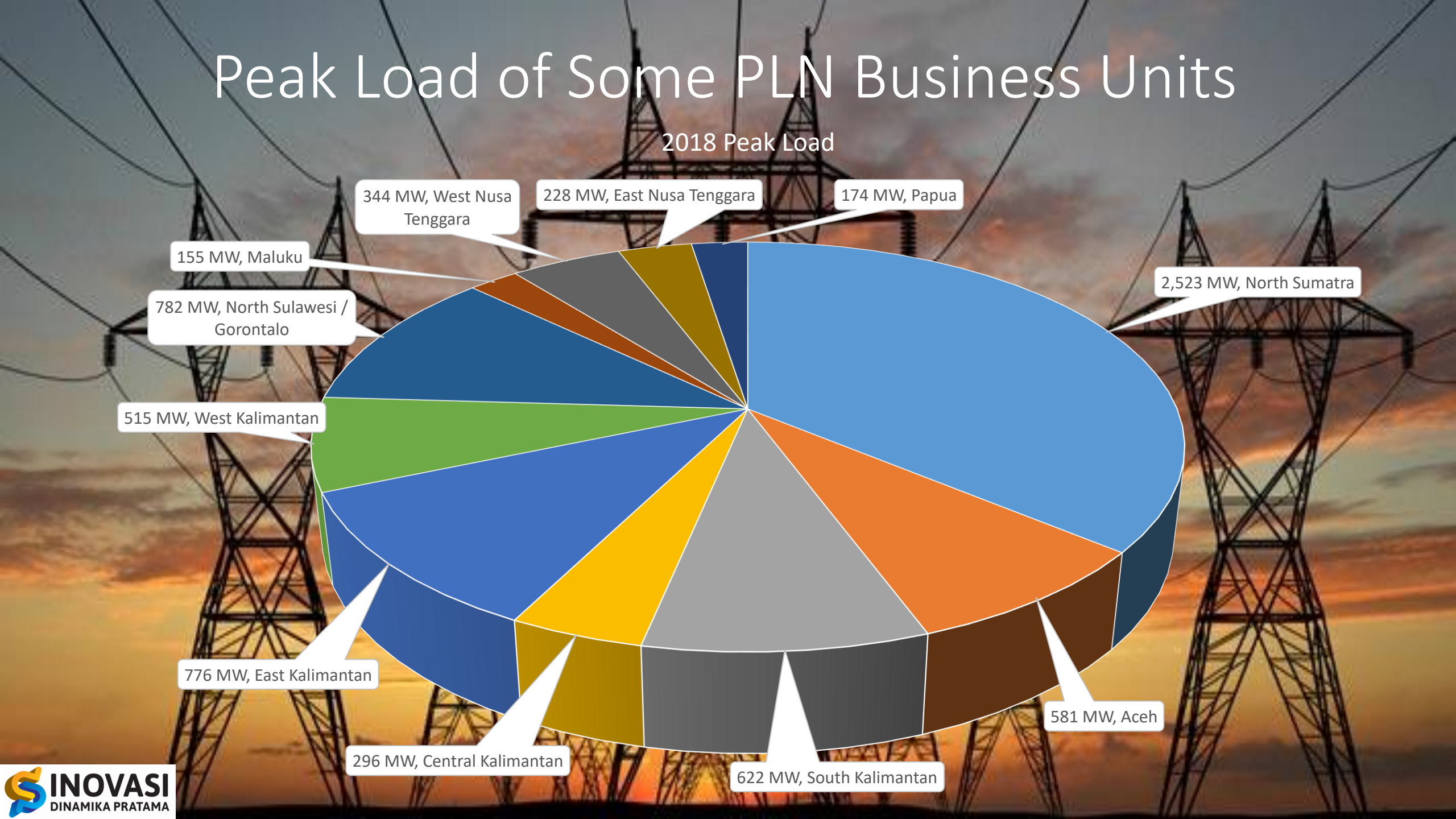
Peak Load of Some PLN Business Units



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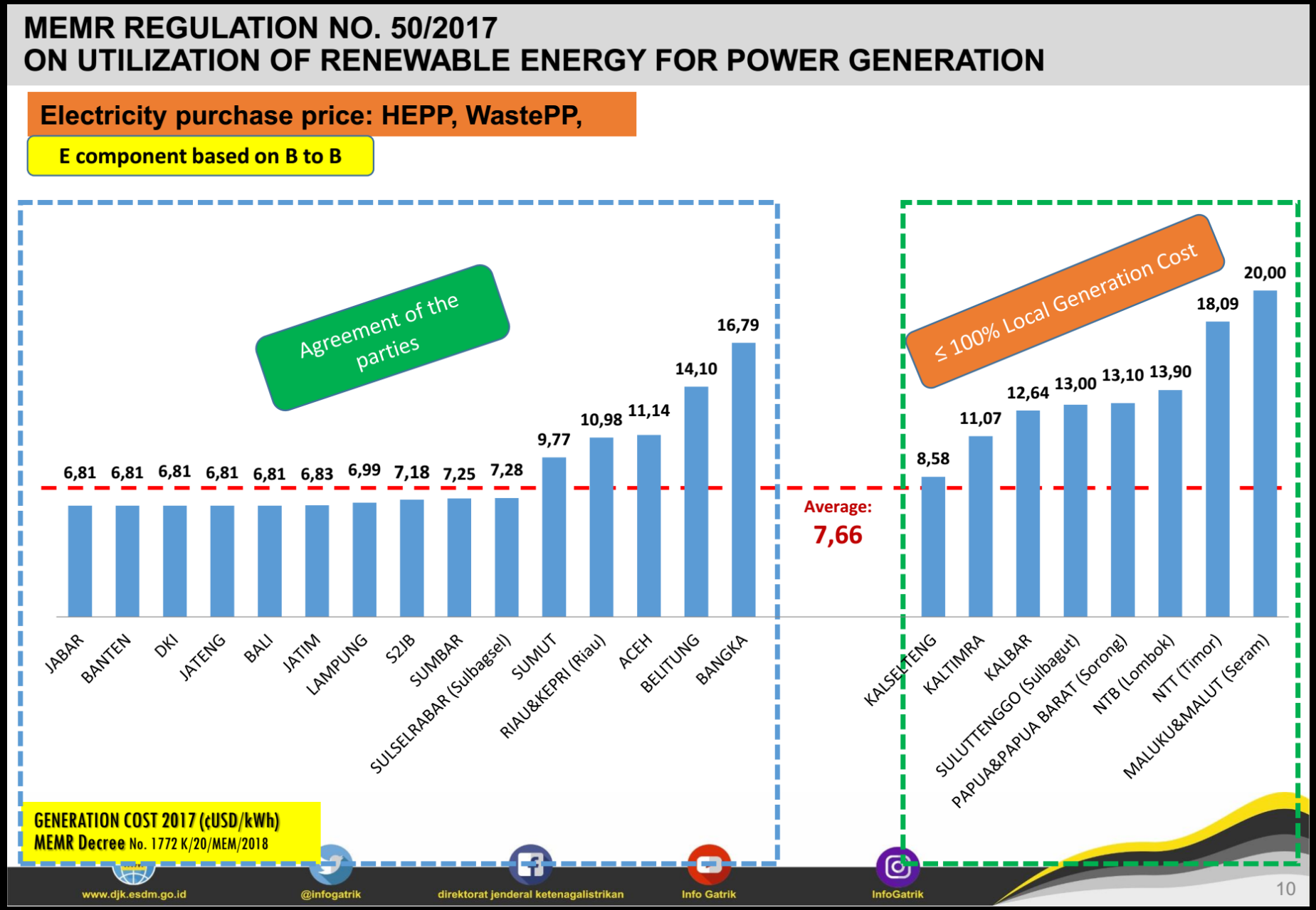
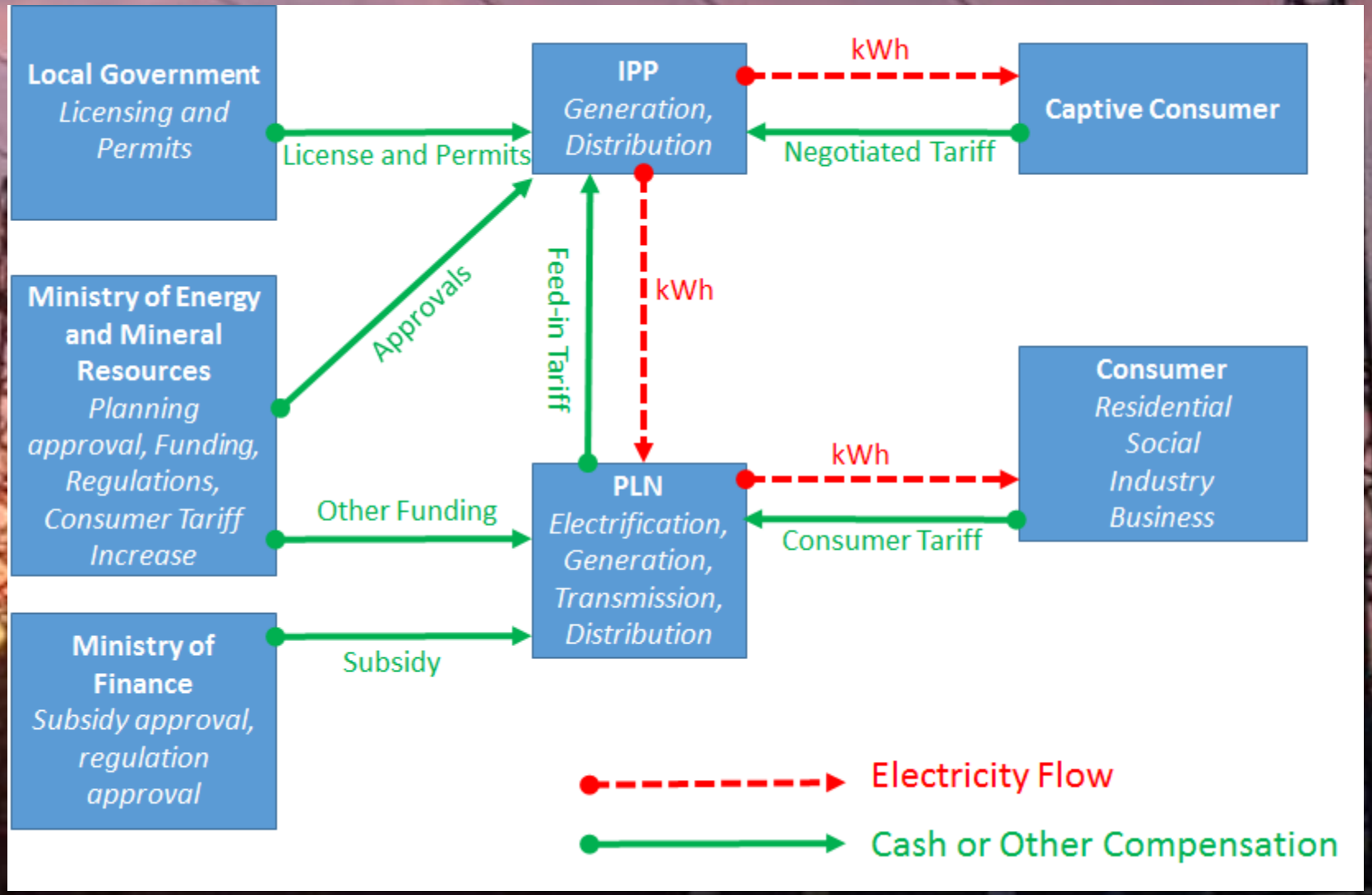
Renewable Energy Purchase Tariff Cap (source – MEMR)



Indonesia's Electricity Sector Stakeholders



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Business Models:

1. Selling to PLN (on-grid)
2. Off-grid
3. B2B with private sector

PLN PPA Business Model #1

- ESCO Model – Shared fuel savings with PLN by developing projects to save fuel from PLN diesel power plants

PLN PPA Business Model #2

- Multiple Revenues – Separate generation revenues from storage and ancillary services

PLN PPA Business Model #3

- Dispatchable Renewable Energy – Provide renewable energy systems that can be dispatchable to PLN's grid

PLN PPA Business Model #4

- Grid System Management – Manage a minigrid for PLN including distribution system

PLN PPA Business Model #5

- Take over existing generation management – Replace all generation plants in a minigrid

PLN PPA Business Model #6

- Off-grid area management – Electrify unserved areas for PLN while they manage the consumers

Selling to PLN – Ministry of Energy and Mineral Resources Regulation 50/2017:

- Solar PV and wind procurement are direct selection based on capacity quota
- Hydro, biomass, biogas and tidal procurement are direct selection
- Build, Own, Operate and Transfer agreement
- Price agreement needs ministerial approval

Microgrid Business Model #1

- Community IPP - Offset own use within the community (avoid high utility tariff) and sell the excess to the utility

Microgrid Business Model #2

- Mini IPP – Create a microgrid/mini grid for the community and sell electricity to the community

Microgrid Business Model #3

- Anchor Tenant – Selling electricity to an anchor tenant at a premium and provide electricity to the community

Microgrid Business Model #4

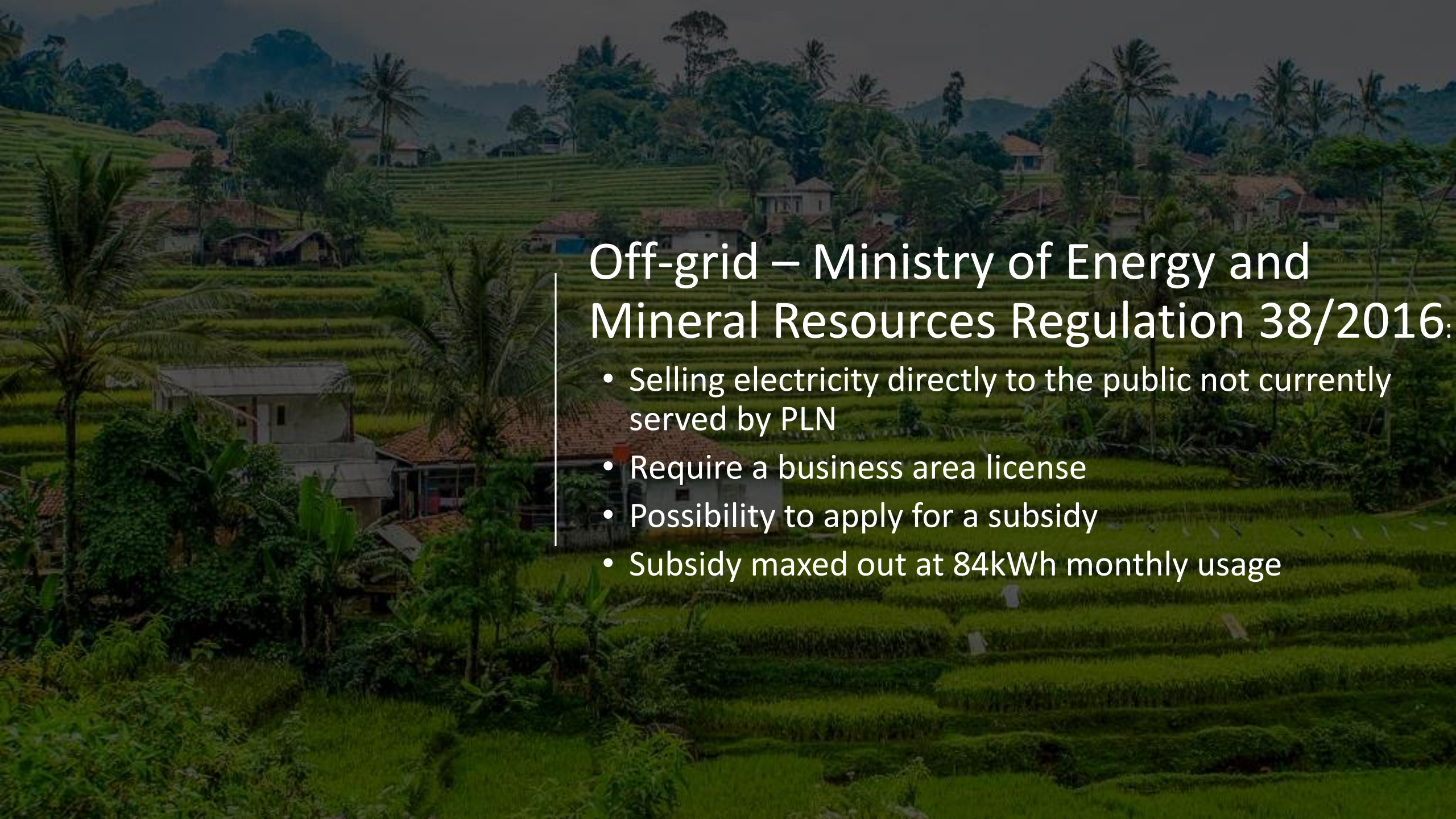
- Demand management – Being paid an incentive for being off the grid as required, cost savings otherwise

Microgrid Business Model #5

- Multiple Revenues – Provide water, sanitation and telecommunication services as a bundle

Microgrid Business Model #6

- Community ownership – Developer own a minority stake to spread default risk and develop many grids



Off-grid – Ministry of Energy and Mineral Resources Regulation 38/2016:

- Selling electricity directly to the public not currently served by PLN
- Require a business area license
- Possibility to apply for a subsidy
- Subsidy maxed out at 84kWh monthly usage

B2B Agreement with Private Sector :

- Equipment rental is the best business model
- Power wheeling is available
- Energy as a service is also possible
  - Ice making or cold storage
  - Drinking water bottling plant
  - Solar water pumping
  - Reverse osmosis plant for municipalities
- O&M agreement

Putting it All Together:

- Indonesia has a huge potential for renewable energy even just to meet its 2025 targets
- Several ways to help the Indonesian government:
  - PPA with PLN
  - Serving off-grid areas
  - B2B agreement with the private sector
- Technology is not a barrier:
  - Financing
  - Risk management
  - Be a good partner – win-win solutions

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EMPOWERING rural communities through INNOVATION