

### MINISTRY OF ENERGY AND MINERAL RESOURCES DIRECTORATE GENERAL OF NEW RENEWABLE ENERGY AND ENERGY CONSERVATION



### Estimating Electricity Generation in Solar PV Installations in Off-Grid Areas

Presented by: Director for Various New and Renewable Energy

On The Event: Joint APEC-IRENA Workshop on Renewable Energy Statistics (18<sup>th</sup> APEC Workshop on Energy Statistics)





# **Current Condition of RE** Development







# NATIONAL PRIMARY ENERGY MIX



- Data of 2015-2019 of Handbook of Energy and Economic Statistic Indonesia 2019; and

- Data of 2020 is temporary data.

- Based on data for the last five years, it shows that renewable energy & coal tends to increase, oil & gas tends to decline;
- Renewable energy programs acceleration are needed to reach 23% by 2025;
- Renewable Energy being developed is focused on fast installation and competitive prices (low cost production);
- Electricity demand growth (-2.4% \*) in 2020 and most COD power plants support the Jamali electricity system;
- Renewable energy activities play a role as a driver of the national economy, including recovering the economy from a pandemic.

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\*) YoY data up to October 2020



# NRE POTENTIAL AND INSTALLED CAPACITY



### \*) Ocean Energy Research:

- Sea wave technology :
  - $\circ$  Oscillating Water Column (OWC) has an opportunity to be located in southern waters of Enggano  $\circ$  Heaving Device has an opportunity to be located in Mentawai.
- Ocean thermal energy technology: Ocean Thermal Energy Conversion (OTEC), in northern waters of Bali.
- Feasibility Study of Sea Current technology has been carried out by Balitbang ESDM in Alas Strait (between P. Lombok and P. Sumbawa), Sape Strait (between P. Sumbawa and P. Komodo) and Pantar Srait (between P. Pantar and P. Alor)





## **RE Policy and Strategy**





# **GENERAL PLAN ON NATIONAL ENERGY**



- Energy Consumption: 0,8 TOE/kap
  Electricity Consumption: 1.084 Kwh/kap
  Total Generation Capacity: 69,7 GW<sup>\*</sup>)
- \*) Indonesia's population in 2019 was 267 million and by 2050 will reach335 million (based on RUEN assumption).

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Source: National Energy Council and Pusdatin

www.ebtke.esdm.go.id



# **REGULATION TO DEVELOP A LEVEL PLAYING FIELD FOR NRE**



#### **Commercial:**

**Non-Commercial:** 

- On-grid and comunnal off-grid: Solar PV, Hydro, Mini/microhydro, Wind, Bioenergy, Ocean Energy
- Investation: Private Sector, BUMN

For village, outer and border area

Wind, Bioenergy, Ocean Energy,

Off-grid: Solar PV, Hydro, Mini/microhydro,

SHS/LTSHE, Street Lighting with Solar PV

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#### Legal Basis

- MEMR Regulation No 50/2017 jo No. 53/2018 jo. No. 4/2020 Utilization of Renewable Energy for Electricity Supply
- □ MEMR Regulation No 38/2016
  - Acceleration of Electrification in Undeveloped Rural Area, Remote Areas, Border Areas, and Small Island with Population through the Implementation of Small Scale Power Supply
- MEMR Regulation No. 49/2018 jo. 13/2019 jo. 16/2019 Utilization of Rooftop PV by PLN's Consumer

#### Legal Basis

- Presidential Decree No. 47/2017 : LTSHE
- MEMR Regulation No.33/2017 jo 5/2018 Procedure for Providing LTSHE
- MEMR Regulation No. 3/2017 Operational Guidelines for Assignment Special Allocation Fund (State Budget) for Small Scale Energy
- MEMR Regulation No. 39/2017 jo No. 12/2018
  Implementation Physical Activity of Renewable Energy Utilization (State Budget)







# DRAFT OF PRESIDENT REGULATION ON RE POWER PURCHASING BY PLN

### PRICE

- 1. FiT 2 stages:
  - Hydro (including reservoir hydro) capacity up to 5 MW
  - Solar PV and wind capacity up to 5 MW
  - Biomass and Biogas capacity up to5 MW
  - Solar PV and Wind expansion for capacity up to5 MW
  - Biomass & Biogas expansion for capacity up to 5 MW
- 2. Ceiling Price (HPT):
  - Geothermal for all capacity
  - Hydro (including reservoir hydro) for cap. >5 MW
  - PLTS & PLTB >5 MW
  - Biomass & Biogas for cap. >5 MW
  - Solar PV and Wind expansion >5 MW
  - Biomass and Biogass expansion >5 MW
  - excess power PLTP, PLTA, PLTBm, PLTBg all capacity;
- 3. B to B:
  - Peaker Hydro for all capacity
  - Waste, Biofuel, and ocean for all capacity;
- 4. B to B needs Minister Approval

### THE POWER PURCHASE MECHANISM

- 1. Direct appointment for:
  - Hydro for all capacity;
  - Solar PV, Wind, Biomass and Biogas for capacity up to 5 MW
  - Peaker Hydro, Wsaste, Ocean and Biofuel
  - Expansion and excess of Hydro, Geothermal, Solar PV, wind, Biomass, Biogass all capacity
- 2. Direct appointment in a form of assignment for:
  - Hydropower reservoir
- 3. Direct Selection :
  - Solar PV, wind, Biomass and Biogas for capacity > 5 MW
- 4. BOOT Scheme is not regulated (B to B)
- 5. Contract period up to 30 years
- 6. Transaction in rupiah with exchange rate of dengan JISDOR





# STRATEGIES ACCELERATING NRE

NRE development acceleration needs to consider energy need reality, a fair economical value by giving the first opportunity to renewable energy as well as minimizing intermittency factor.

- **1. Primary/Final Energy Substitution** by using the existing technology; B30-B50, Co-firing, RDF Utilization
- 2. Fossil Primary Energy Conversion, power plant technology needs to be replaced/converted. Diesel power plant (PLTD) or coal-fired power plant (PLTU) shall be replaced by NRE power plants and also development of biogas and pellet for cooking
- **3. New NRE Installed Capacity** to fulfill demand by focusing on Solar Power Plant (PLTS)
- **4. Non Electricity/Non Biofuel Utilization** such as briquette, agricultural product drying and biogas







# Rural Electrification Program (Prioritize Solar PV) and The Challenges







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### ELECTRIFICATION RATIO AND RURAL ELECTRIFICATION RATIO (April 2020)

# SUBTITUTE DISTRIBUTED DIESEL POWER PLANT (PLTD) BY RE



- It will reduce importing oil and saving state spending, and also reducing gas emissions emit from the operation of PLTD;
- it is a better way to change diesel power plant to be replaced by renewable energy power plants.

*Dedieselisasi Program* at 200 locations, Equivalent Capacity ±160 MW of ± 925 units of PLTD



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# **RENEWABLE ENERGY BASED ECONOMIC DEVELOPMENT (REBED)**

### OBJECTIVE

To encourage regional economies including in "3T Area" (frontier, remote and underdeveloped areas), and to achieve 100% electrification ratio by using RE;

### PROGRAM

- Electricify 433 Villages;
- Provision of electricity supply in the 3T Area;
- Convert Diesel to PV/Wind/Biomass/Biogas/ Hybrid







# **ELECTRIFICATION PROGRAM IN REMOTE AREAS**

Constructing electricity infrastructure, i.e. grid extension, *off-grid/mini grid* development and pre-electrification ratio program (Solar lantern or Micro electric power storage device)



### DEVELOPING THE ECONOMIC CLUSTERING MODEL OF MICROGRID OR HYBRID GENERATION

### DEVELOPMENT AREAS OF ECONOMIC CLUSTERING FOR NRE MICROGRID



Source: Ditjen EBTKE, 2020



\*) ada ribuan pulau terdepan dan pulau-pulau kecil potensi untuk klustrer ekonomi maritim

Hybrid Generation Scheme





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# SOLAR PV ROOFTOP DEVELOPMENT PROGRAM (2020-2035)

### **Objectives**

The involvement and participation of all people in utilizing PLTS

Giving market guarantee for the growth of domestic PLTS industry

### Target: 2,904 GW

- Government Buildings (111,7 MW)
- Building and SOE Facilities (1.426 MW)
- Industry and Business (624,2 MW)
- Household (648,7 MW)



### Installed Capacity: 18,19 MWp (2.556 customers)

- Solar PV Rooftop of MEMR 859 kWp
- Solar PV Rooftop II 241 kWp
- Solar PV Rooftop of Coca cola amatil in Cikarang 7,2 MWp (the biggest in ASEAN)
- Solar PV Rooftop of Pertamina's petrol stations 52 kWp
- Solar PV Rooftop Refinery unit 3,36 MWp, Sei Mangkei 2 MWp
- Solar PV Rooftop Danone Aqua in Klaten 3 MWp

### **Regulation:**

MEMR Regulation no. 49/ 2018 jo. 13 / 2019 jo. 16/2019 Electricity Export-Import Calculation (Net Metering):

- Electricity import from PLN valued for 100%
- Electricity export from PLTS to PLN valued for 65%



# THE CHALLENGES OF OFF GRID RENEWABLE ENERGY



The sustainability of the project, especially for the state budget project, related to the capacity of local operator, the continuation of the funding, and lack of capable local institution;



There's no commercial project yet, due to high investment cost, no subsidy, and low ability to pay of the people;



Very scattered projects by many institutions, so it's very difficult to make a comprehensive database;

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Battery waste management especially in very remote areas;



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