BIOENERGY POWER PLANT IN INDONESIA:
Rules and Implementation

German – Indonesia Business Forum
Jakarta, 9th April 2019

Trois Dilisusendi
Deputy Director for Program of Bioenergy
OUTLINE:

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02 – IMPLEMENTATION OF PALM OIL-BASED POWER PLANT

03 – CLOSING
INTRODUCTION

- PRIORITY OF NATIONAL ENERGY DEVELOPMENT
- INDONESIA'S RE
- RENEWABLE ENERGY TARGET AND ACHIEVEMENT
- BIOENERGY DEVELOPMENT GOALS
- POLICY AND REGULATION FOR BIOENERGY POWER PLANT
- ELECTRICITY TARIFF FOR BIOENERGY POWER PLANT
**PRIORITY OF NATIONAL ENERGY DEVELOPMENT**

**BASED ON NATIONAL ENERGY POLICY**

- **Maximize** the use of renewable energy
- **Minimize** the use of fossil oil
- **Optimize** the use of natural gas and new energy
- **Use** Coal as mainstay for national energy supply
- **Utilize** Nuclear as the last option

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Renewable Energy Target and Achievement

**PRIMARY ENERGY MIX @ 2025**

Gas 22%  
Coal 30%  
Oil 25%  
NRE 23%

400 MMBOE

**PRIMARY ENERGY MIX @ 2017**

Gas 21.2%  
Coal 30.1%  
Oil 41.4%  
RE 7.3%

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**ELECTRICITY**

- **Geothermal**
  - Target: 7.2 GW
  - CAP: 1.81 GW

- **Hydro**
  - Target: 17.9 GW
  - CAP: 5.12 GW

- **Minihydro**
  - Target: 3 GW
  - CAP: 0.21 GW

- **Bioenergy**
  - Target: 5.5 GW
  - CAP: 1.84 GW

- **Solar PV**
  - Target: 6.5 GW
  - CAP: 0.09 GWp

- **Wind Power**
  - Target: 1.8 GW
  - CAP: 0.08 GW

- **Biomass**
  - Target: 8.4 M Tons
  - Utilization: N/A

- **Biofuel**
  - Target: 13.8 M KL
  - CAP: 3.41 M KL

- **Biogas**
  - Target: 489.8 M M3
  - Utilization: 25.96 M M3

- **CBM**
  - Target: 46.0 MMSCFD
  - Utilization: -

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- **92.2 MMBOE**
- **23.0 MMBOE**

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**NON-ELECTRICITY**
BIOENERGY DEVELOPMENT GOALS

1. To support the domestic agriculture-based economy

2. Increase energy security and reliability

3. Commitment to reducing emissions to 29% below BAU by 2030

4. Meet the 23% target of renewable energy in the National Energy Mix by 2025 (Based on National Energy Policy)

5. Reduce consumption and import of fossil fuel

6. Accelerate modern energy access for frontier, outermost and least developed regions (3T regions)
Policies and Regulations for Bioenergy Power Plant

1. LAW No. 30/2007 on Energy
2. LAW No. 30/2009 on Electricity
3. GOVERNMENT REGULATION NO. 79/2014 on National Energy Policy
4. MEMR REGULATION NO. 50/2017 on The Utilization of Renewable Energy Resources for Electricity
5. MEMR REGULATION NO. 38/2016 on Acceleration of Rural Electrification through Small Scale Project
6. MEMR REGULATION NO. 10/2017 on Key Points of PPA

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# ELECTRICITY TARIFF FOR BIOENERGY POWER PLANT

<table>
<thead>
<tr>
<th>NO</th>
<th>BIOENERGY POWER PLANT</th>
<th>PURCHASING MECHANISM</th>
<th>TARIFF (Based on MEMR Regulation No. 50/2017 jo 53/2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biomass (PLTbm)</td>
<td>Direct Selection</td>
<td>Maximum 85% x Regional BPP</td>
</tr>
<tr>
<td>2</td>
<td>Bogas (PLTBg)</td>
<td>Direct Selection</td>
<td>Maximum 85% x Regional BPP</td>
</tr>
<tr>
<td>3</td>
<td>MSW (PLTSa)</td>
<td>Direct Appointment</td>
<td>Maximum 100% x Regional BPP</td>
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<tr>
<td>4</td>
<td>Biofuels (PLT BBN)</td>
<td>Direct Selection</td>
<td>Agreement between parties</td>
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</tbody>
</table>

### PURCHASING MECHANISM

<table>
<thead>
<tr>
<th>PURCHASING MECHANISM</th>
<th>Capacity ≤ 20 MW</th>
<th>Capacity &gt; 20 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Appointment</td>
<td>US$ 13.35 cent / kWh</td>
<td>= 14.54 – (0.076 x contract capacity)</td>
</tr>
</tbody>
</table>

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**ELECTRICITY TARIFF FOR ACCELERATION PROJECT OF MSW POWER PLANT (Based On Presidential Regulation No. 35/2018)**

- **Biomass (PLTbm)**: Direct Selection, Maximum 85% x Regional BPP, Agreement between parties
- **Bogas (PLTBg)**: Direct Selection, Maximum 85% x Regional BPP, Agreement between parties
- **MSW (PLTSa)**: Direct Appointment (based on local government auctions), Maximum 100% x Regional BPP, Agreement between parties (Apply for Sumatera, Java and Bali)
- **Biofuels (PLT BBN)**: Direct Selection, Agreement between parties

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**Regional Electricity Generation Cost (Regional BPP)**

- > Average of National Electricity Generation Cost (National BPP)
- ≤ Average of National Electricity Generation Cost (National BPP)

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1. PT PLN is required to purchase electricity from the Renewable Energy Power Plants in accordance to the National Energy Policy and the General Plan of Electricity.

2. PT PLN purchases electricity from the Biogas or Biomass Plants which can guarantee the availability of feedstock during the PPA period.

3. The electricity purchase by PT PLN (Persero) from MSW Power Plants is intended to support the Local Government to overcome municipal waste problems.

4. Procurement method: **BOOT (Build, Own, Operate, Transfer)**.

5. PPA period: maximum **30 years** since COD, depend on the type of power plant.

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**PROVISION OF TRANSACTION**

**Delivery or Pay**
If IPPs fail to deliver electricity according to the contract due to IPPs’ account

IPP shall pay penalty to PLN

**Take or Pay**
If PLN fail to take the power generated according to contract due to PLN’s account

PLN shall pay penalty to IPPs

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**EXCESS POWER**

- PT PLN (Persero) can buy Excess Power from the Operating Permit’s Holders to strengthen the local electricity supply system.
- The Excess Power Agreement may be less or more than 1 year based on local system conditions and power needs.
- The price will be revisited annually to accommodate the change in Regional BPP.
ELECTRICITY GENERATION COST (BPP) – 2018 (USD sen/kWh)

Based On MEMR Decree No. 55/2019 on Electricity Generation Cost of PT PLN (Persero) in 2018
BIOENERGY

02

IMPLEMENTATION OF BIOENERGY POWER PLANT PALM OIL-BASED

- BIOENERGY DEVELOPMENT PROGRAM
- BIOMASS POTENTIAL FOR ELECTRICITY
- INDONESIA PALM OIL FACT
- INSTALLED CAPACITY OF BIOENERGY POWER PLANT
- DISTRIBUTION OF BIOENERGY POWER PLANT
- STRATEGIC PLANS TO ACHIEVE BIOENERGY POWER PLANT TARGET
BIOENERGY DEVELOPMENT PROGRAM FROM BIOMASS, INCLUDING PALM OIL

01
BIOENERGY FOR ELECTRICITY
Power Plant from Biomass, Biogas, MSW and CPO

02
BIOFUEL PROGRAMME
Mandatory of B20, B30, E2, biodiesel for aviation and Green Fuel.

03
ENERGY FOREST
Utilize forest and non-forest land as well as degraded land for developing bioenergy.
# BIOMASS POTENTIAL FOR ELECTRICITY

<table>
<thead>
<tr>
<th>No</th>
<th>Potential</th>
<th>Sumatera</th>
<th>Kalimantan</th>
<th>Jamali</th>
<th>Nusa Tenggara</th>
<th>Sulawesi</th>
<th>Maluku</th>
<th>Papua</th>
<th>Total (Mwe)</th>
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<tbody>
<tr>
<td>1</td>
<td>Palm oil</td>
<td>8,812</td>
<td>3,384</td>
<td>60</td>
<td>-</td>
<td>323</td>
<td>-</td>
<td>75</td>
<td>12,654</td>
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<tr>
<td>2</td>
<td>Sugar cane</td>
<td>399</td>
<td>-</td>
<td>854</td>
<td>-</td>
<td>42</td>
<td>-</td>
<td>-</td>
<td>1,295</td>
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<tr>
<td>3</td>
<td>Rubber</td>
<td>1,918</td>
<td>862</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,781</td>
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<tr>
<td>4</td>
<td>Coconut</td>
<td>53</td>
<td>10</td>
<td>37</td>
<td>7</td>
<td>38</td>
<td>19</td>
<td>14</td>
<td>177</td>
</tr>
<tr>
<td>5</td>
<td>Rice husk</td>
<td>2,255</td>
<td>642</td>
<td>5,353</td>
<td>405</td>
<td>1,111</td>
<td>22</td>
<td>20</td>
<td>9,808</td>
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<tr>
<td>6</td>
<td>Corn</td>
<td>408</td>
<td>30</td>
<td>954</td>
<td>85</td>
<td>251</td>
<td>4</td>
<td>1</td>
<td>1,733</td>
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<tr>
<td>7</td>
<td>Cassava</td>
<td>110</td>
<td>7</td>
<td>120</td>
<td>18</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>271</td>
</tr>
<tr>
<td>8</td>
<td>Wood</td>
<td>1,212</td>
<td>44</td>
<td>14</td>
<td>19</td>
<td>21</td>
<td>4</td>
<td>21</td>
<td>1,335</td>
</tr>
<tr>
<td>9</td>
<td>Cow dung</td>
<td>96</td>
<td>16</td>
<td>296</td>
<td>53</td>
<td>65</td>
<td>5</td>
<td>4</td>
<td>535</td>
</tr>
<tr>
<td>10</td>
<td>MSW</td>
<td>326</td>
<td>66</td>
<td>1,527</td>
<td>48</td>
<td>74</td>
<td>11</td>
<td>14</td>
<td>2,066</td>
</tr>
</tbody>
</table>

Total potential: 15,588, 5,062, 9,215, 636, 1,937, 67, 151, 32,654

Based on MEMR survey 2013
TOTAL: 1,858.5 MW

ON GRID: 214.6 MW

EXCESS POWER: 164.4 MW

IPP: 50.2 MW

OFF GRID: 1,643.9 MW

ON GRID:
- OIL PALM WASTE: 129 MW
- POME: 23.8 MW
- WtE: 17.6 MW
- OTHERS: 44.2 MW

BIOENERGY POWER PLANT

TOTAL: 1,858.5 MW

NO. | FEEDSTOCKS/INDUSTRY            | CAPACITY (MW) |
---  |--------------------------------|---------------|
 1   | OIL PALM INDUSTRY              | 460.9         |
 2   | POME                           | 9             |
 3   | SUGAR INDUSTRY                 | 219           |
 4   | PULP & PAPER INDUSTRY          | 955           |
    | TOTAL                          | 1,643.9       |

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DISTRIBUTION OF BIOENERGY POWER PLANT

TOTAL INSTALLED CAPACITY of Bioenergy Power Plant Until 2018:

1.856,6 MW

15
STRATEGIC PLANS TO ACHIEVE BIOENERGY POWER PLANT TARGET

To convert Diesel-based Power Plants into CPO-based Power Plants

Develop energy crops/forests as sustainable feedstocks

Develop biomass co-firing with coal-based power plants

2018

1.86 GW

Encouraging the use of agro-industrial waste for electricity generation (POME for electricity)

Encouraging agro industries with captive power to sell their electricity surplus with excess power schemes

Ensure all parties involved to implement the commitment in developing Bioenergy Power Plant as stated in RUPT 2019 – 2028. (794.1 MW)

2025

5.5GW

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- CHALLENGES IN BIOENERGY DEVELOPMENT
- GOVERNMENT EFFORTS
GOVERNMENT EFFORTS

1. **Sustainability of Feedstock**
   - Collaborate with related stakeholders to develop dedicated energy forest.
   - Utilize degraded land/posy-mining land for energy crops.

2. **Create Market**
   - The Government requires PT PLN to purchase electricity from Renewable Energy sources.
   - Establish the acceleration of Waste to Energy project in 12 major cities.

3. **Pricing Policy**
   - Provide certainty to (prospective) investors.
   - Encourage the development of Renewable Energy to eastern part of Indonesia with higher electricity generation cost.

4. **Incentives**
   Encourage investment in bioenergy development by providing incentives, both fiscal and non-fiscal.

5. **Advance Technology & National Standard**
   - Collaborate with related stakeholders in conducting R&D for non-conventional feedstock.
   - Establish national standard and specifications to ensure quality and safety of bioenergy conversion.
   - Develop co-firing generation for biomass and low grade coal.

6. **Increase the Utilization of Oil Palm-Based (Waste) for Electricity**
   - The government to encourage palm oil mills to utilize their waste to produce electricity.
   - Develop CPO-based power plant and/or convert existing Diesel Power Plant to CPO-based power plant.

7. **Develop Local Potential & Project-Based Road Map**
   - Carry out potential mapping and study with related stakeholders to develop Bioenergy based on local potential.
   - Develop project-based road map for Bioenergy Power Plant.

8. **RUPTL Commitment**
   Ensure all parties involved to implement the commitment in developing Bioenergy Power Plant as stated in RUPT 2019 – 2028.

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#EnergiBerkeadilan:

Menyediakan energi secara merata dengan harga terjangkau,
meningkatkan penerimaan negara, sekaligus memacu pertumbuhan dan investasi

Ini adalah hasil kerja bersama...
TERIMA KASIH
Semoga dapat menjadi inspirasi kita bersama.
Terus perbaiki kinerja, untuk berbuat lebih baik bagi rakyat.
IMPLEMENTATION OF BIOENERGY POWER PLANTS (1/2)

Biogas Power Plant

POME-based Biogas Power Plant

- PLTBg PT Austindo Nusantara Jaya - Belitung. The first on-grid POME-based Biogas Power Plant (1.2 MW)

- PLTBg PTPN V, Kebun Tandun, Riau. Biogas: 850 m³/hour (60% CH₄). Capacity: 1 MW

Biomass Power Plant

- PLTBm PT Rezeki Perkasa Sejahtera Lestari – West Kalimantan
  IPP: 10 MW – Feedstock: Palm Waste, Woodchip

- PLTBm PT Growth Asia - Medan, North Sumatera.
  Excess Power: 2 x 10 MW – Feedstock: Palm Waste

MSW Power Plant

- PLTSa Benowo - Surabaya City, East Java
  Unit 1: 1.6 MW, Landfill Gas, COD: 2015
  Unit 2: 9 MW, Gasification, COD: Semester II 2019

Based on MEMR survey 2013

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A CPO – based power plant that built by Indonesian government in 2016. Total investment : USD 6.4 Million.

Located in Belitung Regency, Bangka Belitung.

Installed capacity 2 x 2.8 MW
Contract Capacity : 5 MW.

Status : Commissioning.
The plan to fully operated in 2019 by PT. Belitong Mandiri (a Regional Owned Enterprise)

TOSS (TEMPAT OLAH SAMPAH SETEMPAT)

- Developed from collaborative project of STT PLN, PT Indonesia Power and Klungkung Regency Government, Bali Province.
- Tempat Olah Sampah Setempat (TOSS) is a waste management initiatives to peletizing waste to fuel the gasification power plant with capacity 10 – 150 kW.
- TOSS is expected to become a solution for municipal waste management as well as a solution to meet electricity needs, particularly in remote areas of Indonesia.
- PT Indonesia Power will develop the TOSS Project in West Sumba Regency to fuel PLTBm Bodohula (1 MW).
WASTE TO ENERGY ACCELERATION PROJECT

Manado City
Waste: 1,000 ton
15 - 20 MW

Makassar City
Waste: 1,400 ton
15 - 20 MW

DKI Jakarta
Waste: 2,200 ton
35 MW

West Java
Waste: 1,820 ton
15 - 20 MW

Denpasar City
Waste: 1,200 ton
15 - 20 MW

Bekasi City
Waste: 2,200 ton
9 MW

Semarang City
Waste: 1,000 ton
15 - 20 MW

Surakarta City
Waste: 450 ton
12 MW

Surabaya City
Waste: 1,400 - 1500 ton
11 MW

Palembang City
Waste: 1,200 ton
20 MW

Tangerang City
Waste: 2,000 ton
15 - 20 MW

South Tangerang
Waste: 1000 ton
15 - 20 MW

DKI Jakarta
Waste: 2,200 ton
35 MW

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11 MW

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RUEN’s TARGET AND RUPTL 2019 - 2028

RUEN = Rencana Umum Energi Nasional
      = General Plan of National Energy

RUPTL = Rencana Usaha Penyediaan Tenaga Listrik
       = Electricity Supply Business Plan

RUEN’s TARGET AND BIOENERGY SHARE IN RUPTL 2019 - 2028

<table>
<thead>
<tr>
<th>Year</th>
<th>CPO-Based PP (MW)</th>
<th>MSW PP (MW)</th>
<th>Biomass PP (MW)</th>
<th>Biogas PP (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>1.859</td>
<td>794.1</td>
<td>127.1</td>
<td>19.9</td>
</tr>
<tr>
<td>2019</td>
<td>1.871</td>
<td>794.1</td>
<td>127.1</td>
<td>19.9</td>
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<td>794.1</td>
<td>127.1</td>
<td>19.9</td>
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