Pertamina: “Updates on the Implementation of Advanced Biofuel”

Presented in The Third Bioenergy Week in Asia

Medan, 28th May 2015

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Pertamina Now
Vision, Mission, Values: Challenge to synchronize national energy security and energy commercialization

<table>
<thead>
<tr>
<th>Vision</th>
<th>To be a world class national energy company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td>To carry out integrated core business in oil, gas, &amp; renewables based on strong commercial principles</td>
</tr>
<tr>
<td>Values</td>
<td>Clean, Competitive, Confident, Customer Focus, Commercial, Capable</td>
</tr>
</tbody>
</table>

**Clean | Bersih**
Managed professionally, avoiding conflicts of interest, zero tolerance of bribery, upholding trust and integrity. Based on the principles of good corporate governance.

**Confident | Percaya Diri**
Contributing to national economic development, pioneering the reform of state owned enterprises, and enhancing national pride.

**Competitive | Mampu bersaing di pasar global**
Being able to compete regionally and internationally, boosting growth through investment, establishing of a culture of cost consciousness and rewarding performance.

**Customer Focus | Fokus Pada Pelanggan**
Being customer oriented and committed to delivering the best service to customers.

**Commercial | Komersial**
Creating commercially oriented added value, taking decisions based on sound business principles.

**Capable | Berkemampuan**
Managed by leaders and employees who are professional and talented with strong technical abilities and who are committed to building research capability and development.
Pertamina's aspiration to be a Fortune 100 company energize Asia

- To be a *Fortune Global 100 Company*
- Revenue USD 200 miliar
- EBITDA ~USD 40 miliar
- Integrated Energy Company (including CBM, *geothermal*, renewable energy)
- The Best Domestic and International Player
Pertamina’s Aspiration is To Be a Fortune 100 “Asian Energy Champion” by 2025 Aligned with national mission

<table>
<thead>
<tr>
<th>Leadership in existing core</th>
<th>Growth in new businesses</th>
<th>Increase efficiency in PSO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E&amp;P</strong></td>
<td><strong>PetChem</strong></td>
<td><strong>Oil products</strong></td>
</tr>
<tr>
<td>Leading Asian NOC: 2.2 mmboepd production with domestic leadership (50%) and int’l foot-print (~30% of own prodn.)</td>
<td>Largest petchem player in Indonesia with 35% market share, high margins through integration</td>
<td>Maintain position of strength with 60% market share; new service model through “New pasti pas” and NFR</td>
</tr>
<tr>
<td><strong>Midstream gas</strong></td>
<td><strong>Coal</strong></td>
<td><strong>LPG</strong></td>
</tr>
<tr>
<td>Integrated gas champion with trans-Sumatera and trans-Jawa gas infrastructure</td>
<td>Leader in alternate technology (e.g. CBM, UCG, Coal Gasification) while maximizing coal production</td>
<td>Optimize supply chain and infrastructure</td>
</tr>
<tr>
<td><strong>Refining</strong></td>
<td><strong>Biofuels</strong></td>
<td><strong>Shipping</strong></td>
</tr>
<tr>
<td>Economically competitive refining capacity; Top quartile operating performance</td>
<td>Serving mandate of 20% blend; upstream presence to reduce losses and supply risk</td>
<td>Support own supply chain and also build third party service model</td>
</tr>
<tr>
<td><strong>Industrial fuels &amp; lubes</strong></td>
<td><strong>Power</strong></td>
<td></td>
</tr>
<tr>
<td>Maintain position of strength with over 50% market share, while sustaining profitability</td>
<td>One of the largest Indonesian IPP player with ~ 3-5 GW capacity</td>
<td></td>
</tr>
<tr>
<td><strong>Trading</strong></td>
<td></td>
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<tr>
<td>Optimize supply chain and improve profitability</td>
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</tr>
</tbody>
</table>

**Project & Technology Center:** Technology leader on CBM, Geothermal, EOR and deepwater; Strong project executor with delivery on time and within budget

**Organization & Capability:** Accountability and delivery; Employer of choice to attract and retain best talent

“Asian Energy Champion” ‘Fortune 100’ position (Revenue ~$200b USD, EBITDA ~$40b USD)
Pertamina's vision on "Energizing Asia" can be achieved by:

Entrepreneurship
- Creating and capturing new opportunities
- Looking for a way to resolve the problem
- Focusing on added values

Professionalism
- Develop best practices
- Being a world-class
- Pertamina ambassador

Delivering
- Deliver promised
- Responsibility and collaboration
- Execution is paramount
The Five Strategic Priorities Of Pertamina

The Vision:
To be A World-Class National Energy Company Realizing the National Energy Security

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1 | Development of the Upstream Sector:  
- Takeover and the development of the Indonesia main block: Mahakam, Cepu ONWJ  
- International expansion: Algeria, another international M&A  
- Development Acceleration Geothermal and EBT  
- Operations excellence (Drilling, EOR, efficiency)  
- Exploration |
| 2 | Efficiency in all lines:  
- Reform of the procurement of crude oil and petroleum products (ISC strong in Jakarta)  
- Emphasis losses on all lines of operation: upstream, refinery, land and sea transportation  
- Streamlining corporate functions  
- Centralized procurement  
- Centralized marketing |
| 3 | Increasing the capacity of the refinery:  
- Upgrade refinery (Refinery Dev't Master Plan)  
- A new Refinery (Grass Root Refinery)  
- Revitalization and integration of private refinery  
- Integration of biofuels processing on existing refinery |
| 4 | Development of infrastructure & marketing:  
- Increase storage capacity & terminal  
- Gas Station Network Development and international marketing  
- Development of the infrastructure receiving and LNG & SPBG regasification  
- Marketing Operation Excellence  
- Go International |
| 5 | Improvement the financial structure: - Settlement of state accounts receivable - Alignment of short and long term financing strategy - Planning and evaluation investment management |

Values: Clean, Confident, Customer Focus, Competitive, Commercial, Capable
Good Corporate Governance
Pertamina One Spirit
Understanding the Scope of Business of Pertamina

**Upstream**
- Oil and gas producer in the country and abroad
- Supplier for geothermal

**Downstream**
- Refinery
- Fuel Business (kerosene, HSD / Diesel / MFO, etc) to industry
- Special Fuel Business for retail (gasoline, kerosene, HSD, PertaminaDex, PERTAMAX / PertamaxPlus) Aviation
- Lubricant Base Business
- LPG Business
- Petrochemicals Business
- Responsible for distributing fuel PSO as kerosene, gasoline and HSD
- Implementing Conversion Kerosene

Subsidiaries / Joint Ventures in the business of Pertamina related to the core business and non-core business:

**Core Business**:
- PT Pertamina EP
- PT Pertamina Gas
- PT Pertamina Hulu Energi
- PT Pertamina Drilling Service
- PT Pertamina Geothermal Energi
- PT Elnusa, Tbk.
- PT Usayana
- PT Patra Niaga
- Petral
- PT Pertamina Retail
- PT Badak LNG
- PT Arun LNG
- PT Nusantara Regas
- PT Pertamina Cepu
- EP Technology Center.

**Non core Business**:
- PT. Patra Jasa
- PT Pelita Air Service
- PT Pertamina Tongkang
- PT Pertamina Bina Medika (RSPP)
- PT Tugu Mandiri.
Pertamina’s Business Process

**Key Operating Companies**

<table>
<thead>
<tr>
<th><strong>UPSTREAM</strong></th>
<th><strong>MIDSTREAM</strong></th>
<th><strong>DOWNSTREAM</strong></th>
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<tbody>
<tr>
<td>PT Pertamina EP</td>
<td>PT Pertamina Hulu Energi</td>
<td>PT Pertamina Trans Kontinenal</td>
</tr>
<tr>
<td>PT Pertamina EP Cepu</td>
<td>PT Pertamina Geothermal Energy</td>
<td>PT Pertamina Retail</td>
</tr>
<tr>
<td>PT Pertamina Drilling Services Indonesia</td>
<td>PT Pertamina Internasional Eksplorasi &amp; Produksi</td>
<td>PT Pertamina Lubricants</td>
</tr>
<tr>
<td></td>
<td>ConocoPhilips Algeria Ltd.</td>
<td>Pertamina Energy Trading Ltd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PT Pertamina Patra Niaga</td>
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</tbody>
</table>

*) Pertamina’s share in PT Arun NGL & PT Badak NGL were 55% respectively. But since Pertamina is not the controlling shareholder of both companies, then they cannot be classified as Pertamina’s subsidiary.
New & Renewable Initiatives

In line with Government interest in optimizing energy business, Pertamina expanded the scope of activity to include new and renewable initiatives...

PERTAMINA’S RENEWABLE ENERGY PROJECTS

- Geothermal
- Green Diesel
- Bioethanol
- Bioavtur
- Coal to Ethanol
- Wind
- Solar PV
- Waste to Energy
- Hydro

Environment Friendly Business to align with the Government Policy

Indonesia’s Energy Mix 2011

100% = 1,176 Mboe

- Oil
- Gas
- Coal

Indonesia’s Energy Mix 2025 **)

100% = 2,785 Mboe

- Oil
- Gas
- Coal

*1 New & Renewable Energy
** Based on Energy Mix ESDM “Primary Energy Mix 2025”
With growing fuel demand and the National production continues to decline, in 2020 crude oil & fuel imports projected to reach USD 50 Billion

- Deficit in trade balance due to energy – oil & gas
- Indonesia potentially → biggest fuel importer in the world by 2018 *)
- Indonesia’s Oil Reserve: 12-14 years
- As of Nov 2014, Indonesia has become the Largest Importer of Gasoline

1 2010-2020 growth projected based on projected product growth of 1.8% CAGR
*) Chatib Basri – Minister of Finance, GOI
Based on our strategic studies, Biofuel is one of the solution to replace fossil fuels in order to improve security of energy in Indonesia

NRE category assessment framework

Market attractiveness:
- Market potential
- Competitive landscape
- Feedstock/resource availability
- Technology maturity
- Regulatory environment
- Partners availability
- Economics
- Risks

Fit with Pertamina vision
- Global and Indonesia current situation
- Pertamina vision & current situation

Evaluate and Develop
- Management & stakeholders expectations
- Best practice

De-prioritize

Based on our strategic studies, Biofuel is one of the solution to replace fossil fuels in order to improve security of energy in Indonesia
As of March 2015, Government has aggressively set new biofuels policy, accelerated the implementation of B15 in 2015

### Old Blending Mandate

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<tbody>
<tr>
<td>Biodiesel (PSO&amp;NPSO)</td>
<td>1%</td>
<td>2.5%</td>
<td>7.5%</td>
<td>5%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Bioethanol</td>
<td>1%</td>
<td>3%</td>
<td>-%</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
</tr>
</tbody>
</table>

### New Blending Mandate

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Current</th>
<th>2015</th>
<th>2016</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiesel</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Bioethanol</td>
<td>1%</td>
<td>2%</td>
<td>5%</td>
<td>20%</td>
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**New MEMR Regulation No. 12 Year 2015**

**MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA**

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA NOMOR 25 TAHUN 2013

TENTANG

PERUBAHAN ATAS PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL NOMOR 32 TAHUN 2008 TENTANG PENYEDIAAN, PEMANFAATAN, DAN TATA NIAGA BAHAN BAKAR NABATI (BIOFUEL) SEBAGAI BAHAN BAKAR LAIN
Global Oil Prices Crisis Affects Biofuel Business

- Global Oil price crisis late 2014 – early 2015 affects the Biofuel business
- Hence, as per February 2015, Fame supplies are gradually declined
Biofuel Current Business: PERTAMINA continues to support increasing Government’s blending regulations

- An increase of almost 21% of Biodiesel blending in 2014 compared to previous year
- Discussions and mediations to relevant Government Bodies are frequently held to seek solutions
- CSF – CPO supporting fund mechanism and regulation still unclear

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<th>JAN-MAR 2015</th>
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<tr>
<td></td>
<td>SOLAR</td>
<td>TOTAL</td>
</tr>
<tr>
<td>Biosolar</td>
<td>13.662.838</td>
<td>5.703.933</td>
</tr>
<tr>
<td>Solar</td>
<td>13.590.371</td>
<td>1.188.877</td>
</tr>
<tr>
<td>FAME</td>
<td>1.574.070</td>
<td>20.8%</td>
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Co-Processing roadmap to support “Pertamina Sobat Bumi”

RBDPO (refined bleached palm oil) is the main feedstock for trials.

ECO GREEN DIESEL

**Stage 1**
- Location: RU II Dumai
- **Own Catalyst**, produced by RnD Pertamina
- 3 – 10% bio blending portion in Hydrotreater reactor

**Stage 2**
- Location: RU III Plaju
- **Pioneer in The World** for FCC Co processing
- 5% Bio blending portion
- Producing Bio LPG & Bio Propylene

**Stage 3**
- Location: RU VI Balongan
- **Euro 5 Green Diesel Product** with 10% or more Bio blending portion
- Cetane > 70, Ultra low sulfur
- **Own Catalyst**, by RnD Pertamina
- Minor modification on Infrastructure

2014

2015

2017

2018 onwards

Commercialization Biofuels Projects in Existing Pertamina Refinery
Co-processing Project (RU II Dumai & RU III Plaju)

### PROJECT LOCATION

![Map](image)

**RU II Dumai**

**RU III Plaju**

### PROJECT SCENARIO/PLAN:

- **Existing Feed**
  - Biofeed
  - Products + Bioproducts

- **Existing Unit**
  - DHDT & FCC Unit

### Key Figures

1. **RU II Dumai – DHDT Unit**
   - Unit Capacity: 12,659 bpd
   - Biofeed: RBD Palm Oil

2. **RU II Plaju – FCC Unit**
   - Unit Capacity: 20,500 bpd
   - Biofeed: RBD Palm Oil

### PROJECT PROFILE: CO-PROCESSING TRIAL

1. **RU II Dumai – DHDT Unit**
   - Feedstock: Refined Bleached Deodorized Palm Oil
   - Technology: Hydrotreating
   - Blending Target: 6.5% - vol (822 bpd)
   - Products: Green Diesel, Green Naphta

2. **RU III Plaju – FCC Unit**
   - Feedstock: Refined Bleached Deodorized Palm Oil
   - Technology: Catalytic Cracking
   - Blending Target: 5% - vol (1,025 bpd)
   - Products: Green Gasoline, Green Propylene, Green LPG

### CURRENT STATUS & NEXT STEP PLAN

**RU II Dumai**
- Current Status: Plant Trial already done (16 – 26 Des 2014)
- Next Step: Preparation for Long Term Application

**RU III Plaju**
- Current Status: Lab scale test already done
- Next Step: Plant Trial on 2015 -2016
Biofuels will be crucial in PERTAMINA’s effort to meet the national demand for transportation.

"Pertamina’s target 2025: 15% of Fuel sales from Biofuels; equal to 245,000 boepd”

Before Aug 13

Establish domestic production with proven 1G technologies and available feedstocks

New MEMR Regulation No. 25 year 2013

Wave 1

12,000

Wave 2

25,000

Develop advanced 1.5G (Green Diesel) leveraging same feedstock or improved ones

Wave 3

2018

245,000

Improved biodiesel characteristics

2G biofuel

1.5G biofuel

1G biofuel

*in boepd

Wave 3

2025

Bioethanol, FAME/Biodiesel

Hydrotreated Biodiesel

Bioavtur, Bioethanol

As well as Algae based Biofuel (3G)
Integrate Business Scheme concept is key success factor to guarantee the economics of the project.

Integrated JV Company

Plantation (Upstream) → Feedstock → BIO Refinery (Downstream)

‘Biofuel project will be feasible and price-competitive if only adopt an integrated business model from upstream to downstream’

Biofuel project will focusing the feedstock from Palm oil, as the most ready and the most productive feedstock available.
Lignocellulosic Bioethanol Project (2nd Generation of Bioethanol Technology)

**POTENTIAL LOCATION**

![Map of potential locations](image)

**PROJECT PROFILE: Bioethanol Project**

- **Feedstock**: Napier Grass (Rumput Gajah)
- **Technology**: Enzymatic Bioethanol
- **Total Capex**: USD 200-300 mio
- **Buss Scheme**: Integrated Joint-Venture
- **Onstream target**: 2019

**CURRENT STATUS: Demo plantation**

**BUSINESS MODEL:**

<table>
<thead>
<tr>
<th>DFS</th>
<th>FEED</th>
<th>FID</th>
<th>EPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demo plantation</td>
<td>Rumput</td>
<td>Bubuk</td>
<td>Pre-Treat</td>
</tr>
</tbody>
</table>

**BUSINESS PROCESS**

- **Rumput**
- **Bubuk**
- **Pre-Treat**
- **Biomass**
- **Enzyme**
- **Ethanol**

**Key Figures**

- **Napier Grass Plantation**
  - Capacity: 300,000 Ton/year (dry)
  - Land Requirement: ±9,000 Ha

- **Bioethanol Refinery**
  - Capacity: 60,000 ton or 76,000 kl/year
  - Land Requirement: 15 Ha
Greendiesel Project

REFINERY POTENTIAL LOCATION (Attached to Existing Refinery)

Key Figures
- Capacity: 500,000 ton CPO
- Land Requirement: +100,000 Ha
- Capex: USD 1 bio

PROJECT PROFILE: Greendiesel Project
- Feedstock: CPO, Stearin, PFAD
- Technology: Hydrogenation
- Total Capex: USD 1.3 bio
- Business Scheme: Integrated Joint-Venture
- Onstream target: 2019

CURRENT STATUS: DFS Ongoing

BUSINESS MODEL:
- CPO Plantation (Upstream)
- Greendiesel Refinery (Downstream)
- Integrated JV Company
- DFS, FEED, FID, EPC

BUSINESS PROCESS:
- CPO
- Hydrogen
- Greendiesel

PROJECT PROFILE:
- Greendiesel Project
- Current Status: DFS Ongoing

Key Figures
- Capacity: 10,000 BPD
- Land Requirement: 10-20 Ha
- Capex: USD 300 mio
Bioavtur Project

POTENTIAL LOCATION

PROJECT PROFILE: Bioethanol Project

- Feedstock: CPO & PFAD
- Technology: Hydrogenation + Isomerization
- Total Capex: USD 400-500 mio
- Buss Scheme: Joint-Venture Refinery
- Onstream target: 2019

CURRENT STATUS: DFS Completed

BUSINESS MODEL:

Feedstock Producer → Bioavtur Refinery

Key Figures

- Offtake agreement
- CPO and derivatives
- 450,000 Ton/year

Key Figures

- Capacity 257,000 kl/year
- Land Requirement 15 Ha

BUSINESS PROCESS

Perkebunan Sawit → CPO → Hidrogen → BIOAVTUR REFINERY → Bioavtur

DFS FEED FID EPC

Page 22
There is a huge gap between national supply and demand of Biofuel until 2025, large investment opportunity in biofuels projects and Pertamina is open for Co-partnership

To cover National Mandate, Indonesia need more than 10 Green Diesel Refineries with cap. 10,000 bbl/day in upcoming 10 years

To cover National Mandate, Indonesia need more than 100 Bioethanol Refineries with cap. 76,000KL/year in upcoming 10 years

Bio/Green Diesel Demand & Opportunities

(Mio KL)

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2018</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 G Transesterification/FAME</td>
<td>3.3</td>
<td>3.3</td>
<td>3.2</td>
<td>3.3</td>
<td>3.6</td>
</tr>
<tr>
<td>1.5 G Hydrogenation/Green Diesel</td>
<td>2.8</td>
<td>2.7</td>
<td>2.7</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Partnership opportunity</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
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Bioethanol Demand & Opportunities

(thousand KL)

<table>
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<tr>
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<th>2018</th>
<th>2020</th>
<th>2025</th>
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</thead>
<tbody>
<tr>
<td>1 G Yeast Bioethanol</td>
<td>178</td>
<td>391</td>
<td>852</td>
<td>3076</td>
<td>3076</td>
</tr>
<tr>
<td>2G Biochemical/Enzymatic Bioethanol</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Partnership opportunity</td>
<td>30</td>
<td>361</td>
<td>3076</td>
<td>3076</td>
<td>3076</td>
</tr>
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</table>
PERTAMINA MICROALGAE – ROADMAPS

**Short Term Program**
- 2015
  - Refinery Co-Processing Preparation
- 2018
  - Algae Cultivation Pilot Plant (Batch)
  - Algae Oil to Green Diesel Pilot Plant

**Mid Term Program**
- 2020
  - Establish Algae Oil Specification
  - Process & Product Standardization
  - Establish Modular Algae Cultivation Facility Design
  - Endorse for Algae Based National Specification By Gov’t
- 2022
  - Algae Production Pilot Plant (Continuous & Automated)
  - Algae Strain Development
  - Develop Cultivation & Extraction Technology
  - Existing Facility (Refinery) Assessment
  - Endorse for Algae Based Pricing Policy By Gov’t

**Long Term Program**
- 2025
  - Modular* Algae Production Facility (Batch)
  - Green Diesel Algae Oil to Green Diesel Pilot Plant
  - Modular Algae Production Facility (Batch)
  - Modular Algae Production Plants (Continuous & Automated)
  - Endorse for Algae Based Pricing Policy By Gov’t
  - Access to Pertamina’s refinery sites

*Community Development Program
# Challenges and Possible Solution in Developing Biofuels

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solutions</th>
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<tbody>
<tr>
<td><strong>Feedstock Supply</strong></td>
<td><strong>Domestic Market Obligation</strong> or utilizing funds formed from CPO Supporting Fund</td>
</tr>
<tr>
<td>Feedstock price mechanism for Biodiesel/Green Diesel</td>
<td><strong>Land Support</strong> — Accelerating the allocation of energy forest, where Government can participate on 2nd Generation Biofuel Joint Venture</td>
</tr>
<tr>
<td>Sustainable feedstock supply</td>
<td><strong>Single Window</strong> and simplification of permit process through EBTKE (NREEC)</td>
</tr>
<tr>
<td><strong>Permit</strong></td>
<td><strong>Encourage Indonesian government to further support biofuels</strong>, e.g., tax incentives by Ministry of Finance and synergy between Government Agency (e.g. BKF and Ministry of Finance)</td>
</tr>
<tr>
<td>Permit process involves various agencies and directorate</td>
<td>• Tax refund for next renewable project</td>
</tr>
<tr>
<td></td>
<td>• Free import duty for import equipment</td>
</tr>
<tr>
<td></td>
<td>• Financing scheme using APBN funds</td>
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<td><strong>Financing Scheme</strong></td>
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Thank You

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