

### **3. DME Prospect and Potential Market in Indonesia ( Indradjaja )**



# DME PROSPECT AND POTENTIAL MARKET IN INDONESIA

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# DME MARKET IN INDONESIA



MEMR research indicates there have been a studies examining the role of dimethyl ether (DME) and its relevance to Indonesia for alternative substitution of Liquid Petroleum Gas (LPG).

*MEMR: Indonesia Ministry of Energy and Mineral Resources  
or ESDM: Kementerian Energi dan Sumber Daya Mineral*

## DME Project in Indonesia is in Progress

Wednesday, 22 July 2020 - Dibaca 2487 kali

MINISTRY OF ENERGY AND MINERAL RESOURCES

REPUBLIC OF INDONESIA PRESS RELEASE

NUMBER: 255.Pers/04/SJI/2020

DME Project in Indonesia is in Progress

Ministry of Energy and Mineral Resources (EMR) is working on ways to develop energy alternatives, among others, Dimethyl Ether (DME). In the future, DME can be used as an alternative to Liquefied Petroleum Gas (LPG) in meeting household energy need.

After the successful conversion of kerosene to LPG, demands for LPG, especially by households, have skyrocketed by 96 percent. This has brought about huge imports of LPG.

Head of EMR Research and Development Agency (Balitbang ESDM), Dr. Dadan Kusdiana said the issue of the balance supply and stock of LPG can be solved through the use of energy alternatives, such as Dimethyl Ether (DME).

"DME is especially projected to substitute LPG, which was initially used to substitute kerosene. About 75 percent of the LPG consumed in the country comes from import. If we rely on import, our energy security won't be strong," said Dadan in a press conference in Jakarta on Wednesday (22/7).

DME, continued Dadan, have chemical and physical characteristics similar to those of LPG. "Because of these similarities, we can use current LPG infrastructure such as cylinder, storage, and existing handling," Dadan said.



# POTENTIAL MARKET

LPG	Unit	2015	2016	2017	2018
<b>Domestic Production</b>					
Gas refinery	000 tons	1,631.6	1,410.2	1,162.6	1,144.0
Oil refinery	000 tons	675.8	831.4	865.4	883.3
<b>Total domestic</b>	<b>000 tons</b>	<b>2,307.4</b>	<b>2,241.6</b>	<b>2,027.9</b>	<b>2,027.3</b>
Less: Export	000 tons	-392.0	-580.0	-360.0	-434.0
<b>Add: Imports</b>	<b>000 tons</b>	<b>4,025.6</b>	<b>4,475.9</b>	<b>5,461.9</b>	<b>5,566.6</b>
<b>Total LPG supply</b>	<b>000 tons</b>	<b>5,941.0</b>	<b>6,137.5</b>	<b>7,129.9</b>	<b>7,159.8</b>
<b>Total LPG sold</b>	<b>000 tons</b>	<b>6,377.0</b>	<b>6,642.6</b>	<b>7,190.9</b>	<b>7,562.2</b>

*Source: Directorate General of Oil and Gas.*

Indonesia imported 5.6M tons of LPG and exported 0.4M tons in 2018<sup>1</sup>.

Indonesia imported 73% for its total LPG supply excluding exports.

The remaining 27% of total LPG supply was supplied from its domestic gas refineries (15%) and domestic oil refineries (12%).

<sup>1</sup> 2018 Handbook of Energy, MEMR

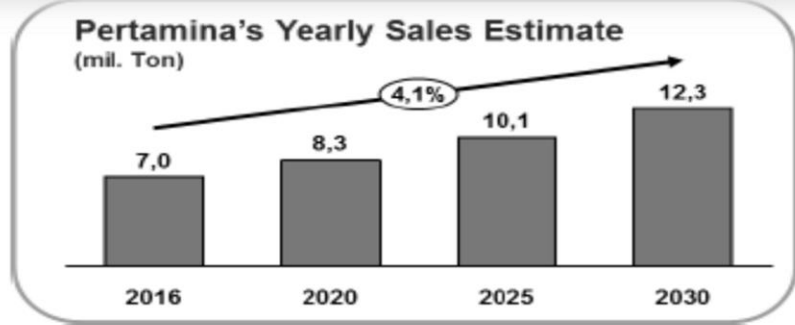
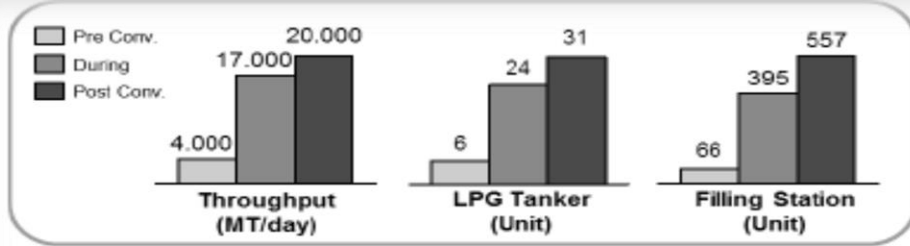
# Indonesia LPG Use by Sector

In 2018, Indonesia consumed 7.6M tons of LPG, of which 96% was used mainly for residential cooking and heating.

LPG	Unit	2015	2016	2017	2018
<b>Domestic Consumption</b>					
Household	000 tons	6,115	6,370	6,896	7,252
Commercial	000 tons	169	176	191	201
Industrial	000 tons	92	96	104	110
<b>Total domestic</b>	<b>000 tons</b>	<b>6,376</b>	<b>6,642</b>	<b>7,191</b>	<b>7,563</b>
<b>Percentage Breakdown</b>					
Household	%	95.9	95.9	95.9	95.9
Commercial	%	2.7	2.6	2.7	2.7
Industrial	%	1.4	1.4	1.4	1.5
<b>Total</b>	<b>%</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

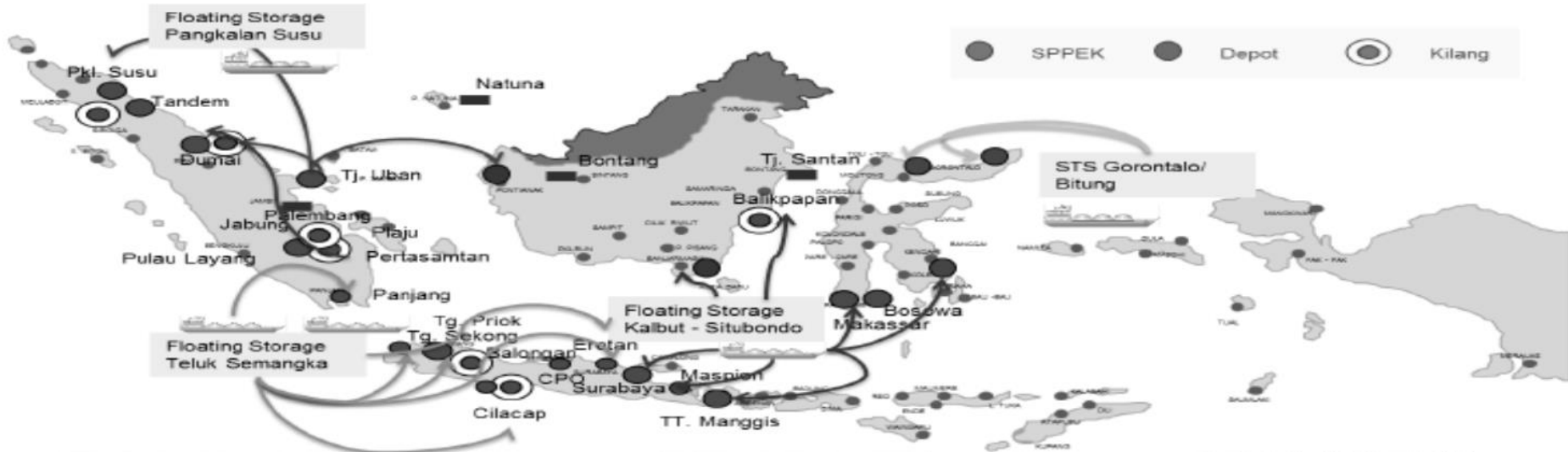
Source: Directorate General of Oil and Gas.

# LPG MAPPING DISTRIBUTION & DEMAND IN INDONESIA (Million tons per year)

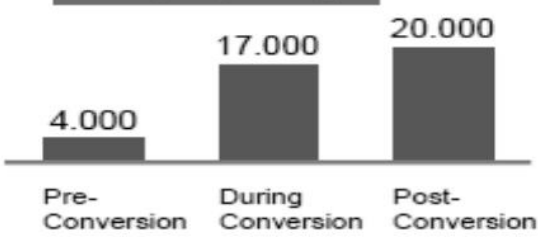


Source: PERTAMINA

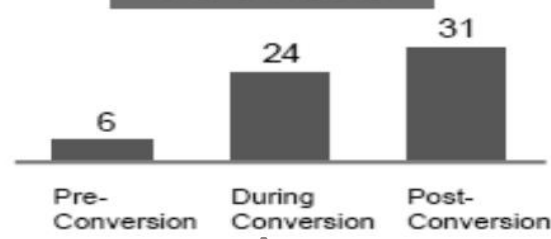
# CURRENT LPG INFRASTRUCTURE



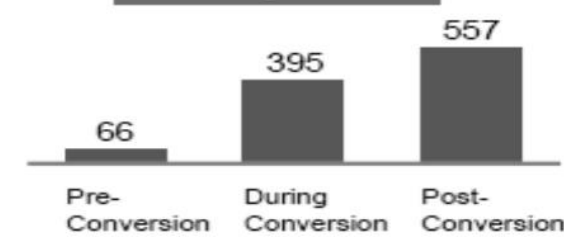
Thruput (MT/day)



# LPG Vessels



# Filling Station



Source: PERTAMINA





# COAL TO DME ISSUE

# INDONESIA COAL DOWNSTREAM INDUSTRY ROADMAP

1. The government encourages coal downstreaming to be able to substitute for fuel , and raw materials for the chemical industry, including: Methanol and DME. It is projected that the demand for coal for downstreaming will increase.
2. In order to anticipate global threats to coal, the future utilization of coal must be balanced with environmentally friendly technology (Clean Coal Technology) to reduce CO2 emissions so as to encourage coal as a more environmentally friendly source. /

## Coal resources and reserves are still quite abundant



# DEVELOPMENT OF INDONESIAN COAL DOWNSTREAM INDUSTRY

- Still in the planning/construction preparation
- Completed Construction/already in production

## COAL GASIFICATION

1. **Coal to DME Project**  
**PT Bukit Asam - Pertamina - Air Product**  
 Already Set to National Project Strategic
  - Est. COD : Year 2025/2026
  - Location : Tanjung Enim - South Sumatera
  - Feedstock : 6 million ton/year (GAR 4200 kcal/kg)
  - Product : 1.4 million ton/year DME
2. **Coal to Methanol Project**  
**PT KPC & PT KNC (Bumi Resource - Ithaca Group - Air Product)**  
 Already Set to National Project Strategic
  - Est. COD : Year 2025
  - Location : Bengalon - East Kalimantan
  - Feedstock : 6.5 million ton/year (GAR 3600 kcal/kg)
  - product: 1.8 million ton/year Methanol
3. **Coal to Methanol Project**  
**PT Arutmin Indonesia**  
 Already Set to National Project Strategic
  - Est. COD : Year 2025
  - Location : IBT Terminal - Pulau Laut South Kalimantan
  - Feedstock : 6 million ton/year (GAR 3700 kcal/kg)
  - Product: 2.9 million ton/year Methanol
4. **Coal to Methanol Project**  
**PT Kendilo Coal Indonesia**  
 Already Set to National Project Strategic
  - Est. COD : Year 2029
  - Location : East Kalimantan
  - Feedstock : 675 thousand ton/year (ADB 5.500 Kcal/kg)
  - Product: 300 thousand ton/year Methanol
5. **Coal to Methanol /DME Project PT Adaro Indonesia**  
 Already Set to National Project Strategic
  - Est. COD : 2026
  - Location : South Kalimantan
  - Feedstock : 6.75 million ton/year (GAR 3900 kcal/kg)
  - Product: 1.34 million ton DME
6. **Coal to Methanol/DME Project PT. Berau Coal**  
 Already Set to National Project Strategic
  - Est. COD : year 2029
  - Location : East Kalimantan
  - Feedstock : n/a
  - Product: Methanol/DME

## UNDERGROUND COAL GASIFICATION

- Still at Pilot Project Scale :
1. PT. Medco Energi Mining International (MEMI) dan Phoenix Energi Ltd, di North Kalimantan
  2. Project UCG PT Indominco di Eaat Kalimantan
  3. PT Kideco Jaya Agung
    - Est. COD : Year 2027
    - Location : East Kalimantan
    - Feedstock 566 thousand ton/year
    - Product: 100thousand ton/year Ammonia,

## COKES MAKING

1. **Factory Batubara Semi Kokas PT Megah Energi Khatulistiwa (MEK)**
  - Location : Bulungan - North Kalimantan
  - Feedstock : 1 million ton/year ( 500thousand ton CV 3100 kcal/kg + 500.000 ton CV 6300 kcal/kg)
  - Product: 500.000 ton SemiCoke, 50thousand Coal Tar
2. **Factory batubara Semi Kokas PT Multi Harapan Utama**
  - Est. COD : Tahun 2027
  - Location : East Kalimantan
  - Feedstock : 1 million ton/year (GAR 6000 kcal/kg)
  - Product: 500 thousand ton/year SemiCoke

## COAL BRIQUETTING

1. **Factory Briket PT Bukit Asam (South Sumatera)**  
 Feedstock: 30.000-40.000, Product: 10.000-20.000 briket (tons/year)
2. **Factory Upgrading-Briket PT Thriveni South Sumatera)**  
 Feedstock: 130.000, Product: 79.000 -85.000 (ton/year)

## COAL LIQUIFACTION

### COAL SLURRY

- Not proposed yet
- Potential for development

# DME ON GOING PROJECT

## Project Profile :C oal to D M E Tanjung Enim

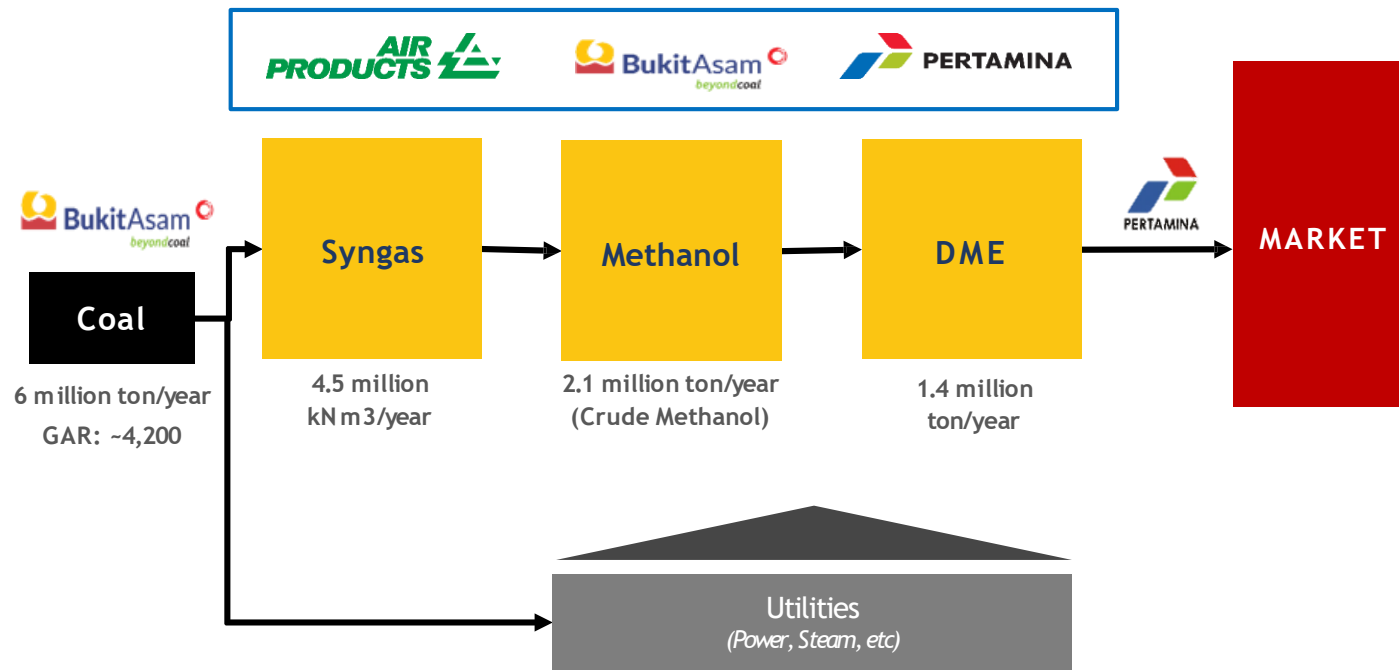
### Overview Project

- Total Investment ~ **US\$ 2.3 Billion**
- Employment ~ **1.000 workers** (during plant operational)
- Land Area ±164 Ha
- Location Tanjung Enim, Provinsi Sumatera Selatan

### Objective

The development of the Coal to DME Project aims to increase national energy security by substituting portion of imported LPG.

### Coal-to-DME Production Chain



**Total Capex: \$ 2.3 Bn**

### Project Timeline

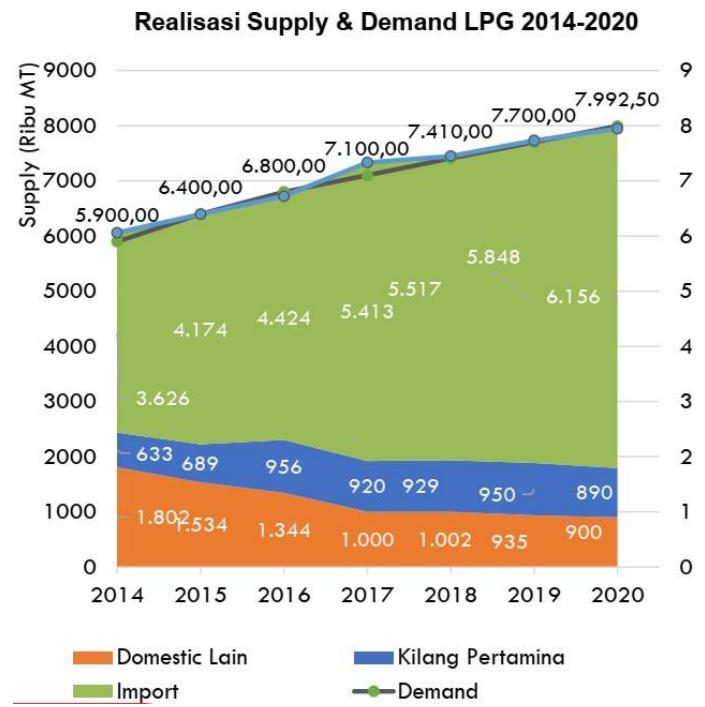


Timeline refers to PSA/LRA

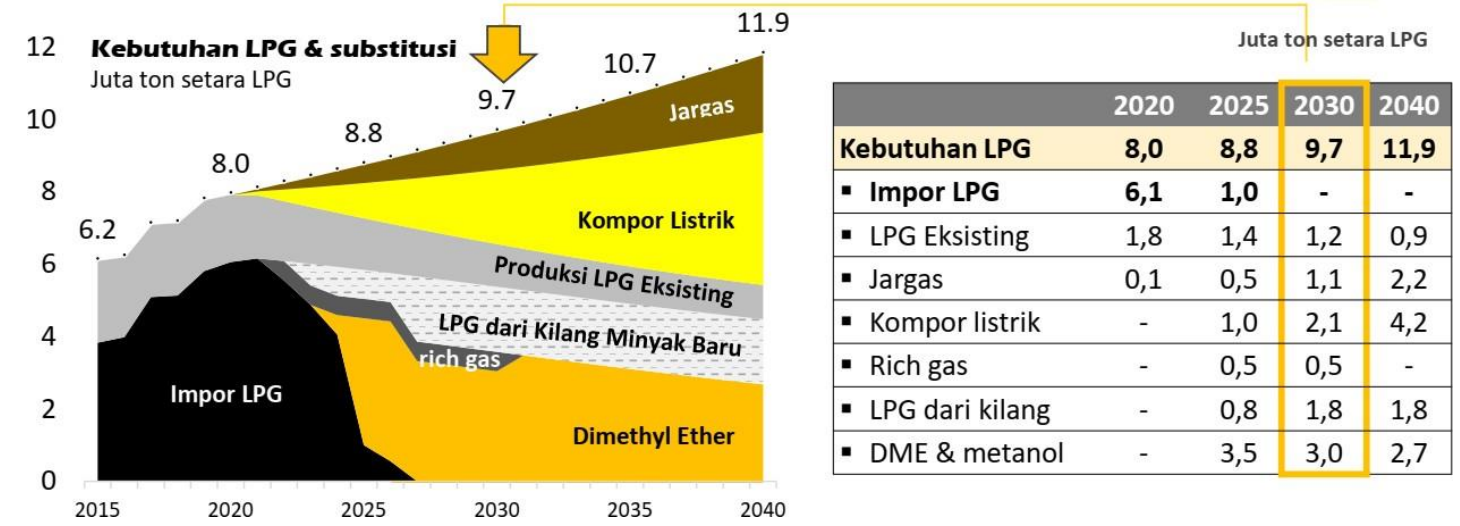
# DME ON GOING PROJECT

DME as an alternative energy launched by the Government to reduce LPG imports

In 2020, 76% of the current national LPG needs are met through imports, with the LPG import value reaching USD 2.8 billion. This is part of the current account deficit and is a concern and concern for the Government



Sumber : Pertamina



In the National Energy Grand Strategy compiled by the Ministry of Energy and Mineral Resources, Dimethyl Ether (DME) is one of the alternative energies to substitute LPG in order to reduce LPG imports. By 2030, DME equivalent to 3 million tons of LPG is required To meet the DME needs, the government also supports the development program for coal downstreaming into DME, one of which is currently being carried out by PTBA in collaboration with Pertamina and Air Products.

# DME ON GOING PROJECT

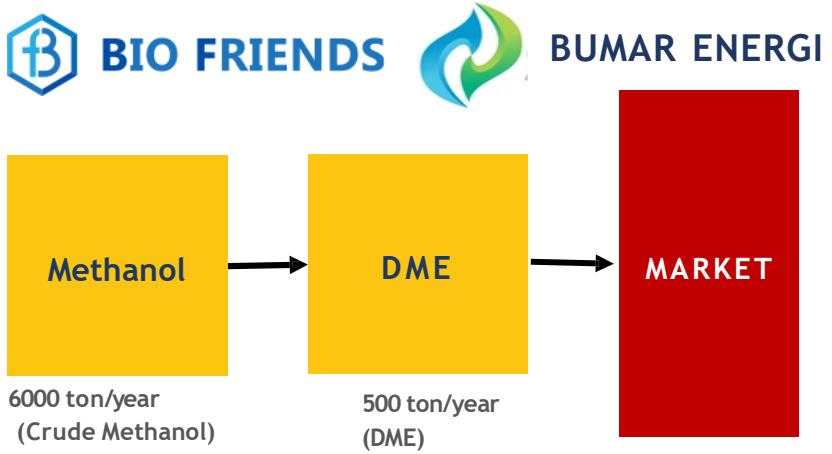
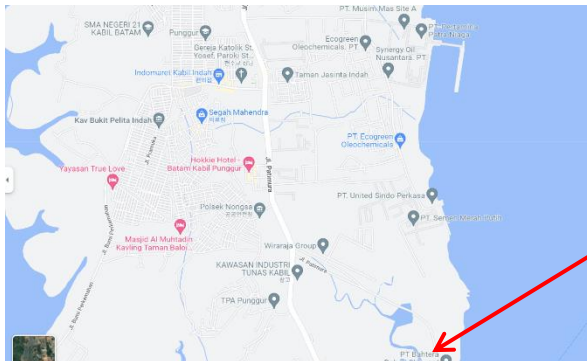
## Project Profile : Methanol to DME Batam Island

### Overview Project

- Total Investment**  
~ **US\$ 5.7 Billion**
- Employment**  
~ **12 workers**  
(during plant operational)
- Land Area**  
±0,5 Ha
- Location**  
Kabil, Provinsi Riau

**Objective** The development of the Methanol to DME Project aims to substituting portion of imported LPG.

### Methanol -to-DME Production



**Total Capex: \$ 4.7 Mio**

### Project Timeline



# Development of coal to DME remains on the table

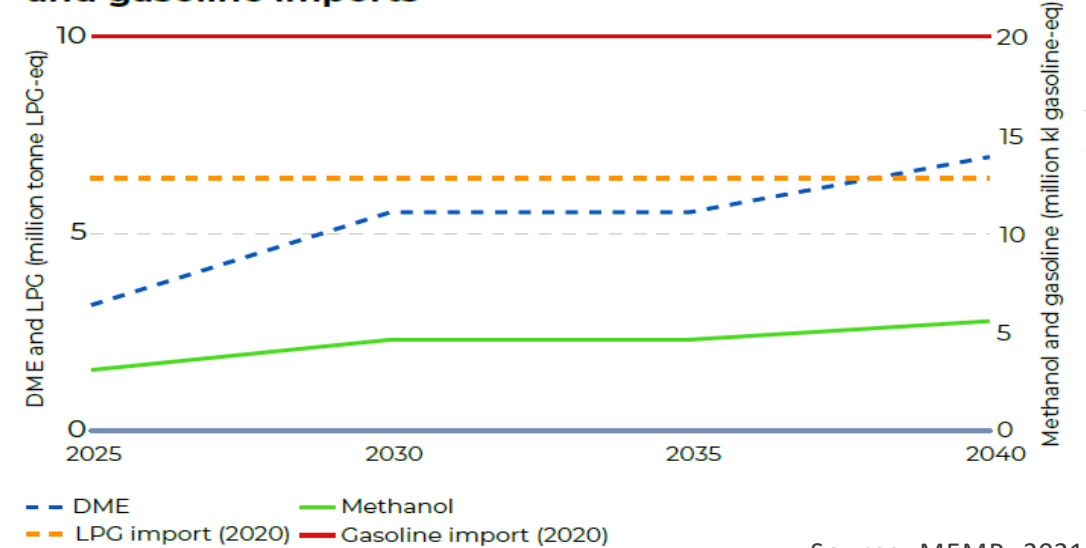
→ Economic feasibility issue

The coal-to-DME projects would likely be exposed to volatility risks of commodity (e.g. coal and LPG) prices.

Assuming a low coal price of USD 20/ton, the DME production would be economically feasible only when the LPG price is above USD 551/ton, much higher than the average price of LPG at USD 430/ton in 2019. Thus, such a project will unlikely be feasible without government subsidies.

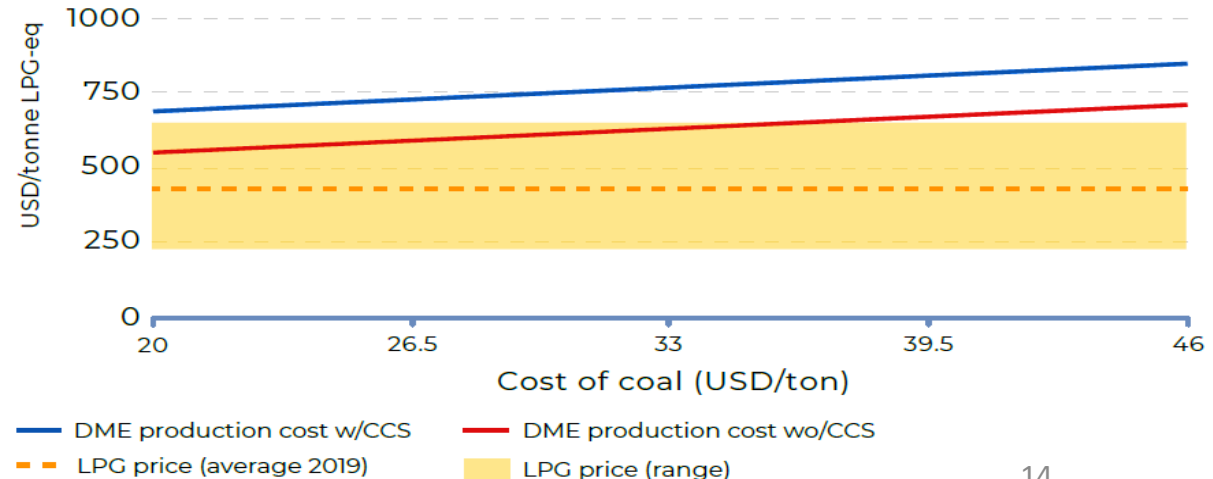
By installing CCS technology to remove the additional CO<sub>2</sub> emission at the cost of USD 20/ton CO<sub>2</sub>-eq, production costs of DME could increase by 20-25%, making it uneconomic even with low coal costs and high LPG prices.

DME and methanol production production target vs LPG and gasoline imports



Source: MEMR, 2021

DME production cost in different cost of coal and CCS utilization scenario

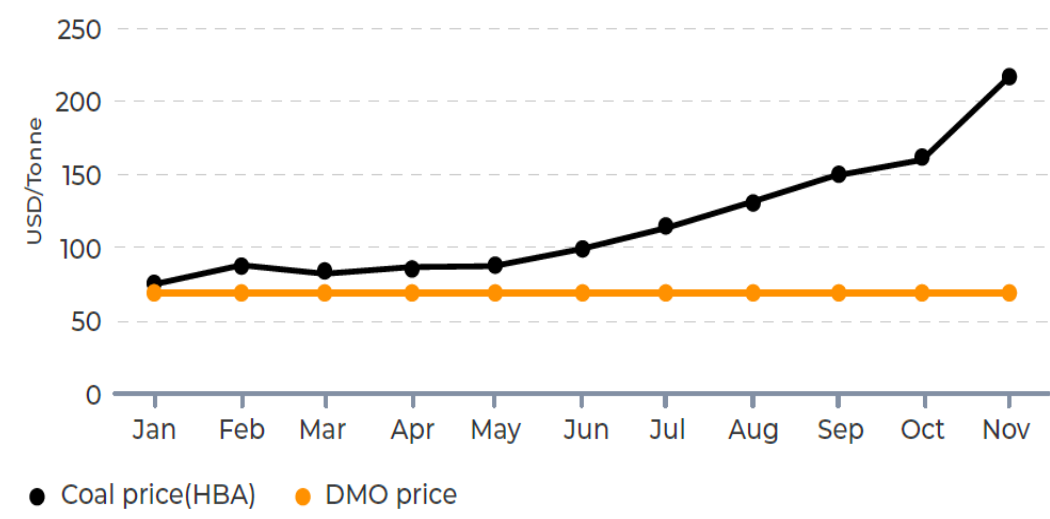


Source: MEMR, 2021

# Coal price volatility posed a risk to businesses, signaling a need to accelerate the energy transition

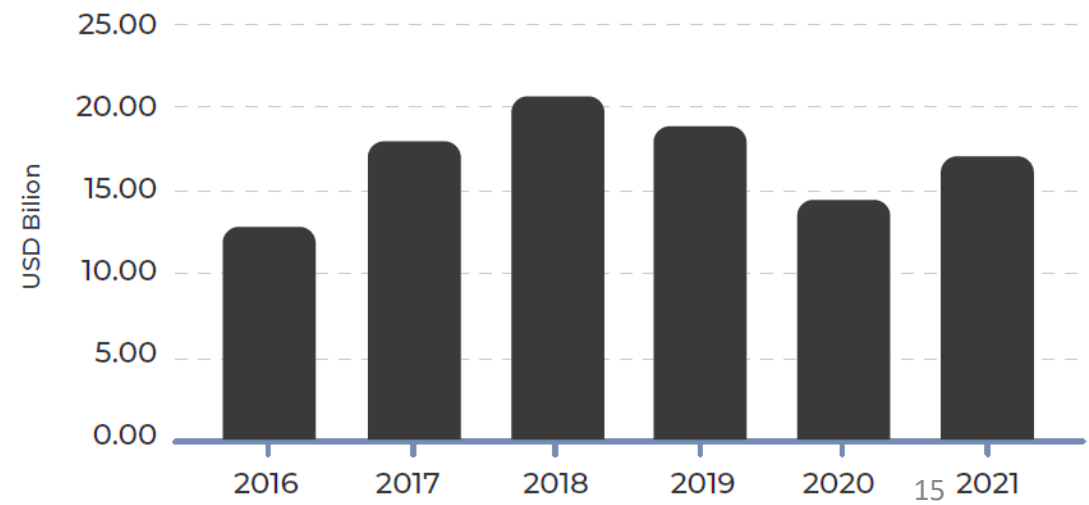
- Indonesia's coal reference price (HBA) set a new record high at around USD 215/ton in November 2021.
- A disparity between international market prices and local prices that are capped at USD 70/ton has made the 25% Domestic Market Obligation (DMO) hard to achieve.

Indonesia coal reference price (HBA) 2021



Source: MEMR, 2021

Annual national coal export value



Source: BPS, 2021.



# SUMMARY

- Ministry of Energy and Mineral Resources (MEMR) is working on ways to develop energy alternatives, among others, Dimethyl Ether (DME). In the future, DME can be used as an alternative to Liquid Petroleum Gas (LPG).
- Trend demand of LPG in Indonesia increases by 4.1 % per year and estimated to be 12.3 (Mio ton per year) in 2030.
- Coal is still the main energy source for the next 10 to 20 years due to abundant coal resources and reserves. Coal downstream process is urgently required to substitute current fossil fuel, and to produce more valuable products for industries, including: Methanol and DME.
- The coal-to-DME projects would likely be exposed to volatility risks of commodity (e.g. coal and LPG) prices. Thus, government subsidies are highly required to increase the project feasibility.

# RECOMMENDATION

DOWNSTREAM PRODUCT	TECHNOLOGY	CHALLENGES	RECOMMENDATION
DME and Methanol	SMR Gasification	<ul style="list-style-type: none"> <li>High cost investment</li> <li>DME prices must be able to compete with subsidized LPG</li> </ul>	Provide incentives by the industry & Government Subsidy for DME, if it is intended for household needs , Reduced Cost Capital by localization & Tax Incentive
Urea dan Amonia	SMR Gasification	High cost investment	Need the role of government as the off taker of the product
Hidrogen	SMR Gasification	<ul style="list-style-type: none"> <li>The market is not yet formed</li> <li>No infrastructure yet</li> </ul>	Encouragement / incentive for the use of hydrogen fuel



# Thank You

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