



Indonesia's Downstream Coal Plans Add Up to a Black Hole

Dimethyl Ether (DME) is
Economically and
Financially Unfeasible

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**Dimethyl Ether (DME) needs
Liquefied Petroleum Gas (LPG)
to be over US\$858/tonne
to justify the economic case**

Stakeholder preferences in Air Products proposed US\$2.1billion DME plant in Sumatra

The three stakeholders in the project, plus the Ministry of Finance, have different preferences:

- **Coal supplier Tambang Batubara Bukit Asam (PTBA)** wants to reduce the stranded asset risk for the 2.8 billion tonne Tanjung Enim coal deposit.
- **DME plant operator Air Products (APD)** wants a fixed return over the 15-20-year period to pay for the costs of building the plant.
- **DME buyer Pertamina** wants to sell the DME at a profit.
- **Ministry of Finance** is focusing on whether a subsidy is required on DME for the Indonesian consumer and how much this would cost.

IEEFA's research conclusion => a subsidy is required for the DME.

This is due to its high production cost of US\$601/tonne which includes 15% DME production margin for APD.

Indonesia's high profile transition bets

MOUs signed by APD on 4 November 2021 for Indonesian projects

Indonesian company	Project type	Value (US\$ bn)
Batulicin Enam Sembilan	Coal to DME	
Indika Energy	Coal to DME	
PTBA	Coal to methanol	
Butonas Petrochemical	Blue Ammonia	
Total		15.0

- APD signed four memoranda of understanding (MOUs) with Indonesian companies for coal downstream projects worth a total of US\$15bn.
- Projects were signed in November 2021 at the Indonesia-UAE Week in Dubai.
- BKPM Chairman and APD CEO signed the MOUs. President Joko Widodo and key ministers witnessed the signings.

Indonesia's high profile transition bets

- APD is involved in two other proposed coal gasification projects in Indonesia:

Coal-to-methanol plant, Bengalon, East Kalimantan

- This project is currently in APD's "major project" list.
- APD will invest US\$2bn to build, own and operate the plant to produce methanol for Bakrie => 6 million tonnes (mt) of coal to produce 2mt methanol.

DME plant, Sumatra

- US\$2.1bn DME plant will convert 6mt of coal to 1.4mt DME annually in conjunction with PTBA and Pertamina.

- APD has been restrained in disclosing details on their website or via corporate announcements. Market information on the PTBA project has come from the Indonesian side.
- There appears to be no firm agreement on funding, pricing or purchase offtake. For example, MEMR has said that PTBA, APD and Pertamina have not agreed on the price of coal for the DME project.

Rationale for the DME Project

- Conversion of coal into liquid or gas through processing was discussed in December 2017 when PTBA, Pupuk Indonesia and Chandra Asli signed the Downstream Agreement.
- The regional coal market has matured. PTBA has to identify domestic sources of demand.
- Interested parties within government and the coal sector developed a plan for the DME market => economic upside is import substitution.
- The DME plant will use 6mt of “unburnable” coal to produce 1.4mt of DME and replace 980,000t of LPG imports.
- *IEEFA believes => **reducing the LPG import bill** was the government’s **main reason** for pursuing the DME project.*

Stakeholder preferences

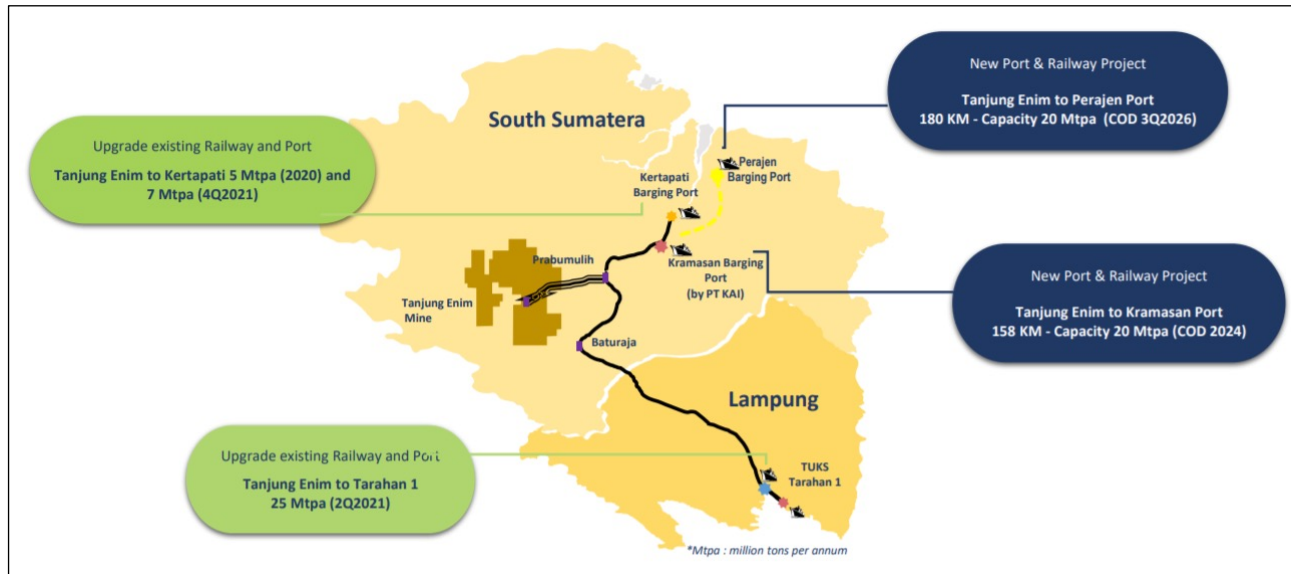
Summary of Each Party's Possible Preferences for DME Project

	PTBA	APD	Pertamina
Coal Mine Capex	Paid by PTBA. Avoid stranded assets.		
Coal Pricing	Sell coal at profit to pay off capex.	Input price adjusted in DME purchase price.	
DME Plant Capex		Paid by APD with purchase agreement in place.	
DME Purchase Price		Based on production cost plus fixed return.	Can sell DME at profit.
Ministry of Finance			DME cheaper than LPG. Subsidy as small as possible.

- **PTBA:** reduce stranded asset risk.
- **APD:** risk-averse model which does not take on price risk and gets fixed return.
- **Pertamina:** DME purchase price lower than LPG price.
- **Ministry of Finance:** DME cheaper than LPG.

PTBA preference: Reducing stranded asset risk

Tanjung Enim Mine, Current and Projected Railways and Ports



Source: PTBA.

- **Large reserves:** Tanjung Enim has a reserve base of 2.8bnt.
- **Coal quality:** Calorific value is around 4,800-5,000kcl/kg => shrinking market.
- **Location:** Located inland and no river system. Transport option is railway to ports.
- **Port expansion:** Need to upgrade both ports from current 32 to 76mt by 2026.

PTBA Current and New Port Capacity, Mine Mouth Coal Power and DME Plant Coal Usage, Completion Dates (m tonnes, MW, km)

Supply/Demand	Capacity (mt)	Date	Capacity (MW or mt)	Rail Distance (km)
Ports to Move Coal				
Tarahan	25.0	2Q 2021		
Kertapati	7.0	4Q 2021		
Current Capacity	32.0			
New Port Capacity				
Kramasan	20.0	2024		158.0
Perajen	20.0	3Q 2026		180.0
New	40.0			
Total	72.0			
Facilities to Create Demand Onsite				
Mine Mouth Plant: Sumsel-8	2.4	4Q 2021	1,200	
Downstream Plant: DME	6.0	2024		
Total	80.4			

- At 2019 production rate of 28.1mt, reserve base will last about **99** years.
- If PTBA expands port capacity plus mine mouth plant and DME plant, then the reserve base will last **35** years.

APD: A successful low-risk business model

- APD's business model is to cut out all commodity price risks and effectively insulate returns.

In its 2021 annual report, APD's business model showed three key characteristics:

1. Gases are produced and supplied by large facilities built by APD.
 2. Gas sale contracts generally have 15- to 20-year terms.
 3. Contracts contain fixed monthly charges and/or minimum purchase requirements.
- APD “mitigates energy and natural gas price contractually through pricing formulas, surcharges and cost pass-through arrangements”.
 - *IEEFA suggests the most likely scenario is APD purchases coal at price set by PTBA, with fixed profit margin on total cost of DME produced.*

Summary of each party's financing and cashflow preferences for DME project

	PTBA	APD	Pertamina
Coal Mine Capex	Paid by PTBA.		
Coal Pricing	Higher of Cost plus 15% or market price.	Input price adjusted.	
DME Plant Capex		In DME purchase price. Paid by APD with purchase.	
Plant Operation	Buy back option if profitable.	15-20-year purchase at cost plus price.	Buy back option if profitable.
DME Purchase Price		Based on production cost plus fixed return- no risk.	

- In the above scenario, the purchaser **Pertamina** must absorb includes the production cost of the DME plus a profit margin for APD.
- **PTBA** will ask for coal market price or coal production cost plus a profit margin, whichever is higher.
- **APD** in turn will seek a cost pass-through with Pertamina bearing full commodity price risk.

DME project only works with cheap coal

DME Project Financial Position Nov 2020 vs. Current (US\$ millions, 000 tonnes, US\$/ tonne)

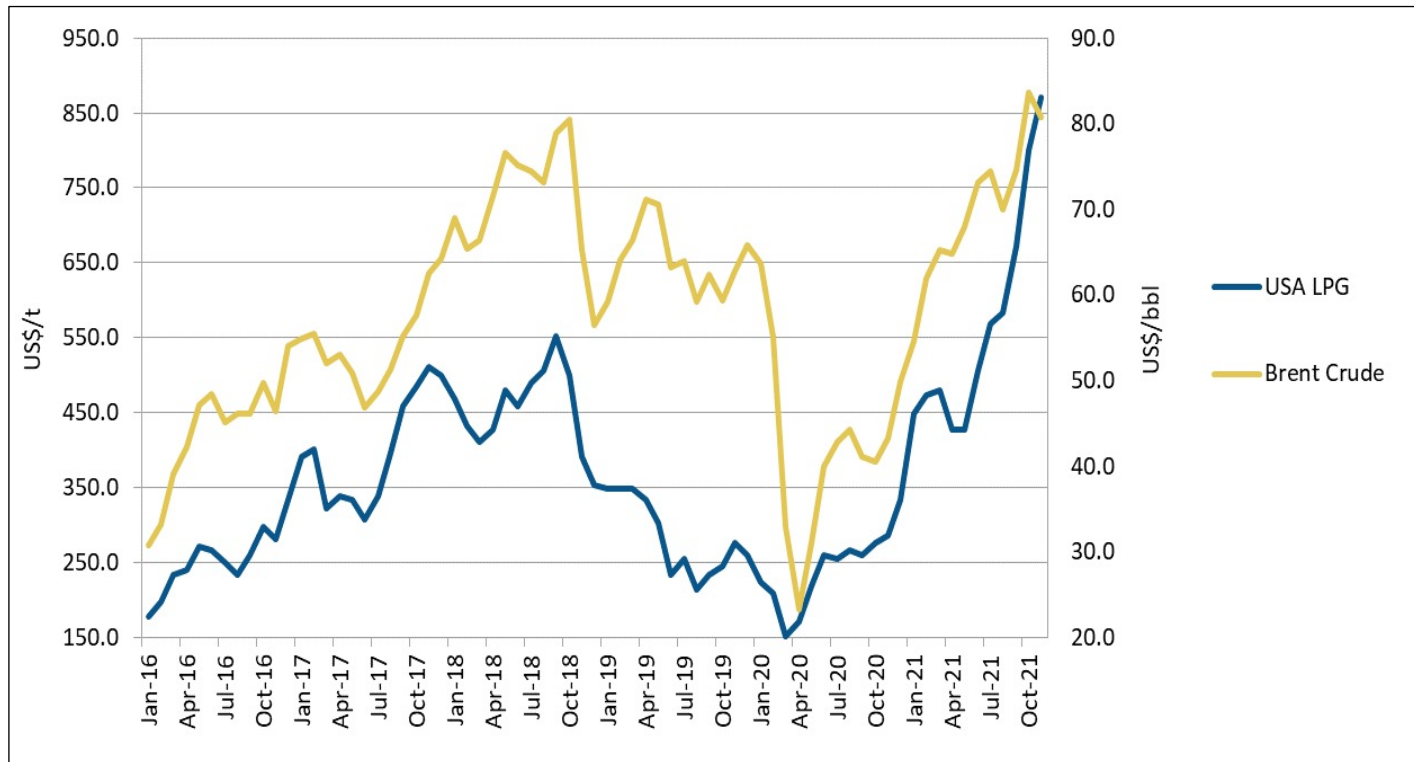
Savings	Unit	at Nov 2020	Nov 2021 Cost Plus	Nov 2021 Market
LPG/DME Prices				
LPG price Saudi contract propane	US\$/tonne	365.0	870.0	870.0
Substitute DME price (30% discount)	US\$/tonne	255.5	609.0	609.0
DME Production Cost				
DME non coal production cost	US\$/tonne	300.0	300.0	300.0
Cost of one tonne coal	US\$/tonne	37.0	48.3	80.0
Cost of 4.6 tonnes coal	US\$/tonne	170.2	222.2	368.0
Total DME cost including coal	US\$/tonne	470.2	522.2	668.0
Total DME cost plus 15% APD margin	US\$/tonne	540.7	600.5	768.2
DME After Financial Cost				
DME profit/(loss) per tonne	US\$/tonne	-285.2	8.5	-59.0
DME produced	000 tonne	1,400.0	1,400.0	1,400.0
Total DME losses pre finance	US\$ m	-300.6	52.9	-82.6
Finance cost US\$2bn @3.8%	US\$ m	-76.0	-76.0	-76.0
Total DME Losses Post Finance	US\$ m	-475.3	-64.1	-158.6

DME project only works with cheap coal

- In our table, we assume a 15% profit margin for APD and look at the financial position under three scenarios.
- This is from the lower end of APD's net income margin range of 16-22% for 1Q 2019 to 4Q 2021 as disclosed in their annual report.
- **IEEFA report from November 2020**: Total losses for the DME project after financing expenses are US\$475m.
- **Current LPG price, coal is supplied at cost plus 15%**: The total losses for the DME project after financial expenses are US\$64m.
- **Current LPG price, coal is at market price**: The total losses after financial expenses are US\$159m.

Pertamina: A profitable purchase price?

USA Texas LPG Spot Price and Brent Crude Monthly Price
Jan 2016-Nov 2021 (US\$ /tonne, US\$ /barrel)



- The difficulty in calculating a purchase price for DME is that coal, LPG and oil prices all move in the same direction.

Pertamina: A profitable purchase price?

Newcastle Coal Price and Brent Crude Monthly Price
Jan 2016-Nov 2021 (US\$ /tonne, US\$ /barrel)



- Purchase price is difficult to calculate as there are two moving parts – the cost of coal required for DME processing and the price of DME to buyer.

Pertamina: A profitable purchase price?

Substitute DME prices, purchase prices and comparisons (US\$ /tonne)

Savings	Unit	Nov-20	Jun-21	Nov-21
LPG/DME Prices				
LPG price Saudi contract propane	US\$/tonne	430.0	530.0	870.0
Substitute DME price (30% discount)	US\$/tonne	301.0	371.0	609.0
DME Production Cost Coal at Cost Plus				
DME non coal production cost	US\$/tonne	300.0	300.0	300.0
Production cost PTBA for coal	US\$/tonne	42.0	42.0	42.0
Cost to DME after 15% markup	US\$/tonne	48.3	48.3	48.3
Cost of 4.6 tonnes coal	US\$/tonne	222.2	222.2	222.2
Total DME cost including coal	US\$/tonne	522.2	522.2	522.2
DME purchase price (cost plus 15%)	US\$/tonne	600.5	600.5	600.5
DME purchase price vs substitute price	US\$/tonne	299.5	229.5	-8.5
DME Production Cost Coal at Market				
DME non coal production cost	US\$/tonne	300.0	300.0	300.0
Market price of PTBA coal	US\$/tonne	27.1	55.9	80.0
Cost of 4.6 tonnes coal	US\$/tonne	124.6	257.1	367.9
Total DME cost including coal	US\$/tonne	424.6	557.1	667.9
DME purchase price (cost plus 15%)	US\$/tonne	488.3	640.7	768.1
DME purchase price vs substitute price	US\$/tonne	187.3	269.7	159.1

- The substitute DME price is based on 30% discount to LPG price. By using coal at cost plus 15% at US\$870/t, it is cheaper than LPG.

Two breakeven LPG prices

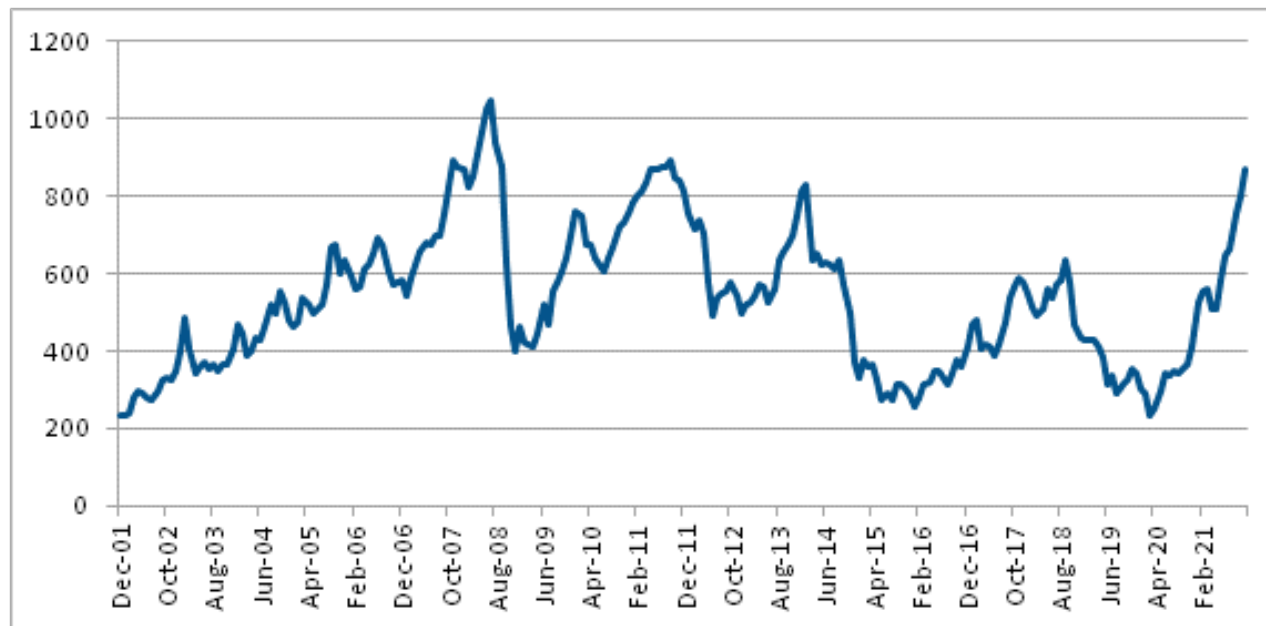
Substitute DME prices, breakeven LPG price estimate (US\$/tonne)

Savings	Unit	Breakeven Cost Plus	Breakeven Market Coal
LPG/DME Prices			
LPG price Saudi contract propane	US\$/tonne	858.0	1,097.5
Substitute DME price (30% discount)	US\$/tonne	600.6	768.3
DME Production Cost Coal at Cost Plus			
DME non coal production cost	US\$/tonne	300.0	
Production cost PTBA for coal	US\$/tonne	42.0	
Cost to DME after 15% markup	US\$/tonne	48.3	
Cost of 4.6 tonnes coal	US\$/tonne	222.2	
Total DME cost including coal	US\$/tonne	522.2	
Purchase price (cost plus 15%)	US\$/tonne	600.5	
Purchase price vs substitute price	US\$/tonne	-0.1	
DME Production Cost Coal at Market			
DME non coal production cost	US\$/tonne		300.0
Market price of PTBA coal	US\$/tonne		80.0
Cost of 4.6 tonnes coal	US\$/tonne		367.9
Total DME cost including coal	US\$/tonne		667.9
Purchase price (cost plus 15%)	US\$/tonne		768.1
Purchase price vs substitute price	US\$/tonne		-0.2

- There are two breakeven LPG prices of US\$858/t (using coal at cost plus 15%) and US\$1,098/t (coal at market price).

Two Breakeven LPG prices

Estimated LPG import price Jan 2016-Nov 2021 (US\$/tonne)



- Between January 2002 and November 2021, there has only been 15 months (6% of the period) where LPG has exceeded US\$858/t (breakeven price using coal at cost plus 15%).
- The LPG price has not reached US\$1,098/t (coal at market price).

Subsidies needed for DME

Cost “Savings” from Purchasing Less LPG and Subsidies (US\$/tonne, US\$ millions)

Total Bill for the GoI	Unit					Breakeven	
LPG							
DME Cash outflow	US\$/t	500.0	600.0	700.0	800.0	870.0	900.0
DME Cash inflow (subsidised price)	US\$/t	300.0	300.0	300.0	300.0	300.0	300.0
Cash outflow (including subsidy)	US\$/t	-200.0	-300.0	-400.0	-500.0	-570.0	-600.0
Total LPG units replaced by DME	000 t	980.0	980.0	980.0	980.0	980.0	980.0
Total Indonesia outflow	US\$ m	-196.0	-294.0	-392.0	-490.0	-558.6	-588.0
DME Production Cost Coal at Cost Plus							
DME Cash outflow	US\$/t	600.5	600.5	600.5	600.5	600.5	600.5
DME Cash inflow (subsidised price)	US\$/t	210.0	210.0	210.0	210.0	210.0	210.0
Cash outflow (including subsidy)	US\$/t	-390.5	-390.5	-390.5	-390.5	-390.5	-390.5
Total DME units produced	000 t	1,400.0	1,400.0	1,400.0	1,400.0	1,400.0	1,400.0
Total Indonesia outflow	US\$ m	-546.7	-546.7	-546.7	-546.7	-546.7	-546.7

- At price of US\$601/t DME, there would be a subsidised price of US\$210/t to be comparable to the current 3kg subsidised LPG price to consumer.
- On 1.4mt of DME, there is cash outflow of US\$547m. The DME substitution will only make sense when the LPG price is above US\$858/t.

Conclusions: Difficult to justify DME

IEEFA's major findings for each of the stakeholders are:

- **PTBA:** Stranded asset risk for Tanjung Enim remains high as the financial returns for the DME project are unlikely to work.
- **APD:** Its' risk-free return model is not a good fit for the DME project. Once the price risk and 15% markup is passed onto DME buyer => price for DME not competitive against LPG.
- **Pertamina:** Based on APD's return requirements, DME is only cheaper than LPG when the LPG price is above US\$858/t => 6% of the period in the last 20 years.
- **Ministry of Finance:** For 1.4mt DME, the total cash outflow is US\$547m => buying DME at US\$601/t and selling it at a subsidised price of US\$210/t.

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