Fuel Switching Pathways for Coal-Using Industries in Jakarta

Pathways for Clean Air and Clean Energy - Regional Sharing Session on Policy, Finance, and Technology Solutions in the Philippines, Indonesia, and Viet Nam

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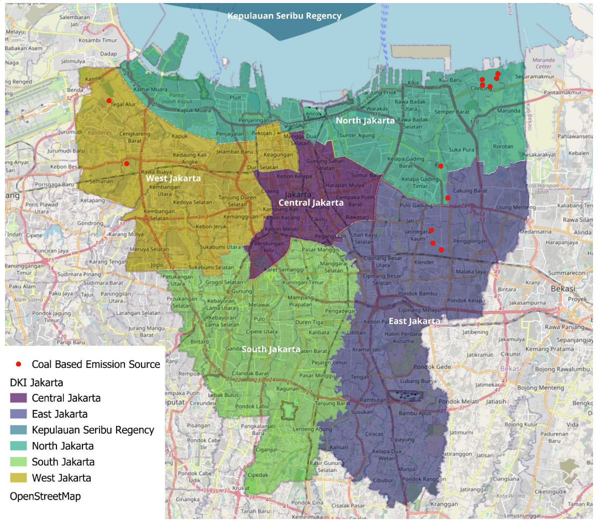
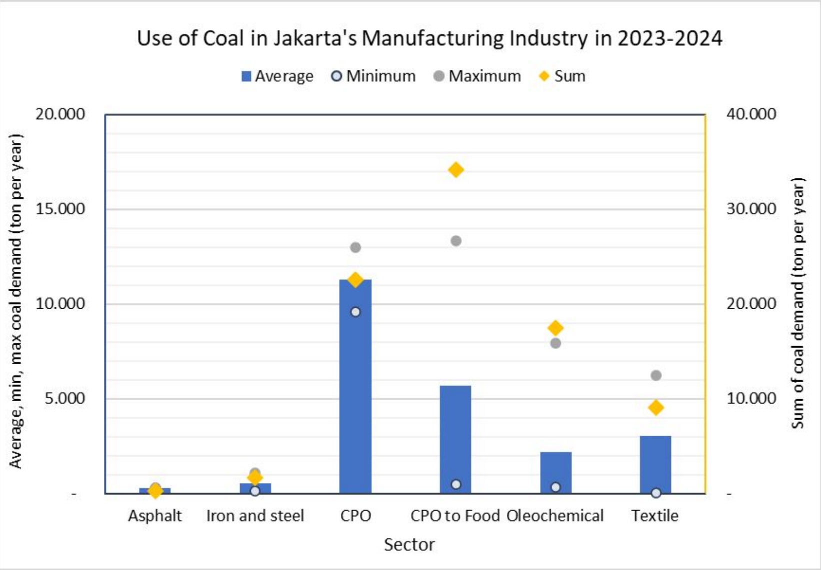
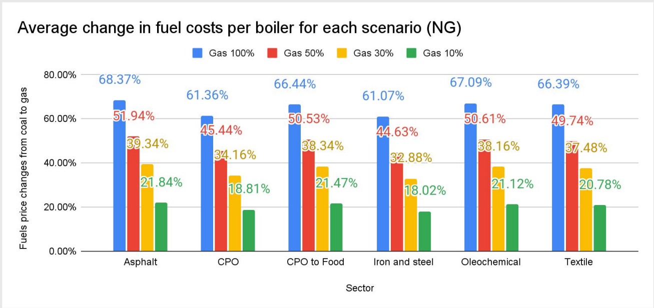
Coal-Using Industries in Jakarta

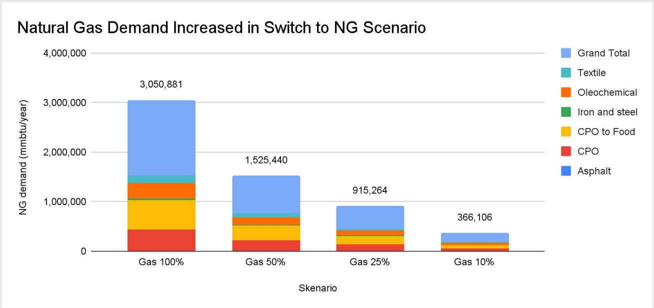


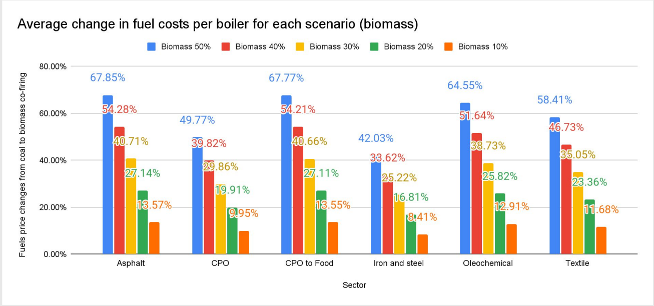
1. Industries has attempted to switch to fuel switch with common options such as gas and biomass
2. High capital expenditure, volatile gas prices, and unstable supply for both gas and biomass discouraged the process
3. Some industries have tried using biomass with varying results (heat demands and total fuel costs)

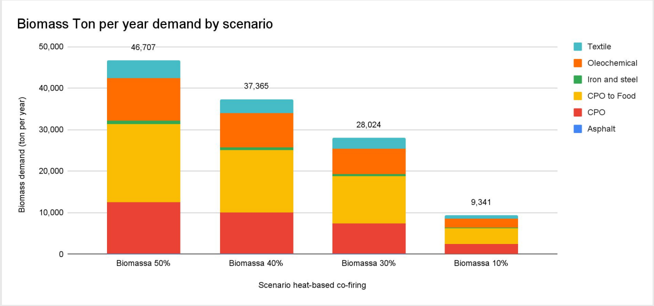
Total of 1,269 TJ/year or 85.2 ktonne/year











Fuel demand that must be met by the market. With current gas demand, National Gas Company (PGN) has been unable to meet this demand. As for biomass supply, industries are struggling to find adequate supplies in sufficient quantities around Jakarta.

Recommendation Fuel Switching Scenarios for Industries in Jakarta

Existing Emission (2025) : $PM_{2.5}$ = 38 ton/year; PM_{10} = 74 ton/year; SO_x = 582.4 ton/year; NO_x = 361 ton/year; CH_4 = 4 ton/year; CO_2 = 145 Kton/year

100% gas

Adjustment:
1. **Gas Boiler purchase**, including feedings system installations, and coal boiler dismantling
2. **New/upgrading of APC technology**
3. **O&M costs due to new systems** and pipe networks and safety system

Emission reduction & Health Impact

Reduction in all parameters

$PM_{2.5}$ -99.5% | PM_{10} -99.7% | SO_x -99.9%

CO_2 -50% | CH_4 -68% | NO_x -76%

39 Deaths avoided

-567 Hospitalization due to respiratory disease

153.6B IDR Economic Benefits from Public Health Improvement

50% coal: 50% gas

Adjustment:
1. **Gas boiler purchase or retrofitting,** including installation of new feedings system
2. **New/upgrading of APC technology**
3. Higher **O&M costs due to new systems** and pipe networks and safety system

Emission reduction & Health Impact

Reduction in all parameters

$PM_{2.5}$ -50% | PM_{10} -50% | SO_x -67%

CO_2 -25% | CH_4 -66% | NO_x -49%

29 Deaths avoided

-401 Hospitalization due to respiratory disease

113.2B IDR Economic Benefits from Public Health Improvement

50% coal : 50% biomassa
(palm kernel shell)

Adjustment:
1. **No changes in boiler or retrofitting to accommodate co-firing,** purchasing new boiler if needed
2. **Addition of APC**
3. Higher **O&M costs due to addition in APC units and biomass warehousing**

Emission reduction & Health Impact

Reduction in all parameters except for CH_4

$PM_{2.5}$ -38% | PM_{10} -1% | SO_x -64%

CO_2 -6% | CH_4 +396% | NO_x -56%

31 Deaths avoided

-427 Hospitalization due to respiratory disease

120.1B IDR Economic Benefits from Public Health Improvement

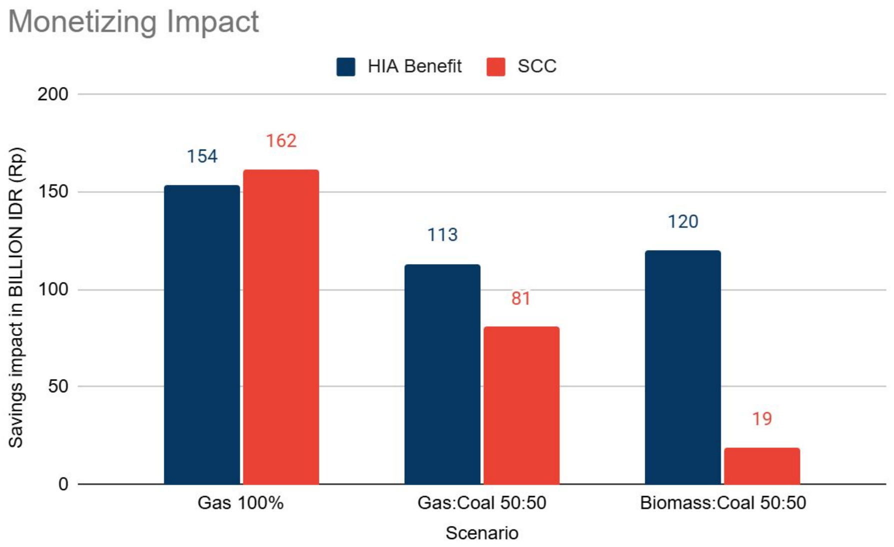
Techno Economic Analysis and CBA for Fuel Switching

Financial Feasibility

Net Present Value (NPV 15 tahun, 12%) (Range Indicative)		Internal Rate of Return (IRR) (Range Indicative), >12%	
Gas 100%	Rp 21 M Rp-6.7 M	Gas 100%	> 20% -8%

Payback Period (PP, years) (Range Indicative), 5-7 years		Return on Investment (ROI, %) (Range Indicative)	
Gas 100%	1.7 28.2	Gas 100%	60.3% 3.54%

Benefit



The key driver for the switch from coal to gas is not investment in equipment, but rather the high price of fuel (natural gas), which will continue to rise. For biomass co-firing, fulfilling sufficient biomass supply and quality is still a challenge.

Despite high economic benefit through public health improvement and SCC, industry corporates will only gain financial benefit through O&M cost saving in gas scenario, making each industries NPV and ROI ranging varily.

Scenario Cost-Benefit

Scenario	2025-2040	
	Total Benefit	Total Cost
Gas 100%	6,091	(5,683)
Gas:Coal 50:50	3,038	(2,983)
Biomass:Coal 50:50	2,196	(1,306)

Total benefit and total cost through 15 years (2025-2040) are in TRILLION Indonesian Rupiahs.

Scenario (SDR = 7%)	2025-2040			
	ENPV	EIRR	B/C	ROI
Gas 100%	197.9	27.4%	2.74	28.1%
Gas:Coal 50:50	0.9	7.2%	1.08	11.1%
Biomass:Coal 50:50	511.9	89.2%	8.69	89.2%

ENPV 15 years (2025-2040), discount rate 7% presented in BILLION Indonesian Rupiahs.

Fuel switching into gas and biomass is feasible, but enabling ecosystem and financial aid is needed for some to stabilize industries' internal cash flow

Recommendations

How should Jakarta pursue the pathways for fuel switching in coal-using industries?

- Short term (<5 years)
  - Improve exhaust gas quality by encouraging to increase the efficiency of industrial APC if fuel switching is not yet possible.
- Medium term (5-10 years)
  - Obligate industries to do fuel switching at a ratio appropriate to each industry's capabilities to begin building a cleaner fuel ecosystem in the future.
  - Advocating improvement of energy mix in industrial areas and push cost-sharing strategies such as communal biomass warehouses
- Long term (>10 years)
  - Provide access to green financing system for industries (green bonds, super tax deductions) for energy transition.

* there is limitation in subnational mandate in regional energy and fuel allocation, which heavily lie within national affairs

Enabling conditions and alignment with national plan

1. Enabling conditions
    - Energy service company to lessen capital expenditure for buying new boilers or installations
    - Expansions of industries eligible for Certain Natural Gas Pricing (HBGT/subsidy scheme), currently limited to only 7 industrial sectors
    - Establishing market and maximum price for biomass and gas
    - Incentive for switching, discount for early years, tax reduction
    - Green bonds
2. Alignment with national plan and harmonization amongst ministries
    - Determining feasible cap value in accordance with regional energy use plan, contributing in national emission trading system
    - Considering regional energy use plan in expanding Certain Natural Gas Pricing (HBGT) quota share

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Thank you

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