

Natural Gas and LNG as the Transitional Fuel in ASEAN

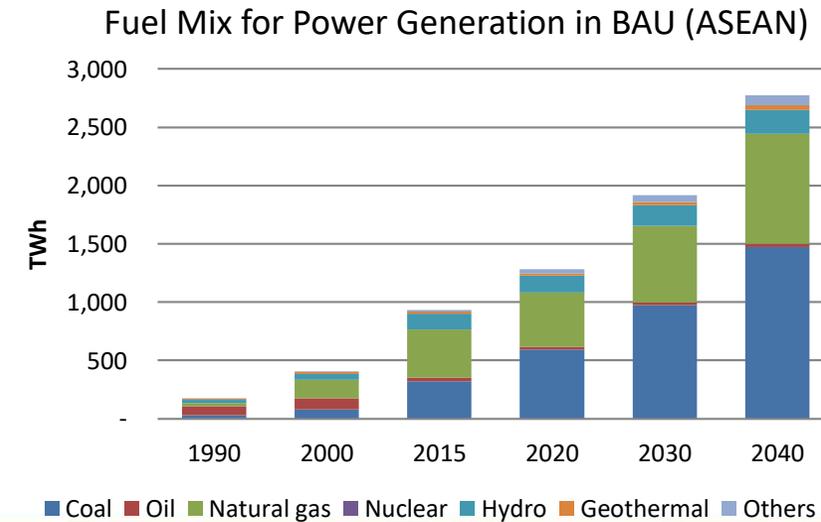
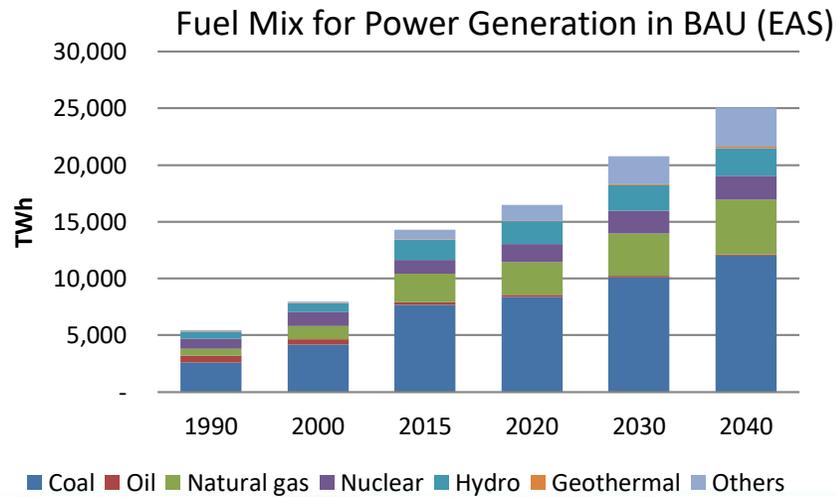
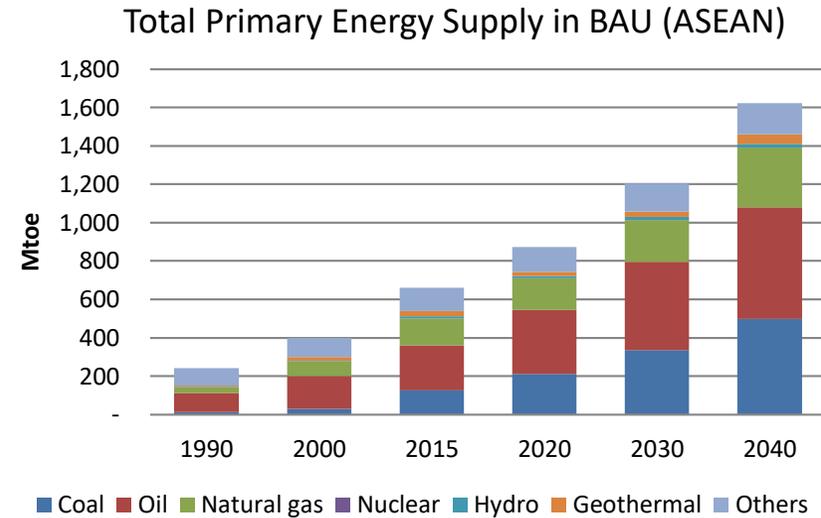
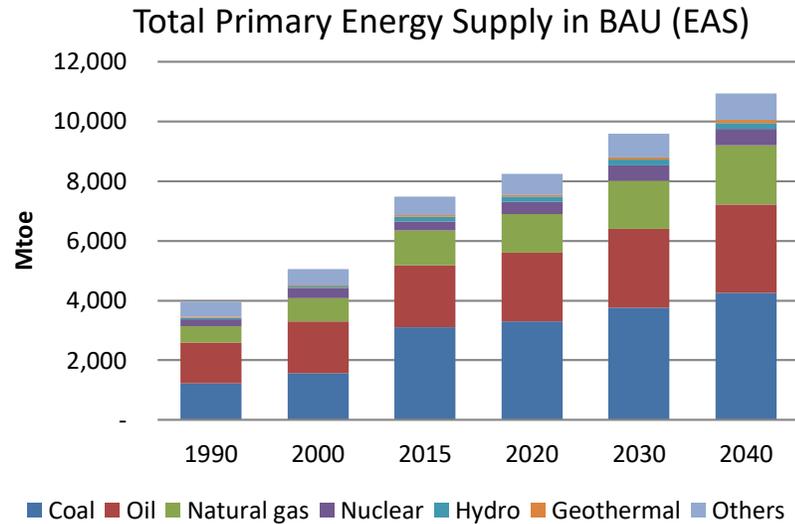
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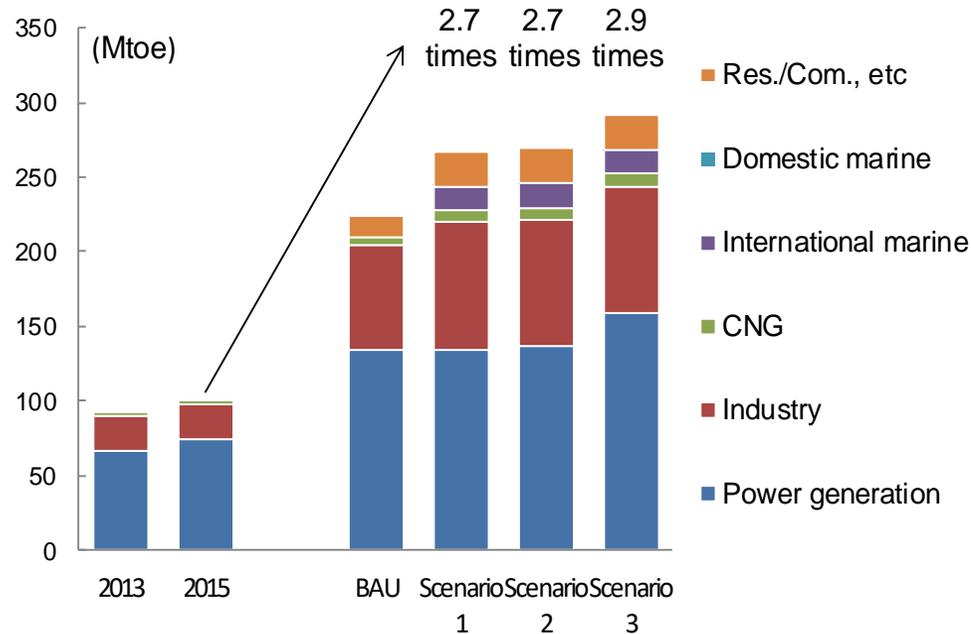


Outlook of Natural Gas Demand in EAS and ASEAN (BAU)

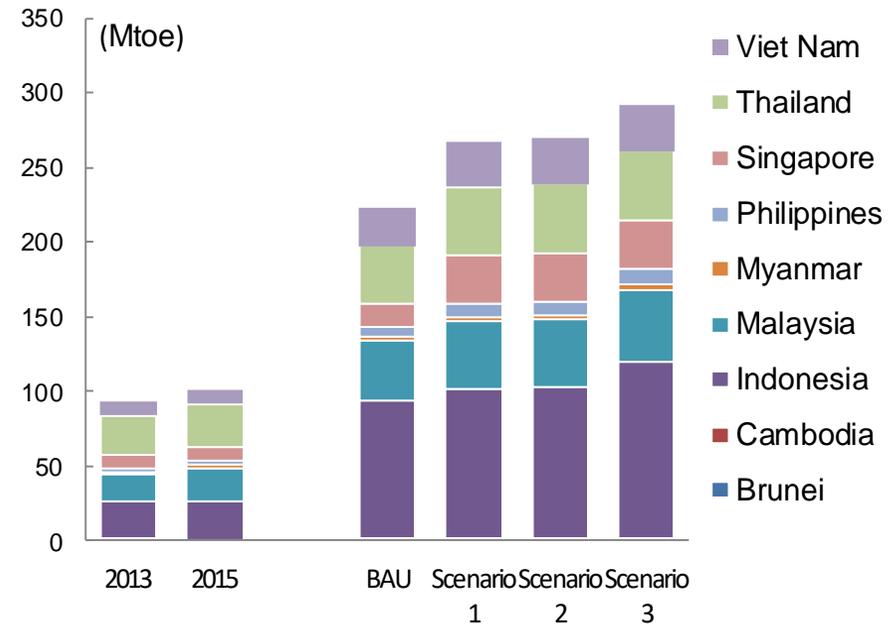


Aggressive Policies Required to Further Boost the Role of Natural Gas as a Transitional Fuel

Natural gas demand potential by sector (2030)



Natural gas demand potential by country (2030)



Note:

- Scenario 1 to 3 assume that the share of natural gas in new thermal power generation capacity will be 15%, 30%, and 60%, respectively.
- Export demand and Non-energy use demand for natural gas are excluded.

Expected Economical and Environmental Benefit

- ◆ In power generation sector, fuel cost will increase though part of it could be offset by lower construction cost. CO₂ emissions can be reduced.
- ◆ In other sectors, both fuel and CO₂ emissions can be reduced by substituting oil.

Power generation

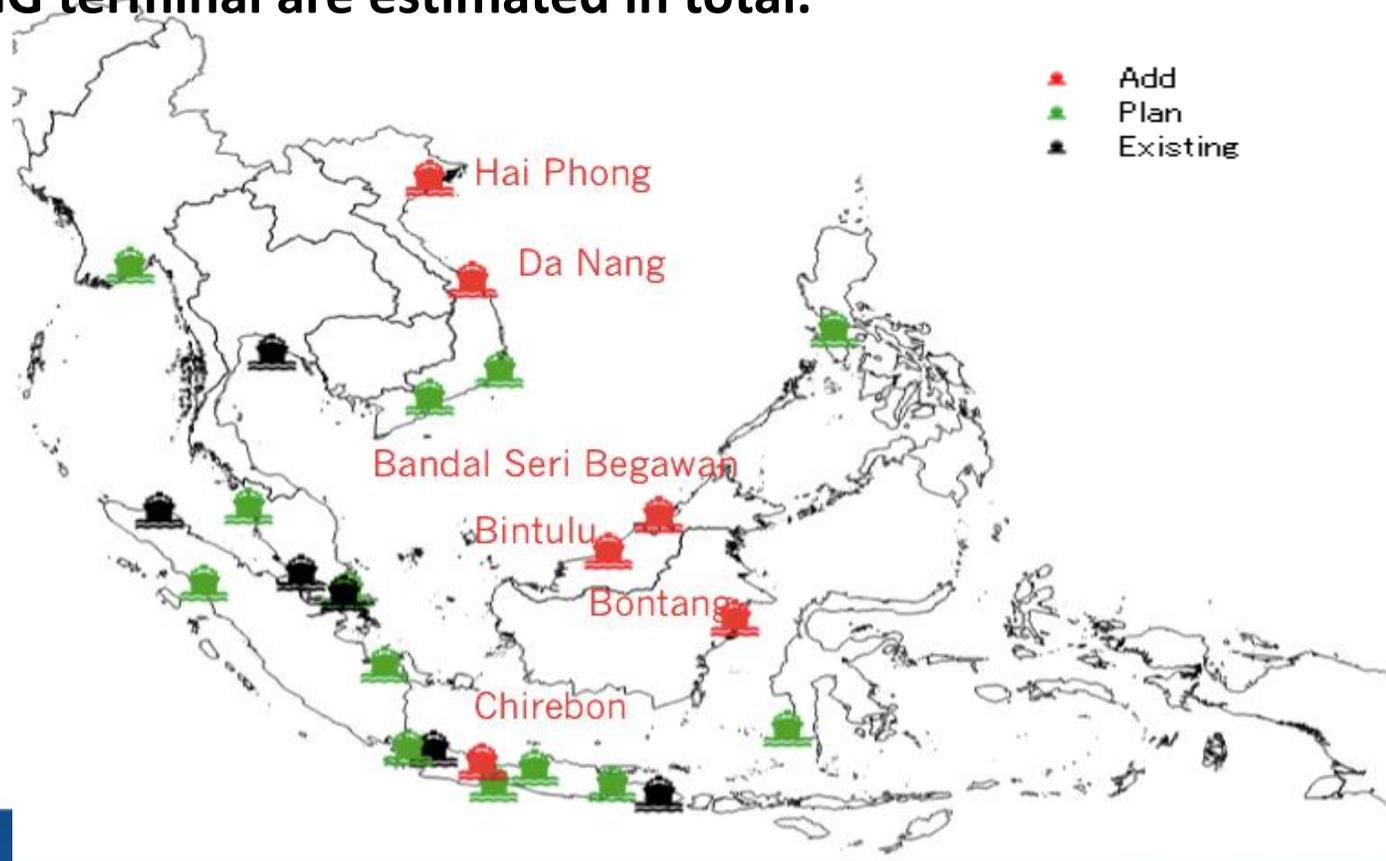
Case	Fuel import cost			Construction cost (Billion USD)	CO ₂ emission (Million tons-CO ₂)	
	LNG: USD 11.9/MMBtu (Billion USD)	LNG: USD 9/MMBtu (Billion USD)	LNG: USD 6/Mbtu (Billion USD)			
Scenario 1	+0.7	+0.5	+0.4	+0.1	+6.4	(+0%)
Scenario 2	+7.5	+4.9	+2.2	-0.5	-55.8	(-2%)
Scenario 3	+20.7	+13.3	+5.6	-1.7	-176.5	(-6%)

Other sectors total

Fuel import cost			CO ₂ emission (Million tons-CO ₂)
LNG: USD 11.9/Mbtu (Billion USD)	LNG: USD 9/Mbtu (Billion USD)	LNG: USD 6/Mbtu (Billion USD)	
-23.2	-33.7	-44.6	-0.047 (-2%)

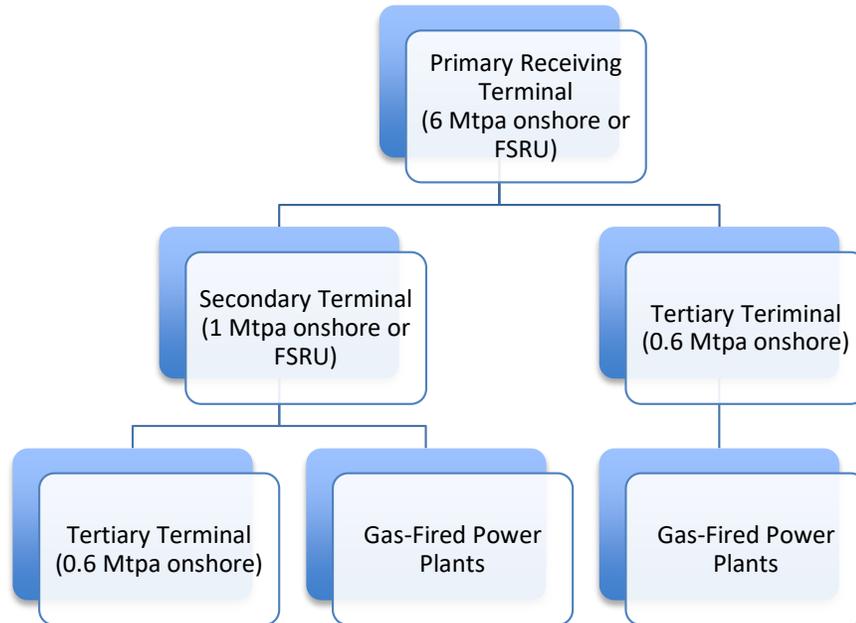
Substantial Infrastructure Investment Required

- ◆ Even considering existing and planned primary LNG terminals, still more primary LNG terminals are necessarily to be constructed by 2030.
- ◆ About 17.15 billion USD for primary LNG terminal and about 9.06 billion USD for secondary LNG terminal are estimated in total.



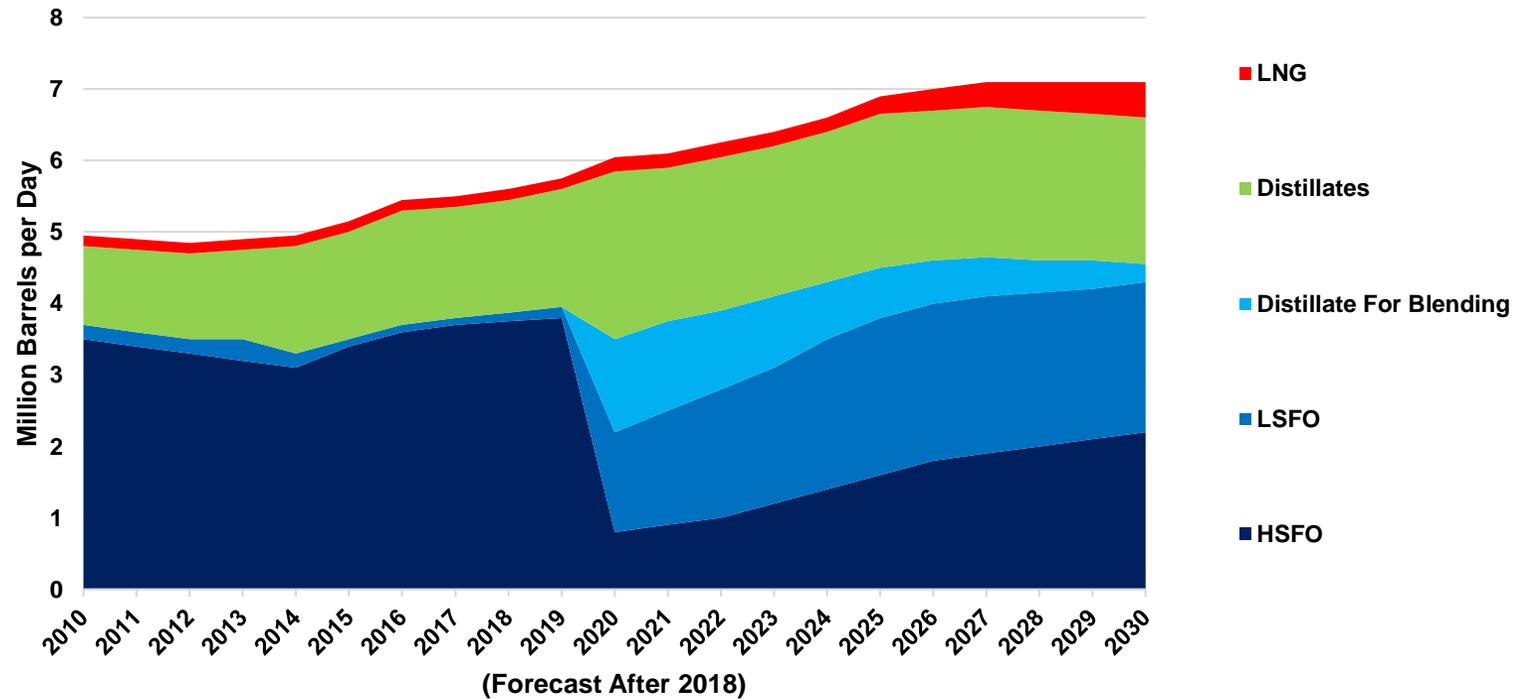
Opportunities in Small Scale LNG: A Study on Philippines

- ◆ LNG imports will increase due to depletion of this gas field and a shift in power generation from coal to gas.
- ◆ It is essential to devise an economic system for delivery of small and medium-scale LNG from primary to subordinate (secondary and tertiary) terminals located near the islands' gas-fired power plants (GPPs).



New Demand from LNG Bunkering

- ◆ Assuming 32.5% of shipping to switch to LNG as propelling fuel due to the IMO 2020 sulfur rule compliance, ASEAN alone could see 17.4 Mtoe per year of LNG demand.

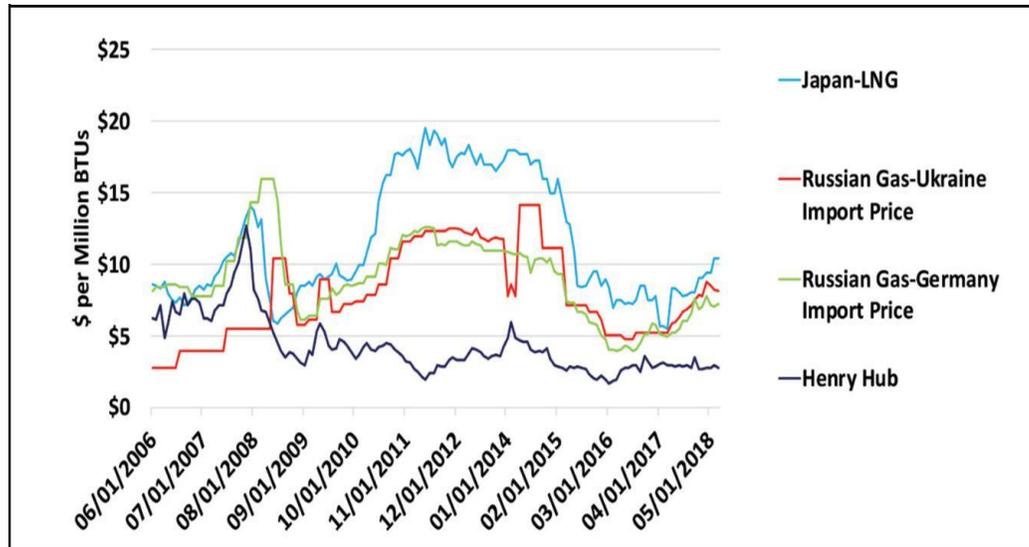


Source: ERIA LNG Market Development in Asia (2018)

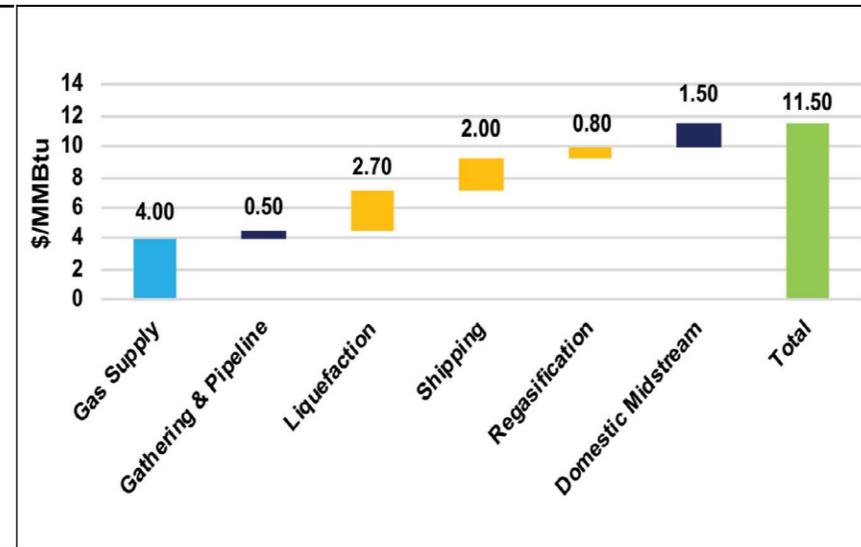
A More Flexible Market and Benchmark Pricing are Called for

- ◆ Asian Premium is not fully explained by the cost of LNG transport.
- ◆ A more competitive and flexible market is needed.
- ◆ An active and influential spot market is needed in the region to provide price benchmarks acceptable for both buyers and sellers

Global Natural Gas Prices in Four Regions



Asia Delivered LNG: High Cost Structure Scenario



Major Policy Recommendations

- **Acceleration of Destination Restriction Removal.**
- **Development of a Reliable LNG Price Benchmark**
- **Assistance to Private Investment in the LNG Value Chain:**
- **Engagement with Emerging LNG Markets:**
- **Development of a Fast-Tracking Tool for Project Development:**
- **Preparation for Emergence of LNG Bunkering Demand**