

Asean LNG to Power: Market Update & Opportunities

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Philippines LNG to Power: Market Update & Opportunities

Tata Corpuz
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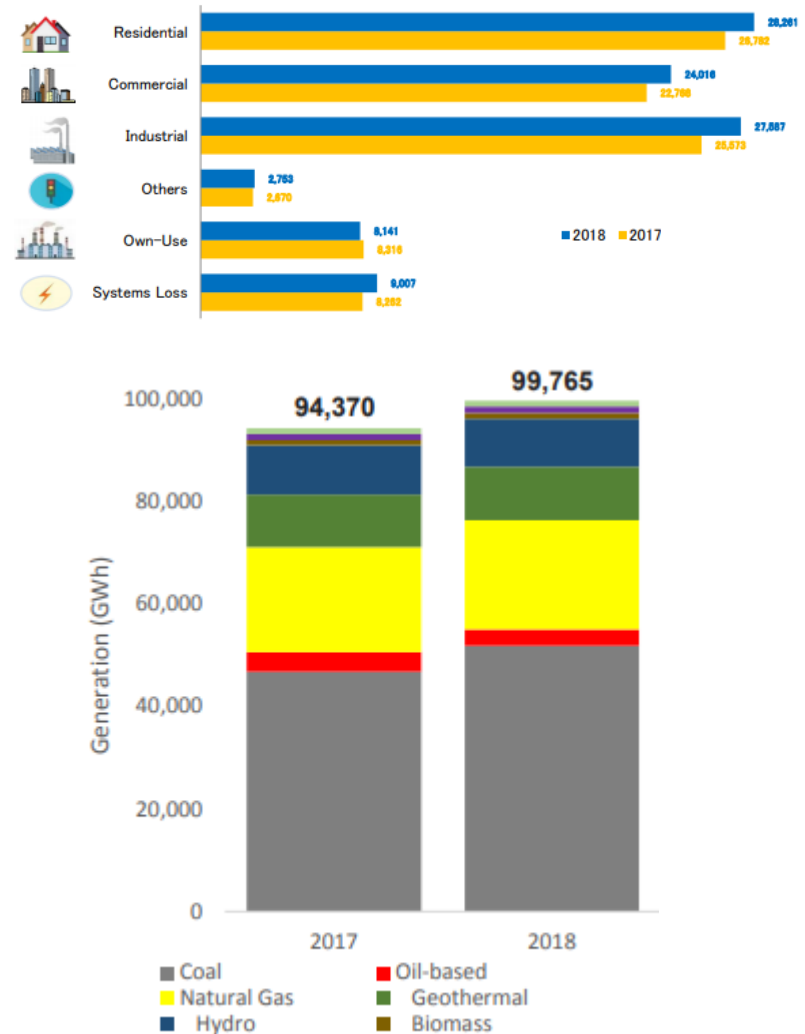
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PHILIPPINES – ENERGY OVERVIEW

WHERE ARE WE NOW?

- The Philippine economy grew by 6.2% in 2018
- Infrastructure spending at \$160-180 billion until 2022
- Power demand is largest in Luzon island at 73%
- Additional 934 MW were added in the country's total energy supply
- Major power consumption from residential and industrial sectors
- Coal accounts for 52% of power generation
- Geothermal source at 45% from total RE generation



PHILIPPINES – ENERGY OVERVIEW

WHERE ARE WE NOW?

NEW POWER PROJECTS

Fuel Type	Committed			Indicative		
	No. of Proponents	Capacity (MW)	% Share	No. of Proponents	Capacity (MW)	% Share
Coal	10	5,085	80.3	10	10,463	31.5
Oil-Based	2	78	1.2	6	415	1.3
Natural Gas	1	650	10.3	5	4,060	12.2
Renewable Energy (RE)	30	516	8.2	152	18,261	55.0
Geothermal	2	81	1.3	3	200	0.6
Hydro	13	79	1.2	54	4,676	14.1
Biomass	12	215	3.4	20	343	1.0
Solar	3	141	2.2	62	10,199	30.7
Wind	0	-	-	13	2,843	8.6
TOTAL	44	6,329	100.0	173	33,199	100.0

NOTE: Numbers may not sum up to total due to rounding off.

THE MALAMPAYA GASFIELD

- Located offshore Northwest Palawan
- 850 meters water depth, 500 kilometres undersea pipeline
- Commenced commercial operations in 2001
- Supplying 30% energy of Luzon grid from 5 natural-gas power plants
- Expected to be depleted by 2024

PHILIPPINES – LNG TERMINAL PROJECT

WHERE ARE WE HEADED?

Project Owner / Foreign Partner	Business Nature	Project Description	Status	Target date
Tanglawan Philippines LNG Inc. / China National Offshore Oil Corporation	Develop, construct, O&M LNG Terminals, pipelines.	\$2 billion LNG regasification facility with capacity at 2.2 mtpa;	Notice to Proceed in 21 Dec 2018	commercial operations by 2023.
FGEN LNG Corporation / Tokyo Gas (20%)	Develop, construct, O&M LNG Terminals, pipelines Import, storage and regasification of LNG Acquire and export and/or its by products to local and foreign buyers, power generation plants, utilities, etc.	Minimum capacity of 3 mtpa equivalent to 3,000 MW Increase to 5 mtpa for future requirements FSRU in first phase	Notice to Proceed from DOE in 7 March 2019 Groundbreaking of its LNG project in May 2019 Negotiations on FID ongoing	Before 2024
Energy World Gas Operations Philippines Inc.	Develop, own and operate LNG import terminal with regasification facility, receiving, storage and distribution on wholesale bases of LNG.	\$750 million project investment; Two storage tans; LNG terminal; 650 MW combined-cycle gas plant Power will be sold through the Wholesale Electricity Spot Market	Permit to Construct in Dec 2018 valid till Dec 2020 90% complete except for right-of-way for its transmission lines Temporary transmission using NGCP lines	2020-2021

PHILIPPINES – SPECIFIC OPPORTUNITIES

- › Containment onshore tanks
- › Dedicated jetty and marine infrastructure for the loading and unloading of LNG ships
- › Regasification, control centre and workshops and other ancillary facilities
- › Operate and Maintain of natural gas pipelines. Permits were given to Pilipinas Shell Petroleum Corporation; National Power Corporation, SC 38 Consortium (Shell Philippines, Chevron-Texaco Philippines Inc. and PNOC-Exploration Corporation)
- › Supply and transport of natural gas. Permits were given to SC 38 Consortium

Thailand LNG to Power: Market Update & Opportunities

Pannalak Lieokomol
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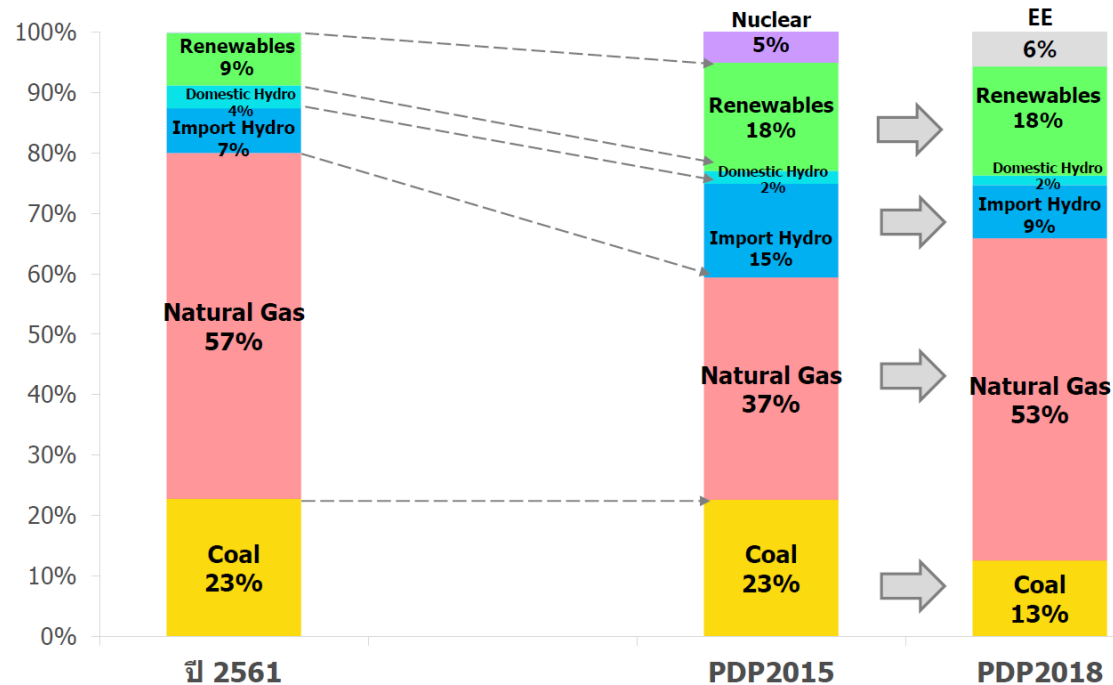


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THAILAND – OVERVIEW OF THAILAND ENERGY SECTOR

- Natural gas in the Gulf of Thailand currently accounts for 57% of the country's power generation (approx.5,000 MCF per day).
- The PDP 2018-2037, Thailand's power production capacity will have 67% growth to be at natural gas (53 percent), non-fossil fuels (35 percent), and coal (12 percent).
- New gas fired power plants are built to replace with small and very small power plants, substitute some retired gas and cancelled coal-fired power plants.
 - PTT
 - Gulf Energy
 - EGCO
 - Ratchaburi Electricity
- Thai energy companies become regional player in the region:



NEW GAS-FIRED POWER PLANT PROJECTS IN THAILAND

Project	Capacity	Commencement date	Project owner/ EPC
Replaced Pranakorn Tai phase 1	2 x 610 MW	2019	EGAT
Bangpakong replacement unit 1 & 2	2 x 693 MW	2020	EGAT
Gulf SRC Unit 1	2 x 625 MW	2021	Gulf Energy
Gulf SRC Unit 2	2 x 625 MW	2022	Gulf Energy
Gulf PD Unit 1	2 x 625 MW	2023	Gulf Energy
Gulf PD Unit 2	2 x 625 MW	2024	Gulf Energy
Replaced power plant in East	700 MW	2024	Ratchaburi Electricity
New power plant in East	700 MW	2025	Ratchaburi Electricity
Replaced Nampong plant	650 MW	2025	
Additional Pranakorn Tai	700 MW	2026	
Additional Pranakorn Tai	1400 MW	2027	
Surathani Unit 1	700 MW	2027	
Additional Pranakorn Nua	700 MW	2028	
Surathani Unit 2	700 MW	2029	

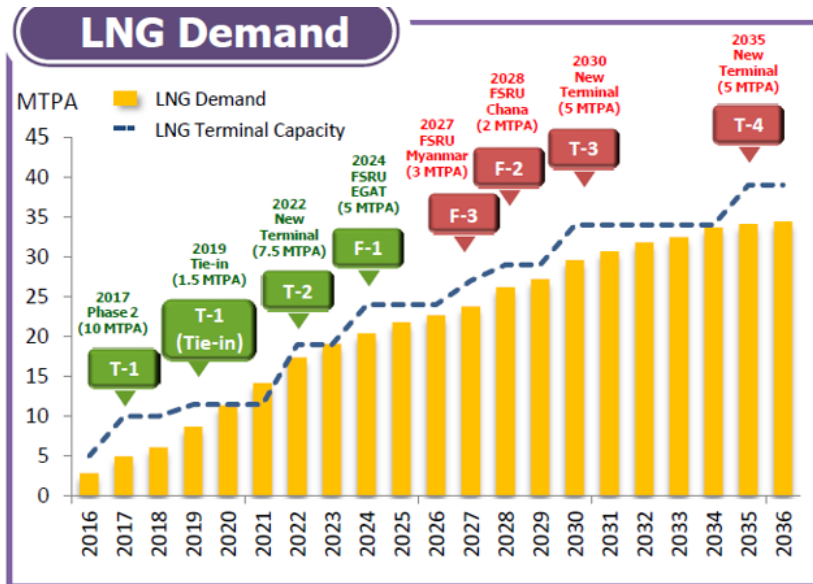
THAILAND – GAS SECTOR OVERVIEW

- LNG remains predominant resources, due to [depletion problem](#) of domestic natural gas reserve, reduced reliance on gas import from Myanmar.
- PTT Plc and EGAT are approved LNG importers. EGAT is introduced to promote LNG domestic market liberalization.
- Thailand is expected to import LNG at 23 million tonnes a year by 2037.
- No sense of urgency to increase LNG import level and increase capacity of LNG facilities, under current situations with 5.4 MT PTT's long term contracts with suppliers and current & near future facilities.

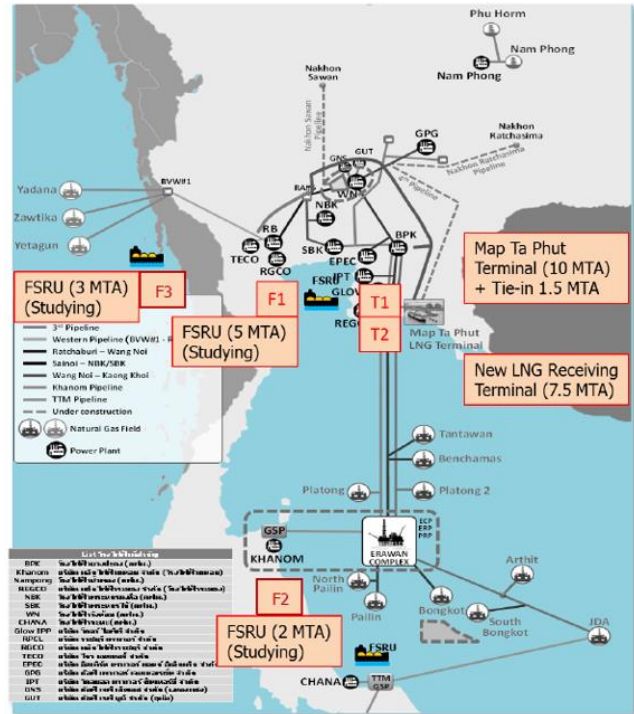
Project	Capacity	Commence date	Stage of development	Project owner/ EPC
Map Ta Phut LNG receiving terminal	5+5+1.5 MT	2011/2017/2019	Operating	PTT Phase 1- Project Management – Fluor EPC – GS E&C, Daewoo Engineering, and Korea Gas Phase 2 expansion EPC - POSCO and IHI E&C
Nong Fab Receiving Terminal (5km away from above terminal)	7.5 MT to 9 MT	2022	Under construction	PTT/ Project management - Tokyo Gas subsidiary Tokyo Gas Engineering Solutions Corporation (TGESC) EPC - Saipem, in a joint venture with CTCI Corporation
Map Ta Phut phase 3	5 MT to 10.8 MT		Early stage	PTT & Gulf Energy

THAILAND– CURRENT LNG RECEIVING TERMINAL & FUTURE DEVELOPMENT

- The additional LNG terminals depends on
 - › How the government will view to increase value of domestic gas to be feedstock
 - › How Thai government’s response to the power deficiency in the Southern part of Thailand and reduced gas reliance from Myanmar.
 - › How active Thailand will play on regional LNG trading.



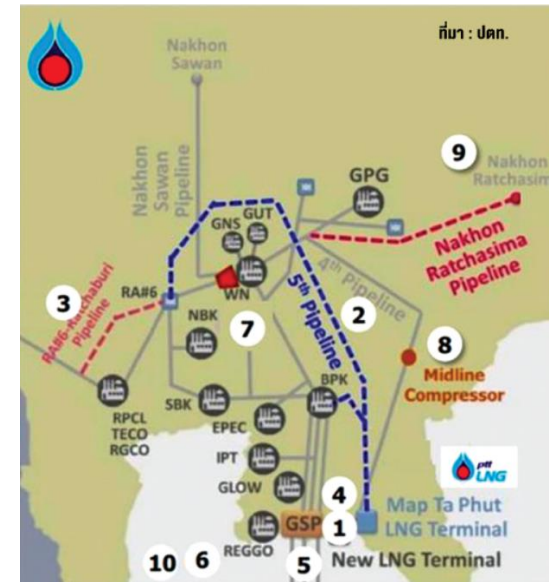
Infrastructure



THAILAND – OPPORTUNITIES FOR LNG AND GAS PIPELINES PROJECTS

- 1. Nong Fab LNG Receiving Terminal commenced operation in 2022 valued at 31,912 million baht
- 2. Gas transmission pipeline no. 5 with 2,000 MCF/day – COD 2021 valued at 17,207 million baht
- 3. Onshore gas pipeline from Ratchaburi-Wangnoi gas pressure station (RA#6) capacity 550 MCF/day COD 2021 valued at 3,266 million baht

Training opportunity to operate LNG FSRU
For EGAT



Vietnam LNG to Power: Market Update & Opportunities

Guest Speaker: Mr Ha Nguyen
Vietbid



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VIETNAM LNG TO POWER OVERVIEW

- Gas Power in Energy Mix
- Government Direction and Priority
- LNG to Power Updates
- Projects and Development Progress
- Opportunity for Australian businesses

GAS POWER IN ENERGY MIX

Attractive Energy Market

Rapid power demand growth

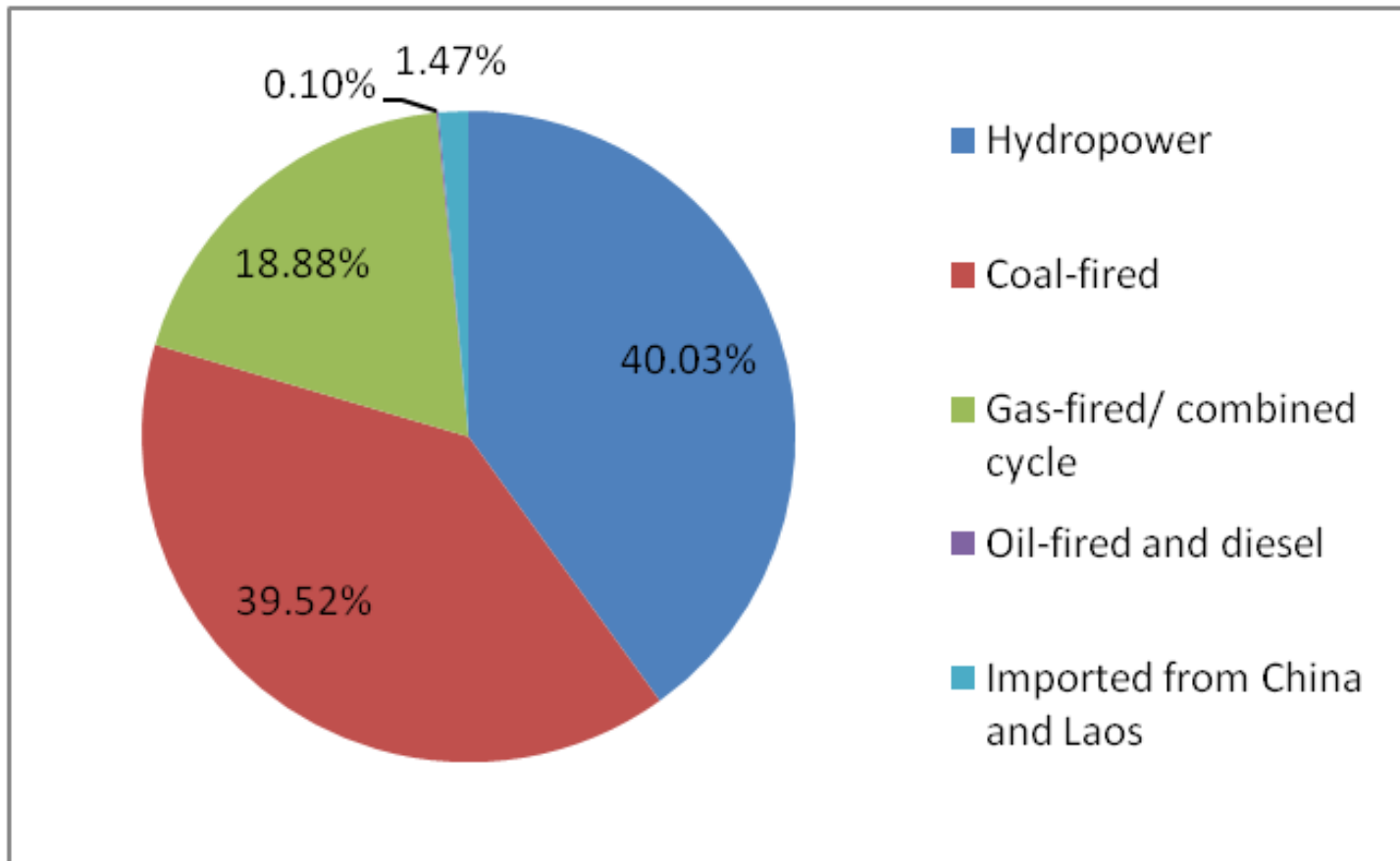
Significant investment and policy support required for energy infrastructure

Gas to maintain an important role in Vietnam's future energy landscape

- Vietnam's economy remains one of the world's most attractive emerging markets. 2019 is forecast at 6.5% GDP growth
- Significant investments in the power and fuel sectors. Vietnam's power demand has grown by an average of 10%-12% annually. This growth to be sustained of 8.0% per annum in 2021 - 2030.
- Significant energy investment and policy support to encourage further fuel and technology diversification in the power sector, as well as increased electricity network infrastructure augmentation, as reflected in the current Power Development Plan (PDP) and Gas Master Plan (GMP).
- Gas continues its important role. Block B and CVX are planned to start in 2021 and 2023 respectively), LNG terminals are in development progress (Thi Vai in 2023, Son My in 2026, Long Son in 2024, and Tan Phuoc in 2027), gas generation share is projected to achieve 22% by 2025, and 26% by 2030. At the same time, the coal share will reduce from 53% (2025) to 51% (2030).

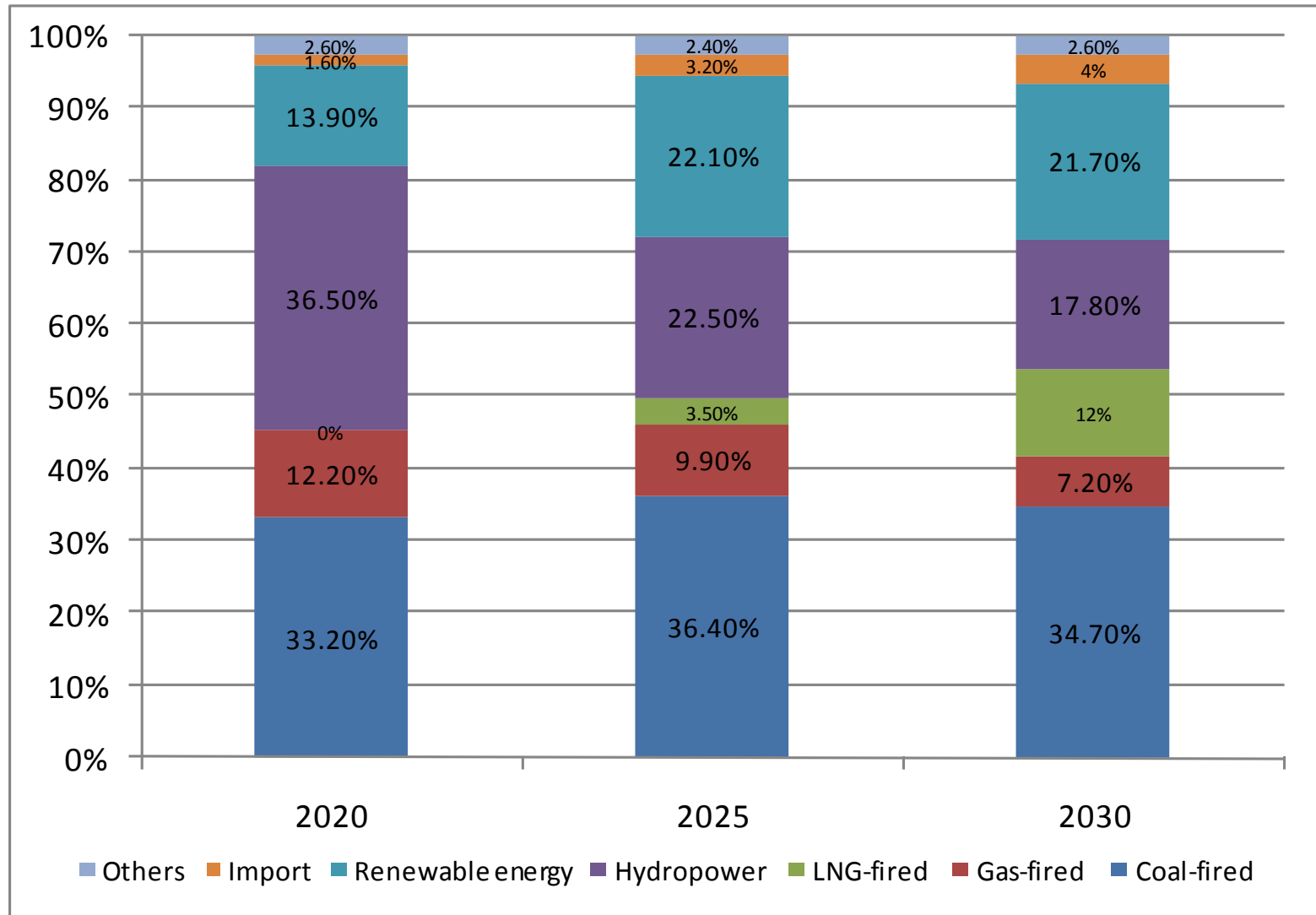
VIETNAM POWER GENERATION OUTPUT 2018

- Total power generation output of Vietnam in 2018: 212.9 bil. Kw/h



Source: MOIT

VIETNAM FUTURE ENERGY MIX



Source: MOIT

GOVERNMENT DIRECTION AND PRIORITY

Coal - low cost and reliable base load

- Coal will continue to dominate as the power sector choice of fuel due to low cost. The role of coal generation is important in the fuel mix to provide low cost and reliable base load to the power system.

Flexible gas supply delivers significant benefits to Vietnam

- The gas/LNG generation is to serve mid-merit order with less emission impact. Rapid development of renewables requires capacity to mitigate the intermittency. ~2.7bcf/d of gas is needed for power sector by 2030, which is about 20% higher than total domestic gas supply, by either imported LNG, or increasing gas production. The primary issue is how to establish appropriate pricing structure to integrate the new gas/LNG supply. Other issues include ensuring government support for new gas projects, and ongoing investment in infrastructure and business development models.

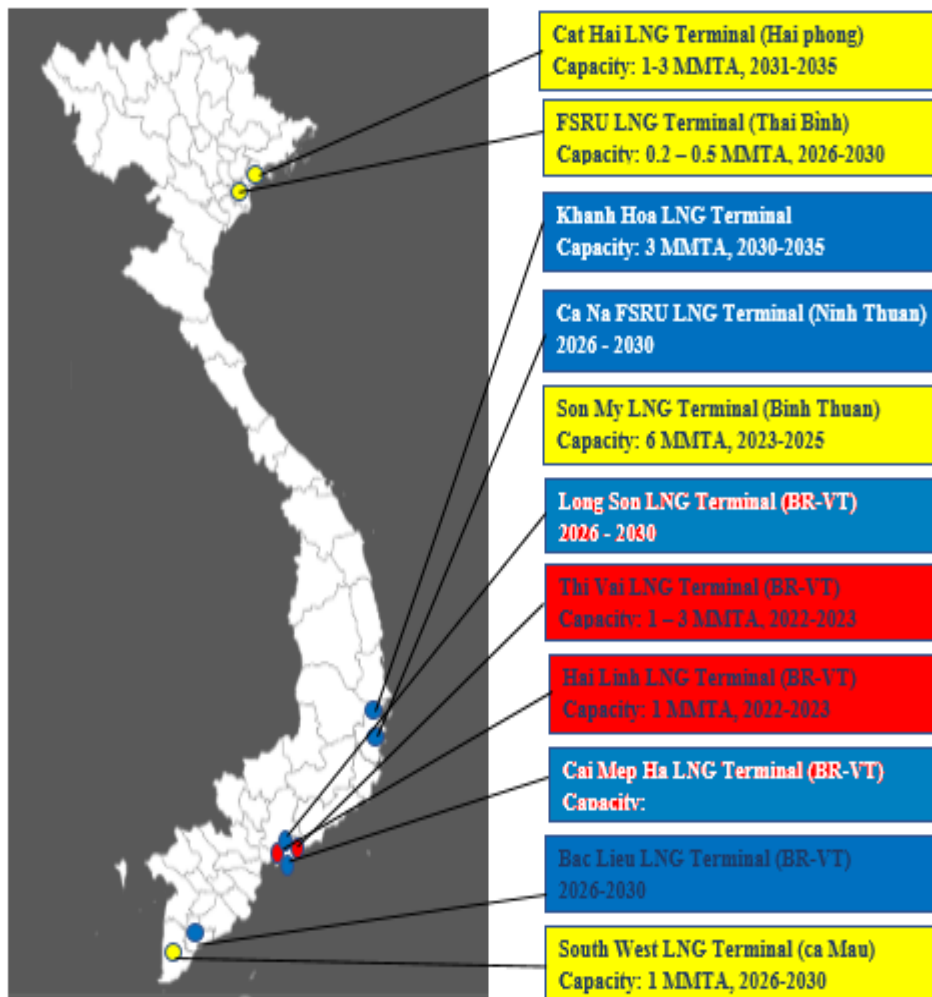
Vietnam's LNG procurement strategy to achieve effective cost

- Vietnam's LNG contracting strategy needs to align with requirements to make the most out of global LNG market trends.

LNG TO POWER UPDATE

- It is estimated by MOIT that the expected volume of LNG imports to Vietnam will be 5million, 10million and 15 million ton by 2025, 2030 and 2035, respectively.
- First LNG import would be by Hai Linh terminal, with capacity of 220,000m3, which construction will be completed before end of 2020.
- Second would be Thi Vai, of which construction has just started, and expected to be completed in mid 2022.
- Needs for LNG will surge in 2021-2022, when (i) power shortage is more severe in the South and (ii) domestic gas supply starts to exhaust. Genco2 and Genco3 have to find alternative sources for FO and domestic gas.
- Genco3 plans to tender for LNG gas in 2020, to be supplied in 2021-2022.
- In addition to new power plants intended to use LNG, there are also power plants previously planned to use coal, but would change to gas, e.g. Long An, or Vung Ang 3.

VIETNAM LNG TO POWER PROJECT MAP



Notes:

- Under construction
- Already approved in Master Plan
- Being proposed/under consideration

PROJECTS & DEVELOPMENT PROGRESS

PROJECTS UNDER CONSTRUCTION

Project	Capacity	Commencement date	Stage of development	Project owner/ EPC
Hai Linh	220,000m3	2018	Near completion of construction	Hai Linh Co.
Thi Vai	1-3 MMTA	2019	Start of construction	PVGas, Tokyo Gas, Bitexco

PROJECTS & DEVELOPMENT PROGRESS

PROJECTS ALREADY IN MASTER PLAN, BUT NOT YET STARTED

Project	Capacity	Development date	Project owner (expected)
Son My	6 MMTA	2023-2030	PVGas, AES
South West/Ca Mau	1 MMTA	2025	NA
Cat Hai/Hai Phong	1-3 MMTA	2030	NA
Thai Binh	0.5 MMTA	2025	NA

PROJECTS & DEVELOPMENT PROGRESS

LNG TO POWER PROJECTS SUBMITTED BY MOIT TO BE INCLUDED IN MASTER PLAN

Project	Capacity	Development date	Project owner (expected)
Ca Na	6,000MW	NA	Siemens, Total, Kepco, Kogas, JERA, ECV, etc.
Long Son	3,600-4,500MW	NA	EVN, Mitsubishi, Genco3, Marubeni
Bac Lieu	3,200 MW	2023	DeltaOE

PROJECTS & DEVELOPMENT PROGRESS

PROJECTS INTERESTED BY DEVELOPERS

Project	Capacity	Development date	Project owner (expected)
Cai Mep Ha	NA	NA	Gen X, T&T, Geleximco
My Giang, Khanh Hoa	3 MMTA	2025	Petrolimex, Daewoo
Van Phong, Khanh Hoa	1 MMTA	NA	Sumitomo,
Tan Phuoc, Tien Giang	3 MMTA	NA	Genco3 (EVN)

OPPORTUNITIES FOR AUSTRALIAN BUSINESSES

- LNG long term supply
- Investment opportunity in LNG to Power assets (Terminal, degasification, pipelines, power plants)
- EPC, engineering, consultant services
- Technology and Equipment supply
- Other related services

QUESTIONS & ANSWERS

ruth.keane@austrade.gov.au

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