

Better Practices and Challenges of Natural Gas Infrastructure Development

A horizontal bar composed of three colored segments: green on the left, orange in the middle, and blue on the right.

Conference toward Energy Security, Sustainability, and Resiliency
Bohol, Philippines,

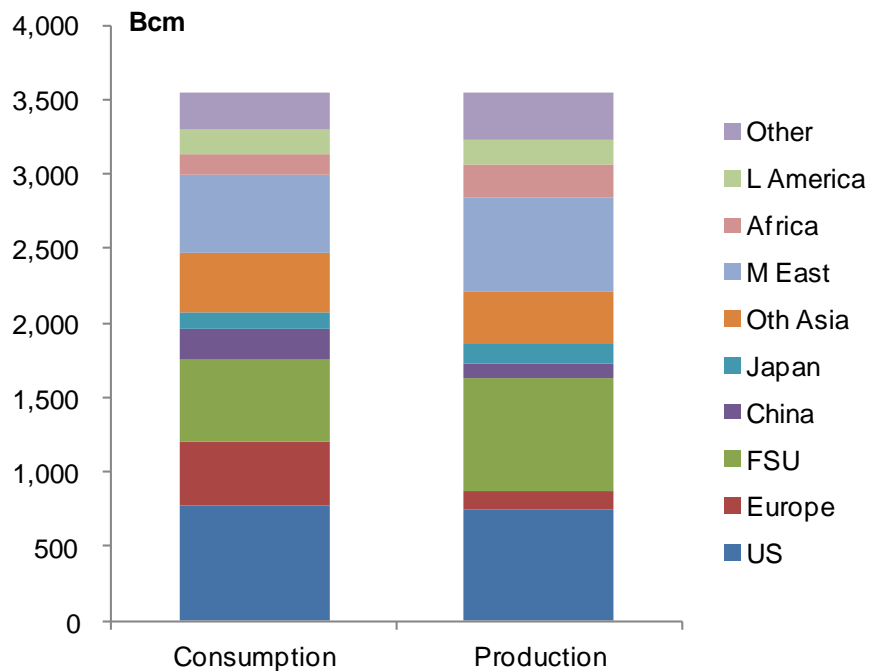
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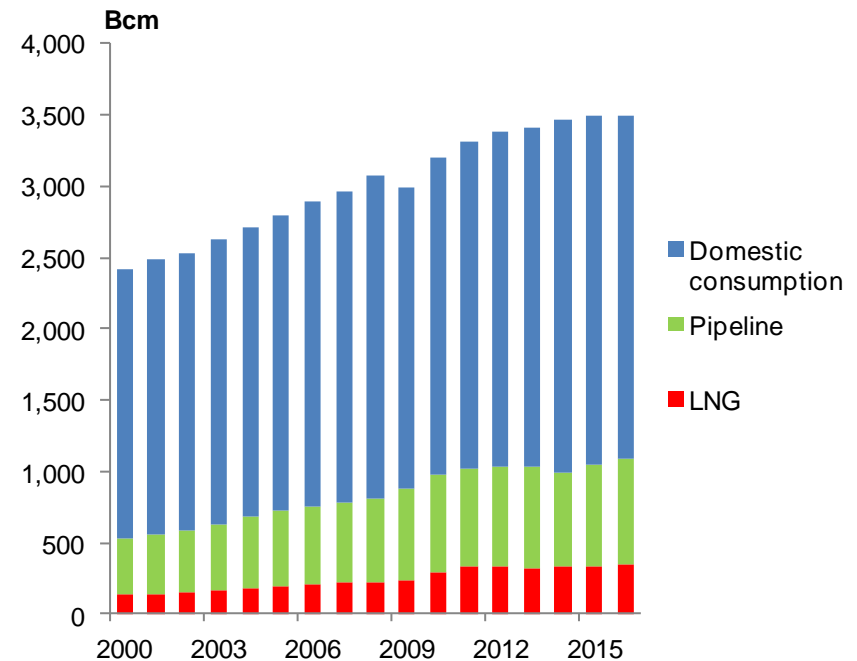
Natural gas tend to be consumed locally (so far)

- ❑ Natural gas traditionally tends to be consumed within the same country / region of production because of its difficulty to transport.
- ❑ The share of international trade has steadily rising in the past decade, implying a growing featuring importance of infrastructure development.

Production and consumption of natural gas

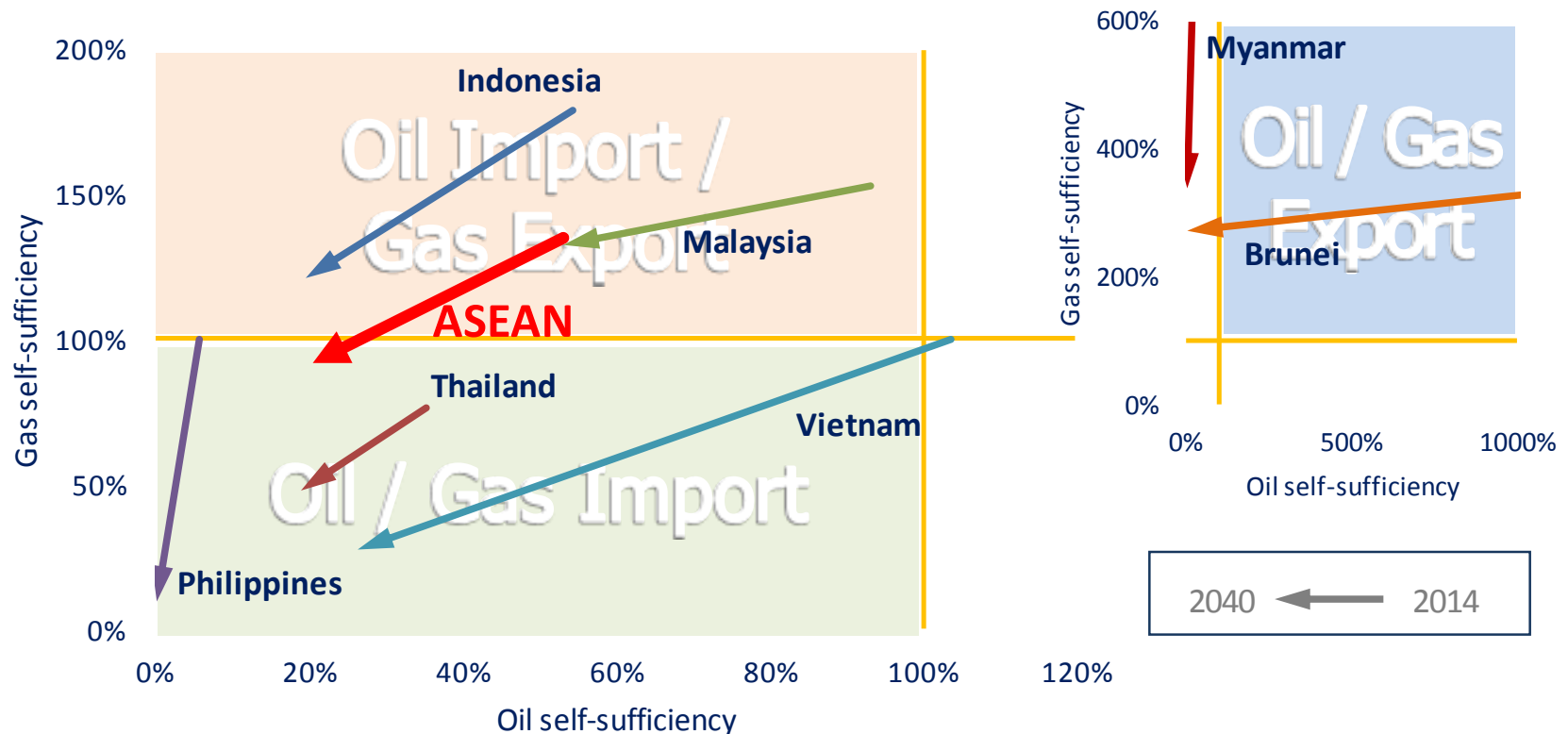


Natural gas consumption and trade



ASEAN Becomes Gas Importer.

- ▣ Energy imports increase because domestic production expansion fail to compensate demand growth.
 - Oil self-sufficiency decreases to 20% from 53%
 - Gas becomes net import fuel by 2030.
- ▣ Fuel net-import bills amount to \$300 B in 2040, comparing with \$10 B today.



International Infrastructure is slow to realize.

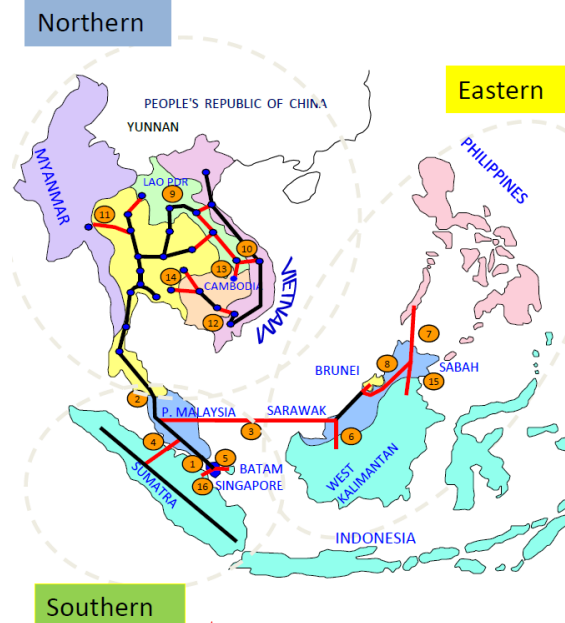
ASEAN Power Grid (APG):

- 5.2GW in operation, 3.3GW under construction and over 20GW under planning.
- Challenges include short of finance and technical experts, lack of legal systems, etc.

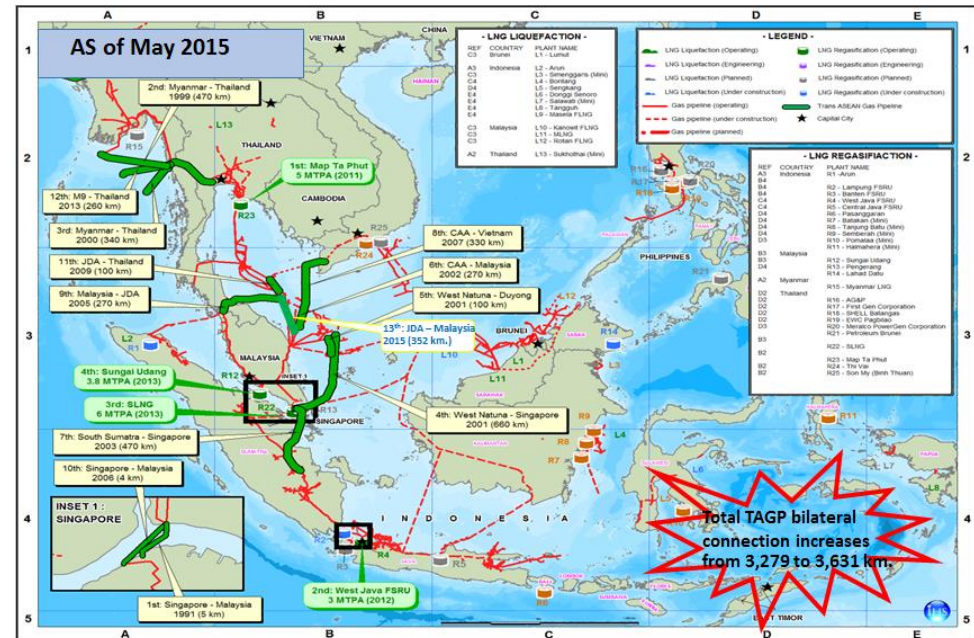
Trans ASEAN Gas Pipeline (TAGP):

- 13 international pipelines in operation. The plan for covering the region is behind schedule due to the lowering export capacity in producing countries.

ASEAN Power Grid



Trans ASEAN Gas Pipeline



Liberalization vs Infrastructure development

- Liberalization of domestic gas market is generally difficult to compatible with sustained infrastructure development.
 - Liberalization => Intense competitions => Less profit => Less fund for infrastructure investment
 - Liberalization => Uncertain future demand => Higher risk to recover investment => Less willingness to invest in infrastructure.

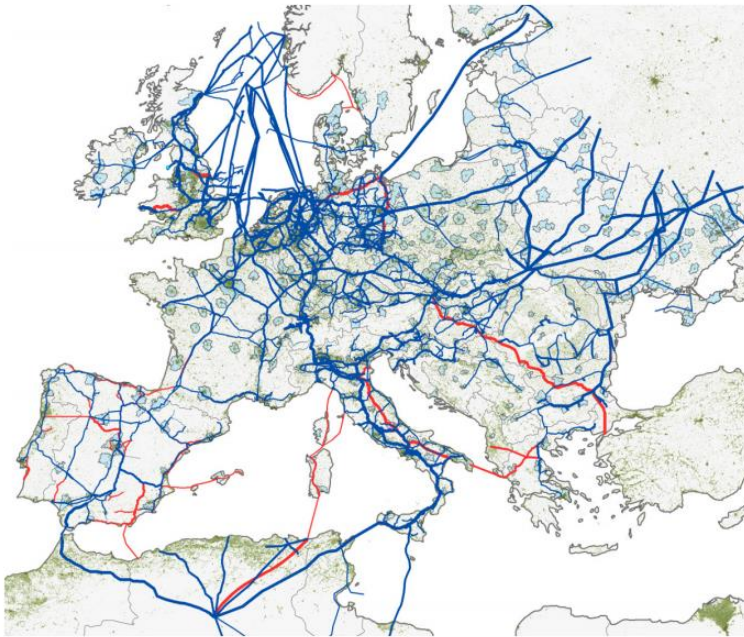
- Yet, liberal market and infrastructure investment can coexist under certain conditions.
 - Typical example is US market.
 - Sufficient liquidity of natural gas market and established price benchmark lowers the risk for investors.
 - Asia needs to have a more liquid natural gas market.



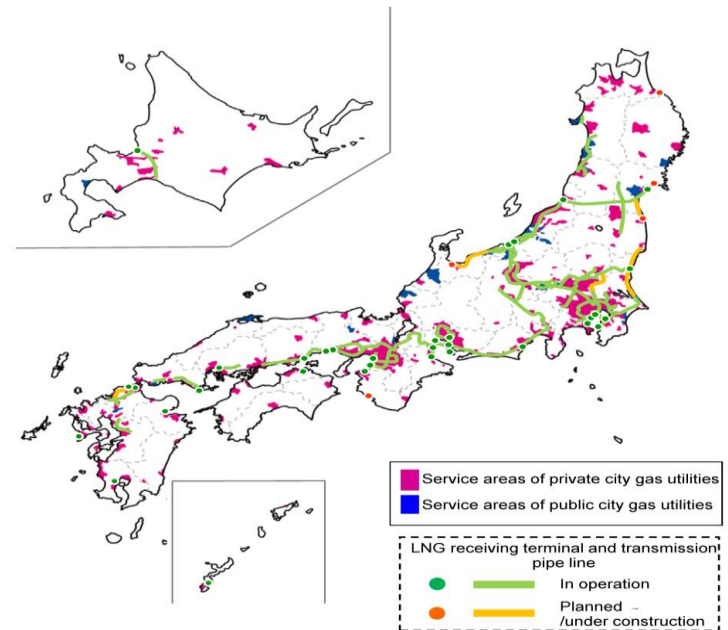
Private vs State-owned industry

- ▣ Nationwide pipeline network usually have been developed by state-owned entity.
 - In Europe, extensive pipeline networks have been developed by state-owned entities before its liberalization.
 - In Japan where gas business have been undertaken by a number of private local monopolies, a nation-wide trunk line do not exist.
 - Government initiative has crucial meaning in developing a pipeline network.

Pipeline network in Europe



Pipeline network in Japan

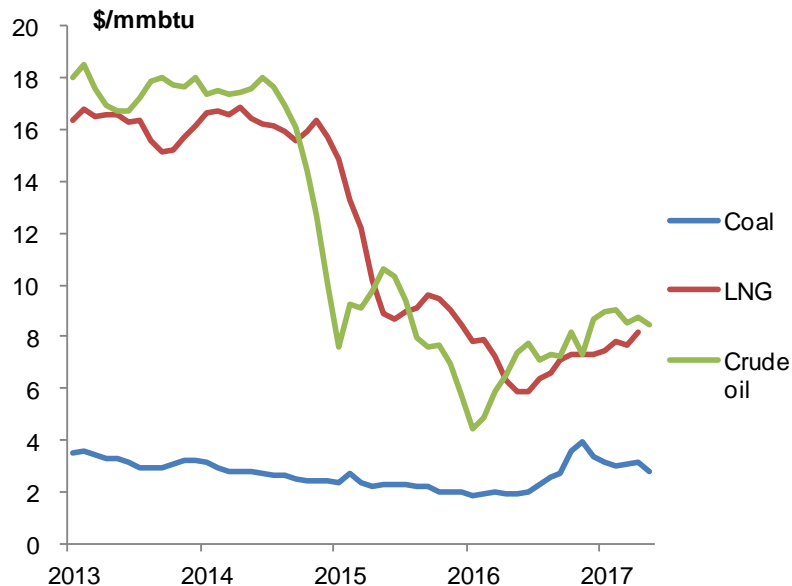


Source: Gas business handbook, The Japan Gas Association

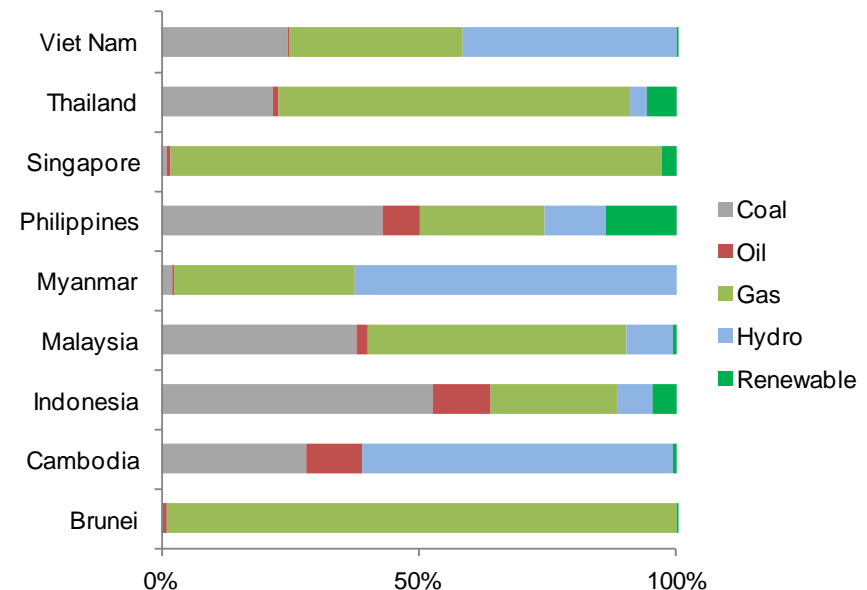
Competitiveness / Attractiveness of Natural gas

- Natural gas / LNG can be competitive if replacing oil product demand in industrial sector or in power sector.
 - Decoupling of LNG price from oil price is likely to continue as Asian LNG market will become more liquid.
- Natural gas, however, is less competitive than coal, especially in power sector.
 - Infrastructure development for natural gas required consistent policy support if natural gas competes coal.

Fuel prices in Asia



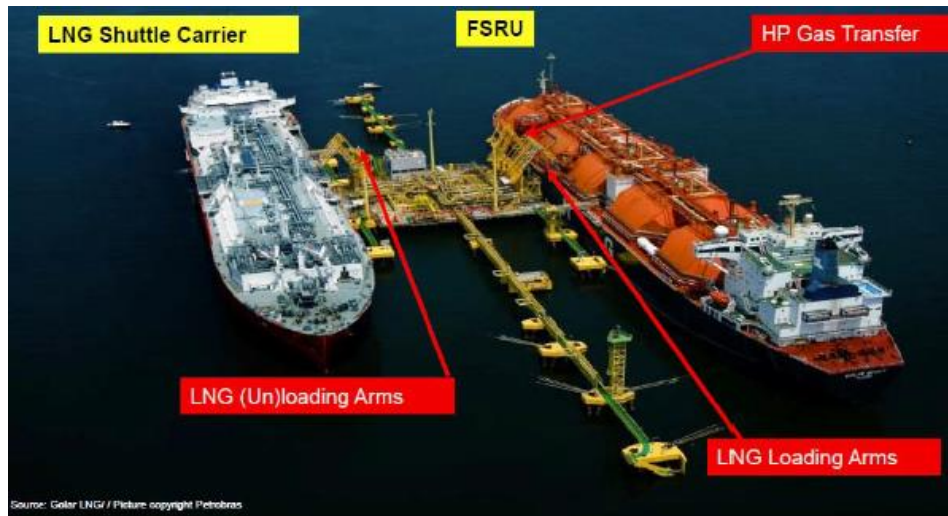
Power generation mix in ASEAN



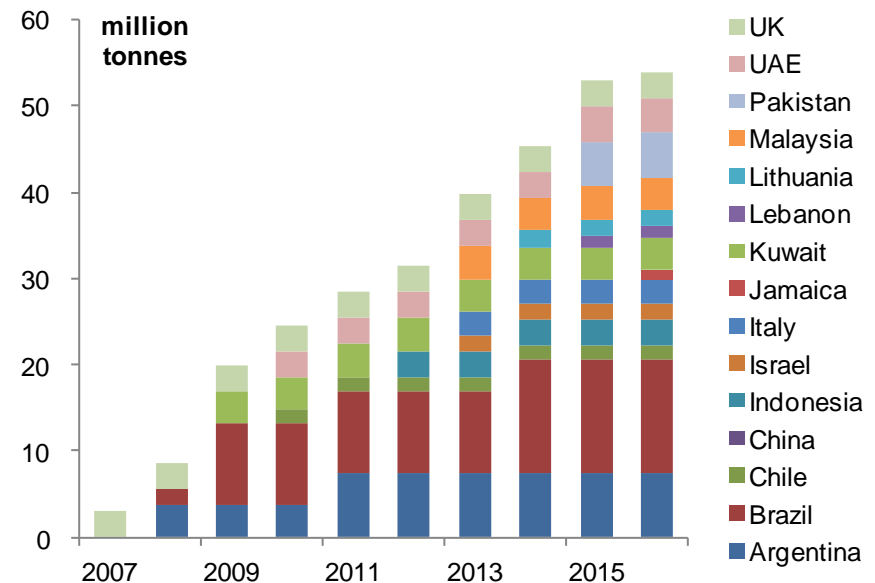
FSRU facilitates LNG introduction

- A number of emerging LNG importers take advantage of the benefits of FSRU.
 - FSRU: Floating Storage Regasification Unit, or offshore LNG regasification terminal
 - FSRU significantly shortens the time required to introduce LNG since it does not require securing onshore land for receiving terminal.
 - Adoption of FSRU is highly likely to spread among new LNG importers.

FSRU



World FSRU capacity



Sometimes infrastructure creates demand

- In China, a national project to build West – East Gas Pipeline has triggered and realized a large natural gas demand along the line.

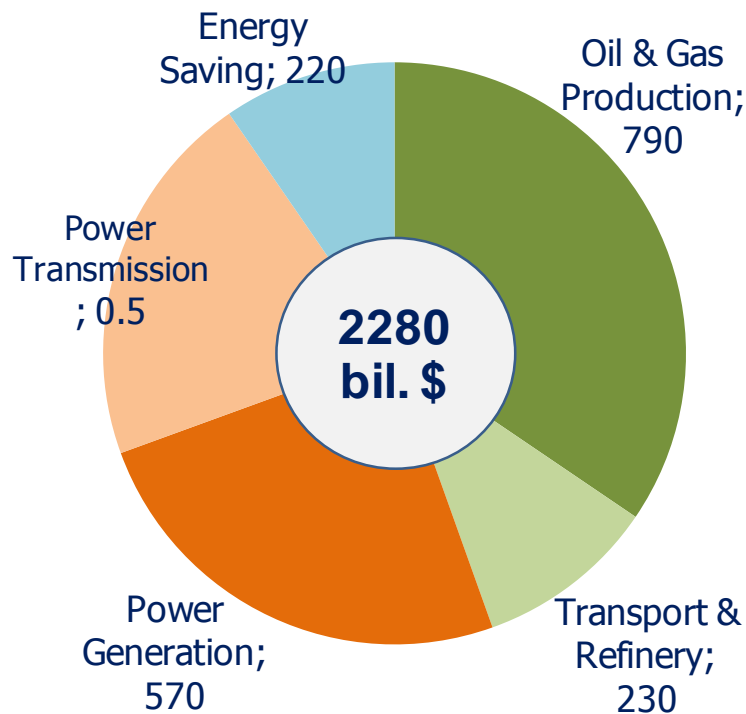
Selected natural gas infrastructure in China



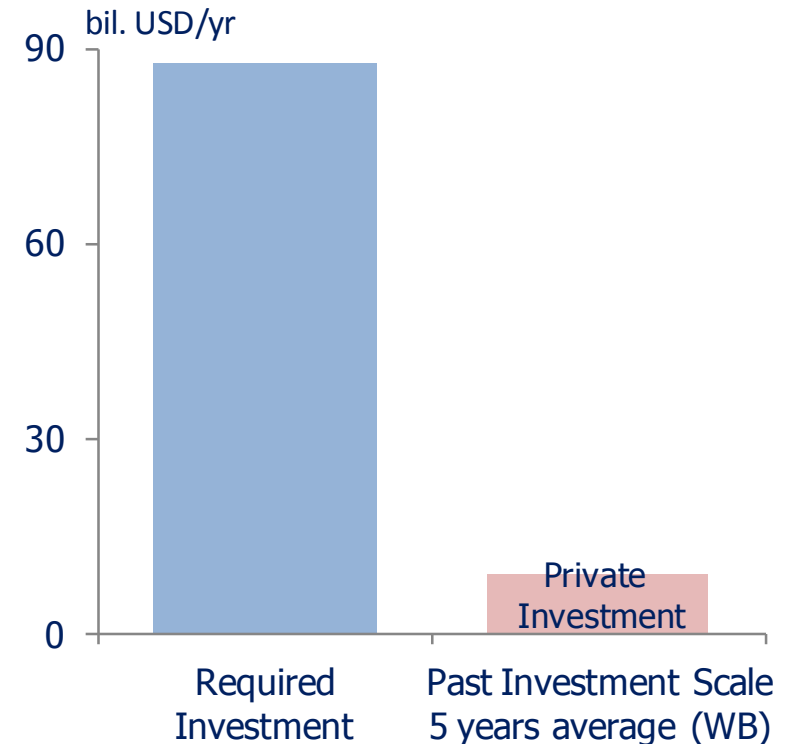
Needs for Finance to Induce Energy Investment

- Cumulative energy-related investments amount to \$2.3 trillion by 2040.
 - Most of them are for energy supply — fuel and electricity divided almost equally.
- A big challenge is how to finance \$90 billion needed annually.

Required Energy Investment Value for ASEAN (cumulative up to 2040)



Average Annual Investment Value



Financing natural gas infrastructure

- Natural gas infrastructure requires a large amount of upfront investment.
 - Especially LNG infrastructure needs far larger investments than pipeline.
 - Natural gas infrastructure by nature has an increasing returns to scale.

- Natural gas infrastructure is less attractive for commercial financiers
 - Thin margin (regulated business), large amount of investment, longer term to recover investment, lower credit rating, etc.

- Public financing, either home government or multilateral financial organization, should play an important role.
 - World Bank, Asia Development Bank, Asian Infrastructure Investment Bank, may provide finances.
 - Host governments are also required to review domestic regulations or speed up approval procedures .



How to promote gas consumption in Asia?

- The key issue is how to allocate risks among relevant parties.

Sellers

- Cost reduction
- Removal / relaxation of destination restriction
- Creation / adoption of reliable and transparent gas price benchmark
- Investment decision for to new project
- Investment in downstream (power plant etc.)
- Transition to gas-to-gas competition price

Financial sector

- Recognition of a new LNG market custom
- Financing based on a new natural gas benchmark

Buyers (company)

- Cost reduction
- Creation / adoption of reliable and transparent gas price benchmark
- Commitment for long-term contract
- Upstream equity participation
- Enhancing trading capabilities
- Utilizing new technologies such as FSRU, LNG vessels, etc.

Importer's government

- Provision of clear policy target
- Promotion of infrastructure development (tax incentive for investments, dialogue with local community, etc)
- Emissions reduction policy (carbon pricing, controlling emission from power sector, etc)

Conclusions

- Asian natural gas demand is forecasted to significantly grow in the future; but without infrastructure development, the demand will not be realized.
- Consistent government policy is essential to realize natural gas infrastructure especially in places where liquid and active natural gas market does not exist.
- Liberalization and infrastructure development are usually difficult to simultaneously achieve. Infrastructure development may better be prioritized.
- Financing is often the largest hurdle for infrastructure development. Given the nature of natural gas infrastructure, any type of public financing will be helpful.