

UNDERSTANDING THE VALUE OF GAS INFRASTRUCTURE IN SUPPORTING SOUTHEAST ASIA'S MID-MERIT POWER STRUCTURE

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Overview

In the USA, shale gas has driven prices so low that gas can be used to generate electricity in some locations at lower short run marginal cost than is possible with coal. Coal is still used, but gas has grown as a baseload fuel, with coal generation being driven to provide more responsive capacity or retire.

The situation is more complicated in Southeast Asia. Despite a fall in international gas prices, gas prices have actually been rising in many Asian countries as historical subsidies have been unwound. For Asian countries without the USA's glut of cheap shale gas, and with historical fields (the source of cheap domestic gas) past peak production, unsubsidised gas remains a more expensive fuel for baseload power generation than coal. This has been reflected in a shift towards the building of coal-fired power plants; striking for a region historically more reliant upon gas-to-power than elsewhere.

At the other end of the merit order, the remarkable fall in the costs of renewable energy means that solar power is now increasingly cost-competitive with gas in meeting daytime peaks. Gas remains part of these countries' aspirational, long term plans, but the economic reality is more challenging. Gas-to-power is facing a competitive squeeze that makes the outlook for Asian gas markets materially different from those seen so far. The result is a very different risk profile, as traditional long-term gas contracts fail to provide the flexibility that gas-to-power would now appear to value. The implications of this shift for Asia, in terms of energy policy, investment, pricing and the build-out of infrastructure, have been under-researched.

Methods

The Lantau Group (TLG) is a specialist energy economics consultancy focusing on the Asian energy sector. TLG curates large databases of gas and power contracts, projects and costs as well as maintaining its own proprietary power sector optimisation models for countries across Southeast Asia. Such models and data allow us to construct economically efficient, policy bounded and technologically constrained dispatch and investment scenarios.

Through its various consulting projects, TLG has access to senior energy executives and officials across the region. Through engagements specifically focused on identifying gas-to-power opportunities and optimising the use of natural gas as a fuel source, and through semi-structured and unstructured interviews with industry stakeholders, we have amassed a detailed understanding of the commercial, policy and regulatory challenges facing the industry.

Combining our model based insights with the information gleaned through interviews, we are able to assess the disconnect between the technical requirements and commercial viability of emerging gas to power trends.

Results

Solar capacity has the potential to lower the amount of gas needed for generation without similarly reducing the required peaking capacity. This is because Southeast Asian countries have a secondary peak demand for electricity in the evening that is only slightly lower than the day time peak that can be served by solar generation.

As a result there remains a considerable need for generation capacity to meet growth, but the question of how much natural gas to procure has become much more complicated driven by the dynamic economics of inter-fuel (coal vs gas) competition and by policies that promote renewables (particularly solar) as well as the projected continued fall in solar generation costs. With coal being less expensive but also less compatible with emerging sustainability policies, more gas will be needed. As traditional domestic natural gas resources pass peak production, the prospective need for LNG is increasing. The conundrum is that many Southeast Asian countries do not have the gas pipeline, LNG import (regasification), or storage infrastructure that they need. Furthermore, historical practice concerning such infrastructure has been highly simplistic, premised mainly on the assumption of high utilisation and

predictability: the opposite of the emerging characteristics of optimal natural gas use in Southeast Asian electricity markets. The need to accommodate intermittent solar generation and cater for the evening peak represent material determinants of investment in gas-fired capacity, but does not translate necessarily into high, continuous, and predictable volumes of natural gas use. Therefore the optimal gas delivery infrastructure must be able to cater for considerable flexibility. Pricing and commercial arrangements, as well as any regulatory and policy settings, must be consistent with this more flexible approach. The resulting arrangements are common in the US and Europe, but are completely undeveloped in Southeast Asia. Even Singapore, which has the most advanced electricity market in the region does not have a robust system of gas trading due to the existence of highly limiting legacy gas contracts and policies that focused on supporting high gas volumes rather than identifying optimal gas usage.

Without the infrastructure, countries like the Philippines and Vietnam, and large parts of Indonesia, cannot access natural gas. If the value proposition is linked to more flexible use of natural gas, the volume based pricing of LNG import terminal services or pipeline transportation services will not be an appropriate pricing model. A common question is whether there is sufficient value in a more flexible gas supply infrastructure to actually invest to develop that infrastructure. This has emerged as the central question of much of our Southeast Asian client work.

Conclusions

We find that flexibility is the most valuable characteristic that enables natural gas to play a robust role as a fuel for power generation. Before terminal and pipeline capacity can be developed it needs to be clear that a flexible operating regime will actually be supported by appropriate regulatory and policy frameworks.

Our model results show revenue streams are highly sensitive to fuel price, solar load factors and LNG regasification costs. While there are certainly scenarios in which gas is commercially viable, without some way of valuing the flexibility gas lends to the power generation system, there are equally plausible scenarios in which necessary infrastructure cannot be profitably built.

Initial results open up two seemingly contradictory scenarios. The first is that gas remains a necessary and valuable contributor to the generation mix. When gas prices and solar penetration levels are at the right balance, revenue streams can justify investing in a new LNG terminal. The problems lie in the careful sizing and selection of LNG regasification technology options, clear and supportive regulatory frameworks, and capacity based pricing more similar to what is found in advanced gas markets such as in the US than what has developed to date in Asia. These are significant challenges and explain the delays and set-backs found in gas-infrastructure proposals across Asia.

Yet our model results hint also at a second scenario where gas remains necessary but where its value cannot be unlocked. The potential low volume gas scenarios that are possible due to the 'squeeze' on gas given coal on one side and solar on the other have the potential to seriously delay necessary gas infrastructure development. The 'squeeze' could be offset by policy restrictions on coal generation but, at least in Asia, this implies significant upward tariff pressure across developing economies. While gas prices remain twice equivalent coal prices, and while solar remains the true competitor to gas (in terms of environmental footprint, role in the merit order and, increasingly, price), we find that there may be no pain-free set of policies currently available for an Asian gas renaissance. If LNG is to be part of the transition from traditional coal-based generation to a more significantly decarbonised future, both a policy and commercial transition will be needed.

From our client work we can still glimpse both scenarios. National power plans across Southeast Asia appear to remain underpinned by the buildout of cheap coal-fired capacity. Similar plans for the expansion of gas-fired power remain, but they have in many instances been pushed out further into the future. At the same time, independent power producers have struggled to build commercially viable projects for gas-fired power. Which scenario wins out in the longer term will depend on the continued fluctuations in coal and gas prices, the degree to which solar costs continue to decline, and the degree to which energy policy is rewritten to place a premium on a more flexible power system.