

Looming LNG Dependency to Drive Thai Energy Sector Change

By Jack Kneeland

The Thai gas and power sectors are coming under pressure from shortage of domestic natural gas, changes to the regulatory framework, geopolitical dynamics, and the evolution of clean energy technology. While there are powerful forces acting to slow reform, these will eventually fade. Thailand may be on the pathway to an energy future that is quite different from what we see today.

Historically, Thailand has a high level of dependency on natural gas supplied via pipeline from domestic resources in the Gulf of Thailand and Malay Basin as well as imports from Myanmar and a joint project with Malaysia. Approximately 60% of piped gas resources are used for power generation and natural gas accounts for more than 60% of power generation fuel supply. This gas also provides feedstock for the Thai petrochemical industry, supplies energy for industrial use and fuels natural gas vehicles (NGV).

However, it appears that piped gas supply to Thailand peaked in 2014 and has declined since. Official figures show that investments made in new production wells do not seem to be significantly increasing supply. This trend is expected to continue and based on official figures current reserves will run out entirely by 2036. New gas discoveries not factored into this calculation could mitigate this somewhat, but won't save the day.

The country's current plan is to replace local gas with liquefied natural gas (LNG) imported from international suppliers. Thailand has already taken steps to prepare for large scale LNG imports including development of a series of regasification terminals and has signed long-term contracts for 5.2 million tons per annum (MTA), which will provide over 10% Thai gas supply.

The global LNG supply market is currently in a state of oversupply, which is expected to continue for the next 3-5 years. Current LNG prices are

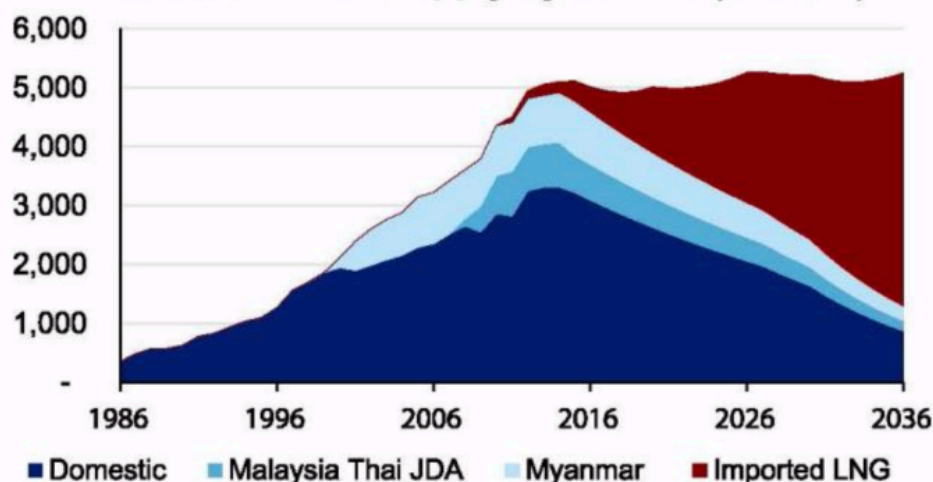
higher than domestic piped gas, but less expensive than gas from Myanmar. However, there is large price risk after that period. Asian LNG prices hit \$18 in 2014, almost three times prices available in the region today. LNG prices are particularly important for Thailand as over 60% of power is fueled by gas and electricity tariffs as the power market structure passes energy costs on to consumers.

There is also a large set of pending and in-progress regulatory change expected across the entire gas to power industry value chain, the outcome of which could be transformational.

tourism and fisheries require sophisticated management and the selection of a less capable operator could present risks. Additionally, Thailand has created a new Production Sharing Agreement (PSA) structure, which replaces the traditional profit sharing model. How the market will react to these terms is still unclear. Contracts for the Yadana and Yetagun field in Myanmar field are also on track to expire and there may be some risk to their extension.

Gas transmission and distribution
The future structure of Thailand's gas transmission and distribution

Thailand Natural Gas Supply by Source (mmscfd)



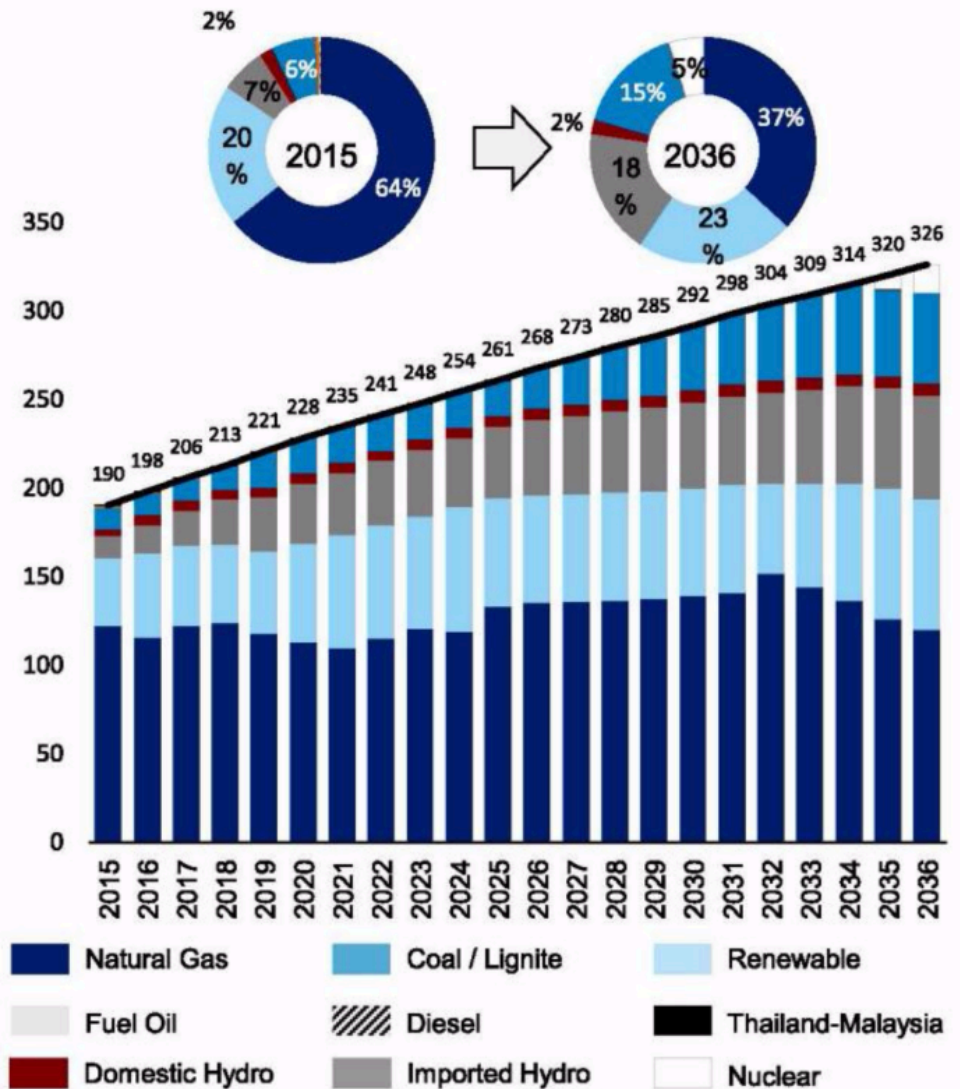
Source: Thailand 2015 power development plan and gas model

Upstream gas

Thailand is currently in the process of conducting two major contracting processes for extension of existing concessions and new exploration properties under the 21st concession round, which had been cancelled several times primarily due to political pressures. While the auction looks likely to proceed there are still risks. The concession extensions involve the large Bongkot and Erawan fields which together account for almost 70% of Thailand's piped gas supply. These large fields, some near sensitive

segments is also unclear. On the one hand, a range of reforms including third party access (TPA) to the gas pipeline infrastructure; plans for multiple LNG buyers; and mention in Energy 4.0 of addressing PTT's monopoly suggest that Thailand is moving in the direction of global practice where liberalization is taking hold. However, rights given to PTT under the 2007 Energy Industry Act; grandfathered rights to pipelines and other infrastructure, and the duration of existing gas sales agreements (GSAs) make rapid change difficult.

Thai Projection of Power Generation (TWh)



Electricity markets and renewable energy

Much attention has been paid to renewable energy both in Thailand and around the world. Thailand is a regional leader in renewable energy with large biomass, solar PV and wind programs, although the pace of development has slowed. The government's official position appears to be that it will revisit large-scale RE expansion when it becomes competitive with imported LNG although exactly what "competitive" means is not currently clear.

If LNG remains abundant and inexpensive, Thailand may be able to transition fairly seamlessly. However, we should not overlook the risk to LNG prices and Thailand's limited alternatives for power generation. Aside from LNG, Thailand looks to domestic and imported coal-fired power, imported hydropower and ambitious energy efficiency programs to help meet the gap. But given the limited ability of these options to scale, it does look like Thailand is putting all of the country's eggs in the LNG basket.

Despite the force of these pressures for change, we do not expect an overnight transformation for the Thai energy sector. However, the drivers of change are too powerful to avoid forever. The most powerful driver remains the risk of higher LNG prices. If on a 5-year window, LNG becomes xx% of natural gas supply, a doubling in price - which is not unfathomable - would pass costs on to residential and industrial consumers which may not tolerate such price increases.

However, there are a set of positive factors as well. The world has seen crashing solar PV equipment costs drive a global solar boom that made solar the single largest power investment segment around the world. A similar dynamic that could be happening in the battery space could enable "renewable energy plus storage", in a range of configurations, to meet the government's

criteria of similarly reliable power at a lower price than from LNG. Thailand has also long maintained a highly regulated electricity distribution system that doesn't permit many of the innovations seen around the world. However, a new net-metering program may bring life to wide-scale solar rooftop development and usher in a new era in which low cost renewables, energy storage retail reform and micro-grid application advances could present a new energy system that could solve many of the problems presented by the decline of piped gas resources.

It does seem unlikely that Thailand will see the kind of changes over the next few years that have transformed the power sector around the world. However, the country's energy security situation is getting drastic and the track record of reform, innovation and investment point to a wave of viable

solutions. Change happened very fast in the other countries and may sneak up on Thailand - and indeed may represent the country's best path forward to a sustainable energy future.

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