Executive Summary Report

Phase 2: Liquefied Natural Gas (LNG) demand projection, procurement strategy and risk management

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1. EXECUTIVE SUMMARY

1.1. PURPOSE OF THIS DOCUMENT

The Lantau Group (TLG) is appointed by the World Bank to provide technical assistance for the facilitation of LNG-to-power developments in Vietnam ("the Project"). Phase 1 of the Project entailed reviewing and recommending a legal and regulatory framework for LNG-to-Power developments in Vietnam, whilst Phase 2 involved designing an LNG procurement and risk mitigation strategy that fits with the Vietnamese context and requirements.

A workshop was held in Hanoi on 26th of June 2018 to present the findings of the Project to the key gas stakeholders in Vietnam comprising of the Ministry of Industry and Trade (MOIT), state-owned enterprises (SOE) such as PetroVietnam (PVN), PetroVietNam Gas (PVGas), Vietnam Electricity Corporation (EVN) as well as private sector participants.

This report is a summary of the Phase 2 findings of the Project.

1.2. KEY FINDINGS

- The global LNG trade saw the fastest growth in 2017 since 2010, expanding at 12 percent year on year to 297 mmtpa, with Asia accounting for the bulk of growth. Asia is expected to remain the dominant buying region for the foreseeable future with China and India expected to lead the growth, and supported by other new markets as well.

- Growth in LNG demand and trade has in part been supported by technological developments in the industry, including a new wave of Floating Storage Regasification Unit (FSRU) developments which shorten lead time and the cost for LNG value chain development.

- Global liquefaction capacity reached approximately 365 mmtpa at the end of 2017 with an additional 142 mmtpa under development. Global supply overhang could potentially persist through 2025, with supply shortfall emerging in the early half of the 2020s as demand outpaces supply on the back of slowdown in final investment decisions (FIDs). However, these concerns over future supply shortages have been partly alleviated on the back of positive developments by some recent large projects including Shell’s LNG Canada and Qatar’s North Field expansion project.

- Spot prices are likely to remain depressed as new supplies from US and Australia enter in the near-term, while more LNG supply is expected to enter the spot market as buyers remain hesitant to sign long term contracts.
• The LNG market is still currently in an excess supply environment, presenting buyers with favourable conditions for signing LNG procurement agreements (i.e. Sales and Purchase Agreements or SPAs). Shorter contract tenures and rising spot trades, smaller volume sizes, diversion rights (i.e. flexibility on destination), as well as new pricing options, are giving buyers greater options to procure LNG on terms that meet their requirements.

• The entry of new players into the LNG market including traders, portfolio players, and new buyers from emerging markets, combined with the LNG supply demand balance is changing the LNG contracting trend away from traditional long-term contracts. In particular, the LNG supply glut has enabled buyers to seek greater concessions and flexibility in LNG contracting, which has resulted in a trend towards shorter term and more flexible contracts, with new pricing options. These trends present valuable options for Vietnam’s LNG importation strategy:

- There has been a recent surge in LNG spot/short term buying, supported by greater flexibility in the LNG market and players seeking to capitalise on excess capacity across the value chain. The share of spot/short-term in overall LNG trade stood at 25% in 2017, up from 17% in 2010.

- Buyers are also seeking smaller contract volumes. Average contract size has been under 1mmtpa since 2014 as buyers seek greater flexibility on the back of market uncertainties.

- There has also been a shift towards contracts with greater diversion rights (i.e. destination flexibility), supported by the entry of destination-free, flexible US volumes entering the Asia market. This has also been driven in part by buyers having greater uncertainties in demand from their domestic markets.

- Whilst oil-indexation remains the dominant option, the buyer’s market has opened up new LNG pricing options as sellers seek to lure buyers. New pricing options include Henry Hub-linked prices, hybrid-pricing, fixed price contracts, as well as alternative pricing indices such as Japan LNG Cocktail (JLC) and Japan Korea Marker (JKM).

### KEY RECOMMENDATIONS

• Vietnam’s long-term LNG procurement framework must be consistent with the preferred LNG terminal development model, which we concluded as the Public/Private model under a tolling arrangement in the Phase 1 study. The procurement strategy and approach should be dynamic, evolving over time to continuously target flexible least cost purchases by reflecting changes in the global LNG market, Vietnam’s capability, expected future LNG demand, as well as price and volume risk appetite/tolerance, among other factors.
Various LNG price options are available to Vietnam including oil-indexation, hub-linked, spot purchases, as well as alternative pricing options, each of which carries different risks profiles. We believe new LNG importers would be better served by procuring LNG under conventional pricing options (i.e. oil-linkage, Henry Hub-linkage, and/or spot purchases) which are more established and offer greater supply options.

- Based on a high level probabilistic analysis of fuel price path evolutions, our initial proposed contracting strategy would begin with the use of spot/short term trades and/or short term Henry Hub-linked contracts for the near-term LNG supplies. This should be helped by the fact that Vietnam’s maiden project is expected to come online by 2022/23, where the global LNG market is still expected to be in an oversupplied market.

- As the LNG demand increases in Vietnam, we would recommend broadening the supply sources (i.e. countries and projects) and price indexation options, by including oil-indexed prices, thereby constructing a portfolio with an array of contracts. Given the volatile market conditions, a portfolio-based approach comprising of different supply sources and pricing options is believed to be a prudent choice for price diversification and risk management purposes.

- The LNG procurement strategy also needs to strive to achieve total system least cost by delivering flexible power generation supply benefits on the back of volume commitments that enable it to optimise fuel consumption. LNG can provide flexibility for upstream gas monetization by introducing international prices which can help optimise the use of upstream gas resources in a more efficient manner. At the same time, the flexibility of gas is compatible with the development of variable renewable energy resources.

- To achieve this goal, Vietnam needs a view on its future LNG demand and understand its price and volume risk sensitivity, among other factors, to help develop commercial terms.

- The flexibility benefits associated with gas-fired generation cannot be unlocked under rigid offtake agreements. Our analysis indicates that lower Take or Pay (ToP) levels increase system flexibility and result in total system cost savings, which could amount to USD 15 billion over time\(^1\). The benefits of contractual flexibility, through Upward Quantity Tolerance (UQT) or Downward Quantity Tolerance (DQT), smaller and shorter contracts, diversion rights, will need to be weighed against the impact of SPA pricing.

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\(^1\) TLG estimated that total system cost savings of USD 15bn (in NPV terms) could be achieved from the four proposed LNG-to-power projects over the period 2018-2040 by contracting LNG on reduced ToP levels.
- EVN and/or PVN, possibly in collaboration with foreign portfolio players, should be allowed to act as a demand aggregator to optimise LNG procurement at the portfolio level.

- Finally, LNG contract negotiations are a matter of striking a balance between pricing levels and indexations against flexibility in other commercial terms, while addressing security of supply concerns. Shorter contract durations allow more flexibility, but it must be weighed against potentially greater competition for LNG cargoes (potentially higher spot prices) in the next decade. Flexibility on volume commitments or diversion rights are nice to have, but may impact other SPA provisions such as pricing.

- As a new-comer to the LNG market, Vietnam can secure its new LNG supplies through a combination of spot purchases and longer-term Destination ex-Shipping (DES) contracts. Vietnam can consider undertaking procurement on Free on Board (FOB) basis once it has sufficient technical and operational capability.

- As Vietnam gains experience in the LNG value chain, it could look to expand its future LNG portfolio by securing investments into upstream LNG liquefaction plants, which are more complex. Investing in liquefaction projects would allow for the possibility of Vietnam to secure supply (on an equity basis) and hedge against future price risks.
2. GLOBAL LNG MARKET DEVELOPMENTS

2.1. GLOBAL LNG SUPPLY AND DEMAND

In 2017, global LNG trade grew at 12 percent year on year to 297 mmtpa, marking the fastest growth since 2010, with Asia accounting for most of the demand growth and expected to remain the dominant buyer for the foreseeable future. Japan remained the largest importer globally at over 83 mmtpa, but China's demand growth in 2017 stood out at an increase of 11.6 mmtpa, or over 40 percent year on year, to just over 39 mmtpa, surpassing South Korea to become the second largest importer in the world. China and India will remain key demand centers in Asia while the emergence of new markets will also lend support to the regional demand growth. The number of LNG importing nations has steadily increased from 23 nations in 2010 to 39 nations in 2017. Figure 1 shows the distribution of LNG buying nations against their respective demands, reflecting increasing entries of many new smaller LNG buyers in recent years.

Figure 1 – Global number of LNG Buying Nations and their Demand Globally

Growth in new buyers has in part been supported by technological developments in the industry. In particular, a new wave of lower cost flexible offshore LNG solutions, in particular floating storage and regasification unit (FSRU), globally and in Asia is shortening lead time and barrier of entries for LNG value chain development².

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² Following the introduction of the first Floating Storage, Regasification Unit (FSRU), EXCELSIOR, in 2005 by Excelerate Energy, the technology has sufficiently matured now. These integrated LNG vessels can be easily deployed, offer significant potential savings in upfront capex, require less lead time than conventional onshore terminal, while offering valuable mobility options to owners. Nonetheless, FSRUs do have some drawbacks including operational constraints, limited expansion possibility, and operating costs susceptibility to metocean conditions.
To meet the growing demand for LNG, global liquefaction capacity has been growing at a rapid rate, reaching nearly 365 mmtpa by the end of 2017, with another 142 mmtpa of capacity expected to come online over the next five years. Australia and the USA led the capacity additions in 2017, accounting for four out of a total of six new liquefaction unit additions. Gorgon Train 3 and Wheatstone Train 1 became operational, adding 9.6 mmtpa in Australia, while Sabine Pass Train 3 and 4 were commissioned in the US, adding 9 mmtpa of capacity. Russia’s Yamal LNG and Malaysia’s offshore PFLNG Satu were the other two plants that started up in 2017.
Notwithstanding expectations of continued robust demand growth from China and the emergence of new buyers in Asia, we expect that supply from new projects will continue to outstrip demand – with the surplus expected to peak around 2022/2023 after factoring some delays in project completion and new supplies from Russia, US, and Australia. Potential short-term supply shortfalls post 2022/23 will likely see room for new projects to materialize and call for final investment decision (FIDs) on new LNG liquefaction projects.

Contingent on investment decisions in the next few years, there remains a considerable upside to global supply should the pipeline of projects materialize. Whilst the absence of new final investment decision (FID) could potentially see a supply shortfall emerging as early as 2022, a recent pick-up in LNG plant expansions and new greenfield plan projects, notably Shell and its partner’s LNG Canada project and Qatar’s North Field expansion project, has eased concerns over longer-term supply needs.\(^3\)

**Figure 4 – LNG supply and demand scenarios**

![Graph showing LNG supply and demand scenarios from 2017 to 2030.](image)

Source: TLG Analysis

Whilst spot prices strengthened recently on the back of oil price recovery and stronger demand, new supplies coming out of US and Australia will weigh on spot prices through the early 2020s. Consequently, Asian spot prices are expected to remain below long-term contract prices for a few more years and potentially bottom out in 2023.

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\(^3\) Shell and its partners announced on 2 October 2018 to proceed on its long-delayed USD 40 billion LNG Canada project, with a combined 14 mmta of capacity from two trains.

Qatar announced plans to boost its LNG production from its current 77 mmta to 100 mmta by 2023, and 110 mmta by 2024. Qatar Petroleum awarded a FEED contract to Chiyoda Corp. for the 23 mmta North Field expansion project in March 2018. Qatar Petroleum is expected to make its final investment decision in 2019.
3. LNG CONTRACTING TRENDS

3.1. INTRODUCTION

The current supply surplus implies that current market price signals are determined by Short Run Marginal Cost (SRMC) dynamics. Consequently, LNG buyers/sellers will likely remain hesitant to ink long-term contracts at prices underpinning liquefaction project Long Run Marginal Cost (LRMCs)\(^4\)/SRMC. Changes in LNG demand and supply coupled with the impending expiry of long-term contracts will likely increase uncontracted LNG supply and push more LNG into spot markets and contribute to shorter contract durations.

Against this backdrop of growing supply at lower prices, the global LNG market conditions have largely tilted the negotiating power in favour of buyers. Consequently, we have seen a shift away from traditional contracting model built on long-term, destination-specific contracts between buyers and suppliers. Instead, buyers have been able to procure shorter-term, flexible contracts with softened price slopes. The buyer-friendly condition is has aided the entry of new LNG buyers in emerging markets, not all of whom have investment grade credit ratings.

Figure 5 – Transitioning LNG contracting trends

**Traditional LNG contracting**
- Long contract duration 20+ years; Long-term contracts helped underpin the high capital costs, while also ensuring supply security to buyers
- Large contract volumes
- Contract between suppliers and credit-worthy utilities
- Supply from specified export facility
- Fixed destination clauses (i.e., profit sharing on diversions, re-exports)
- Typically indexed to oil
- Mainly large onshore import terminals

**Recent LNG contracting**
- Shorter contract length; More spot, short- and medium term volumes; more room for contract renegotiation/price reviews
- Smaller contract volumes; More quantity flexibility (i.e., DQT/UQT, cargo cancellation rights)
- Short term contracting between suppliers and various types of offtakers including utilities, portfolio players, traders.
- Supply can come from portfolio
- More flexibility on destination clauses
- More options on price formations (i.e., Hybrid, HH-linked, oil indexation); structural shift to lower slope
- Increased use of FSRUs

Figure 5 introduces some of the changes in LNG contracting changes witnessed in recent years. The remainder of this section will focus on the following five key shifts observed in the LNG contracting market: growing share of spot trades; smaller contract volumes; shorter contract durations; destination restrictions and flexibility; and LNG pricing trends options.

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\(^4\) SRMC of LNG includes the feedstock gas price at the liquefaction plants, liquefaction plant O&M costs, and the transportation costs. LRMC will add the levelized LNG liquefaction plant capital costs to the SRMC.
3.2. **GROWING SHARE OF SPOT TRADES**

Spot trading have become increasingly common with growing number of players seeking to capitalize on excess capacity across the LNG value chain (liquefaction, tankers, regasification facilities). The share of LNG spot and short-term buying had increased to 25% in 2017 from 17% in 2010. Growing spot cargoes also stem from increasing contractual flexibility (i.e., resulting from long-term buyers exercising larger downward quantity threshold, DQT / upward quantity threshold, UQT provisions); and the need for optimization arising largely from over-commitment on buyer side – resulting in excess supply and subsequent offloading of LNG on the spot market.

The emergence of traders (Trafigura, Vitol etc.) and portfolio players also contributed to more active trade flows in the spot market. Even established buyers, like Japan’s JERA\(^5\), are looking to balance their portfolio between long term contracts and short term and spot cargoes\(^6\).

![Figure 6 – Growing importance of spot/short-term trade in Global LNG Trade](image)

**Figure 6 – Growing importance of spot/short-term trade in Global LNG Trade**

Looking forward, the expectations of an excess in the global LNG supply and demand balance, the commissioning of more destination-flexible US LNG export projects, and the imminent expiry of existing long-term contracts could push more LNG supplies into spot and short-term markets, for as long as uncontracted LNG supplies remain abundant.

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\(^5\) JERA is a JV between Tokyo Electric Power Company (TEPCO) and Chubu Electric Power Company, and is the world’s largest importer of LNG

\(^6\) JERA indicated that it plans to lower its share of long term contracts in its portfolio from 35 of about 40 mmtpa in 2016 to about 15 mmtpa by FY 2030, with the remaining LNG volumes to be supplied by medium term, short term and spot trades. Source: JERA
As sizeable volume of Asian long-term contracts are expected to expire in the early 2020s (above 6% of global LNG will expire in 2020, and an amount over 20% will expire by 2025), both buyers and sellers will have the opportunity to renegotiate terms which could give rise to more shorter-term flexible deals. As a consequence, the share of spot and short-term contracts in overall LNG trade is expected to continue to grow.

3.3. SMALLER CONTRACT SIZES

Contract sizes have fallen over time as new smaller buyers have entered the market. In addition, established buyers, i.e. the Japanese buyers, have been increasingly seeking out smaller contract volumes and shorter contracting period to mitigate demand uncertainties in their home markets.

Figure 7 – Average Global Contract Size

The advancements of smaller and mid-scale LNG storage and regas solutions (particularly FSRUs) further supports the need for flexible contracting of modest LNG volumes. Whilst this may present some degrees of monetization challenges to LNG plant developers, it also opens up opportunities for competitive LNG break-bulking across the region.

7 TLG Analysis
8 Average contract sizes, which were over 2 mmtpa in 2008, fell to below 1 mmtpa in 2014.
9 JERA inked agreement to purchase 2.5 mmtpa LNG from Petronas following the expiry of 15-year contract for 4.8 mmtpa LNG in March 2018.
10 Break-bulking refers to the splitting of large LNG cargoes into smaller parcels, allowing for the distribution of use of small scale LNG.
3.4. **SHORTER CONTRACT DURATION**

A key change in LNG contracting has been the reduction in contract durations of contracts signed in recent years. LNG contracts with durations of 15 years or longer used to account for almost 80% of total global LNG contracts signed, as lenders sought long term commitments to underpin the financing of the Seller’s LNG terminal project developments. However, the proportion of contracts with 15 years or longer has since dropped to about 30 percent as buyers pushed for shorter and more flexible contracts amidst the supply glut in the market. Therefore, LNG plant developers looking to secure FID will have to be forced to pursue portfolio financing with shorter term contracts.

The inclination towards shorter contract duration signals a general lack of stakeholder consensus over future market outlooks as buyers hold off longer-term commitments to secure new supplies. Increased price volatility and emergence of lower credit buyers had also challenged buyers/sellers from locking into long-term deals.

![Figure 8 - Contract Duration of Recently Signed LNG SPAs](image)

We believe short- and medium-term contracts will remain an important composition of overall LNG portfolio as new smaller buyers (initially lacking LNG experience and credibility) enter the market and established players seek out opportunistic deals. Longer-term LNG contracts will continue to be sought after by buyers looking for security of supply in their overall portfolios.\(^\text{11}\)

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\(^{11}\) CNPC, for example, signed a 20-year agreement in September 2018 to buy 3.4 mmtpa from QatarGas. Similarly, Cheniere will supply 2 mmtpa to Taiwan’s CPC under a 25-year agreement signed in August 2018.
3.5. **DESTINATION RESTRICTIONS AND FLEXIBILITY**

Destination clauses are features that were traditionally included in many long term LNG contracts as Sellers’ sought to limit Buyers’ ability to re-sell purchased LNG into regions outside of Buyers’ regions as this could compete with Sellers’ own supply. Whilst the European Commission has investigated and reached settlements with LNG sellers over territorial restriction clauses in LNG contracts from as early as 2002\(^{12}\), many Asian LNG Buyer’s contracts still included destination restrictions.

The attitude towards destination restrictions has shifted in recent years as Buyers seek for greater contracting flexibility (i.e., destination-free and diversion rights). A June 2017 ruling by Japan’s Fair Trade Commission (FTC) deemed destination clauses to be anti-competitive and set the stage for Buyers to review and soften such restrictions\(^{13}\). In addition, it was reported that the ASEAN Council on Petroleum (ASCOPE) has published a standardised LNG contract template with limited destination restrictions, promoting LNG to be traded among the ASEAN common gas market\(^{14}\).

![Figure 9 - Destination Clauses in LNG Contracts Signed](source: TLG Analysis)

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12 European Commission, Commission settles investigation into territorial sales restrictions with Nigerian gas company NLNG (December 2012)

13 Large LNG importers such as Japan’s Jera, Kogas of South Korea and China’s CNOOC are jointly working to secure destination flexibility

14 TLG advised ASCOPE on the creation of a common gas market in ASEAN (October 2018)
3.6. LNG PRICING TRENDS AND OPTIONS

3.6.1. From oil indexation to the emergence of hub-based pricing

Historically, LNG price indexation to oil has met the needs of both sellers and buyers as a deeply traded liquid price marker which is less susceptible to manipulation. The original rationale for oil-linked gas prices was that end-users had the choice between burning gas and refined oil products, and as such gas contracts were offered at a discount to oil parity in order to stimulate broader use of gas. Consequently, oil indexation has historically been the dominant LNG price indexation15.

However, with the increased oil price volatility, there has been a desire by buyers and sellers for gas prices to reflect changing energy market conditions – thereby establishing the need for price adjustment mechanisms or price review clauses, as well as exploring appropriate competitive pricing mechanisms which better reflect fundamental demand side gas switching incentives, giving rise to gas-on-gas competition in the case of an established gas market with many buyers and sellers at the same place.

Over the last 20 years, and particularly in Atlantic Basin markets, natural gas trading hubs have emerged with sufficient depth and liquidity to become a credible pricing reference against which gas and LNG, sold under medium and long-term contract, could be priced.

In North America, the Henry Hub gas price is the major reference point against which most gas is traded while in Northern Europe the major hubs are the U.K. National Balancing Point (“NBP”) or the Dutch Title Transfer Facility (“TTF”). While the U.S. Henry Hub (HH) is a physical hub with cost-plus pricing features, the European NBP and TTF markets are virtual hubs whereby gas pricing is determined based on regional supply demand and competitive trading in an open and transparent manner. The traded gas hubs in Atlantic Basin markets took 20 years to develop. It required transnational regulatory oversight in ensuring consistency on critical issues such as infrastructure access terms, competition, LNG/gas quality, pricing terms and cost pass-through. Integration with pipeline trade was also essential to the development of the European liquid hub, where gas-to-gas competition flourished.

Gas (or LNG) trading in the Asia-Pacific region has yet to develop to the point at which an acceptable hub has evolved against which traded gas (or LNG) could be priced. Although considerable effort has been made to establish an Asian gas hub, it is likely to be some time before sufficient volume is traded to the extent that buyers and sellers are confident in its use as a price reference point.

15 Oil indexation accounted for around 75% of LNG traded in 2014. Source: KAPSARC and Oxford Institute for Energy Studies
The price of gas at a traded hub is subjected to quite different forces to those seen in the oil market to such an extent that prominent dislocation between oil and gas prices is to be expected. The main forces include:

- Regional gas/LNG supply-demand fundamentals;
- Seasonal/regional weather (extreme cold during the winter in heating markets and extreme heat during the summer in cooling markets);
- Availability and utilization of gas storage capacity and fluctuations in gas inventories;
- Market perception that can significantly influence near term/prompt prices;
- Changes in regional economic conditions;
- General petroleum and coal prices that determine underlying contract prices for some gas supplies and define inter-fuel price thresholds;
- Mismatch between demand and the development of LNG and pipeline gas supplies; and
- Gas/LNG sale and purchase agreement terms and conditions.

Historically, LNG pricing mechanisms in North America, Northern Europe and much of Latin America are set by traded prices at regional hubs while those in Southern Europe and Asia-Pacific set by oil (either Brent or JCC\(^16\)).

However, the advent of the U.S. as an exporter of LNG has created a new price benchmark in the Asia-Pacific region based on the cost of supply from the Henry Hub market\(^17\) with the evolving Northeast Asian LNG spot price often compared against the U.K. NBP price as the alternative outlet for clearing excess supplies of LNG. Historical and evolving pricing mechanisms are illustrated in Figure 10 below.

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\(^{16}\) JCC is an acronym for the Japan Customs Cleared or Japan Crude Cocktail price that represents the average cost of crude oil imported into Japan and has, historically, been the reference price used in most long-term LNG sale and purchase agreements in Asia.

\(^{17}\) Coinciding with high oil prices during 2011 until 2014 Q2, many Asian buyers and portfolio players negotiated and purchased volumes on the new US supply contracts that were linked to Henry Hub (HH) pricing index in a bid to diversify their portfolios. However, since the oil price crash in 2014 Q4, HH-linked deals have slowed and buyers have been signing more oil-linked priced contracts as they became more competitive in the lower oil price environment. In recent months, oil-linked contracts have increased, raising the attractiveness of HH pricing among new emerging Asian buyers.
Historically (2009-2018), the average Brent premium over HH is $1.6/mmbtu, with oil indexed gas prices trending above DES\textsuperscript{18} HH prices in Asia for 69% of the time. Brent-linked pricing premium against cost-plus HH pricing is invariably influenced by crude prices. Since 2017, HH pricing had enjoyed a discount to crude indexed price in Asia for only 10 out of 19 months.

In today’s uncertain market conditions, hybrid pricing\textsuperscript{19} is adopted by numerous buyers as an approach for price diversification and risk management\textsuperscript{20}.

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\textsuperscript{18} Delivered Ex Shipping or DES refers to contracts where the seller delivers goods when they are placed at the disposal of the buyer on board the ship, not cleared for import at the named port of destination

\textsuperscript{19} Hybrid pricing typically refers to contracts with linkage to oil and Henry Hub gas prices. Buyers can also construct a portfolio with hybrid characteristics by procuring contracts with both oil-index and HH-linked prices

\textsuperscript{20} Risk mitigation against exposure to single pricing index, as well as LNG sourcing.
3.6.2. LNG industry enters Buyers’ Market owing to oversupply

A large increase in LNG liquefaction plant capacity additions in recent years, led by Australia and the US, helped to establish a buyer’s market in recent years as supply outstripped demand.

An oversupplied market combined with a fall in crude oil prices since the 2013/2014 highs has allowed buyers (and new entrants) to gain favourable LNG supply terms for new contracts (i.e. lower pricing levels, competitive slopes21, and more flexible terms), while also giving some an opportunity to re-visit older contracts through exercising re-opening clauses to reset pricing terms by removing price caps and floors or reducing the oil index slope, leading to significant savings in some instances.22

Figure 12 – Oil-indexed slopes have softened in recent years

![Oil-indexed slopes graph]

Source: TLG Analysis

3.6.3. The Emergence of New Pricing Options

The oversupplied market conditions have also lead to the creation of new non-traditional pricing options, as suppliers sought to attract buyers. Some of the recent new pricing options or trends seen in the market include:

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21 The ‘slope’ of an LNG contract determines the degree of the LNG price indexation to oil prices. The steeper (higher) the slope, the higher the indexation of LNG prices to oil prices. LNG contracts can include S-curves, whereby the indexation has different slopes which are connected by kink points that vary the indexation at different oil price

22 Petronet LNG Limited, ‘Re-negotiated Qatar gas deal giving daily gain of $5/mmBtu’ (January 2016)
• **Alternative pricing indices** - Japan LNG Cocktail (JLC), and Japan Korea Market (JKM) are examples of new pricing indices that have made some in-roads in recent years.\(^{23}\)

• **Phased pricing / Step-up pricing / Tranche pricing** - Given the uncertainties over future prices, a number of contracts have incorporated phased pricing mechanism allowing for lower pricing in the initial years that increase over time. In step-up pricing, different pricing slopes/terms are applied through the life of the long-term contract. Whereas in tranche pricing, different pricing are applied at different periods corresponding to the start-up of liquefaction trains to reflect the staggered commencement timing of trains and FID requirements on each train.

• **Fixed price offers (and progressive fixed price offers)** - US based Tellurian proposed in 2017 to supply LNG at fixed-price of US$8/mmbtu to Asia under five-year contracts from 2023. Australia’s Woodside Petroleum also recently expressed that it is contemplating sales of some of its LNG on a fixed-price basis.

**Figure 13 - Different types of LNG pricing mechanisms which are addressable to Vietnam**

These alternative pricing contracts are now available to new and emerging buyers in Asia as evidenced in Bangladesh, Pakistan, India and China.

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\(^{23}\) For instance, some Japanese utilities still want to have a portion of JLC in their portfolio. Therefore, it is understood that JERA needs a certain volume of contracts priced on JLC since that will be basis for their offer to other smaller regional utilities.
3.6.4. Asian Spot Prices

The evolution of Asian spot price is expected to have an important impact to Vietnam’s LNG projects, whereby a more flexible offtake strategy could be supported by an effective sourcing requirement utilising flexible shorter-term or spot LNG supplies. Spot LNG supplies (into Vietnam) are expected to remain competitively priced for as long as the global LNG uncontracted supply surplus persists.

Our analysis indicates that the price path of Asian spot LNG closely tracks the utilization rate of LNG liquefaction plants with a lag of about a quarter (see Figure 14). In addition, the movement of Asian spot price is a function of the global LNG supply demand balance. Historical Asian spot prices broadly trends between average oil indexed LNG contract price in Japan (in period of tightness) and NBP price (in period of looseness).

Figure 14 – LNG Spot price trend, LNG supply-demand balance and other commodity prices

Source: TLG Analysis

3.7. Implications for Vietnam of Recent Changes in LNG Contracting Trends

Changes in recent LNG contracting trends have led to an increase in flexibility for buyers, which is positive for Vietnam in light of the need to strike the most optimal balance between pricing levels and indexations against flexibility in key commercial terms (duration, pricing, diversion rights, take-or-pay upward/downward tolerances), and addressing security of supply concerns. Vietnam’s LNG procurement strategy and tenders must be structured to leverage these advantages.
4. LNG PROCUREMENT STRATEGY FOR VIETNAM

4.1. GENERAL

An effective procurement strategy widens available LNG sourcing options, enhances security of supply, improves supply terms’ alignment to offtake requirements, delivers competitive pricing outcomes, supports risks management and promote diversification. Procured flexibly, LNG supply can deliver the following key benefits to Vietnam:

- Empower the role of gas-fired plant as the most competitive flexible generation resource to cope with short-term demand and supply fluctuations (arising from hydrology, weather seasonality and/or renewables intermittency);
- As strategic fuel to extend the economic life of existing combine cycle gas plants and improve system reliability and security;
- Supports economic use of gas in the non-power sector; and
- Lowering the total system least cost.

The preferred LNG terminal development framework for Vietnam, which we concluded in Phase 1 of our work as being the Public/Private model under a tolling arrangement, is highly compatible to delivering a favourable LNG procurement outcome for the country consistent with the above-mentioned benefits.

4.2. LNG PROCUREMENT OPTIONS AVAILABLE

A wide range of options available to prospective buyers of LNG. Each procurement option has unique characteristics, advantages, and risks/ exposure which a buyer will have to consider when determining the best fit with its LNG supply requirements and business strategy. These options are broadly categorized by the degree of buyer’s appetite for upstream integration:

- **A sale and purchase agreement (SPA) with an LNG project or supplier.** Various structures are possible for contract terms, duration, pricing scheme, etc. The number of possible suppliers has grown as LNG trade globally has risen. New buyers may contract with LNG projects, traditional suppliers (IOC / NOC), portfolio supplier, LNG marketing companies, LNG aggregators as well as traders.

- **Securing equity LNG offtake from direct investment in an LNG supply project.** Buyers may choose to invest in upstream gas supply projects, liquefaction plants, marketing consortia, and/ or shipping assets. Equity participation tends to be more complicated, and involves higher risk exposure and investment, but has potential upside value. The price of LNG is determined by the project costs (upstream, liquefaction, shipping), while the LNG offtake duration will last for the life of the project (20 – 30 years). This model is presently offered by the likes of supplier such as Tellerium and NextDecade.
It is recommended that new LNG buying nations such as Vietnam should start by committing to term and spot purchases, rather than directly undertaking equity investments into specific upstream LNG projects. This is important new buyers often lack the experience, expertise and financial resources to mitigate complex upstream exposures. Understand seller’s incentives is the first step towards successful LNG SPA contract negotiations.

Figure 15 – Opposing expectations in SPAs by buyers and sellers

4.3. **Key Commercial Terms and Considerations**

Key commercial terms include pricing, volume commitment, destination restrictions (or not), quantity and timing of cargoes, guarantees as well as title and liabilities. These are summarized in the table below.

**Table 1 – LNG SPA Commercial Terms and Considerations**

<table>
<thead>
<tr>
<th>Key Terms</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price level and price indexation</strong></td>
<td>Buyers should aspire to price terms that integrate with overall fuel portfolio. Best prices will likely be obtained for long term SPAs</td>
</tr>
<tr>
<td><strong>Take or Pay</strong></td>
<td>Stringent Take or Pay terms (95-100%) have been the “norm” for LNG Term sellers. However, the current oversupply will make sellers more compliant to buyer-friendly terms (possibly 85-90% ToP). Spot cargoes will almost certainly be 100% take but buyers could on-sell once it has established its trading credentials.</td>
</tr>
<tr>
<td><strong>Destination (FOB or DES)</strong></td>
<td>If FOB(^{24}), then buyer needs to arrange and be responsible for the Shipping. FOB is a “must” for trading purposes</td>
</tr>
</tbody>
</table>

\(^{24}\) Free On Board (FOB) refers to contracts where the seller delivers when the goods pass the ship's rail at the named port of shipment
However, it would be more sensible for Vietnam to contract on DES basis initially given it will have no/limited experience in LNG shipping.

ACQ

Quantity and timing of cargoes could provide key negotiating terms. If buyers can be responsive to seller’s flexible supply arrangements, beneficial price terms may be negotiated. If buyers require flexibility, then price may be relatively higher. Term contract ACQ could be determined by assessing minimal stable annual LNG requirements for the power sector.

Guarantees

Buyers will need to arrange guarantees to underwrite LNG purchases at least cargo by cargo. This is necessary for LNG Trading under a Master Agreement but could be negotiated in terms of Parent Company Guarantee to Letters of Credit or cash held in escrow. The sellers may also need to place Guarantees for trading arrangements whereby buyers could be exposed to creditors or third-party buyers if it on-sells.

Title and Liabilities

The FOB and DES arrangements will define the point at which title and ownership changes hands. The liabilities will also be transferred at this point. Buyers will need to ensure that its interests (rights and obligations) are aligned with the details at point of transfer.

Figure 16 outlines some of the key questions that importers such as Vietnam should consider when negotiating LNG SPA terms.

**Figure 16 – Considerations that will help drive deciding on commercial terms**

<table>
<thead>
<tr>
<th>Short Term Contracts</th>
<th>Long Term Contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Is supply security a paramount concern?</strong></td>
<td>Long-term contracts can offer supply security and contract stability</td>
</tr>
<tr>
<td><strong>How important is volume flexibility?</strong></td>
<td>ToP is inflexible, but options like UQT and DQT can provide some flexibility to buyers</td>
</tr>
<tr>
<td><strong>What is the buyer’s willingness / ability for ongoing supply procurement efforts?</strong></td>
<td>While there can be price renegotiations built into contracts, there is typically less ongoing negotiation required for the life of the contract</td>
</tr>
<tr>
<td><strong>What volume risk is the buyer willing to take?</strong></td>
<td>Long-term contracts offer guarantees for imported volumes and a fixed price formula</td>
</tr>
<tr>
<td><strong>What is the buyer’s appetite for price risk?</strong></td>
<td>Long-term contracts offer more short-run price certainty, but longer term prices are uncertain and influenced by factors beyond the control of buyers</td>
</tr>
</tbody>
</table>

Short-term contracts can help diversify supply but may not always be available at desired prices.

Short-term contracts well suited to offer flexibility.

Procurement via short-term / spot LNG likely requires more ongoing negotiation and LNG procurement efforts.

Supply is not guaranteed through relying on spot cargo purchases, and price varies based on market conditions.

Short-term and spot purchase are subject to more price volatility.
4.4. LNG Pricing Options and Considerations

4.4.1. Commercial Considerations

Buyers and Sellers often have diametrically opposing commercial views with regards to the LNG SPA price clauses.

**Buyer Price Drivers**

- Needs to achieve a price that will either allow buyer to sell profitably into end use markets or ensure that end product (i.e., power) is competitive in end-use markets after allowing for own costs – desire to achieve the lowest possible purchase price

**Seller Price Drivers**

- Wants assurance that the price of gas reflects its value in the end-use market and wishes to maximize either the return on any capital investment or his margin over the fuel acquisition cost – desire to achieve the highest price possible

For Vietnam, it is beneficial to recognize several key factors that influence LNG pricing terms, including:

- Availability of potential LNG supply and sustainability/security of supply over the medium to long term;
- Availability and the cost of access to LNG/RLNG supply infrastructure;
- Dynamics of buyer’s end market and any associated fuel cost pass-through issues;
- Underlying commodity price volatility and options for price risk management. In particular, buyers must consider how movements in LNG prices may impact the relative competitiveness of gas-fired generation against competing fuels like domestic or imported coal.
- Supply volume flexibility and the cost of flexibility;
- Expected development of the regional gas and LNG supply (long-term and spot/short-term) in regional and international markets; and
- Expected evolution and role of traders and portfolio supply players in the market and the consequent impact on regional and international prices.

We believe countries which are new to the LNG industry would be better served by procuring LNG under conventional pricing options (i.e. oil-linkage and Henry Hub-linkage) which are more established and offer greater supply options. In the next section, we discuss the relative pros and cons of oil indexation and hub-linked prices.
4.4.2. Oil Indexation vs. Henry-Hub linked pricing

The choice between oil-indexation and HH-linked often rests on the value drivers and risk factors that sellers and buyers are most comfortable with. For example, oil-indexation may offer greater supply sources and is cost competitive at low oil prices, but it is subject to greater geopolitical risks. HH-linked LNG, on the other hand, offers greater price stability, volume and destination flexibility, but typically has a lower GCV pipeline specification\(^{25}\) and will be at a cost disadvantage at low oil prices (a possibility that cannot be excluded).

Table 2 lists typical advantages and disadvantages associated with oil-index LNG and HH-linked LNG prices.

### Table 2 – Relative merits and drawbacks of oil- and Henry-Hub-indexed prices

<table>
<thead>
<tr>
<th>Index</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>Lower delivered LNG price at lower oil prices</td>
<td>Higher delivered LNG price at higher oil prices</td>
</tr>
<tr>
<td></td>
<td>Opportunity for periodic price reviews</td>
<td>Limited volume flexibility with potential high take-or-pay obligation that could be 100% of annual contract quantity</td>
</tr>
<tr>
<td></td>
<td>Point of title transfer flexibility with both DES and FOB sales used although the shipping responsibility for the latter will be the buyer’s responsibility</td>
<td>Limited feed gas supply diversity as the favoured contracting form for integrated projects with the potential for upstream feed gas supply disruption</td>
</tr>
<tr>
<td></td>
<td>Gas not lifted as a result of take-or-pay provisions can be lifted at a later date (Carry Forward Gas)</td>
<td>LNG price subject to geopolitical events/shocks</td>
</tr>
<tr>
<td></td>
<td>Preferred contract terms by LNG producers/traders (especially in the Asia-Pacific region)</td>
<td>Possible destination restrictions and/or diversion profit-sharing mechanisms</td>
</tr>
<tr>
<td></td>
<td>Liquid crude oil futures market that provides the opportunity for hedging delivered LNG price risk (with some potential for basis exposure if JCC or ICP(^{26}) is used as the reference price)</td>
<td>Greater potential for delivered price volatility as a significant portion (and in some cases all) of the delivered price is subject to indexation</td>
</tr>
<tr>
<td></td>
<td>Reduced potential supply disruption risk due to shorter shipping distances from regional Pacific-Basin LNG producers</td>
<td>Delivered LNG price will not necessarily reflect global or regional gas market fundamentals</td>
</tr>
<tr>
<td>HH</td>
<td>Lower delivered LNG price, in relative terms, at higher oil prices</td>
<td>Higher delivered LNG price, in relative terms, at lower oil prices</td>
</tr>
</tbody>
</table>

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\(^{25}\) US gas is lean, meaning it has a Gross Calorific Value (GCV) below 42 MJ/m\(^3\); while importing nations in Asia like Japan, Korea and Taiwan have GCVs above 43 MJ/m\(^3\).

\(^{26}\) JCC refers to Japan Custom Cleared; ICP refers to Indonesian Crude Price
### Advantages

- Total volume and destination flexibility as supply is typically contracted on an FOB basis and the owner of the liquefaction facilities tend not to be present as marketers of LNG on a DES basis
- No global geopolitical price premium attached to Henry Hub prices
- Considerable feed gas supply diversity and security as supply is taken from the U.S. natural gas pipeline network and not tied to one supply source
- Liquid Henry Hub futures market provides the opportunity for feed gas price risk management
- Greater delivered price stability as only the feed gas price is subject to potential volatility
- Feed gas and delivered LNG prices reflect the marginal cost of U.S. natural gas production that is deemed to have a long and flat supply cost curve

### Disadvantages

- Liquefaction tariff is paid regardless of whether capacity is used with no carry forward of unused capacity into subsequent years
- LNG typically sold on an FOB basis with the buyer responsible for transportation of LNG
- U.S. pipeline specifications imply a low Gross Heating Value (GHV); propane blending may be required if high GHV LNG is required
- Tolling agreements do not contain provisions for review of the liquefaction tariff
- Feed gas prices are unreflective of regional Asian market fundamentals
- Long voyage times from the U.S. to Asia with the potential for delivery delays due to hurricanes in the Gulf of Mexico and subsequent congestion in the Panama canal

Henry-Hub indexed LNG can provide more price stability along with volume and destination flexibility but may not be the lowest cost source of LNG particularly when oil prices are low. Figure 17 indicates the possible oil and Henry Hub breakeven prices, demonstrating wide price range where the two indexation options compete.
The probabilistic evolution of oil and gas prices were used by TLG to forecast a range of DES LNG prices to Vietnam. Oil indexed price trends higher (and above Henry-Hub-linked prices) due to expectation that global oil prices will increase due to tightening demand supply balance (See Figure 18).

While Figure 18 may lead some LNG purchasers to conclude that LNG procurement based on Henry-Hub alone would always be optimal, buyers should seek to diversify their supply sources and indexation options to minimise concentrated risks that may arise from an over reliance on one index.
4.4.3. PRICING STRATEGY FOR VIETNAM

Based on a probabilistic analysis of price path evolution, we propose the use of spot/short term trades and/or short-term Henry Hub-linked contracts (see Table 3). As LNG demand increases, we would recommend Vietnam to explore broadening the supply sources (i.e. countries and projects) and price indexation options, by including oil-indexed prices, to help diversify supply and manage price risks.

Table 3 – Projected LNG contracting strategy that offers lower overall cost of procurement

<table>
<thead>
<tr>
<th></th>
<th>Short Term (~2022)</th>
<th>Medium Term (2023-25)</th>
<th>Long Term (2025 +)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal mix of pricing in contracts</td>
<td>Asian spot/ short term HH</td>
<td>Asian spot + medium term contracts (HH/Oil)</td>
<td>HH/Oil long-term contracts + Asian spot</td>
</tr>
<tr>
<td>Rationale</td>
<td>Short term, flexible, smaller entry volumes</td>
<td>Portfolio build</td>
<td>Expand portfolio supply balancing, security and pricing outcome</td>
</tr>
</tbody>
</table>

The procurement strategy and approach should evolve over time to continuously target least cost flexible purchases. Vietnam should also consider the following for the procurement approach:

- A portfolio approach in optimizing supply cost with flexible shorter-term contracts and array of indexation options and prices can improve overall positions, while offering key diversification benefits;

- Buyer decisions can improve domestic market efficiency through price discovery, optimal use of infrastructure, advocating flexibility options, and gradual deregulation of markets to extract benefits; and

- Sellers competitiveness and responsiveness to customer needs is enhanced in a period where the supply outpaces demand. Buyers can take advantage of the efficiency of source markets in bringing down cost of supply.

29 The following caveats apply to this. Trend spotting assumes perfect foresight. HH long-term pricing level is supported by long flat supply curve. Price volatility not assumed to impact long-term value propositions. Projections can be distorted by unpredictable events and such imbalances in an inefficient market.
4.5. **VOLUME COMMITMENT AND THE VALUE OF FLEXIBILITY**

4.5.1. Introduction

As mentioned in the Phase 1 report\(^{30}\), gas is the most competitive mid-merit generation fuel. Our analysis indicates that coal-to-LNG switching in the baseload operation is possible when gas prices are below $5/mmbtu. Higher coal-to-gas breakeven prices are plausible considering increasing coal development costs associated with coal handling facilities, higher financing costs for greenfield coal projects, tighter emission standards, as well as possible future carbon prices.

Historical coal and spot LNG prices illustrate the breakeven economics for building a new advanced LNG-fired CCGT plant versus a new coal-fired power plant at different expected capacity factors. Figure 19 illustrates how the competitiveness of a new LNG-fired power plant has improved dramatically in the past three years as the relative fuel prices have evolved.

**Figure 19 - Coal-to-LNG Strategic Switching in Power Sector for New Investment**

LNG fired power plant is most competitive in the mid-merit operations (capacity factor 40%). This implies that volume flexibility will always be preferred from the Buyer’s perspective, but such optionality comes at a price.

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\(^{30}\) See Section 2.4 of the Phase 1 Report.
Consequently, it is important to understand how much the volume flexibility is needed and the valuation of such flexibility to the market.

To help address this question, TLG used its inhouse electricity market modelling tool, Quafu, to analyse the impact of various LNG contracting options to Vietnam. We then derived the impacts of LNG volume commitment on total system cost\(^\text{31}\). The main purpose of the modelling was to examine the benefit of volume flexibility by considering different levels of take-or-pay LNG volumes under the base case scenario\(^\text{32}\).

### 4.5.2. The ability to flexibly contract LNG can contribute towards total system least cost

Figure 20 shows the LNG demand and the annual total system cost savings under three different LNG take or Pay scenarios that were modelled (90%, 60% and 30%). Our analysis indicated that a reduction in Take or Pay (ToP) levels increases system flexibility and leads to annualized (levelized) total system cost savings in the order of USD 360 to 700 million\(^\text{33}\) over the long horizon, based on the fuel price projections assumed.

![Figure 20 – Total system cost saving and LNG demand under various ToP levels](image)

\(^{31}\) Total system cost is defined as the sum of the capital costs, operating costs, fuel costs and the value of lost load

\(^{32}\) Our base case scenario includes: macroeconomic assumptions (GDP growth rate of 6.5\%/pa from 2018-2020; 5.8\%/pa for 2021-2030 and 5.2\%/pa for 2031-2040); exiting capacity, and future power plants from PDP; power demand growth of 10.2\%/pa for 2018-2020; 8.4\%/pa for 2021-2030; and 6.6\%/pa for 2031-2040; renewable outlook based on PDP VII revision; domestic gas reserve and production outlook based on input from stakeholders such as PVN; LNG enters the system from 2023 onwards with ToP requirement

\(^{33}\) The total system cost savings represent the average savings from 2023 to 2040 for each scenario, applying a discount rate of 5.6\%/pa. The total aggregate net present savings over the same period was found to range from USD 7.6 billion to USD 14.8 billion. All values cited are discounted to 2018 values.
The reduction in total system cost mainly arises from the benefit that lower ToP quantities allow for flexibility in switching from LNG to other portfolio fuel (in this case coal) whenever economic to do so.

Figure 21 shows a breakdown of the change in total generation and the net present total system cost components between 2018 and 2040 under the three different LNG ToP scenarios that were modelled. The figure presents changes in generation and system cost relative to the Base Case scenario (90% ToP) on the left. As the LNG ToP is reduced, we see more economic switching of LNG to coal under the assumed fuel prices.

The value of volume flexibility (when reducing ToP levels from 90% to 30%) for the four integrated LNG-to-power projects is estimated at about USD 15bn (in NPV terms) over the period of 2018-2040 coming from an LNG contract quantity reaching 12 mtpa by 2029. Though further analysis is merited, this provides some level of indication as to how Vietnam could value LNG volume commitment terms.

In addition, gas as a flexible fuel in power generation, can complement other technologies or fuels which are subject to intermittency (renewable energy), seasonality (hydro), as well as supply disruptions (upstream domestic gas).

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34 Total System Cost are again discounted to 2018 values using a discount rate of 5.6%

35 Referencing Vietnamese long-term debt as a proxy, a discount rate of 5.6 percent was used to compute the NPV.
4.6. **OTHER CONTRACTUAL RISKS FOR VIETNAM**

In addition to the key LNG contractual parameters highlighted in the previous sections, there are other important commercial terms and conditions that deserve due consideration. This includes terms relating to issues such as Force Majeure, applicable laws, delivery points, security, limits of liabilities, as well as step-in rights (highlighted in Figure 22).

**Figure 22 – Other contractual factors to consider**

<table>
<thead>
<tr>
<th>Parties</th>
<th>Quality specifications</th>
<th>Preferential rights</th>
<th>Credit and Security</th>
<th>Terminal Use Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of supply</td>
<td>Measurement specifications</td>
<td>Conditions precedent</td>
<td>Taxes</td>
<td>Limitation on Liability</td>
</tr>
<tr>
<td>Rights and obligations</td>
<td>Tariffs</td>
<td>Duration</td>
<td>Representations and Warranties</td>
<td>Annual Schedule Forecast</td>
</tr>
<tr>
<td>Facilities</td>
<td>Tariff reduction</td>
<td>Termination</td>
<td>Force Majeure</td>
<td>Maritime operations</td>
</tr>
<tr>
<td>Deliver and re-delivery point</td>
<td>Terminal fill cool down volumes</td>
<td>Stop-in rights</td>
<td>Title</td>
<td>Capacity Allocation in case of Curtailment</td>
</tr>
<tr>
<td>Services provided</td>
<td>Capacity allocation</td>
<td>Assignment and Subcontracting Rights</td>
<td>Liability for off-spec LNG/gas and volume losses</td>
<td>Maintenance</td>
</tr>
<tr>
<td>Billing, Payment and Audit</td>
<td>Dispute Resolution</td>
<td>Confidentiality</td>
<td>Applicable Law</td>
<td>Other miscellaneous items</td>
</tr>
</tbody>
</table>
4.7. **Summary of Initial Assessment on Key Commercial Terms for Vietnam**

Vietnam’s commercial terms for LNG procurement need to reflect its capability, expected demand, and price and volume risk appetite/tolerance, among other factors. Shorter contract durations allow more flexibility, but it must be weighed against potentially greater competition for LNG cargoes (potentially higher spot prices) in the next decade. Diversion rights are good to have, but may impact other SPA provisions such as pricing. Given Vietnam will be an end-user with no trading ambitions (for now), seeking for full destination flexibility may be unnecessary as flexibility can also be negotiated in the traditional form of DQTs.

A summary of our initial views based on our understanding of the global LNG market and Vietnam’s requirements is presented in Table 4 overleaf.
Table 4 - Summary of our initial views on LNG contracting approach for Vietnam

<table>
<thead>
<tr>
<th>Key contract terms</th>
<th>Initial views on key contracts terms for Vietnam</th>
<th>Chapters</th>
</tr>
</thead>
</table>
| Term contracts or Spot purchases | • Likely both term contracts to secure baseline LNG needs and spot cargoes for seasonal demand, etc.  
  • Ultimately this choice comes down to the desired level of security of supply and price sensitivity that can be tolerated  
  • Spot purchases will also be economic for Vietnam’s maiden LNG project in the short-term oversupplied market | 4.4; 4.5.3 |
| Annual Contractual Quantity (ACQ) | • Term contract ACQ could be determined by assessing minimal stable annual LNG requirements for the power sector (i.e. mid-merit CCGT demand).  
  • Mid- to long-term contracts should be able to serve Vietnam’s base demand whilst seasonal demand can be handled by spot/ST purchases | 4.4 |
| Volume flexibility (UQT/DQT) | • Volume flexibility could potentially influence contract price negotiations  
  • Flexibility is often requested by buyers with uncertain demand or highly seasonal demand profiles as well as small buyers with limited storage handling capacities  
  • UQT and DQT may not necessarily be symmetrical in any contract.  
  • Vietnam could consider higher ToP levels for ACQ destined for stable LNG demand if it offers pricing advantage (or mitigates pricing disadvantage) | 4.4; 4.6 |
| Price Formula | • A new buyer lacking experience and credibility typically holds weaker bargaining power.  
  • Incorporate S-curve to protect both parties against unexpected oil price fluctuations (Kink points as a reflection of buyer/seller’s expectation of future oil prices during delivery period.) | 4.5.2 |
| Duration | • Shorter duration would probably be less risky for the first contract, to mitigate risk of committing to a poorly negotiated long term contract | 4.5.3 |
| Title transfer and shipping | • DES, given the added complexity of riding down the learning curve on LNG shipping within a short time-frame | 4.4 |
| Destination | • Destination flexibility is not required for short term contracts. Insisting on this will likely come at a cost  
  • Furthermore, Vietnam would need to contract LNG on FOB basis, and Vietnam’s lack of overseas gas marketing experience will be a disadvantage | 3.7; 4.4 |
| Government guarantees | • Guarantees will likely be preferred by LNG suppliers for long term contracts  
  • Back-to-back contracts reflecting key commercial terms (pricing and volume) with LNG offtaker (i.e. anchor CCGTs) may need to be considered | Phase 1 Report Section 4.3 |