FLOATING LNG — DEVELOPING AND IMPLEMENTING FLOATING
REGASIFICATION AND LIQUEFACTION PROJECTS

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ABSTRACT

Floating Regas: The key driver is the delivery of natural gas to locations or facilities where there is a gas shortage, or no gas at all. With the elimination of significant land-based facilities, floating regas can save years in regulatory approvals and lower overall capital costs.

Challenges to be managed include vessel performance risk, coordination with shore-side facilities, testing and delivery of the vessel. Potential risks require careful consideration and mitigation strategies appropriate to the specific context of the project.

Operating and performance risks are typically allocated to vessel owners using the LNG time charter party model. However, significant downstream risk may remain, and will need to be carefully considered, allocated and mitigated.

Floating Liquefaction: The key driver is the monetisation of otherwise stranded gas reserves, or reserves that may be uneconomic to develop and market. Where not monetised, associated gas is typically re-injected, flared or left untapped.

There are three basic models for the development of floating liquefaction projects, with many potential hybrids: Integrated Model: the FLNG vessel is treated as part of the overall project infrastructure, integrated into the upstream arrangements. Project Company Model: the vessel owner processes the gas and markets the LNG on its own behalf. Tolling Model: the vessel owner processes the gas, but does not take title, instead receiving a fee for services.

Implementation of the above will have fundamental implications on the project structure, project contracts and the allocation of risk between the stakeholders. Mitigating such risks and achieving an appropriate alignment of interests is critical to the success of any FLNG project.

FLOATING REGASIFICATION

Introduction

Floating regasification projects involve the storage and regasification of liquefied natural gas (LNG) by specialised vessels. Floating storage and regasification units (FSRUs) and shuttle regasification vessels (SRVs) are two such vessels.

FSRUs. FSRUs can either be conventional LNG vessels, with the ability to operate as such and trade cargoes, or vessels (even barges) designed to remain stationary, performing the storage and regasification activities at a given location. Most commonly, FSRUs perform operations at a specifically designed terminal, pier or protected marine location, receiving LNG on board from a liquefaction facility (where trading) or another vessel, regasifying the LNG and injecting the natural gas directly into the local natural gas transportation system.

SRVs. SRVs perform the same storage and regasification functions as FSRUs, but with different design and operational parameters. SRVs are trading vessels that deliver LNG regasified on-board into a buoy system

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that rises from the sea floor into the hull of the vessel. The buoy system is received into the hull and, when detached, rests on the seabed. The SRV injects the natural gas via the buoy system into an underwater gas pipeline, for transportation to shore and into the local gas system. The design is intended to allow the SRV to perform these functions at a significant distance from shore, rather than at a terminal, pier or protected marine environment close to land. SRVs can also be designed to remain permanently at the designated location of the buoy system and receive LNG from other vessels, rather than performing the “shuttle” aspect of the operation - where it would transit and receive a cargo of LNG from a liquefaction facility. In this case, the buoy system would remain connected to the vessel whilst moored at the designated location.

The distinction between FSRUs, SRVs and other vessels performing similar functions can become less well defined as specific vessel design gives way to the particular needs of each project, and the terminology used by project developers, vessel owners and others in the industry.

**Why floating regas?**

The increasing use of floating regasification is a result of its being, in many cases, a faster and less costly energy solution. For example, land-based LNG regasification facilities can have a full project development time frame of between 5 and 7 years (allowing for permitting and construction), and are highly capital intensive. The capital cost of a land-based LNG regasification facility can vary significantly depending on such factors as size and capacity, local market conditions (labour and materials), location of the facility (remoteness), construction technique (for example, use of modularisation) and LNG construction industry trends. With LNG construction costs reportedly on the rise worldwide, and particularly in certain locations (Australia is frequently cited as an example, in the context of liquefaction projects), the capital cost of land-based facilities is likely to be relevant in the growing use of floating regas. An additional factor in this regard is the relative lack of predictability of the capital cost of a land-based facility, particularly in the project concept phase, due to the variability of the above factors. Contrasted with this, the established LNG shipyards of the world are able to offer predictable pricing and very precise delivery dates for regas vessels - approaching 30 months for construction. While this is not the end of the story, as the vessel has to be positioned, and successfully commissioned at the designated operating location, it can present a more predictable alternative to land-based facilities in terms of both cost and delivery time. For the above reasons, floating regasification can be quicker, cheaper and more flexible than other gas infrastructure alternatives - such as extending the local gas transportation system to a specific city or facility.

Floating regasification is also cited as providing additional flexibility, both in terms of flexibility of supply (where seasonal demand issues exist) and the ability to trade LNG cargoes (arising perhaps due to such seasonality issues). Any benefit derived from such flexibility is likely to be more relevant in countries such as Brazil, where hydro-electric power is a primary (yet seasonal) source of power. To the extent LNG is not required to supply gas to the thermo-electric power stations, LNG regas vessels can provide the means by which to trade such surplus volumes

**State of play.** As of December 2012, there were nine operational regas vessels worldwide, with a number of new projects contracted, planned or reportedly under consideration in many countries around the world.

**Project structures and contract issues**

Key to the successful completion and operation of a floating regasification project is a contract structure that eliminates or mitigates project risks and creates an alignment of interests among the project parties. A fundamental issue in this regard is the selection of an appropriate project structure. As an example, the use of a time charterparty structure in a floating regas project will result in a significantly different risk allocation from a vessel ownership or bareboat charter structure. Under a time charterparty, the vessel owner or operator (and not the charterer) will be primarily responsible for the operation of the vessel (i.e., vessel operating risk). Whereas, the vessel owner or demise charterer (i.e., the charterer under a bareboat charter) will be primarily responsible for vessel operating risk. Accordingly, to the extent that the entity (project)
requiring the regasification services implements the time charterparty structure, it will have successfully allocated vessel operating risk to those best able to manage that risk (i.e., the vessel owner or operator). It is worth noting that the time charterparty structure has been the most frequently used floating regas structure to date (with some variations due to local laws and requirements), probably for the risk allocation reasons noted above.

The “golden rule” in risk allocation is that risks should be allocated to those best able to manage them - due to industry experience, proven reliability, creditworthiness, financial capability or other factors. An alignment of interests is created by careful coordination among all the project contracts, and the use of legal devices such as deliver-or-pay, take-or-pay, liquidated damages and other legal devices that incentivise each party to perform its obligations, as intended at the time of contracting (i.e., the so-called “carrot and stick” approach).

Depending on the specific circumstances of a floating regas project, contracts may be required in relation to the following: vessel construction, procurement of other significant assets (for example, a buoy system or hard arms for the transfer of LNG), vessel chartering and operation, gas pipeline construction and operation, terminal or pier construction, terminal use agreements (for multiple party facilities), LNG supply agreements and natural gas sales contracts. This paper will focus primarily on the floating regas vessel related contracts.

**Vessel construction.** From the vessel owner’s perspective (owner), it is imperative that the builder (shipyard) take responsibility for building and delivering the vessel on time, in accordance with the specifications and for the agreed sum. The reasons for this, vis-à-vis owner and shipyard, are obvious enough, but the owner must also be concerned about its obligations to the project developer and/or operator (project company*). The project company is (depending on the project) required to deliver natural gas to a third party (local authority or facility), and will likely face serious damages or penalties for any failure to deliver gas as and when required. Local authorities tend not to be accommodating when considering, for example, their responsibility to provide power to a metropolitan area. Accordingly, the project company will also be concerned to ensure that owner and shipyard perform respective mutual obligations to each other in a manner that ensures the project company will be able to perform its obligations to the local authority or facility for the duration of the project. This will typically result in a high degree of “oversight” or participation by the project company in the shipyard-owner contractual relationship. This can manifest itself in various forms, such as back-to-back provisions between the vessel contracts (charterparty) and the construction contract and/or a tripartite (or “direct”) agreement among the shipyard, owner and project company. Put simply, there is absolutely no upside to the project company if the shipyard and owner both perform impeccably under their contract, where this results in the delivery of a vessel unable to perform as required by the project company.

Particular areas in which the project company will typically have a high degree of oversight or participation under the shipbuilding contract include technical specifications and any changes thereto, payment terms, the delivery date, inspection and testing provisions, approval of vessel parts and shipyard sub-contractors, performance warranties, liquidated damages for delay and credit support (refund guarantee) in respect of the shipyard’s obligations to build and deliver the vessel. Many of these can be managed by way of back-to-back provisions from the vessel contract (charter) to the construction contract (shipbuilding contract). However, these may also be managed under the tripartite agreement noted above. In addition, typical project protection techniques may also be employed as a risk mitigation strategy, thereby also helping ensure the project is a success. For example, without appropriate protection, default by the owner under the shipbuilding contract may trigger the right to sale, permitting the shipyard to sell the hull to a third party. While this may be a reasonable outcome for the shipyard, it would be disastrous for the project company, which would not only lose the vessel but which may suffer significant damages where it has committed itself to the development of the shore-side facilities, provision of other significant assets, LNG purchase

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* The word “company” is used here for convenience, as the project itself need not have corporate personality.
obligations and downstream gas delivery obligations. These obligations will likely entail significant capital expenditure, significant take-or-pay or deliver-or-pay obligations and/or substantial financial damages. These obligations will not go away, even if the vessel is no longer available. Risks to the project company relating to vessel availability can be addressed by way of the tripartite agreement - including, for example, by use of standstill, cure and replacement obligations/rights.

**Vessel charterparty.** Focusing on the vessel contract (charterparty), the project company must ensure that the vessel will enable it to meet its downstream obligations. Accordingly, protection in relation to the construction, delivery and performance of the vessel (as noted above) will typically be included in the charterparty (and backed-out into the shipbuilding contract). For example, the owner will typically warrant the vessel’s ability to receive and off-load LNG, LNG storage (boil-off), regasification and send-out, as well certain key physical parameters such as tank storage capacity and draught - where a failure will result in the reduction of vessel hire. These remedies are in addition to such standard charterer protections as off-hire during periods when the vessel is unavailable to charterer (i.e., during which no hire is payable). It is important to note that these, and other tools under the charterparty, are unlikely to fully insulate the project company from the damages it may suffer for a breach of its downstream obligations, notwithstanding that the default in question may be the result of a vessel defect or owner or shipyard default. The above are instead intended to create an alignment of interests among each party in the contract chain, so that if one suffers damages as a result of breach, the others also incur an appropriate amount of damages. What is “appropriate” in this context is clearly a commercial issue, and will vary depending on all the circumstances of the project. However, it is unlikely to be appropriate to pass along the entire amount of loss or damage suffered at each contractual link in the chain to the last entity in that chain. Specifically, there is likely to be no advantage in imposing an aggregate financial penalty on any party in excess of what that party can reasonably bear. The intention here is to create a sufficient incentive mechanism to encourage “good” contractual behaviour by all parties. Carrots and sticks.

However, while the charterparty provisions relating to monetary damages payable by owner may not fully cover all the project company’s downstream obligations, other contractual provisions can help mitigate such risks and potential losses, including the ability to convert the charterparty (where a time charterparty) into a bareboat charter. The effect of such outcome is essentially to take operational control of the vessel away from the owner (or manager) and to give it to the project company (or a party nominated by it). A vessel purchase option can be used to similar effect, but this can be both complex and costly where the vessel is subject to a lease or financing structure - which can result in a buy-out price in excess of market value.

Another area of complexity can arise in relation to testing the vessel and the new facility, which can only be one-hundred percent confirmed with the vessel in situ. Difficulties arise because the vessel’s shipyard is often a significant distance from the operating location, and each facility often has its own unique operational parameters and characteristics. Issues include the time and cost of repairs to the vessel (who and where), LNG acceptance obligations (take-or-pay) where the vessel is unable to accept or store LNG, downstream gas delivery obligations (deliver-or-pay) where the vessel is unable to meet the commercial delivery schedule agreed with the downstream parties, what to do with LNG loaded onto a defective vessel and procuring replacement cargoes as needed to re-run the acceptance tests. Addressing these issues can often result in a complex series of potential contractual alternatives, in each case attempting to place the risk of default, loss or damage on the party responsible for that outcome, but in a manner that makes the eventual satisfactory performance of those obligations more, rather than less, likely. In each case, this requires a detailed understanding of the project’s operational issues, each party’s ability to perform the relevant obligations and a pragmatic view of the possible outcomes.
Conclusion

The rising tide of floating regasification can be seen as a result of its own relative merits - often being the best short, mid or even long term energy solution. However, there are significant potential risks that need to be managed in these projects, requiring careful consideration of the project’s often unique context, the likely downside risks and the means by which to achieve a commercial and pragmatic outcome for all project parties.

FLOATING LIQUEFACTION

Introduction

For the purposes of this paper, FLNG is the liquefaction of natural gas aboard a floating production storage and offloading (FPSO) type vessel moored directly over an oil (where associated gas will be commercialised) or gas field. FLNG has the ability to unlock stranded gas in fields that are otherwise commercially, financially or technically unattractive to develop. Having the FLNG vessel moored directly above the source of gas potentially eliminates the need for a costly pipeline to land and land-based liquefaction facility, and facilitates the transfer of LNG from the FLNG vessel to conventional LNG carriers for transportation to market - wherever that may be in the world. FLNG is under consideration in two distinct contexts - the first, being larger scale units that would be expected to stay in situ for their operating life, and the second, being smaller in scale that could potentially move among reserves, monetising otherwise potentially uneconomic reserves. Although, for various reasons, it is the first of these that appears to be getting some traction in the industry.

Despite the obvious benefits that FLNG may offer, these potential benefits have to be weighed carefully against the many inherent challenges, legal, technical, commercial and operational, that present themselves in a “never-been-done-before” project of this type and scale. While numerous major international oil companies (IOCs) are moving forward with the potential implementation of FLNG, the clear leader is Shell with its Prelude project in Western Australia. Many insiders believe that FLNG will be as prevalent, and successful, in relation to gas and LNG as FPSOs have been in relation to the production of oil and gas. The story thus far is positive, as, for example, Shell is reportedly planning two further FLNG projects, Petronas is also reportedly moving forward with two FLNG projects, Inpex is considering FLNG for the Indonesian Abadi field, Petrobras has been considering FLNG in the development of its huge pre-salt and other offshore reserves, Pacific Rubiales is implementing a smaller FLNG vessel and there are press reports of FLNG being considered in relation to Israel’s huge Leviathan field. While only time will tell, there appears to be sufficient interest in FLNG, and success in its development, to suggest that the FLNG story will indeed end positively - but of course, one or two projects will need to be successful for the industry to embrace the technology and concepts. There is also the possibility of a “second phase” of growth for FLNG - resulting from the effort and capital of those currently developing the concept, who are effectively de-risking FLNG, thereby potentially reducing future project development costs and lowering the barriers to entry.

Project structures

There are three general business models applicable to the development of a FLNG project, each outlined below. The decision as to which structure is used will depend on various factors, including the legal arrangements of the upstream assets, local laws, applicable tax regimes and appetite for, and allocation of, risk.

Integrated model. Under the integrated model, the upstream participants build or procure all necessary infrastructure to produce, liquefy and market the gas. The relevant granting instrument sets out the participants’ share of production as between the government and the upstream participants. Typically the joint operating agreement, governing the relationship of the contractor parties, will designate one of the parties as operator of the development for and on behalf of the other joint venture parties. The operator will typically be responsible for procuring all necessary assets and services to develop the field. Each upstream participant retains title to their respective share of production (under the granting instrument) and can market
this separately to a third party, although the joint venture partners could also market the LNG jointly. If each participant markets its LNG separately, then using the integrated model aligns the parties as regards cost and risk sharing, and each participant is able to hold its own negotiations to market its share of LNG. Issues to be addressed will include entitlement to capacity, availability of storage and offloading capability and obligations and liability for failure to offload.

An example of an integrated model is illustrated below.

**Project company model.** This is the most common model in conventional liquefaction projects, under which the project company builds or procures the FLNG vessel, purchases feedstock from the upstream participants and processes, liquefies and sells the gas for its own account. Often, but not always, the upstream participants are shareholders in the project company pro-rata to their upstream participation interests. This has the benefit of ring-fencing pricing risks with selling and marketing the LNG. It also allows parties other than the upstream participants to take an equity interest in the development - for example, downstream participants, the national oil company (NOC) or technology licensors. This potentially further benefits the upstream participants where they are unwilling or unable to fund the build or operating cost associated with the FLNG vessel. Commercial issues for consideration include: will the project company source gas only from the upstream participants, and will LNG be sold only to its shareholders or to third parties as well. An important consideration will be whether the local laws permit this type of structure or whether a separate tax entity will be required.

An example of a project company model is illustrated below.
Tolling model. The third model is the tolling model, in which a tolling company receives a fee for processing, liquefying and storing the LNG without taking title to the gas and/or LNG. The tolling company is responsible for building or procuring and operating the FLNG vessel, and the tolling fee typically covers fixed operating costs and an equity return for the tolling company. The upstream participants may enter into a tolling agreement where a fixed volume will be processed for a fixed fee and, where additional volumes are processed, the tolling company receives a variable fee. Similar to the project company structure, the upstream participants do not bear the capital expenditure or operating costs of the FLNG vessel, which are the responsibility of the tolling company. In the same way that the LNG sale and purchase agreements underpin the project financing of the integrated and the project company models (being the principal revenue generating contract), the tolling agreement and the fees therefrom will need to underpin the project financing of the FLNG vessel by the tolling company.

An example of a tolling model is illustrated below.

Contract issues

In addition to those issues relevant to the selection of a business model, this paper considers certain commercial and contractual issues relevant to developing a FLNG project. In this context it is relevant to note the potential scope of the FLNG value chain and disparate nature of the potential project parties, which may include: NOCs, IOCs, independent energy companies, oilfield service companies, independent contractors, shipyards, specialist engineering contractors, technology providers, FLNG vessel owners/operators, FLNG
vessel tolling operators, buyers of LNG and NGLs, owners/operators of conventional LNG and NGLs vessels, suppliers of fuels, catalysts and services (including tug services, logistics and supplies) and relevant local government authorities.

An example of an FLNG value chain is illustrated below:

<table>
<thead>
<tr>
<th>Field development and gas production</th>
<th>FLNG vessel construction, installation and commissioning</th>
<th>FLNG liquefaction, storage and offloading</th>
<th>LNG transportation, marketing and regasification</th>
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</table>

In an FLNG project, where the FLNG vessel is physically proximate to the gas production facilities, the upstream legal and contractual regime governing the development and production of the gas field and the determination of the gas suppliers’ production shares (including applicable laws, granting instruments such as licences and production sharing contracts and joint operating agreements), may be included in the FLNG value chain. Further, downstream activities such as LNG regasification, gas storage, transportation (pipeline) and marketing arrangements may also form part of the FLNG value chain, and, in any case, will be important to analyse because they may affect the creditworthiness of the LNG buyers.

Although it is beyond the scope of this paper to consider all contractual and commercial challenges across the entire value chain of an FLNG project, four generic challenges are considered below.

**Technical issues:** In this context, it is appropriate to acknowledge the technical and operational achievements of the offshore oil and gas industry over the past 30 years or so - particularly, in the context of FLNG vessels, the development of FPSOs. While FLNG vessels and projects present new technical and operational challenges to that of FPSOs, there is also substantial commonality of issues between the two. Further, by virtue of similar operating environments, there may also be operational parallels to be drawn.

In relation to FLNG-specific technologies, and although the development and implementation of the FLNG concept appears to be within grasp, it must be noted that the technology has not yet been successfully implemented on a commercial scale, challenges include: the integration of topside processing equipment with the hull (with a deck layout that meets all operational and safety requirements), selection of a containment system that minimises LNG sloshing and boil-off (with the difficulty of constantly changing volumes within the tanks), marinisation of equipment specifically required for the liquefaction process (unique to LNG), up-scaling of plant capacity and ship-to-ship offloading of LNG in potentially dynamic metocean conditions.

**Operating issues:** Consider the logistical issues involved in operating an FLNG vessel potentially far from land-based services, without drydocking, for a period of 20 years or more. Relevant issues may include: the provision of tug services, the scheduling of FLNG vessel and equipment maintenance (planned and unplanned), the delivery and storage of spare parts, fuels and catalysts, the scheduling of gas receipt, processing and liquefaction to meet LNG and natural gas liquids (NGLs) delivery obligations and the scheduling of liquid cargo transfers (both LNG and NGLs). A failure at any stage of the process, or in any aspect of the vessel’s operating activities, could potentially cause a shut-down of the vessel, a “shut-in” of the field and contracted cargo delivery obligations to be breached.

**Commercial issues:** Each contract in an FLNG project brings with it commercial issues that must be properly addressed. At the conceptual level, developing a suite of project contracts across the FLNG value chain that creates an effective alignment of interests among each of the relevant project parties, whilst eliminating or mitigating risk, is a fundamental pre-requisite to the development and success of an FLNG project. Not only must the underlying economics of each project contract work for each party thereto, each
party must be appropriately incentivised from a commercial and legal perspective to perform its obligations over the life of the project to ensure the project as a whole remains viable.

Relevant high level commercial issues may include the over-all economic viability of the FLNG project, given such factors as: the availability of more accessible gas (land-based or not), alternative pipeline and processing infrastructure, the cost of developing and operating the upstream assets, the cost of procuring and operating an FLNG vessel, the demand and market price for LNG and NGLs and the allocation of risk for failure to perform any obligation at any point across the LNG value chain.

At the contract level, relevant issues may include the carrots and sticks to be used to help align the parties' interests and ensure that each party performs its obligations as and when required. As noted above, examples of these may include deliver-or-pay or take-or-pay obligations, liquidated damages, performance warranties on technology, operational performance targets and bonus structures.

**Selected legal issues:** Many legal issues will arise in the context of developing an FLNG project. Considering the potential breadth of the FLNG project value chain, and the range of potential parties involved, a review of all such issues is beyond the scope of this paper. However, we will briefly consider issues that may be relevant in two areas: upstream and vessel construction.

As noted above, the physical and legal proximity of the FLNG vessel to the upstream legal arrangements/regime will almost certainly impact the FLNG project. For example, will the cost (capex and opex) of acquisition, chartering and operating the FLNG vessel be recoverable under the scope of the granting instrument? If so, will title to the FLNG vessel be required to pass to the government upon termination of the granting instrument? Will the gas destined for the FLNG vessel be processed by the upstream participants separately, jointly, by a special purpose project company or by a third party under tolling arrangements - and do local laws require or prohibit any or all of the above options? How will the production "split" and the relative allocation over time influence the participants in deciding whether to market their own LNG or to form a marketing company to aggregate and sell the LNG? Where does title to the gas pass to participants, and does any transfer of title occur as LNG? Will the upstream participants be obliged to supply LNG to the relevant local market - and, if so, on what terms including pricing and liability for failure to take such supply? What is the basis of valuation of production entitlement (LNG or natural gas, and local or international market price)? The answers to these questions will be guided by applicable law and the upstream legal regime, and are likely to have a significant impact on the project structure implemented.

FLNG vessel construction will likely be undertaken pursuant to a contract that is an amalgam of concepts derived from the construction of LNG vessels (including LNG regas vessels) and FPSOs, the former primarily in relation to what we may term “LNG matters” and, the latter, primarily in relation to vessel construction and implementation techniques. Additional issues will need to be considered in the context of FLNG vessels. For example, and similar to FPSOs, a FLNG vessel will be constructed as two predominantly separate components, consisting of the hull (including tanks) and topside. The hull will be built by a shipyard (with the tanks being built with, or integrated into, the hull by specialist technology providers), while the topside will most likely be constructed by a consortium of engineering and specialist technology providers. These two components are then integrated into one vessel, most likely at the shipyard. In this context, the issue of construction and performance risks become relevant, with the question being who, if anyone, is primarily responsible for the overall performance of the FLNG vessel? If no one entity “wraps” such FLNG vessel performance, a potential liability gap may exist between the parties responsible for building and/or integrating the above components.

In addition, the FLNG vessel needs to be installed and commissioned in-situ, so detailed provisions will be required in relation to the responsibility (or otherwise) of the contractor group to deliver the FLNG vessel. Relevant to this will be responsibility for installing, hooking up or tie-ing in the FLNG vessel into relevant upstream assets, start-up tests and commissioning responsibilities. These issues can be addressed
pursuant to an EPCI or EPCIC (engineering procurement construction installation and commissioning) contract. This form of contract typically provides for various stages of completion in respect of the various parts or functions of the FLNG vessel, with a mechanical completion stage in relation to fabrication, installation and pre-commissioning of some or all parts of the FLNG vessel, after which sea and dock trials may occur. With new technology and integration of work performed by different contractors, testing the FLNG vessel aims to ensure the unit’s compliance with the design and technical requirements, and allows the contractors to rectify any defects prior to substantial completion - where the vessel will typically be accepted subject to correction of minor items. The contractual outcome on these and other construction, delivery and testing issues will depend on the particular circumstances of the project.

Conclusion

While FLNG continues to gather momentum in the offshore gas industry, with numerous large players actively implementing or considering the implementation of the concept, not one such project has yet achieved commercial operation - let alone demonstrated years of successful operation. Further, those developing FLNG are required to rely upon their experience in related projects - such as land-based liquefaction facilities, conventional LNG vessels (including floating regas vessels), FPSOs and upstream development projects - when considering how to structure the economic, legal and contractual frameworks. FLNG is an extremely challenging and costly undertaking, with the prize being the monetisation of potentially uneconomic or trapped reserves.

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