# *What are the potential implications, of exchange-based LNG auctions, for investments in liquefaction capacity?*

by

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***Abstract***

*The evolution of LNG trade has created the need for more transparent pricing. While some have argued that the secretive nature of LNG trade is hampering liquidity, there is yet a generally accepted replacement for existing price regimes. However, there are on-going efforts to establish electronic trading platforms for the commodity. What potential implications could such a trading mode have for investments in gas liquefaction infrastructure? In other words, could the spot trading of LNG, on an electronic platform, enhance or constrain investments. This issue is important because liquefaction capacity is the weakest link in the LNG supply chain. Theoretical and descriptive analyses are applied to evaluate the potential impacts of exchange-based LNG trade on four key determinants of liquefaction investment - Price; Available Markets; Trading Mode and Source of Funds (Project Finance). Data on current and proposed LNG projects, contracts, price, as well as, cost are used to substantiate underlying arguments and assertions. The research reveals that the success of an exchange-based LNG trade depends on its liquidity. By fostering transparent pricing and stakeholders' confidence, regular LNG auctions would be an incentive for demand-side investments. Due to the geological and strategic nature of gas, however, supply-side investments require more than that. While competitive LNG trade could result in efficient pricing, it is insufficient to neither attract investments nor replace oil price indexation in long term contracts – primary determinant of investments in liquefaction infrastructure. Besides, inadequate feed gas and escalating EPC costs are stronger factors constraining investments.*

## 1.0 Introduction

LNG supply is tight and it is likely to remain so in the foreseeable future. The evolution of LNG trade has also created the need for more transparent pricing and most energy economists agree on this. While there is yet a generally accepted replacement for the existing price regimes, efforts are on-going to establish electronic trading platforms for the commodity. One of such efforts is in Qatar, where the International Mercantile Exchange (IMEX) is designing a platform for regular LNG cargo auctions.[1] Similarly, Dubai Mercantile Exchange (DME) intends to list LNG futures contract but they are also considering collaboration with IMEX in Qatar.[2]

Against this background, it is pertinent to determine whether the absence of transparent LNG pricing is responsible for few supply-side investments. What potential implications could this trading mode have for investments in gas liquefaction infrastructure? In other words, could the spot trading of LNG, on an electronic platform, enhance or constrain investments. The paper adopts a theoretical approach, based on the determinants of investment, to test the following hypothesis: Lack of transparent LNG pricing discourages investments in liquefaction infrastructure. Four factors define the analytical framework: Demand; Price (or pricing); Cost; and Project Finance.

The research shows that, given liquidity[3], regular LNG auctions would generate transparent prices and increase stakeholders' confidence. It is evident from the exercise that some likely benefits of exchange-based LNG trade are already being earned by exporters. Consequently, despite its potential strengths, LNG exporters are not likely to adopt an exchange-generated price as benchmark for contract indexation. The analysis reveals that competitive prices may be adopted in investment decisions but opportunities for upstream investments must exist. So, unhindered access to gas reserves is vital for transparent prices to affect investments in liquefaction infrastructure.

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[1] The contracts are being developed by Hess Energy Trading Company (Hetco) and Clifford Chance to be regulated by the Qatar Financial Centre Regulatory Authority (QFCRA).

[2] Unofficial discussions have begun as reported in Platts, *DME considering joint LNG futures with Qatar,* at http://www.platts.com/Natural%20Gas/News/6685890.xml?src=Natural%20Gasrssheadlines1

[3] It is important to note that previous attempts to list LNG spot and futures contract on exchanges have failed due to illiquidity - insufficient transaction volume to achieve competitive trade and profitability.

This effort is important because liquefaction capacity[4] has become the weakest link in the LNG supply chain. Due to the secret nature of LNG transactions, price discovery is not market-based. Some analysts have argued[5], therefore, that trade is inefficient as the right signals for investment are not transmitted across the supply chain. This issue is also relevant because investors and producers are eager to know what factors determine the long term price of natural gas. Meanwhile, supply uncertainty could increase as Northeast Asia and North America are expected to depend more on LNG imports. Perhaps, the uneven increases[6] in regional gas prices would constrain interregional gas trade.

The paper starts with a brief description of exchange-based trading and the prevailing investment climate surrounding LNG. The author then discusses the potential impacts (direct and indirect) of exchange-based trading on some of the determinants of LNG investment. The discourse invariably reveals how competitive trading and transparent pricing could constrain or enhance investments.

## 2 Exchange-based LNG trade and Investment Climate

### 2.1.1 Exchange-based LNG auctions

Exchange-based LNG trade, which has also been termed "regular LNG cargo auctions" or "LNG hub"[7], simply refers to the trading of LNG spot contracts (cargoes) through a competitive (bidding) process on an electronic platform. The prospective trading schemes mentioned above have considered different operational modes. Dubai's DMCC aims to build an LNG Storage Facility[8] that would enable customers to store, trade and manage LNG supplies with opportunities for LNG loans and quality blending. Initially, IMEX's LNG spot contracts were to be traded in a manner similar to Dated-Brent crude oil contract, but now the idea is for exporters[9] to auction

[4] Relative to LNG tankers and regasification terminals, but excluding feed gas.
[5] Frisch, M., *LNG market may soon see emergence of regular auctions for spot cargoes*, LNG Journal, April, 2008.
[6] As well as, differences in LNG pricing regimes.
[7] These concepts/phrases are subsequently used interchangeably in this text.
[8] In partnership with Canadian LNG Firm IMPEL.
[9] This would include LNG exporting Countries and International Oil and Gas Companies.

LNG cargoes for bidding on an electronic platform[10]. Generally, the main idea behind the proposed endeavours is to make LNG trade more competitive and transparent.

### 2.1.2 Potential benefits and issues[11]

Several benefits could be realized from trading LNG on an electronic platform. Some of these benefits are discussed below to lay a foundation for subsequent analysis. These potential benefits have remained fairly contentious[12] among LNG economist and industry consultants.

- **Transparent price discovery**

This implies the competitive determination of spot price(s) for LNG as different from the current negotiated or formulated approach[13]. The real price[14] of LNG remains an illusion[15] but regular auctions could yield a solution as buyers compete for cargoes. Depending on the market situation (long or short, as in Box 2.1), the resultant spot price may be higher or lower than long term negotiated prices. Overtime, if sustained, such an efficient mechanism could develop into a price trend (forward curve) for spot LNG. Although such outcomes are desirable, an important issue for consideration is how these outcomes would affect LNG exporters in relation to their investment decisions.

**Box 2.1 LNG price discovery through spot LNG auctions[16]**

| Long Market | Short Market |
|---|---|
| ✓ Spot trading reveals price <LT contracts | ✓ Spot trading reveals price >LT contracts |
| ✓ Breaks oil-price link with low prices | ✓ Breaks oil-price link with high prices |
| • Will set the real value of LNG | |

***Note**:* LT refers to the negotiated long term contract price

[10] Frisch, M., *LNG market may soon see emergence of regular auctions for spot cargoes*, LNG Journal, April, 2008.
[11] Most of the issues raised in this sub-section are addressed in section three below.
[12] For this author's perspective of exchange-based LNG trade please see: Wagbara, O., *To what extent is a liquid LNG Hub, in the Middle East, feasible?* Paper presented at the Middle East Gas Summit (MEGAS), Qatar, 2008.
[13] Price negotiation based on: the Henry Hub (HH) gas price, National Balancing Point (NBP), a premium to Japan's LNG price or the price of other fuels.
[14] The real price gives an indication of the satisfaction which consumers derive from consuming a commodity, service or its end-product.
[15] Even as the price of long term gas supply is difficult to determine.
[16] As presented in Frisch, M., *LNG market may soon see emergence of regular auctions for spot cargoes*, LNG Journal, April, 2008.

- **Emergence of financial instruments and trading**

On the basis of physical trading and consequently, a forward curve, LNG futures and other financial derivatives could emerge.[17] It is anticipated that, the resultant forward and futures price curves could be useful tools in financial analysis and making investment decisions across the LNG supply chain. A pertinent question, however, is how reliable would these derivatives be in respects of liquefaction investments?

- **Reference price**

Unlike crude oil, there is no global approach to LNG pricing. Existing literature indicate that three conditions are vital for the emergence of a reference price for an internationally-traded commodity.[18] The first condition is the existence of an organized market[19]. Secondly, the market must be liquid. Thirdly and more importantly, price formation must be competitive[20].

It is conceivable that a global reference price could emerge from competitive LNG auctions on an electronic platform. Prices obtained from the exchange could become the benchmark for price indexation. Consequently, the costs of contract negotiation/renegotiation would be reduced. This expectation is on the premise that a defined relationship emerges between exchange-based LNG prices and downstream gas prices as they interact.[21] But, how tenable (realistic) are these assumptions (expectations) given that the largest LNG importing markets[22] offer higher prices based on crude oil price? Or would the LNG-oil price link be broken for this to happen.

## 2.2 Overview of the current investment climate:

Constrained investments in liquefaction capacity, among other factors, have been due to:

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[17] The emergence of natural gas futures at NYMEX following the liquid trading of physical gas at the Henry Hub is one reason for this expectation.

[18] Mazighi, A., *Henry Hub and National Balancing Point prices: what will be the international gas price reference?* Volume 29, Issue 3, OPEC Review, September 2005.

[19] It could be either a physical or electronic.

[20] Based on the principles of supply and demand, short term prices should be unpredictable and they should converge over the long term.

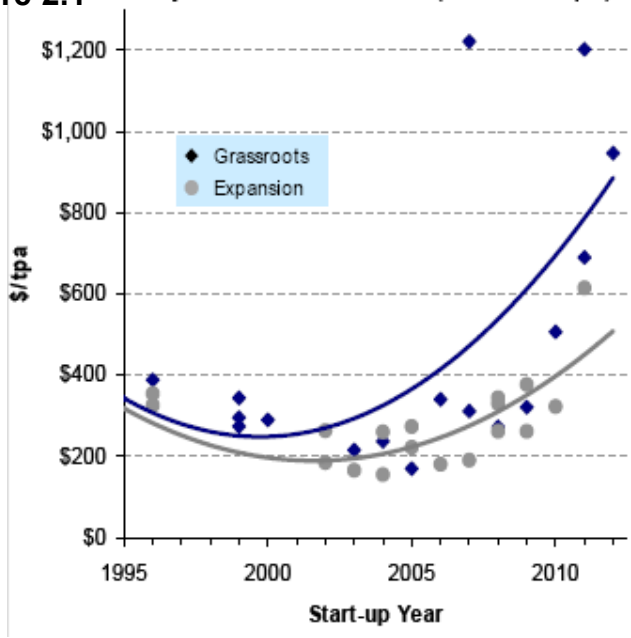
[21] This interaction may be difficult to conceive at this point in the market.

[22] Pacific LNG importers such as Japan, Korea and Taiwan, LNG imports are the gas market. For these markets, it will be much easier for exporters to exert considerable influence.

- Inadequate reserves and inaccessibility of IOGCs[23] to gas deposits;
- Rising domestic demand, economic and geopolitical concerns for most exporters
- Inadequate skilled engineering, procurement and construction (EPC) personnel and constrained contractor capacity;
- Rising EPC costs[24] despite technological innovations;

Due to the above constraints, only four liquefaction projects were concluded[25] during the last three years (from end 2005 to date).

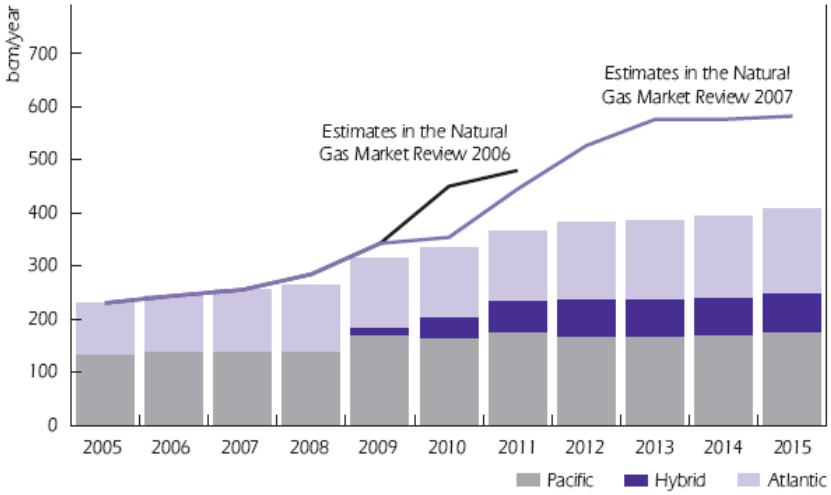
**Figure 2.1** **Liquefaction EPC costs** (2008 US$/tpa)




Apparently, predictions that demand trend of the last five years could be surpassed in the next five years[26] may not materialize. This is evident from the International Energy Agency (IEA)'s downward review of market estimates (as shown in Figure 2.2 on the next page). Moreover, the figure gives an indication that LNG supplies may not increase significantly after 2009.

[23] International Oil and Gas Companies
[24] The initial reduction in EPC cost along the LNG Chain ended in 2004 and subsequently the trend reversed due to construction capacity constraint and rising cost of raw materials (especially steel). A clear indication of this is shown in Figure 2.1 (Source: Poten and Partners at http://www.ncac-usaee.org/pdfs/2008_09Adamchak.pdf ).
[25] Final Investment Decision (FID) taken.
[26] IEA, Natural Gas Market Review 2006: Towards a global gas market. Page 49, (Paris: OECD/IEA, 2006)

**Figure 2.2** Expected LNG export capacity by region[27]




One reason for this review is that changes in the market portend newer risks and challenges for LNG producers and investors.

## 3.0 Analysis

The following discourse aims to show that other factors, other than price transparency, are fundamental to investment decisions. To determine whether the lack of transparent LNG pricing discourages supply-side investments[28], it is necessary to discuss the effects of hub-based pricing on the determinants of investments – oil and gas prices; demand; trading mode; source of funds for investment; and availability of markets; and proven gas reserves. Issues relating to the aforementioned benefits are also analyzed.

### 3.1 Oil and Gas Prices

The price of natural gas reflects the scarcity of other fuels, as well as, its end-products. Crude oil prices[29] and downstream gas prices in the US and UK determine the spot and long term prices of LNG [30]. Although spot prices and contractual prices reflect market fundamentals at different times both are connected – oil price is a

[27] IEA at http://www.iea.org/Textbase/nptable/2008/gasmarket2008_f17.pdf
[28] In this case, in natural gas liquefaction infrastructure
[29] Oil prices in Japan and the prices of petroleum products in Continental Europe.
[30] Ceteris paribus.

common link[31] between them. Within this context, oil price is one of the most significant determinants of investment in liquefaction infrastructure.[32]

Over the years, it has become obvious that exporters are more concerned with the variables and formula for determining long term LNG price. For instance, LNG investments had risen simultaneously with continued and sustained increase in oil price. To a large extent, this explains why long term LNG contract prices (or price mechanisms) determine the sources of funds, and also influence investment decisions. Unfortunately, competitive price determination[33] is often misconstrued by industry players to mean transparent price signals. A commodity's price may be competitively determined, but until it becomes the basis for investments[34] it can not be considered a transparent price signal.

Let us assume that Exchange-based LNG auctions would set the real price of LNG as buyers compete for cargoes. If this happens it could have positive implications for LNG trade but exporters would loose[35] when the market is long (i.e. oversupplied). Besides, many energy economists had anticipated that long term contracts and oil-based LNG pricing would be history, but "*LNG has not followed this script".*[36] A general explanation for this is that someone has to take responsibility for servicing the project debt[37]. Another reason, though often ignored, is producers' unwillingness to supply long term LNG linked to uncertain downstream gas prices (HH and NBP). These competitive prices, though initially reliable, have become highly volatile and often divergent[38] because the US and UK markets are now net importers of gas[39].

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[31] This link, however, occurs with a lag which is due to or related to contract indexation.
[32] It would be a worthwhile effort to evaluate the effects of current fall in oil price.
[33] Competitive price determination, as distinct from the prevalent, negotiated price determination, is a likely outcome of exchange-based LNG auctions.
[34] Demand-side (regasification terminals) investments are determined (among other factors) by domestic gas prices and spot LNG price. Given the supply-side perspective and scope of this paper, the argument holds for investments in liquefaction infrastructure.
[35] Relative to the mixed pricing portfolio currently applied by exporters
[36] Jensen, J., *Comments on Gas Demand, Contracts and Prices*, Oxford Energy Forum, May 2008.
[37] This relates to the capital intensive nature of liquefaction projects.
[38] In the short term, but over the long term prices could converge as recent studies have shown. For a recent study, s*ee* Neumann, A., *Linking Natural Gas Markets – Is LNG doing its job?* DIW Berlin Working Paper, September 2008, at http://www.diw.de/documents/publikationen/73/89043/dp822.pdf
[39]These markets are uncertain in terms supply-demand fundamentals; dependence on domestic production and exposed to changers in other markets. For instance, the linkage of Continental Europe to the UK market through the Interconnector distorts LNG demand patterns.

If investors are skeptical about using competitive gas prices for making long term investment decisions[40] then exporters are likely to perceive auction-based LNG prices in the same manner. Moreover, it would be difficult to reconcile the exchange-based price with different domestic gas prices. Since domestic gas (hub) prices are the bases on which LNG importers negotiate long term and short term contracts, by what mechanism would exchange-generated prices influence investment. So whether the market becomes long or remains tight, as has been forecasted, the few investments in liquefaction capacity can not linked to how LNG is priced currently. Rather, it is exporters' perception of current and future price regimes, relative to their interests, that matter. This is because the price of a commodity may not be the actual basis on which investment decisions are taken – as is the case with LNG liquefaction infrastructure.

### 3.2 Demand

A discourse on the demand-side issues is pertinent because demand is also a determinant of LNG investments. Furthermore, the price mechanism for LNG would be inefficient without the interaction of demand. Apart from technology and the initial fall in costs, increased gas demand has been instrumental to the expansion of LNG trade. Growth in LNG demand can be traced to a number of factors. Principal amongst them are oil price hikes; low-priced natural gas; diminishing domestic gas production; increased size of LNG vessel; climate change policies and supply diversification.

For instance, efforts to solve problems with (or diversify) traditional OECD gas supply[41] have made LNG a valuable option. Existing data reveals that OECD countries accounted for 93% of total LNG volumes traded in 2005 and their consumption of LNG is projected to double in the next five years.[42] Consequently, LNG trade has grown from being just 6% of international gas trade in 1970 to 22% in

[40] The NBP and HH prices have been used as benchmarks for pricing long term contracts in only a few liquefaction projects. Even in such cases, higher Asian prices and diversion rights provided additional protection from potential losses associated with lower prices in the UK/US.
[41] Jensen, J.T., The development of a global LNG market, (Oxford: Oxford institute for Energy Studies, 2004).
[42] IEA, Natural Gas Market Review 2006: Towards a global gas market. Page 35, (Paris: OECD/IEA, 2006).

2006[43]. Some projections indicate that the LNG demand centre would move to the Atlantic Basin from Asia-Pacific, with drastic increase in imports[44].

A competitive regime for trading LNG would, therefore, enhance importers' confidence in the global commodity as price discovery takes a competitive turn. With supply diversification becoming the norm, new importers would be keen to participate in regular LNG auctions. But to do this, they would need to investment in regasification terminals. Therefore, as cargoes are traded across the globe, it could trigger more speculative investments in regasification capacity as the existing terminals become fully utilized. The question, however, is whether such developments could be incentives for similar supply-side investments.

One can confidently assert that, if the above expectations materialize, then they could provoke investments in shipping capacity. To the extent that oil price permits, it is conceivable that some investments in liquefaction infrastructure would be provoked by demand increase. In this sense, the incentive is a relative and sustained increase in LNG (or oil) price due to the demand increase rather than competitive LNG trade[45]. While it is apparent that regasification terminals currently exceed liquefaction terminals, we are yet to see the sort of increase in liquefaction investments speculated above. Rather new regasification projects are being hampered by tight LNG supply.[46]

### 3.3 Trading mode

Typically, a commodity's trading mode affects investments. The nature and mechanism of influence would, however, depend on the type of commodity being traded. Irrespective of the commodity, two fundamental conditions are necessary: it has to be the predominant trading mode for the commodity and its transmitted prices should form the basis for contracting along the value chain. In the case of LNG, most transactions are done by long term contracts indexed to the prices of other fuels, natural gas and its end-products. To impact investments, therefore, exchange-based

[43] Chabrelie, M., *LNG: A Commodity in the Making*, PANORAMA 2006 at http://www.ifp.fr/IFP/en/events/panorama/IFP-Panorama06_10-GNL-VA.pdf
[44] IEA, Natural Gas Market Review 2006: Towards a global gas market. Page 52, (Paris: OECD/IEA, 2006).
[45] It may be argued, however, that exchange-based auctions triggered the initial demand increase.
[46] Rudo, D. and Flippen, S. *Recent trends in downstream project financing*, Vol. 50, No 31, MEES July 2007, at http://www.mees.com/postedarticles/oped/v50n31-5OD01.htm

LNG prices have to influence or replace crude oil prices as the basis for contract indexation[47]. In the alternative, spot LNG auctions must become the dominant trading mode.

Some proponents of exchange-based LNG trade expect the former but it is unlikely to occur even with increased spot trade. This expectation may not be met unless exporters perceive that the benefits of regular LNG auctions are not derivable from the existing price regimes. Furthermore, the industry's evolutionary path indicates that long term contracts (whether between or within[48] companies) would continue to underlie LNG project finance and trade. However, with increased liquidity[49], on the exchange or LNG Hub, the amount of contracted capacity required for LNG projects to be initiated would gradually decrease over time. Consequently, this could make it easier for Final Investment Decisions (FID) to be taken.

### 3.4 Source of funds (project finance)

The source of investment funds is another determinant of investment in liquefaction infrastructure. It also directly linked to commodity's trading mode and price regime. What's more, stakeholders and financiers' confidence impact on the availability of project finance. Between 2004 and 2006 LNG projects secured some of the largest financing deals even at relatively low margins due to the high confidence financiers and investors had in the commodity. So could transparent LNG pricing increase confidence?

Spot LNG auctions would complicate an extremely dynamic LNG industry, but, if transactions or prices become more transparent, it could increase stakeholders' confidence in the future of the commodity. The degree of confidence would depend on how much importers use the exchange to diversify supply and hedge risks as trade expands. Also, because it could reduce contract negotiation time and costs,

[47] It also has to be the basis for other contracts/transactions across the LNG chain.
[48] The self-contracting of LNG liquefaction capacity, by project partners, to their downstream subsidiaries (indirect integration) is gradually replacing the traditional sales contracts to third parties.
[49] It is important to note that previous attempts to list LNG spot and futures contract on exchanges have failed due to illiquidity - insufficient transaction volume to achieve competitive trade and profitability. Some questions relating to the extent of liquidity that is feasible has been put forward by this author in: Wagbara, O., *To what extent is a liquid LNG Hub, in the Middle East, feasible?* IELR, Issue 3, 2008.

project partners[50] and financier would be willing to use it as a benchmark provided it is acceptable to exporting countries. A relevant question is whether the exchange generated price would be equal to or higher than crude oil parity[51].

Besides, how certain can one be about project financiers' preference for an LNG-based international pricing system? LNG trade has not only become sophisticated with self-contracting, cargo diversions and profit splitting mechanisms, but pricing is more complex. The situation has changed risk profiles along the chain and lenders are now apprehensive that the prevailing trade model involves less secure off-take contracts[52]. In addition, financial derivatives have lost their attraction[53] as useful tools for providing price certainty in the long term. Unfortunately, rising project costs, since 2005, is worsening financiers' unease about escalating budgets. Exchange-based trading could generate transparent short term LNG prices, but the fact is that financial risk protection is a concern for sponsors and financiers even in competitive markets[54].

It is evident from the above that several factors are responsible for increased project finance risks and relative drop in LNG investments. So, it would be inconclusive to assert that the absence of transparent pricing is a disincentive to investment in liquefaction capacity. Though competitive price discovery has its merits, auction-based LNG trade[55] alone would not encourage investments in liquefaction capacity. Rather, it is certain that exporters' perception of and response to risks and opportunities in the market would change. For lenders and equity investors, regular LNG auctions could reduce the economic uncertainties and risks associated with destination flexibility. But it is exporters' response to the new risks that would ultimately determine financiers' perception and consequently, the availability of funds for liquefaction investments.

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[50] IOGCs that are venture partners in the Special Purpose Vehicle (SPV) created for liquefaction projects.
[51] This is question another reason why LNG importers consider HH and NBP more competitive indices in the US and UK respectively.
[52] Due to the existence of LNG Aggregators: a new role being played by International Oil and Gas Companies (IOGCs).
[53] Since the collapse of Enron
[54] Either in fully-liberalised gas markets or an LNG Hub: See Jensen, J., *Comments on Gas Demand, Contracts and Prices*, Oxford Energy Forum, May 2008.
[55] This also is a mechanism for achieving competitive price discovery.

A positive trend could emerge, however, if IOGCs can fit spot LNG auctions into their new role as aggregators[56]. Given positive expectation of the market, they would continue as arbitrage agents, while increasing their investments and participating in regular cargo auctions. Having successfully funded the uncontracted elements of the LNG supply chain,[57] the industry could rely less on lenders. A potential implication is increased supply and market liquidity if more participants decide to invest without the essential off-take contracts. Over time we could also see a reduction in the cost of borrowing for LNG projects as financial institutions compete among themselves.

### 3.5 Available Market(s)

In deciding to invest in liquefaction capacity for export, gas-rich nations evaluate their proven reserves against domestic demand. This explains the tendency[58] of producing countries to withhold a greater proportion of gas production for their growing domestic markets. In addition, exporters now have a strategy of using markets in the Pacific Basin as substantial channels for achieving higher prices. It is probable that these are not in any sense "communal decisions" and have been taken for different national reasons.[59] What is important, however, is that this trend would continue[60] despite the emergence of a transparent price mechanism through cargo auctions.

Considering the above posture of LNG exporters, what are the potential implications for other stakeholders? Generally, before investing IOGCs consider the market and its potential impacts on future cash flows. As a result, they consistently align their investment patterns with expectations of the market. In reality, IGOCs have geopolitical concerns relating to upstream access. Even where there is upstream access, in many LNG exporting countries, investments are hampered by domestic

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[56] In this role, IOGCs determine the ultimate cargo destination and optimize profitability.
[57] This was the case in the Equatorial Guinea and Egyptian LNG projects, as well as, some of Qatar's LNG projects.
[58] A trend among most LNG exporters to delay and restrict new export projects has become clear: moratoria on new projects already exist in Qatar and Egypt; and Nigeria has paused to reflect on domestic gas/electricity developments while Trinidad, needs to find new gas to expand further.
[59] The prospect of a gas cartel remains contentious among Energy Economists. This author's views are discussed in Wagbara, O., *What are the prospects for a Gas OPEC?* International Gas, October 2008 and *To what extent could an LNG export organization, operating a uniform pricing or volume control mechanism, influence LNG trade in the Atlantic Basin?* Paper presented at the 27th IAEE/USAEE North America Conference, Houston 2007.
[60] In the foreseeable future: A clearer perspective of this issue was presented in Dargun, J., *Trouble in Paradise – The Widening Gulf Gas Deficit*, Volume 51, No.39, MEES, Sept., 2008 at http://www.mees.com/postedarticles/oped/v51n39-5OD01.htm

supply obligations[61]. Besides tighter and unstable fiscal regimes for upstream gas contracts have discouraged investment.[62] It is important to note also that investment in gas exploration and production capacity precedes investment in liquefaction capacity.

So unless domestic price reforms are undertaken and IOGCs gain access to gas reserves, competitive prices would not be useful for making investment decisions. Neither would spot LNG trade nor competitive pricing be pivotal to the eventual abandonment of long term contracts as a prerequisite for investments in liquefaction capacity.

## 4.0 Conclusion

Theoretically, the mode of trading and pricing a commodity affects infrastructural investments. Given demand, regular LNG auctions could be an incentive for demand-side investments by fostering transparent pricing. Due to the geological and strategic nature of gas, however, supply-side investments require more than that. While competitive LNG trade is attractive and necessary for the attainment of efficient pricing, it would not replace long term contracts[63]. Neither would competitively determined LNG price sufficiently replace oil price indexation in long-term contracts.

Spot LNG auctions, however, has some implications for other determinants of investment – project finance; short term pricing and trade. Meanwhile, insufficient feed gas and inadequate construction capacity (rising costs) are stronger factors constraining investments. There are concerns for equity and debt investors with competitive pricing – Henry Hub and National Balancing Point gas prices. Furthermore, domestic pricing in most LNG-exporting countries need to be reformed. This would be an additional incentive, as gas producing companies (IOGCs) also need to meet domestic supply obligations.

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[61] At subsidized prices in regulated gas markets: *See* Stern, J., *Gas as a transitional fuel*, OEF; February, 2008.

[62] For instance, OKLNG and Brass LNG in Nigeria have fought unsuccessfully to enjoy the same tax holiday as Bonny LNG. There are on-going efforts, by the National Assembly, to amend the 1990 NLNG (Fiscal Incentives, Guarantees and Assurances) Act, Cap N89, Laws of the Federal Republic of Nigeria, 2004.

[63] One fundamental requirement for investments in liquefaction infrastructure

The lack of competitive price discovery does not significantly hamper supply-side investments and is not responsible for the tight LNG supply situation. Rather the trend among LNG exporters to delay and restrict new export projects[64] has significant consequences – it would suppress any effects of competitive pricing on investments in liquefaction capacity. Finally, therefore, the extent to which exchange-based LNG trade affects supply-side investments would depend on exporters' willingness to forego crude oil price indexation.

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