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Our reference: 5671421/ 5651583

2 July 2010

Dr Michael Nahan MLA
Chairman
Economics and Industry Committee
Legislative Assembly Committee Office
Level 1, 11 Harvest Terrace
WEST PERTH WA 6005

Attention: Mr Timothy Hughes, Principal Research Officer

Dear Chair

SUBMISSION TO THE STATE PARLIAMENTARY INQUIRY – DOMESTIC GAS PRICES

Please find **enclosed** a copy of Woodside's submission to the Economics and Industry Committee's Inquiry into Domestic Gas Prices.

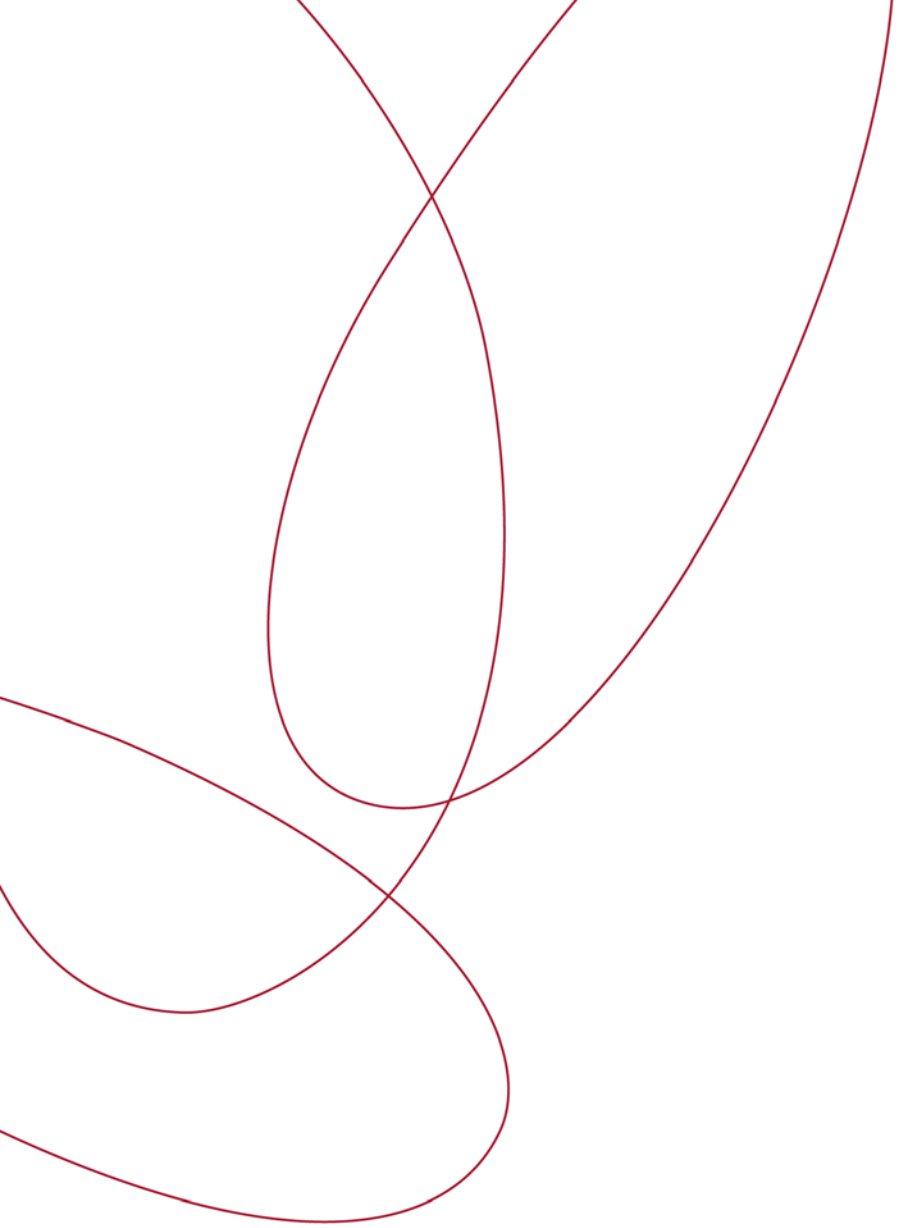
We trust that we are able to provide valuable insight for the Committee's debate and discussion.

Should you require additional information, please do not hesitate to contact me.

Yours sincerely

Niegel Grazia
Vice President, Corporate Affairs

Enc.



Submission

WA Parliament
Economics and Industry Standing Committee

Domestic Gas Prices Inquiry

2 July 2010

DRIMS#5651583

TABLE OF CONTENTS

KEY POINTS

1. In response to the Terms of Reference:
   - Average gas prices in Western Australia have been comparable and slightly lower than prices in the east coast market.
   - Average gas prices in Western Australia have been significantly lower than international prices for gas over an extended period.
   - Average gas prices in Western Australia remain well below average international liquefied natural gas prices.
2. Media reports suggest that new contracts for incremental gas into the system have been struck at relatively "high" prices reflecting market fundamentals at the time of the agreement and the alternative fuels available to the customer.
3. The structure of the market and the nature of long term existing contracts in Western Australia have resulted in low prices which in turn have discouraged further investment. More recent indications of stronger pricing have resulted in new investments being made.
4. The rising cost of gas field development in Western Australia is a driver of gas price. Upstream costs today are significantly higher than when existing domestic gas supply projects were developed.

1 INTRODUCTION

Woodside welcomes the opportunity to make this submission to the Western Australian Legislative Assembly Economics and Industry Standing Committee Inquiry into Domestic Gas Prices. This submission is made by Woodside and not on behalf of the North West Shelf Venture.

Woodside is keen to ensure that in the development of this important area of policy there is an accurate reflection of the Western Australian gas market and the size and composition of the State's substantial gas reserves. It is important to note that the nature of new gas sources is different from historical supply and presents challenges to the economic development of these gas resources. Woodside continues to address these challenges to produce gas to meet market demand.

As a member of the Australian Petroleum Production and Exploration Association (APPEA), Woodside has contributed to the peak body submission and supports the ongoing advocacy of APPEA on this matter. The purpose of this submission is to complement the opinions expressed by APPEA through the emphasis of particular recommendations and key issues.

In addition to the comments in APPEA's submission, Woodside highlights further impacts with regards to:

- market fundamentals of the WA pipeline gas market including supply and demand;
- the competitive environment of the WA pipeline gas market;
- contract terms and conditions;
- industry dynamics such as cost increases;
- comparison of east and west coast pricing and market structures; and
- liquefied natural gas (LNG) prices.

We trust our submission assists the Committee in its deliberations.

2 ABOUT WOODSIDE

Woodside is Australia's leading independent oil and gas exploration, development and production company. We seek to maintain this position through the responsible delivery of outstanding economic performance, environmental excellence and social contribution.

Based in Perth, Western Australia (WA), Woodside has major operating assets in Australia and the United States of America (USA) and exploration interests around the world.

Woodside operates two of Australia's largest resources projects, including the North West Shelf Venture (NWSV) Karratha Gas Plant (KGP) in WA, which produces more than 40% of Australia's oil and gas. The NWSV KGP also supplies around 65% of Western Australia's pipeline gas production and more than 80% of Australia's LNG exports. Woodside, as operator and participant in the NWSV, is proud of its contribution to the WA gas market over the last 25 years and is committed to marketing gas to new and existing customers.

In 2010, Woodside will complete construction of the Pluto LNG Project near Karratha. The Pluto Project, together with its growth potential will advance Woodside's objective to become a global LNG leader. The Sunrise and Browse LNG Developments also provide significant opportunities for further investment and growth.

Woodside aims to commercialise some of Australia's largest undeveloped gas resources through the application of leading technologies and by competing for sales agreements in the global LNG market.

3 GAS MARKET CHARACTERISTICS

Woodside is in accord with international bodies such as the International Energy Agency (IEA) which consider that

> "In open gas markets, supply and demand can usually be balanced by the market. The challenge of security of supply is to make sure that the market can always clear supply and demand".[1]

Basic economics dictates that in open, market based systems, supply and demand are balanced through the clearing mechanism of price. Supply, demand and price interact in a complex and dynamic feedback process. Regulatory intervention which prescribes specific outcomes for supply, demand or price has historically failed to produce economically efficient outcomes in the longer term.

The IEA further counsels that open markets provide efficient outcomes in the long-run, but that due to short-term market imbalances, there may be concern that:

> "...market outcomes – like volatile prices, or high prices – may lead some industries to relocate to regions with lower gas/electricity prices. Governments may take unsatisfactory market outcomes as an impulse to rethink the framework and implement its modification to mitigate market outcomes in line with their policy".[2]

On the supply side, the specific characteristics of the gas market can limit the responsiveness of supply to changes in demand in the short term, which affects price. Though gas can be bought and sold like any other good, the difference between gas and other commodities markets is that the delivery of gas is capacity-bound, either for production, processing or transmission, which limits the ability for supply to respond to changes in market conditions in the short term. Pipeline gas is delivered "through a long fixed chain of capacity-bound investment, where any part of the chain may prove to be a weak link for the rest of the chain".[3] In this respect, the importance of the entire gas value chain and its impact on prices needs to be considered.

Upstream supply is only one part of the gas value chain which affects end-user prices. Gas transportation is typically a natural monopoly because there are economies of scale and it is inefficient to build competing networks. Thus, the supply of gas to end users in many cases involves an element of monopoly — even in a competitive market.[4] Government has a responsibility to regulate natural monopolies to facilitate positive outcomes in the long term. This would include providing clear market signals to allocate spare capacity for future investments,

[1] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.19
[2] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.20
[3] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.59
[4] IEA (1998) Natural Gas Pricing in Competitive Markets, Paris, p.16

such as the supply of sufficient transmission capacity to support both the long-term and short-term market for gas.[5] Lack of pipeline capacity results in price volatility during peak periods. Various approvals processes for projects can also contribute to delay in the responsiveness of supply to increased demand.

In an efficient gas market, production and transmission infrastructure are operating near capacity. New capacity is created as a result of price signals. However, prices are generally lower on average than for less open gas markets.

On the demand side, the demand for gas is relatively unresponsive to changes in price (inelastic), where fuel-switching is not an option. This can put upward pressure on price, when capacity is near its limits.

4 THE WA PIPELINE GAS MARKET

4.1 Background

The WA pipeline gas market is unique, being geographically isolated from other Australian gas markets. It is primarily a long-term bilateral contract-based market. Contracts are typically confidential to the parties involved. The market has little data with which to assess the availability of new supply or the standing of potential buyers.

Woodside would like to address key aspects which impact the gas price outcomes in WA, including:

- WA gas market characteristics – supply, demand and participation.
- WA gas market structure, including value chain considerations and the impact of bi-lateral contract terms and conditions. The impact of non-commodity services on pricing is assessed.
- Industry dynamics, such as cost trends across the energy industry.

4.2 Supply

There is no shortage of natural gas reserves accessible by the WA market,[6] however, "the conventional view is that larger fields or groups of fields are not suitable for stand-alone domestic development and the majority of Western Australia's resources fall into this category".[7] These fields are not only distant from shore, but there is also a very large geographical distance between their location and that of end users, "requiring long haul pipelines with few genuine hubs".[8]

However, specific market structure issues have created a structural over supply position resulting in artificially low gas prices in WA over an extended period. This has resulted in a failure to stimulate sufficient investment in new supply chain capacity over this period.

In the last 2-3 years a tightening market and the need for higher revenues to support the development of new higher cost resources, has seen a rise in pricing for new gas contracts. Upward trends in upstream costs are detailed further in Section 4.7.

Wood Mackenzie[9] outlines some recent issues affecting current domestic gas supply, some positively and some negatively, such as:

- The declaration of force majeure by the Harriet Joint Venture in relation to uncertainty of gas reserves in 2006.

[5] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.68
[6] WA Department Mines and Petroleum (2010) Western Australian Minerals and Petroleum Statistics Digest 2009, p.18
[7] McLennan Magasanik Associates MMA (2007) Report to the Joint Working Group on Natural Gas Supply – Natural Gas in Australia, 16 July 2007, p.59
[8] Chamber of Commerce and Industry WA (2007) Meeting the Future Gas Needs of Western Australia – A Discussion Paper, May 2007, p.51
[9] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, pp.31-2

- The imposition of the Domestic Gas Reservation Policy in 2006 in order to secure up to 15% of reserves from LNG projects for delivery into the WA pipeline gas market.
- The Varanus Island pipeline explosion in May 2008.
- Changes to gas pipeline specifications.

Two key factors impact the availability of natural gas over the forward period. First, supply from current production facilities will begin to decline as these developments complete supply contracts and deplete their developed resources. Second, there will be a number of new projects commencing supply into the market. These new facilities are a combination of dedicated pipeline gas developments and pipeline gas plants associated with new LNG developments. The APPEA submission to this Inquiry details the new projects which can supply pipeline gas to the WA market.

Woodside expects that incremental net supply equivalent to approximately 30% of the current market (which is of the order of 1,000 terajoules per day (TJ/d)) will be coming on stream by 2013.

4.3 Demand

WA gas demand has increased sharply in recent years, and notwithstanding the drop due to the global financial crisis, growth is forecast to continue.[10] This demand has been driven in part from the industrial sector, during a period of strong economic growth and increased activity due to the commodities boom. In addition, more than half of WA power generation is gas-fired and the future outlook continues to be positive with strong population growth in WA,[11] and with the environmental trend towards cleaner, lower emissions fuels. This increased demand has contributed to the tightening of the supply/demand position noted above.

With current gas demand at around 1,000 TJ/d, various third party demand growth forecasts by the former Department of Industry and Resources, the WA Chamber of Minerals and Energy (CME) and the WA Domgas Alliance, exhibit a wide range (up to 1,000 TJ/d) for the forward period.[12] Of the third-party views available, Woodside's view is most closely aligned with the CME projections in the medium term.

4.4 Supply and Demand Balance

Woodside's forward view, based on our 'most likely' supply and demand scenarios, indicates a tight supply/demand position in WA until at least 2012. The tight supply/demand balance suggests an increase in prices for contracts in the short term only. The WA gas market is expected to ease after 2013, with the addition of significant supply volumes from the Reindeer/ Devil Creek (Apache Energy – under construction) and Macedon (BHP Billiton – Final Investment Decision expected this year) dedicated pipeline gas projects resulting in a more balanced market. This relatively balanced period of supply and demand is expected to persist until 2015, after which the State-directed domestic gas obligations from the Gorgon and Wheatstone LNG projects will tip the market into long-term oversupply again, likely causing prices to fall.

The view of a tight market in the mid-term is quite widely shared and has prompted the State Government to take action to facilitate new pipeline gas developments, in the first instance, the BHP Billiton Macedon project. WA Parliament passed legislation on 17 November 2009 to broaden the gas specifications applicable to the State's main gas pipelines, removing a key obstacle to the Macedon gas project, which will produce a low heating value product. However, limited pipeline capacity will continue to constrain the ability to supply.[13]

[10] The Chamber of Minerals and Energy WA (2009) Developing a Growth Outlook for WA's Minerals & Energy Industry – Outlook and Implications, 18 December 2008
[11] Australian Bureau of Statistics (2008) Population Projections Australia 2006-2101, Cat No. 3222.0, September 2008
[12] The Chamber of Minerals and Energy WA (2009) Developing a Growth Outlook for WA's Minerals & Energy Industry – Outlook and Implications, 18 December 2008; Economic Consulting Services, Report for the Domgas Alliance – Natural Gas Demand Outlook for Western Australia and Economic Impact, October 2008; WA Department of Industry and Resources, Petroleum in Western Australia, September 2007, p.5
[13] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.8

Woodside is not privy to the contract prices of other suppliers. However, media reports[14] suggest that these new contracts for incremental gas into the system have been struck at relatively 'high' prices, reflecting market fundamentals at the time of agreement. For example, it is understood that some new oil-linked pipeline gas contracts reached unprecedented price highs driven by the efforts of the mining industry to bring new projects to market at a particular point in time – in particular, those occurring after the supply disruption caused by the explosion at the Varanus Island gas processing plant (June 2008) – which caused a severe tightening in the WA gas market from the supply side – but prior to the impact of the global financial crisis – which caused a loosening of the market from the demand side (late 2008).

Price volatility can be exacerbated from both the supply-side and the demand-side. In WA, increments to gas supply and demand occur infrequently and in large tranches. Being a bilateral contract-based market, these large increments on both sides give the WA gas market its "lumpy" nature. Furthermore, the successful matching of supply with demand must be coordinated with the required level of transportation capacity. As investment in additional transmission capacity is also based exclusively on long-term contracts for capacity, there is currently no mechanism to provide capacity to support the development of short and medium term trade, which impedes gas suppliers efforts to provide incremental volumes during periods of market tightness.

Any consideration of domestic gas prices needs to be in the context of the entire energy supply chain, in particular, gas transmission impacts must be assessed.[15] With regards to the delivery of gas to the residential sector and small-to-medium businesses, as APPEA has highlighted, the delivered cost is dominated by the margins taken at the distribution and retailing points, with upstream suppliers receiving "less than one fifth of the price paid by residential customers in Perth".[16]

4.5 Competitive Environment

4.5.1 Background

In recent years, many reports, publications and submissions have thoroughly described the features of the WA gas market.[17] Importantly, in that time, indeed in the last decade or more, little has changed in terms of market structure.[18]

The structure of the market is fundamental to determining its efficiency, including the reliability of supply and the affordability of gas. [19] The more open the market, that is, where prices are set by the forces of supply and demand and where there is less direct government intervention, the more efficient the market. The IEA states that open gas markets

> "are powerful 'tools' for providing efficiency and ensuring that gas goes to its highest value. In the short term, they allow supply and demand to be balanced by the price mechanism. In deep and liquid markets, like the US and UK, suppliers/consumers will always be able to sell/buy gas on the spot market, providing they accept the market price."[20]

Only mature markets can offer customers a choice between suppliers and the level of liquidity in both the physical commodity and capacity that are required to promote competition. Though the unique nature of the WA market precludes it from some of the advantages of other more open, liquid gas markets, prices have remained stable for a long period of time. However, price

[14] See Santos News Announcement, "Santos secures Moly Metals gas supply contract", 8 October 2008; Santos News Announcement, "New contract for John Brookes gas field", 12 August 2004
[15] APPEA (2010) Submission to Strategic Energy Issues Paper, March 2010, p.3
[16] APPEA (2010) Submission to Strategic Energy Issues Paper, March 2010, p.16
[17] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010; KPMG (2010) Gas Market Report, May 2010; Chamber of Commerce and Industry WA Meeting the Future Gas Needs of Western Australia – A Discussion Paper, May 2007; Ministerial Council on Mineral and Petroleum Resources/ Ministerial Council on Energy Joint Working Group on Natural Gas Supply Final Report, September 2007
[18] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.8
[19] IEA/OECD (2008) Natural Gas Market Review, p.217
[20] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.65

adjustments still have to be made at intervals to reflect significant changes in market conditions and to bring supply and demand back into balance. The recent gas price changes in WA are part of this long-overdue adjustment.

Wood Mackenzie[21] identify the following key components of an efficient and mature market:
1) Number of customers and their requirements;
2) Number of competitive suppliers;
3) Gas transportation options;
4) Gas storage options;
5) Activities of gas brokers/ aggregators;
6) Existence of gas-related financial markets; and
7) Extent of short term and spot markets/ sales.

Whilst these factors have been discussed at length elsewhere, it is worth briefly highlighting the key issues below.

4.5.2 Number of Customers

As noted earlier the WA pipeline gas market is primarily a long-term bilateral contract-based market. It is unique in that five major customers (Alcoa, Alinta, BHP Billiton, Burrup Fertilisers and Western Power) account for approximately 90% of the State's gas consumption, with four of them sited in the southwest of the state, remote from the main supply sources.[22]

The majority of gas purchases are from the major buyers. Between 1998 and 2009 the number of active gas sales contracts in the WA gas market has increased from approximately 22 contracts in 1998 to a high of 33 contracts in 2005 and falling to 26 active contracts in 2009.[23]

The largest segment of the WA gas market (58%) is the industrial market.[24] The major buyers sell their products into the international market and benefit from international market prices for these products. The second largest segment in WA is electricity generation, accounting for a further 29%.[25] Gas competes with coal as a primary fuel source in this market. Gas demand for power generation in WA is currently approximately 150TJ/d. Approximately 60% of WA's power generation is fuelled by gas.[26]

Reticulated gas for direct household use represents less than 5% of the pipeline gas market.[27] Prices for this segment of the market are regulated by the WA Government.

4.5.3 Number of competitive suppliers

Gas sold in the WA pipeline gas market is predominantly sourced from the Carnarvon Basin, offshore north-west of WA. The majority of domestic gas sales are through joint venture sales - the combined gas sales of NWSV, Apache Energy and Santos Joint Ventures make up 95% of the gas sales in WA.[28]

In recent years there have been significant changes to the State's gas reserves position with gas reserves increasing dramatically with the discovery of a number of large, new gas fields in the offshore Carnarvon Basin.[29] These gas fields are sufficient to support a strong domestic market as well as large export projects.

[21] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010
[22] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.12
[23] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.13
[24] APPEA (2010) Submission to Strategic Energy Issues Paper, March 2010, p.7
[25] APPEA (2010) Submission to Strategic Energy Issues Paper, March 2010, p.7
[26] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.17
[27] APPEA (2009) Submission to The Gas Supply Emergency Management Review Committee, Gas Supply Security in Western Australia, May 2009, p.5
[28] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.21
[29] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.19

4.5.4 Gas transportation options

The WA pipeline gas market is predominantly served by two large pipelines delivering gas from the producer areas in the north-west to the major consumption centres in Perth, areas south of Perth and the Goldfields region. There is limited interconnectivity between these pipelines.

4.5.5 Gas storage options; Activities of gas brokers; Existence of gas-related financial markets; and Extent of short term and spot market

The gas market of the USA is an example of a highly liquid and mature market which has developed over the last 20 to 30 years. Key policy decisions and the geographical distribution of population have driven the development of numerous interconnected pipeline facilities. Trading hubs have developed at significant inter-connection points. Deregulation of the gas industry has resulted in unbundling of commodity and service components of the market. These hubs, with physical storage facilities, have allowed the creation of exchange markets facilitating transparent price discovery and the balancing of supply and demand at each point. Surplus physical storage furthermore promoted the development of futures markets and related financial markets/instruments.[30] There are over 30 such hubs in the USA, with the largest and most liquid in the world, Henry Hub in Louisiana, connecting 13 pipelines and three salt cavern storage facilities.

Storage and interconnection (hubs) allow producers and consumers to manage exposure to seasonal and outage related fluctuations in supply and demand.

Due to the geography of WA, the location of its customers, suppliers and pipelines, level of storage, many of these features are absent. As a result such liquidity is not possible for the Western Australian market at present.

Currently, there is only one commercial gas storage facility in WA which is a small underground facility located near Dongara (Mondarra) which has limited capacity of around 12 TJ/d in and out.[31] [32]

Lack of a spot gas market and the absence of spot pipeline capacity has impeded the emergence of gas brokers and aggregators in WA. Since 1998, gas aggregation and brokering services to the WA gas market have progressed but are still considered immature. The four established businesses offering gas brokering and aggregation services to the WA gas market are: Alinta, Synergy, Verve Energy and Perth Energy. [33]

Currently, there are no gas related financial markets in WA.[34]

The WA spot market is modest and considered highly immature.[35]

4.6 Contract Terms and Conditions

In addition to market fundamentals and structure, gas price outcomes in WA must be seen as an outworking of the negotiation process regarding the terms and conditions of the sales contracts, which are primarily long term. In addition to comments in APPEA's submission regarding the inter-relation of contract terms and conditions, Woodside emphasises that prices are a result of these terms and conditions, reflecting risk premia on various activities for buyers and sellers. Such terms and conditions might include:

- the length of term;
- flexibility of volume taken;

[30] IEA/OECD (2000) Regulatory Reform: European Gas, Paris, p.99
[31] KPMG (2010) Gas Market Report, May 2010, p.44 citing APA Group Website, Western Australia, http:www.apa.com.au/our-business/gas-transmission-and-distribution/western-australia.aspx
[32] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p. 39 citing Office of Energy "Information Update", 25 June 2008
[33] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.40
[34] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.42
[35] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010, p.43

- price review periods/ trigger points;
- payment method;
- nomination period; and
- penalties associated with failure to supply.

Each of the terms and conditions are a result of both the buyers and sellers negotiating to their needs. Due to the WA market structure, both require long-term, large volume contracts in order to mitigate project risks. Obtaining project finance for WA's typically capital-intensive projects requires:

- for suppliers, that a high proportion of the volume has been sold on a long-term basis;
- for buyers, that energy supply is likewise secured on a long-term basis.

The terms and conditions represent concessions made on both sides in terms of liability (for the level of price and volume changes, notice period changes required, etc) which then modulate the contract price up or down depending on the onus of the liability being on one party or the other.

The hazard with long-term contracts, however, is both parties being bound by an agreement that no longer reflects the market situation, such as the demand/supply balance, input and output prices, changes in the market structure or technological innovations. For example, contracts for the North West Shelf project were struck originally some 30 years ago when there was almost no existing demand for gas, and the significance of changes in the customer and cost structure were unforeseen.

However, the characteristic of the WA market being dominated by long term contracts should not be viewed as detracting from its efficiency. In each part of the energy supply chain, from the upstream right through to the final user of the gas, long-term contracts have played a useful role to hedge long-term risks "where the instruments of liquid and open markets were not applicable or useful".[36] Indeed evidence from mature gas markets shows that "long-term contracts do not disappear with market liberalisation".[37] However, though long-term contracts remain a major factor ensuring future gas supplies, with evolution of the market, their structure and pricing clauses are likely to undergo substantial changes, such as shorter terms for new contracts, smaller volumes and pricing against new/different indices.

4.7 Industry Dynamics – Costs

The rising cost of gas field development is a further driver of gas price change in WA. The cost structure for gas supply projects in WA is comprised primarily of costs associated with the sourcing of materials and services from the global upstream materials and services market and a large volume of skilled Australian engineering, construction and manufacturing labour.

For pipeline gas projects, the upstream typically represents the majority of total investment, accounting for more than half of total global gas sector spending.[38] Upstream costs are composed of a range of equipment and services, including but not limited to: engineering, procurement and construction and front end engineering and design for offshore platforms, vessels, pipelines, subsea structures, and wells.

In WA most of the more easily accessible, known resources have already been developed. Now, commercially viable gas fields generally:

- lie further from shore, requiring more significant infrastructure (e.g. pipelines);
- lie in deeper water;
- contain fewer revenue-generating liquids (e.g. condensates);
- contain greater proportions of impurities, such as carbon dioxide or nitrogen and consequently, lower energy content;
- exist under more difficult geological conditions.

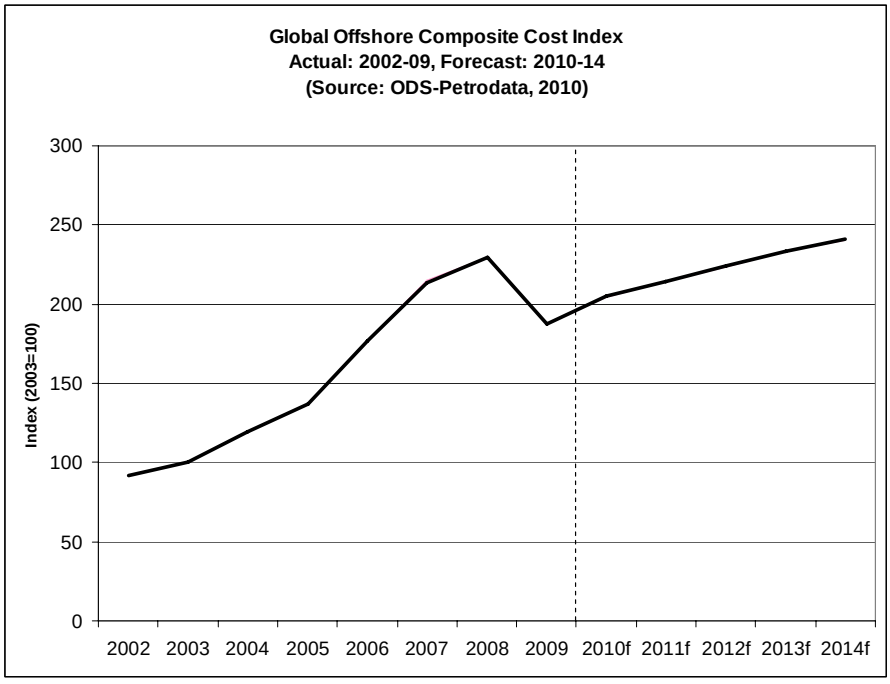
[36] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.35
[37] IEA/OECD (2004) Security of Gas Supply in Open Markets – LNG and Power at a Turning Point, p.35
[38] IEA/OECD (2007) Natural Gas Market Review 2007, Paris, p.47

The end result is that upstream costs today are significantly higher than when existing domestic gas supply projects were developed. Similar upward cost trends have occurred worldwide, due to increased difficulty of extraction on the supply side and due to a long period of sustained economic growth from 2002-2008 on the demand side, increasing all types of energy demand which tightened the demand for oil and gas equipment and services in an environment of significant commodity price rises. Global upstream costs have been increasing rapidly, on average 18% per annum in the period 2003-2008 (CAGR).[39] Furthermore, generally "the offshore markets have been subject to much more extreme cost inflation than for the onshore segment".[40]

As can be seen in Figure 1 below, the ODS-Petrodata (2010) global offshore cost index (excluding drilling) peaked in 2008 at more than double (235) the cost for five years earlier (index, 2003=100). Indeed, this index which represents a weighted average offshore cost model grew by 36% in one year alone (2006) due to a sharp increase in day rates and rising raw material costs.[41]

Though there has been a retraction in 2009 due to lower activity levels associated with the Global Financial Crisis, ODS-Petrodata forecasts continued upward growth in upstream costs from 2010 to 2014 as demand recovers.

Figure 1

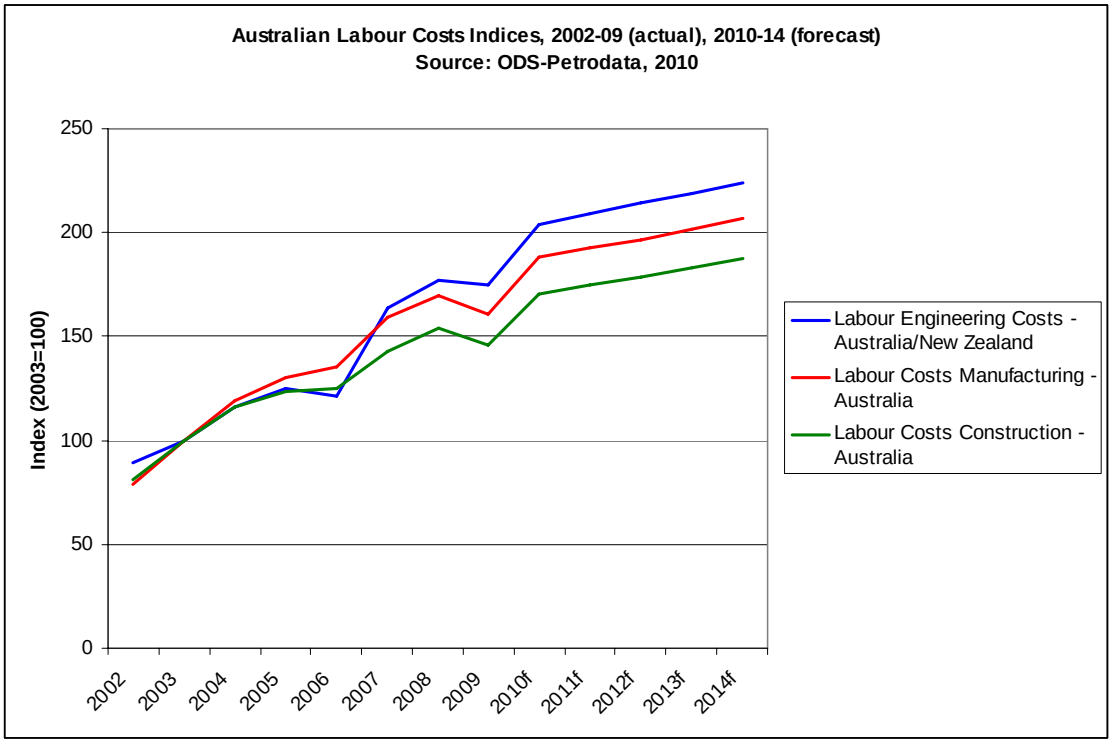


Source: MSS (ODS-Petrodata) Industry Trends – Market Segment Analysis

Upstream costs are further exacerbated by the cost of labour in Australia and particularly WA. A majority of oil and gas developments located in WA are in sparsely populated remote areas. Therefore "project developers are forced to attract skilled workforce by offering them higher salaries and attractive working and social conditions".[42] Australian labour cost indices for engineering, manufacturing and construction exhibit very similar trends to that of offshore composite costs as depicted below.

[39] Author calculations from MSS ODS-Petrodata (2010) Industry Trends – Market Segment Analysis Cost Model, Offshore Composite Costs Index, May, Market Survey System website
[40] MSS ODS-Petrodata (2010) Industry Trends – Market Segment Analysis, May 2010, p.35
[41] MSS ODS-Petrodata (2010) Industry Trends – Market Segment Analysis, May 2010, p.35
[42] MSS ODS-Petrodata (2010) Industry Trends – Market Segment Analysis, May 2010, p.66

Figure 2



Source: MSS (ODS-Petrodata) Cost Model

In addition, as can be seen in Figure 3 below, Australia is a relatively expensive place to conduct business in comparison to other oil and gas provinces around the world. In terms of capital expenditure, there is a "huge disparity in the cost of maintaining and increasing oil and gas production capacity in different parts of the world".[43] In Australia, it requires far more investment of corporate resources to maintain net capacity growth in comparison to large fields in the Middle East and Caspian states. This means that oil and gas companies with an international portfolio of assets may choose to develop other assets, due to more attractive cost/benefit ratios, before those located in Australia. Figure 3 below illustrates this.

Figure 3 Overall Oil and Gas Capital Expenditure Costs

Country	Capital Expenditure, 2008-12 (US$ billion)	Net incremental capacity ('000 barrels of oil equivalent per day - boe/d)	Cost of incremental capacity (US$ million per boe/d
Qatar	42	2,326	18
Iraq	24	848	28
Saudi Arabia	43	1,468	29
Brazil	47	825	57
Kazakhstan	37	647	57
Russia	129	1,259	102
Angola	63	606	104
US	335	1,788	187
Australia	68	317	214
Canada	121	141	858

Source: Wood Mackenzie Upstream Service Insight, "The first hints of recovery in global upstream spending" Oct 2009

[43] Wood Mackenzie (2009) Upstream Service Insight – "The first hints of recovery in global upstream spending", October 2009, p.5

5 COMPARISON OF THE PRICE OF GAS WITH OTHER STATES

Global gas prices vary widely. This is a reflection of the greater difficulty of moving large quantities of gas between regions of the world. Regional gas supply and demand imbalances are therefore significantly more difficult to correct with imported product than would be the case for liquid fuel markets. The existence of price differentials between geographical regions that do not have large scale gas interconnections (typically pipelines) is therefore the norm.

Global gas prices for several key international gas markets and west and east coast gas markets are presented in Figure 4 below.

Figure 4

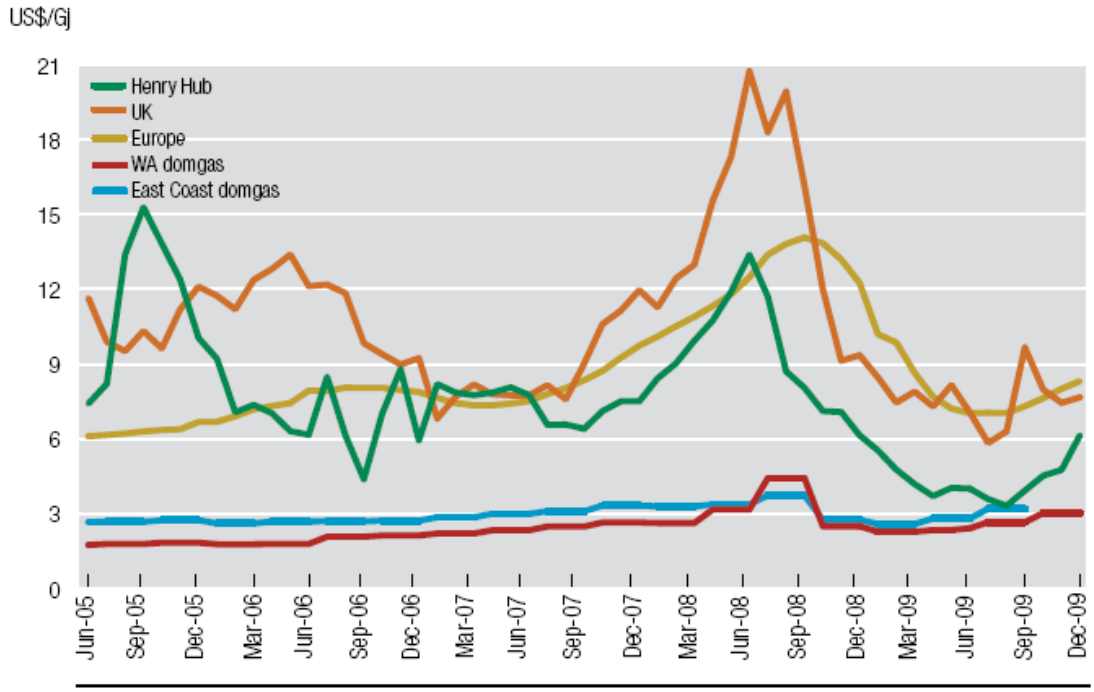


Figure 36 | **Average Natural Gas Prices** Source: Argus Monthly LNG, EnergyQuest, DMP

Source: WA Department of Mines and Petroleum 2010, Western Australian Mineral and Petroleum Statistics Digest 2009, April, p. 13

Several key observations can be made in relation to the data presented in Figure 4.

- Gas prices in Australia (both east and west coast) have been significantly lower than international prices for gas over an extended period.
- The international prices shown all represent prices in much larger and more deregulated markets with more highly developed infrastructure and supporting services.
- Prices in WA have typically been lower than prices in the east coast markets.

These different gas price dynamics reflect the underlying differences in market structure, regulation, consumer profiles, fuel competition and supply opportunities in each market.

Data from the WA Department of Mines and Petroleum indicates that the average WA pipeline gas price in 2009 was around A$3.20 per gigajoule (GJ) (ex-plant).[44] The extent of differences in the structure and characteristics between the west coast and east coast market make the comparison of pipeline gas prices problematic, as it is not a like-for-like comparison. Despite this, west coast average prices have been consistently below average east coast prices for a number of years (excepting the Varanus supply disruption period).

[44] Based on calculations of total natural gas quantity as against its total value from WA Department of Mines and Petroleum (2010) Western Australian Mineral and Petroleum Statistics Digest, 2009, p.21 Dependent on assumption regarding energy value per gigajoule.

As outlined above in section 4.5, Wood Mackenzie[45] summarises the key components for a well-functioning market. Woodside would like to emphasise the highlights of Wood Mackenzie's comparison of the east and west coast markets in Figure 5 below:

Figure 5

Key Component	East Coast Market	West Coast Market
Number of customers and their requirements	Many	Few
Number of competitive suppliers	Many	Few
Gas transportation options	- Many - Interlinked	- Few - Lack of interconnection
Gas storage options	Limited (but a large volume of storage is provided in form of linepack)[46]	Limited
Activities of gas brokers/ aggregators	Many	Few
Existence of gas-related financial markets	Some	None
Extent of short term and spot markets/sales	Many	Modest Immature

Source: Imputed from Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010

More mature market environments typically result in more transparent discovery of price, more closely aligned with the true value of the gas in its alternative uses. Noting that the WA market is in many ways the least mature of all the markets represented in Figure 5 above it is often contended that the lower prices enjoyed by gas consumers in WA are the result of the intervention of non-market factors. Key to this understanding is the fact that the early long term gas contracts underpinning the development of the market in WA essentially created a significant structural overhang of supply, capping price until demand grew sufficiently to be able to absorb these volumes.

6 INTERNATIONAL LNG MARKET AND PRICES

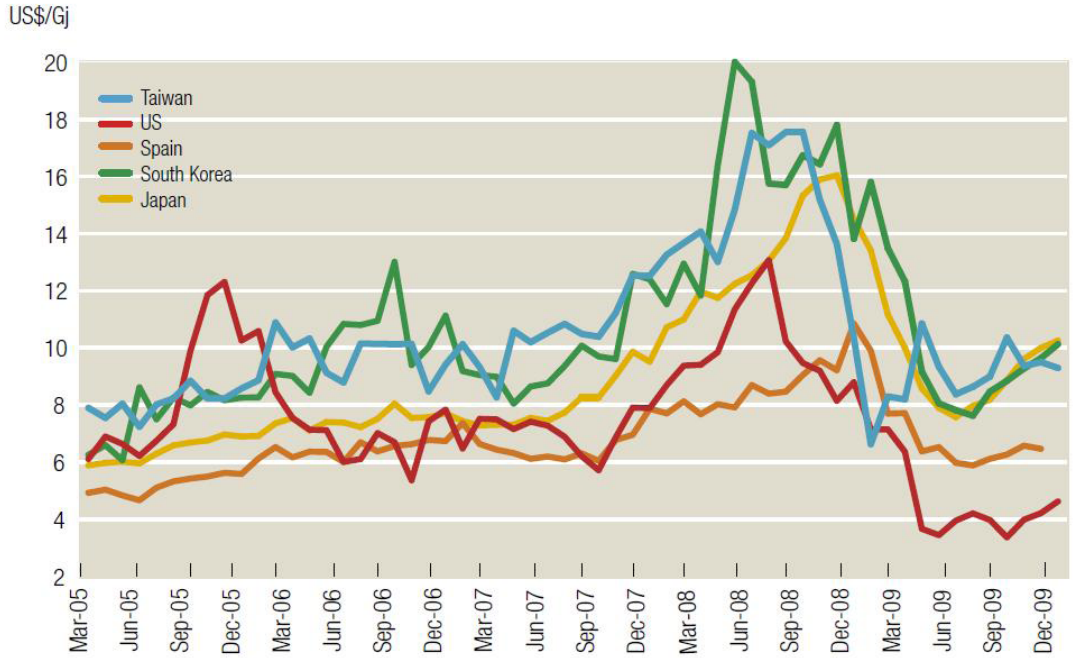
6.1 Comparison of the Asian LNG and WA Pipeline Gas Market Features

The LNG industry developed as a mechanism to enable commercialisation of large gas resources by connecting them to large markets for energy. In Asia these markets initially included the rapidly growing economies of Japan, Korea and Taiwan. LNG shipping is a costly process and as a result Australia's LNG industry has historically targeted these regional markets These LNG-importing countries are almost totally dependent on LNG for their natural gas supplies, having little or no indigenous gas production and/or imported pipeline gas supplies. This characteristic has been the key determinant for import volume, pricing systems and contract terms in these countries.[47] For example, reflecting the lack of alternative supplies, LNG prices have historically been higher in the traditional Asian markets than elsewhere in the world, as they are benchmarked to the main competing fuel, imported crude oil, rather than against the price of other sources of pipeline gas.

[45] Wood Mackenzie (2010) Western Australia Gas Market Study, 26 March 2010
[46] KPMG (2010) Gas Market Report, May 2010, p.32
[47] EIA (2003) The Global Liquefied Natural Gas Market: Status and Outlook, Paris, December 2003

The traditional Asian LNG market has focused on security of supply over price. Contracts are long-term (typically 20 years), and carefully structured to share risk between the buyers and sellers. 'Take or pay' clauses ensure that the volume risk is assumed by the buyer. The trade-off for LNG sellers is accepting the price risk, as the LNG price fluctuates with the price of oil. Due to their confidential nature and the varying number and size of LNG contracts over time, there is no relevant 'Asian LNG' market price, average or otherwise, which can be discussed. Third party estimates of average prices to various markets are however published from time to time and an example is provided in Figure 6 below.

Figure 6 Average LNG Import Prices



Source: Argus Monthly LNG (Prices include freight and regassing) cited in Western Australian Mineral and Petroleum Statistics Digest 2009, Department of Mines and Petroleum, April, p.13

It is important to note the similarities between the Asia-Pacific LNG and the WA pipeline gas markets in that they are both dominated by long term bilateral confidential contracts. In addition, both markets have few or none of the features of the liquid gas markets in the US and Europe.

The key difference between the two markets, however, is that Asia-Pacific LNG prices have long been indexed to oil prices which vary with global supply and demand forces. WA gas market prices have historically been indexed to local inflation. In WA, gas competes with abundant and low cost non-export quality Collie coal in the power generation market in the south-west of the State. This has effectively capped gas prices in this market.

LNG shipping allows flexible delivery and customers have a large choice of suppliers. By contrast, WA pipeline gas delivery is constrained to the existing pipeline delivery points.

The Australian Bureau of Agricultural and Resource Economics (ABARE) indicate that for the domestic market Australia provides some of the lowest cost gas in the world.[48] In 2009, the average price for WA was around A$3.20/GJ.[49] The corresponding average WA LNG price for 2009 is A$7.60/GJ.[50]

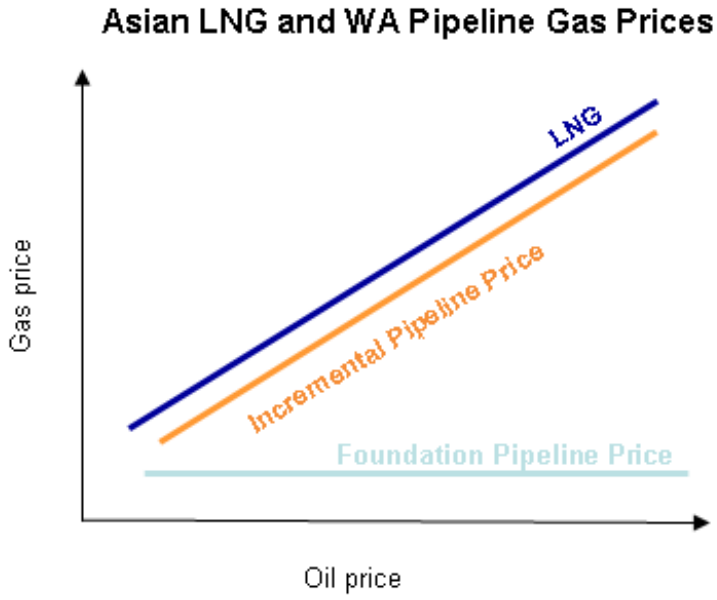
[48] ABARE (2010) Australian Energy Resource Assessment, p.106
[49] Based on calculations of total natural gas quantity as against its total value from WA Department of Mines and Petroleum (2010), Western Australian Mineral and Petroleum Statistics Digest 2009, p.21. Dependent on assumption regarding energy value per gigajoule.
[50] Based on calculations of total natural gas quantity as against its total value from WA Department of Mines and Petroleum (2010), Western Australian Mineral and Petroleum Statistics Digest 2009, p.21. Dependent on assumption regarding energy value per gigajoule.

To put WA pipeline gas prices in perspective, the Allen Consulting Group reported that gas prices in WA have historically been slightly above A$2/GJ, which equates to roughly US$12 a barrel in oil-equivalent terms.[51] World oil prices have consistently been above US$12 a barrel since the mid-1980s (except for a dip to just above $12 in 1998 at the time of the Asian Financial Crisis).[52]

More recently, some relatively small new WA pipeline gas contracts have been struck at prices linked to crude oil or crude oil derived products such as diesel (as for LNG). This change in pricing basis is a reflection of the nature and location of the consuming party. The customer has typically been a mining project located in the north of WA whose alternative energy source would have been diesel.

This changing price dynamic is illustrated schematically.

Figure 7



It should be remembered however that the vast bulk of WA pipeline gas continues to be supplied under contracts with pricing set at the much lower levels and comparison of the prices provided in Figures 6 and 7 above confirms that average WA prices therefore continue to be consistently lower than LNG prices in Australia's key target market Asian countries.

As noted earlier, WA has significant gas resources in its adjacent offshore areas. These gas reserves are primarily found in a relatively small number of very large reservoirs. The Joint Working Group of the Ministerial Council on Mineral and Petroleum Resources found that the development of LNG export projects, which take advantage of economies of scale by accessing export markets in order to improve gas field economics, would "assist in bringing on additional sources of gas for the domestic market".[53] The Joint Working Group further stated that

> "From this perspective, attraction of export prices is not a barrier to supply; on the contrary it should be seen as enhancing the likelihood of resources being developed for export with domestic supply as a flow-on".[54]

[51] The Allen Consulting Group (2009) Gorgon Gas Project Joint Venture Application for Authorisation of Joint Marketing: Report to ACCC, July 2009, p.7
[52] BP (2010) BP Statistical Review of Energy 2009, www.bp.com
[53] Ministerial Council on Mineral and Petroleum Resources/ Ministerial Council on Energy (2007) Joint Working Group on Natural Gas Supply, September 2007, p.30
[54] McLennan Magasanik Associates MMA (2007) Report to the Joint Working Group on Natural Gas Supply – Natural Gas in Australia, 16 July 2007, p.59

7 CONCLUSION

Western Australian average gas prices are lower than Australia's east coast and significantly lower than in the USA and Europe. Gas prices in WA remain low reflecting the long-term contracts put in place when the gas resource was developed.

The long-term gas supply picture for WA will necessarily involve new gas resources that have fundamentally different compositions and development characteristics than current supply sources. As a consequence, new developments face different challenges in connecting resources with pipeline gas and LNG markets to supply customers while providing an acceptable economic return to shareholders.

Woodside believes Government has a fundamental role in encouraging gas exploration and enabling market forces to drive the response to domestic pipeline gas demand. As expressed by APPEA, the elements of this role include the setting of policies that support expansion of a free market for gas and increased investment.[55]

Woodside continues to review opportunities to develop additional supply into Australian markets.

8 CONTACT

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[55] APPEA Fact File, The Western Australian Gas Market