AUSTRALIAN COMPETITION
& CONSUMER COMMISSION

Gas Inquiry 2017-2025

Guide to the LNG netback price series

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Australian Competition and Consumer Commission
23 Marcus Clarke Street, Canberra, Australian Capital Territory, 2601

Contents

About this guide

This document—*Guide to the LNG netback price series*—explains how the ACCC calculates the LNG netback price series published on its website and provides guidance on how the series can be used by east coast gas market participants.

The publication of the LNG netback price series is one of the measures implemented by the ACCC as part of its Gas Inquiry 2017-2025 to improve transparency of gas prices in the east coast gas market.

The ACCC welcomes feedback on the LNG netback price series and this guide. Comments can be made in writing to gas.inquiry@accc.gov.au.

Abbreviations

C&I	commercial and industrial
CPI	Consumer Price Index
CSG	coal seam gas
DES	delivered ex-ship
DFDE	dual-fuel diesel electric
FOB	free on board
GSA	gas supply agreement
JCC	Japanese Crude Cocktail
JKM	Japan Korea Marker
LNG	liquefied natural gas
LRMC	long run marginal cost
MMBtu	Million British Thermal Units–see below, Units of Energy
NBP	National Balancing Point
SPA	sale and purchase agreement
TTF	Title Transfer Facility
Organisations	
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ICE	Intercontinental Exchange
RBA	Reserve Bank of Australia
SPGCI	S&P Global Commodity Insights
Units	
MMBtu	Million British thermal units
mtpa	million tonnes per annum
GJ	Gigajoule
PJ	Petajoule

Glossary

ACCC's 2015 inquiry: The ACCC's inquiry into the east coast gas market in 2015, as reported on in April 2016.

ACCC's Gas Inquiry 2017-2025: The ACCC's inquiry into the supply of and demand for wholesale gas in Australia that commenced in April 2017.

Delivered ex-ship price: The price of gas delivered by ship to a destination port. LNG prices are often specified as delivered ex ship.

East coast gas market: The interconnected gas market covering Queensland, South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

Free on-board price: The price of gas loaded on a ship at a port connected to an LNG plant. LNG prices are sometimes specified as free on board.

Gas supply agreement: A contract between the buyer and seller for the supply of gas in the domestic gas market.

Henry Hub: A major gas hub for spot and futures trading in the United States which acts as the notional point of delivery for gas futures contracts. Henry Hub is based on the physical interconnection of nine interstate and four intrastate pipelines in Louisiana.

Japan Korea Marker (JKM): An international benchmark price for LNG spot cargos. It is an assessed price published by S&P Global Commodity Insights and reflects the spot market value of LNG delivered ex-ship (DES) into Japan, South Korea, China and Taiwan.[1]

Liquefaction: The process of liquefying natural gas.

Liquefied natural gas (LNG): Natural gas that has been converted to liquid form for ease of storage or transport.

LNG cargo: The LNG that is loaded on to an LNG tanker.

LNG netback price: An LNG netback price is a measure of an export parity price for gas. It represents the effective price an LNG producer would expect to receive for gas, at a specific reference location, if that gas were converted to LNG and exported. This is done by taking the price receivable for LNG and subtracting or 'netting back' costs incurred between the reference location and the location where the LNG is delivered.

LNG plant inlet: The physical point at which natural gas is fed into an LNG production facility.

LNG strip: A multi-cargo LNG contract with duration typically over the short to medium-term.

LNG producer: LNG producers process and prepare natural gas, using liquefaction, into LNG for transmission and sale to overseas markets.

LNG train: A liquefied natural gas plant's liquefaction and purification facility.

Load factor: Measures the extent to which a buyer can take more than the average daily contract quantity throughout the year, subject to the cap imposed by the annual contract quantity.

[1] https://www.spglobal.com/commodityinsights/en/our-methodology/price-assessments/lng/jkm-japan-korea-marker-gas-price-assessments

National Balancing Point (NBP): Is a major virtual marketplace for gas located in the United Kingdom that allows market participants to transfer gas to other participants.

Oil index: An average of regional oil prices calculated over a given day. Examples include Brent and the Japanese Crude Cocktail (JCC).

Sale and purchase agreement (SPA): A sales contract between the buyer and seller for LNG.

Southern States: South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

Spot market transactions: One-off transactions, as distinct from transactions occurring under supply contracts.

Take or pay multiplier: A term in GSAs specifying the minimum proportion of annual contract quantity the buyer must pay for in each year irrespective of whether they take the gas.

Title Transfer Facility (TTF): Is a major virtual marketplace for gas located in the Netherlands that allows market participants to transfer gas to other participants.

Units of Energy

Joule—a unit of energy in the International System of Units

Gigajoule (GJ)—a billion (10^9) joules

Terajoule (TJ)—a trillion (10^{12}) joules

Petajoule (PJ)—a quadrillion (10^{15}) joules

Million British Thermal Units (MMBtu)

Wallumbilla Gas Supply Hub: An exchange for the wholesale trading of natural gas operated by the Australian Energy Market Operator located in Wallumbilla, Queensland. It is the pipeline interconnection point that links the LNG producers' gas production facilities to the east coast gas market.

Wellhead: The equipment that acts as the surface termination point of an oil or gas well.

1. Introduction

1.1. Purpose of the LNG netback price series

When the ACCC's gas inquiry began in 2017, commercial and industrial (C&I) gas users expressed concern about the lack of gas price information in the east coast market. The newly developed LNG export facilities in Queensland had linked the domestic and international gas markets and increased the volatility and unpredictability of domestic prices. In this environment, gas users were less able to understand the drivers of domestic gas prices and form expectations about future prices. Many gas users therefore had divergent views on how LNG prices might influence the domestic market.

In early gas inquiry reports we acknowledged that the lack of an indicative or reference gas price in the domestic market was a key problem for C&I users. Given that most gas on the east coast is traded under long-term confidential and bilateral contracts, information on longer term gas pricing is not broadly available. On the supply side, gas producers and retailers typically have greater and more reliable information on recent gas prices to inform their negotiations for gas supply with C&I users because they typically engage in negotiations more frequently with a range of buyers.

The ACCC's analysis of GSA and offer data obtained from suppliers throughout the inquiry has suggested that this information asymmetry has persisted. This imbalance can disadvantage gas buyers in their negotiations and can impair competitive bargaining and favour large incumbent gas suppliers.[2]

The ACCC began publishing the LNG netback price series in 2018 to improve gas price transparency, reduce information asymmetry and to provide users with information that could be used in contract negotiations. Given market dynamics prevailing at the time, LNG netback prices were based on Asian LNG spot prices with a forward period of up to 2 years.

In 2020-21 the ACCC reviewed the pricing strategies of domestic suppliers. We found that oil prices had been a key influence on domestic pricing over the preceding 2 years, and that suppliers had increasingly used oil-linked medium term LNG contracts as a domestic reference price in addition to LNG spot prices. In the ACCC's 2021 review of the LNG netback price series, following stakeholder consultation and independent expert advice, we decided to continue publishing short-term LNG netback prices based on expected Asian LNG spot prices. We also decided to extend the netback price series by including additional forward LNG netback prices out to 5 years based on an oil index (see box 1.1 below).

Given the influence of oil prices on the domestic gas market and the existence of medium-term LNG contracts as an alternative to domestic supply, longer-term forward LNG netback prices will increase domestic gas price transparency. It will further assist in addressing the information asymmetry between C&I users and those suppliers who already consider oil-linked LNG prices when forming views about longer-term domestic prices.

Over the remainder of the gas inquiry the ACCC will continue to monitor the effectiveness of all aspects of the LNG netback price series. We will monitor developments that may influence the relevance of LNG prices to the domestic market, including the capacity of the Queensland LNG facilities, structural changes in global LNG markets, and the domestic regulatory environment. In 2024, or earlier if warranted by market developments, the ACCC will conduct another formal review of the netback price series.

[2] ACCC, *Gas Inquiry 2017-2020 interim report*, April 2018.

Box 1.1: LNG netback price series review

In 2021 the ACCC conducted a review of the LNG netback price series. The review considered a range of matters, including:

- The most appropriate forward period over which to publish forward LNG netback prices
- The choice of LNG price used as a reference to calculate netback prices
- How LNG liquefaction and pipeline transportation costs are treated.

The ACCC consulted extensively with stakeholders throughout the review and engaged energy consultant Wood Mackenzie to provide expert advice. The ACCC published an issues paper in March 2021 and a draft decision in July 2021 and sought submissions. The ACCC met with stakeholders to discuss submissions and held a public roundtable in July 2021.

In September 2021 the ACCC concluded the review and published a final decision. The ACCC decided to:

- continue to publish historical and short-term forward LNG netback prices extending to 2 years based on expected Asian LNG spot prices
- publish longer-term forward LNG netback prices extending to 5 years based on an oil index
- maintain the approach to estimating export costs in calculating LNG netback prices.

The ACCC noted that it would source from consultants on a least an annual basis:

- estimates of the appropriate percentage, or slope, to apply to an oil index to derive an estimate of medium-term LNG contract prices
- longer-term LNG freight cost estimates .

The ACCC flagged a further review of the LNG netback price series in 2024 or earlier if market developments warranted (such as LNG export facilities reaching capacity on a sustained basis).

1.2. How the LNG netback price series can be used

The LNG netback price series comprises:

- historical LNG netback prices at the Wallumbilla Gas Supply Hub, dating back to January 2016, based on a measure of historical Asian LNG spot prices
- forward short-term LNG netback prices at Wallumbilla, over a 2-year period, based on market expectations of future Asian LNG spot prices
- forward medium-term LNG netback prices at Wallumbilla, over a 5-year period, based on estimates of oil-linked prices under medium-term LNG contracts for delivery to Asia.

Historical and forward short-term LNG netback prices are published as monthly averages, while forward medium-term LNG netback prices are presented as annual averages over a 5-year forward period.

These LNG netback prices are measures of export parity prices, at Wallumbilla, for either spot or medium-term LNG sales into northeast Asia. Gas buyers in the east coast gas market and other parties can use this information to:

- observe historical trends of export parity prices, including seasonal patterns in both the level and volatility of those prices
- identify temporary or longer-term changes in export parity prices, resulting from changes in LNG prices, shipping costs or AUD/USD exchange rates
- estimate an indicative reference price of gas in the east coast gas market, considering relevant factors and limitations (as discussed in section 4), with estimates applicable:

- at a specific point in time
- at a particular location in the east coast gas market
- to an offer or agreement to supply gas for a term of up to 5 years

- when estimating an indicative reference price, substitute any inputs or assumptions used by the ACCC in the calculation of forward LNG netback prices with their own
- compare estimated indicative reference prices to contemporaneous gas prices being offered or agreed in the east coast gas market for supply with a term of up to 5 years.

For negotiations between a supplier and buyer concerning future gas supply, the most relevant reference prices are forward LNG netback prices that are applicable to the proposed supply period.

1.3. Limitations of the LNG netback price series

The LNG netback price series does not represent:

- the ACCC setting prices in the east coast gas market or any other market in Australia
- the ACCC providing a view on what level of gas pricing is 'fair' to either sellers or buyers
- the ACCC's forecast of international or domestic gas prices
- the ACCC's forecast of any of the inputs used in the calculation of the LNG netback prices (such as shipping costs or foreign exchange rates)
- an endorsement by the ACCC of the price reporting agencies and consultancies whose data are used in the calculation of LNG netback prices, or the specific methods adopted by those agencies.

The extent to which an LNG netback price is relevant as a price marker in negotiations for domestic gas supply may vary. Parties to a negotiation should satisfy themselves that the LNG netback price is the most appropriate reference point. In using the published LNG netback price series, parties should also be aware that:

- the LNG netback prices have been calculated specifically for the east coast gas market and are not applicable to any other locations in Australia
- LNG netback prices are not the sole factor influencing gas prices offered or agreed in the east coast gas market – other factors are also relevant, particularly the individual non-price terms and conditions of gas supply and any applicable transportation or retailer charges (as discussed in section 2.4)
- there may be specific dynamics that affect how LNG netback prices influence gas prices in their particular location in the east coast gas market – different pricing dynamics apply in states and territories outside Queensland (as discussed in section 2.4.1)[3]
- the LNG netback series is most relevant for an offer or agreement to supply gas for a term of up to 5 years – for longer term gas supply, further information may be needed and gas price markers other than Asian LNG prices may be more appropriate
- the data from Commodity Insights, Argus, ICE, GaffneyCline and FTI Consulting used by the ACCC is derived using the specific methods adopted by those entities – each data set has its own limitations (see section 4)
- the ACCC takes the data from Commodity Insights, Argus and ICE as given – the ACCC does not have any input into the method used by each agency in deriving the data nor does the ACCC amend the data in any way

[3] ACCC, *Inquiry into the east coast gas market*, April 2016, pp. 42-53.

- the LNG price and LNG freight cost estimates by GaffneyCline and FTI Consulting reflect the methods, inputs and assumptions adopted by these consultants, each of which has limitations. Estimates are provided over a 5-year forward period and they are subject to the inherent uncertainties of longer-term forecasting (see section 4)

1.4. Publication of additional information

The ACCC publishes additional information on its website alongside the LNG netback price series to improve transparency of gas prices in the east coast gas market, including information on transportation charges and estimates of gas production costs.[4]

1.5. Structure of this guide

Section 2 of this guide explains the concept of LNG netback pricing its relevance to the east coast gas market.

Section 3 sets out the method and data sources used by the ACCC to calculate the prices published in the LNG netback price series.

Section 4 provides users of the LNG netback price series with guidance on the interpretation and use of published LNG netback prices.

[4] https://www.accc.gov.au/regulated-infrastructure/energy/gas-inquiry-2017-2025/lng-netback-price-series

2. LNG netback prices in the east coast gas market

Section 2.1 below explains the relevance of LNG prices to the east coast gas market.

Sections 2.2 and 2.3 explain the concept of LNG netback pricing, while section 2.4 sets out other factors that can influence domestic prices.

2.1. Relevance of LNG prices

Prior to the development of the Queensland LNG export facilities, gas produced in the domestic market by upstream producers could be sold only to the domestic gas buyers at prevailing market prices (which were significantly lower than contemporary domestic gas price levels). However, the LNG facilities have provided east coast gas producers the option of supplying uncontracted gas to export markets.

In practice, the option to supply export markets is more readily available to the LNG producers as they own and operate the LNG plants. We have observed LNG producers selling uncontracted gas into LNG spot markets over the course of the current inquiry. Non-LNG producers could potentially also access LNG export markets, however, by entering into agreements with the Queensland LNG producers. This could involve domestic gas suppliers:

- selling gas directly to LNG producers on a third-party basis, at prices influenced by prices in export markets, which an LNG producer would then liquefy and export
- entering into a 'tolling' arrangement with an LNG producer to access unutilised LNG plant liquefaction capacity, whereby an LNG producer would charge a toll to liquefy gas on behalf of the supplier, with that supplier then selling the LNG into export markets.

The ACCC has also observed during the gas inquiry that some non-LNG producers on the east coast view selling to the LNG producers as an alternative to supplying the domestic market.[5] In the ACCC's 2015 gas inquiry, we also observed that the Queensland LNG projects have economic incentives to purchase additional domestic gas to maximise LNG production, provided it is profitable for them to sell that gas into overseas markets.

Our 2020-21 examination of domestic supplier pricing strategies confirmed that both LNG producers and domestic producers on the east coast consider LNG prices when forming views about prices in the domestic market. Producers generally view Asian LNG spot prices as a reference for shorter-term GSAs up to a term of 2 years, with some producers considering oil-linked medium-term LNG contracts as a reference beyond 2 years.

LNG producers will continue to be able to sell uncontracted gas into export markets only if the Queensland LNG plants continue to have unutilised LNG capacity (in aggregate) and they are able to recover their marginal costs of producing this uncontracted gas. In the absence of major new gas discoveries, the Queensland LNG plants are expected to continue to have unutilised liquefaction capacity, meaning LNG producers will continue to have an alternative to supplying the domestic market.

Information collected by the ACCC over the gas inquiry indicates that the Queensland LNG facilities are likely to continue to have spare capacity into the near future. The LNG producers, in aggregate, currently expect to produce gas above what is required to satisfy long-term LNG contractual obligations over the near term. The most likely destination for this gas (if not sold domestically) is the Asian LNG market, either under spot sales or medium-term contracts. Given that LNG producers are expected to be the marginal suppliers of gas

[5] ACCC, *Gas Inquiry 2017-2025 interim report*, January 2021.

into the domestic market, the price they would expect to receive for this gas from Asian LNG markets influences prices across the domestic market.

The relevance of LNG prices to the domestic gas market may change over time, however. Factors that may influence the relevance of LNG prices to the domestic market include the capacity of the Queensland LNG facilities, structural changes in global LNG markets, and the domestic regulatory environment.[6] The ACCC will continue to monitor developments in these factors over the remainder of the gas inquiry.

2.2. What is an LNG netback price?

LNG producers that supply uncontracted gas into the domestic market forego the opportunity to sell that gas into export markets. This means that there is an opportunity cost associated with supplying the domestic market.

LNG netback prices represent a measure of this opportunity cost by estimating the effective price that LNG producers could receive for exported LNG after applicable costs are subtracted from the LNG price. This is done by taking an LNG price and subtracting or 'netting back' the costs incurred between a particular location (such as upstream processing facilities) and the delivery point of the LNG. This price represents an export parity price of gas for that location—also known as an LNG netback price.

Put another way, an LNG netback price is the price an LNG producer would expect to receive for uncontracted gas from domestic buyers to be indifferent between supplying that gas to the domestic market or overseas markets all other things equal.

LNG netback prices reflect the commercial options available to LNG producers for their uncontracted gas. They can sell it domestically, into international markets or, where feasible, divert it into storage or delay production. Because of this, an LNG netback price is inherently calculated from the perspective of a gas seller, LNG producers in this case, rather than that of a gas buyer.

By publishing LNG netback prices, the ACCC provides information to the market on the commercial realities faced by LNG producers when supplying the domestic market. The ACCC is not providing a view on what level of gas pricing is 'fair' to either sellers or buyers, or providing a 'bottom up' reference price that applies a margin to gas production costs.

An LNG netback price also represents the maximum price at which an LNG producer will be willing to purchase gas from domestic producers (unless the LNG producer is short of gas required to meet contractual obligations), as it will not be able to export it above this price for a profit.

LNG netback prices are an important benchmark because if domestic gas prices fall below LNG netback prices, then LNG producers will have the incentive to sell uncontracted gas overseas rather than to domestic buyers. Given LNG producers supply a significant proportion of domestic demand, such a shift will likely cause a shortage in the east coast gas market and place upward pressure on domestic gas prices.

If LNG netback prices and domestic prices are below the marginal costs of production, gas producers may also have incentives to store uncontracted gas or delay gas production.

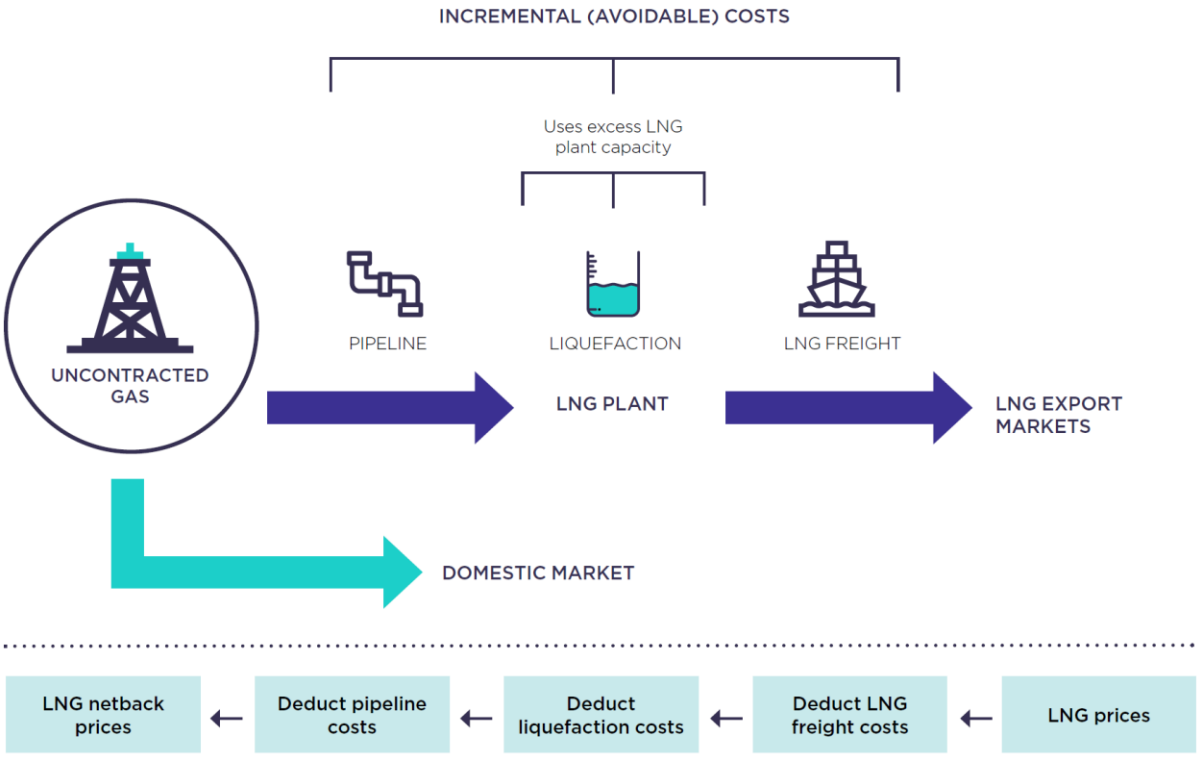
[6] ACCC, *LNG netback review final decision paper*, September 2021, p. 12

2.3. How are LNG netback prices derived?

LNG netback prices are calculated by taking the price that LNG producers would expect to receive for supplying uncontracted gas to overseas buyers and deducting or 'netting back' any costs that are incurred to export that gas (figure 2.1). These costs include:

- Costs of shipping LNG from Gladstone to the destination port
- Liquefaction costs associated with converting gas to LNG
- Pipeline costs to transport gas from the wellhead to the LNG facility in Queensland.

Figure 2.1: Conceptual framework for LNG netback prices



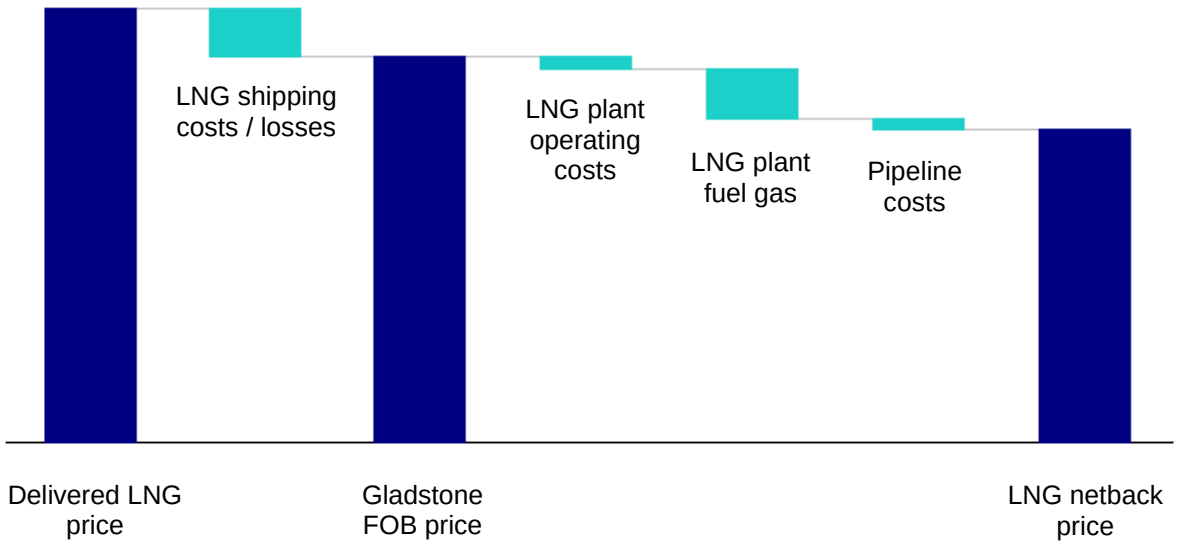
Only the incremental costs the LNG producer incurs when supplying uncontracted gas to LNG markets are deducted, as these are the only costs avoided if the LNG producer instead chooses to supply the uncontracted gas to the domestic market. LNG producers will consider only these costs when deciding whether to supply uncontracted gas to LNG export markets or the domestic market.

Costs that cannot be avoided by LNG producers are not deducted because they are incurred regardless of where the uncontracted gas is sold. This includes the costs of extracting the gas at the wellhead and the capital costs incurred in developing the pipeline and LNG plants.

Deducting non-avoidable costs would mean that LNG netback prices would no longer represent the price at which domestic producers would be indifferent between supplying the domestic market and export markets.

The LNG netback price at a particular location is calculated by taking a delivered LNG price and subtracting the cost of shipping the LNG from the loading port to the destination port, the short-run marginal cost of liquefaction, and the short-run marginal cost of transporting the gas from the relevant location to the LNG production facility. This is illustrated in figure 2.2.

Figure 2.2: Stylised LNG netback price calculation



In figure 2.2, the LNG price represents the delivered price of LNG at the destination port. This can either be LNG spot prices or a medium-term LNG contract. LNG shipping costs and losses are deducted from the delivered price to give a free on board (FOB) price at Gladstone, which represents the effective price of LNG at the point it is loaded onto the LNG tanker. These shipping costs reflect the cost of chartering an LNG vessel, loading and discharge port fees, the cost of LNG tanker fuel oil, as well as the value of the LNG that is lost during shipping due to boil-off.

The FOB price is netted back to Wallumbilla by subtracting short-run marginal LNG plant operating costs (such as labour and electricity), the value of marginal gas consumed during the liquefaction process, and the short-run marginal cost of transporting gas from the wellhead to the LNG production facility. This gives an LNG netback price which can then be used for comparison to domestic gas prices.

2.4. Other factors that can influence domestic gas prices

Factors other than LNG netback prices may also influence gas prices offered in the domestic market. Some may influence prices in combination with LNG netback prices, while others may affect prices independently. The following factors may, to some extent, influence the prices offered by domestic suppliers for longer-term GSAs. These factors are not exhaustive and their influence on gas prices may vary.

2.4.1. Cost of transportation

If a supplier is required to transport gas to the buyer's location, the delivered gas price may reflect both the gas commodity charge (the price of the gas itself) and the cost of transporting the gas to the buyer's location. The cost of transportation may therefore directly affect the price payable for gas at the buyer's location.

In southern states, the commodity charge itself may also be affected by transportation costs. The prices published in the LNG netback price series are netback prices at Wallumbilla, and are therefore most comparable to gas prices in Queensland (although delivery to some locations in Queensland will also incur transport costs). However, the pricing dynamics in the southern states are different from those in Queensland.[7] Due to the cost of transportation

[7] Southern States include South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

between the southern states and Queensland, there is a range of possible pricing outcomes in gas supply negotiations in the Southern States, which would usually be expected to fall between:

- the buyer alternative (representing a ceiling in negotiations) – the LNG netback price at Wallumbilla plus the cost of transporting gas from Wallumbilla to the user's location
- the seller alternative (representing a floor in negotiations) – the LNG netback price at Wallumbilla less the cost of transporting gas to Wallumbilla or the forward cost of production (whichever is higher).

Users of the LNG netback price series can refer to our interim reports for more information on the differing pricing dynamics across the east coast gas market.[8]

2.4.2. Cost of production

Production costs would, in most circumstances, set the floor price in negotiations between gas producers and gas buyers, particularly for longer-term gas offers. This is because gas producers have some ability to defer or delay production. There may, however, be some periods where suppliers sell at or below costs of production if they are not able to ramp down gas production in response to low prices.

2.4.3. Non-price terms and conditions

The characteristics of an individual user's gas requirements can influence the price a supplier may be willing to offer. Non-price terms and conditions in GSAs, such as take-or-pay levels, daily swing (load factor) allowances, transportation requirements, GSA quantity and duration can affect the costs and risks associated with supplying a particular user. The supplier may charge a higher price to recoup costs or compensate for supply or price risk.

However, costs and risks associated with an individual GSA can sometimes be smoothed out and reduced across a portfolio of GSAs. The costs and risks taken on by a supplier when entering a marginal domestic GSA may therefore not be as high when considered in the context of the supplier's entire portfolio.

The ACCC's 2020-21 review of supplier pricing strategies found that non-price terms and conditions typically sought by C&I users do not appear to attract a significant premium (if any) relative to underlying prices. We found that volume flexibility and fixed domestic pricing structures in particular are rarely explicitly accounted for by suppliers and unlikely to have materially influenced observed prices.[9]

2.4.4. Retailer costs and margins

Prices charged by retailers under GSAs are generally higher than those charged by producers. There are factors that are specific to gas supply by retailers that may influence retailers' price offers, including costs associated with transportation and demand variations, and retailer margins.

Costs associated with managing demand variations (gas shaping) can vary depending on the flexibility of the GSA. For example, under a GSA with a high load factor, the user may require a significant quantity above the average daily quantity on a particular day. This may result in a shortfall in the retailer's portfolio on that day, which would need to be filled using gas either purchased from domestic short-term markets or drawn from storage. The expected cost to the retailer of addressing these daily variations over the life of the GSA will determine the additional costs that will be passed on to the user.

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8 See for example, ACCC, *Gas Inquiry 2017-2025 interim report*, July 2021, Appendix B.

9 ACCC, *Gas Inquiry 2017-2025 interim report*, July 2021.

Similarly, a higher load factor may result in higher transportation costs since the retailer will need to ensure that there is pipeline capacity available to satisfy additional demand beyond the average daily quantity.

2.4.5. Domestic short-term markets

Prices in GSAs might be explicitly linked to prices in one or more of the domestic short-term markets. There may also be circumstances where retailers sell gas to users before they purchase it from producers, conferring a price risk onto the retailer. Depending on the availability of gas, the retailer may need to rely on domestic short-term markets to secure sufficient gas to meet their contractual commitments to the C&I user. In these circumstances, the retailer may factor this risk into the GSA price it offers.

Finally, sourcing gas from domestic short-term markets may be an alternative to entering into GSAs. While the majority of gas buyers in the east coast gas market continue to rely on long-term GSAs to meet their gas requirements, a number of C&I users are now using, or investigating the use of, domestic short-term markets to either supplement GSAs or to source their entire gas requirements. If these markets were to become sufficiently liquid such that more users could rely on them for their ongoing gas needs, prices in domestic short-term markets may have a greater influence on the prices agreed under GSAs.

2.4.6. Electricity prices

Domestic gas and electricity market dynamics can influence both NEM and short term gas market prices. In periods of peak electricity demand, GPG is often the marginal generator and can influence the wholesale electricity price. High demand for GPG in peak periods can also put upward pressure on prices in short term gas markets. In addition, the prices that generators expect to receive in electricity markets over the longer-term could potentially influence the prices they are willing to pay for gas under long-term GSAs.

3. LNG netback price series methodology

The prices published in the LNG netback price series are based on measures of spot and medium-term Asian LNG prices. LNG prices are netted back to Wallumbilla, as this is the pipeline interconnection point that links the LNG producers' gas production facilities to the domestic market.

To calculate an LNG netback price at Wallumbilla, the following short-run marginal costs are deducted from Asian LNG prices:

- LNG freight costs
- LNG plant costs, and
- Pipeline transportation costs.

The sections below explain the ACCC's method for calculating the prices shown in the LNG netback price series, and set out the steps taken to convert delivered LNG prices to LNG netback prices at Wallumbilla.

3.1. LNG prices

The starting point for calculating an LNG netback price at any given time is a measure of the LNG price.

The sections below set out the measure of Asian LNG spot prices the ACCC uses for the historical component of the LNG netback price series, and the measures the ACCC uses for expectations of future Asian LNG spot prices and prices under medium-term LNG contracts.

3.1.1. Historical LNG prices

For the historical LNG netback price series, the ACCC uses the JKM (Japan Korea Marker) as assessed daily by S&P Global Commodity Insights (Commodity Insights) as a measure of Asian LNG spot prices.

The JKM is Commodity Insights' price assessment for physical LNG spot cargoes delivered ex-ship into northeast Asia.[10] These daily price assessments are published by Commodity Insights (to subscribers) in US$/MMBtu on the basis of information obtained from market participants such as producers, consumers, traders, brokers, shippers and other active spot market participants.[11] Commodity Insights also uses a Market on Close (MOC) assessment methodology, through which market participants report firm bids, offers and trades. Information considered by Commodity Insights when making price assessments includes firm offers and bids, expressions of interest, confirmed trades, and third party reports of transactional activity.[12]

The JKM is assessed for LNG cargoes to be delivered over a particular calendar month (referred to as the 'front month'), with the relevant month depending on when the assessment is made. On the 16th of each month, the JKM front month rolls over to the calendar month commencing six weeks ahead. For example, on 16 July, Commodity Insights commences assessing the JKM for cargoes to be delivered over the month of

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10 Commodity Insights, 'Platts JKM LNG Price Assessment', https://www.spglobal.com/commodityinsights/en/our-methodology/price-assessments/lng/jkm-japan-korea-marker-gas-price-assessments

11 Commodity Insights, *Specifications guide: Global LNG,* https://www.spglobal.com/commodityinsights/PlattsContent/_assets/_files/en/our-methodology/methodology-specifications/global_lng.pdf

12 Commodity Insights, *Specifications guide: Global LNG,* https://www.spglobal.com/commodityinsights/PlattsContent/_assets/_files/en/our-methodology/methodology-specifications/global_lng.pdf

September. Price assessments will continue to be in relation to September deliveries until 16 August, when the JKM front month rolls over to October.

The historical LNG netback prices published by the ACCC for any given month are based on JKM price assessments for LNG deliveries in that month. For example, an historical LNG netback price for September will be based on an average of JKM price assessments in respect of LNG deliveries for the month of September, which means that the netback price will be based on the JKM as reported between 16 July and 15 August of that year.[13]

3.1.2. Forward short-term LNG prices

For the forward short-term LNG netback price series, the ACCC uses prices for JKM futures contracts that are quoted by ICE, as at the time of publication, as a measure of expectations of future Asian LNG spot prices.

These are cash-settled futures contracts based on JKM price assessments for a given calendar month, and are traded in lots of 10,000 MMBtu (which is around 10.5 TJ or 0.3 per cent of a typical LNG cargo). ICE JKM futures prices are settled daily and published in US$/MMBtu on the ICE website.[14] The daily prices are determined by ICE using price data from a number of sources including spot, forward and derivative markets for both physical and financial products.[15]

JKM futures contracts are settled after the final day of trading, which is the 15th calendar day before the contract month. This aligns with the last day that Commodity Insights assesses the JKM for LNG deliveries in that month. The final settlement price is based on the average of Commodity Insights' daily JKM price assessments for LNG deliveries over the contract month.[16]

For example, a September JKM futures contract will cease trading on the 15th of August, which is the last day that Commodity Insights will assess the JKM for LNG cargoes for delivery in September. The final settlement price for the futures contract would be the average of the JKM price assessments for September—that is, the average of individual JKM prices reported by Commodity Insights each day between 16 July and 15 August.

The forward short-term LNG netback prices published by the ACCC for a given future month are based on the end-of-day JKM futures prices quoted by ICE the day before publication.

3.1.3. Forward medium-term LNG prices

Medium-term LNG netback prices are calculated using estimated prices for medium-term LNG contracts for delivery to Asia. The ACCC uses Brent oil futures and applies an estimated LNG slope. These two inputs are detailed below.

ICE Brent Crude futures

The ACCC uses prices for ICE Brent oil futures contracts, retrieved from Bloomberg, as at the time of publication as a measure of expectations of future oil prices to calculate medium-term LNG contract prices.

These are a deliverable physical contract with an option to cash settle against the ICE Brent Index price for the last trading day of the contract.[17] Trades are made in contract sizes of

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13 Netback prices are calculated separately for each day of the period based on daily JKM assessments, and then averaged over the month. See section 4.3 for a worked example of the calculations.

14 ICE Futures Europe Report Centre, https://www.theice.com/marketdata/reports/144

15 ICE, 'JKM LNG (Platts) future', https://www.theice.com/products/6753280/JKM-LNG-PLATTS-Future

16 ICE, 'JKM LNG (Platts) future', https://www.theice.com/products/6753280/JKM-LNG-PLATTS-Future

17 https://www.theice.com/publicdocs/futures/ICE_Brent_EFP_Explained.pdf

1,000 barrels (which is around 6.12 TJ or 0.1 per cent of a typical LNG cargo). Trading for a future contract month ceases on the last business day of the month two months prior. For example, the March contract month will expire on the last business day of January.

Brent Crude futures prices are published in $US per barrel on the ICE website.[18] The daily prices are determined by ICE using the weighted average price of trades during a two-minute settlement period from 19:28:00, London time.[19] ICE requires that all positions in any given contract month must be reported to the exchange on a daily basis.

The forward medium-term LNG netback prices published by the ACCC are based on the end of day Brent futures prices quoted by ICE the day before publication.

LNG slope estimates provided by GaffneyCline

The ACCC uses estimates of LNG slopes for medium-term LNG contracts (or LNG strips) provided by GaffneyCline. These estimates are expressed as a percentage, or slope, of Brent oil prices and can be applied against Brent oil futures to derive estimates of forward prices for LNG sold into the Asian LNG market.

To estimate LNG prices, LNG slopes are multiplied by Brent oil futures prices for each month of the 5-year period starting at the time of each LNG netback price series update. These prices are then annualised using a simple average for each year of the forward period.

GaffneyCline's methodology for estimating LNG slopes, including information on relevant LNG contracts, key assumptions and the approach used to normalise LNG contract parameters, are outlined in the GaffneyCline methodology paper published on the ACCC's LNG netback price series webpage.[20] The estimates are based on actual LNG market transactions to the extent possible, normalised to represent deliveries to northeast Asia. The ACCC recognises the potential for there to be insufficient information on recent medium-term LNG contracts at any given time. In this case, GaffneyCline's methodology considers prices under short-term LNG tenders, long-term LNG contracts, and the long-run marginal cost of LNG from the US Gulf Coast to supplement medium-term contract data.

GaffneyCline provides the ACCC with LNG slope estimates on a 6-monthly basis, along with an information paper detailing how it has estimated LNG contract prices and key market developments that provide additional context for estimated LNG prices. This information paper is published on the ACCC's LNG netback price series webpage.[21]

3.2. LNG freight costs

For a given measure of Asian LNG prices, the next step in a netback price calculation is to deduct a measure of LNG freight costs, which represents the cost of shipping an LNG cargo from the loading port to the destination port.

The sections below set out the measure of LNG freight costs the ACCC uses for the historical component of the LNG netback price series, and the measures used for expectations of future LNG freight costs for short- and medium-term LNG netback prices.

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18 ICE, Futures Europe Report Centre, https://www.theice.com/marketdata/reports/10

19 ICE, 'JKM LNG (Platts) future', https://www.theice.com/products/6753280/JKM-LNG-PLATTS-Future

20 https://www.accc.gov.au/system/files/GaffneyCline%20methodology%20report%20-%20LNG%20price%20estimates.pdf

21 https://www.accc.gov.au/regulated-infrastructure/energy/gas-inquiry-2017-2025/lng-netback-price-series

3.2.1. Historical LNG freight costs

For the historical LNG netback price series, the ACCC uses Commodity Insights' daily assessments of LNG freight costs between Gladstone and Japan/Korea. The reference delivery port Commodity Insights uses for this price assessment is Futtsu in Tokyo Bay.

Commodity Insights publishes a single daily value (to subscribers) in US$/MMBtu indicating the implied cost of a voyage between Gladstone and Futtsu. These daily freight cost estimates are based on a range of both static and variable inputs and assumptions. The individual components of these LNG freight costs are as follows:[22]

- Port costs – This reflects costs incurred at the loading port and discharge port. Commodity Insights' assumed port costs are published on its website in its LNG methodology guide.[23]
- Charter costs – This is the cost of chartering the LNG tanker for a round-trip voyage structure, and an assumed three-day loading/discharging period. A ballast rate assessment is also included to value the return leg of the voyage, as typically ship-owners seek payment from charterers to position and re-position their ship. The hire rate is determined using Commodity Insights' daily Asia Pacific LNG Day Rate assessment, and the ballast rate is published under Commodity Insights' Asia Pacific Ballast Rate assessment (both of which are available to subscribers).
- Boil-off costs – This reflects the estimated value of the volume of LNG that is lost during the voyage due to boil-off. Commodity Insights uses assumptions on the rates of boil-off for different legs of the voyage (such as when the tanker is in port and when it is *en route*) and the capacity of the LNG tanker (including its fillable volume) to estimate the quantity of LNG boil-off, which is then valued at the destination price (that is, using the relevant JKM assessment).
- Fuel costs – This reflects the estimated cost of LNG tanker fuel oil costs. Commodity Insights uses assumptions on the consumption rate of fuel oil in combination with Commodity Insights' daily Singapore bunker fuel price assessment (available to subscribers) to estimate the total fuel cost for the voyage.

For the ACCC's historical LNG netback price series, Commodity Insights' daily Gladstone-Futtsu LNG freight cost assessments are subtracted from daily JKM prices to give free on board (FOB) prices at Gladstone in US$/MMBtu.

3.2.2. Forward short-term LNG freight costs

For the forward short-term LNG netback price series, the ACCC uses forward LNG freight costs between Gladstone and Tokyo assessed by Argus Media.

Argus assesses forward LNG freight costs on a weekly basis in US$/MMBtu for each month of a 24-month forward period (with the first month being the next full month). Argus provides this data to the ACCC and the ACCC republishes these assessments under licence on a fortnightly basis on the LNG netback price series web page.

The Gladstone-Tokyo forward freight rates assessed by Argus comprise the cost of chartering the vessel, fuel costs, and boil-off losses (which are also consumed as fuel) over a round trip from Gladstone to Tokyo. Argus uses the following key assumptions:[24]

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[22] For a more detailed explanation of Commodity Insights' LNG freight cost methodology, see Commodity Insights, *Specifications guide: Global LNG,* https://www.spglobal.com/commodityinsights/PlattsContent/_assets/_files/en/our-methodology/methodology-specifications/global_lng.pdf

[23] Commodity Insights, *Specifications guide: Global LNG,* https://www.spglobal.com/commodityinsights/PlattsContent/_assets/_files/en/our-methodology/methodology-specifications/global_lng.pdf

- The calculation assumes a 135,000-185,000m³ dual-fuel diesel electric (DFDE) vessel, travelling at 19.5 knots over a 16.65 day, 7,794 nautical mile round trip.
- The vessel is assumed to use LNG boil-off as fuel on its outward leg, and to return powered with bunker fuel.
- Boil-off is assumed to occur at a rate of 0.1pc/day. The value of the cargo lost to boil-off is determined by the delivered LNG spot price in northeast Asia.
- Bunker fuel costs are taken from Argus' assessment of Singapore high sulphur fuel oil swaps, assuming consumption of 122t/day.
- Charter rates are determined using assessments of Argus Round Voyage forward rates for Australia-Northeast Asia (ARV1).

For the ACCC's forward short-term LNG netback price series, Argus' forward LNG freight costs for a given future month are subtracted from the ICE JKM futures quote for the corresponding month to give a forward FOB price at Gladstone in US$/MMBtu.

3.2.3. Forward medium-term LNG freight costs

For the forward medium-term LNG netback price series, the ACCC uses annual forward LNG freight costs between Gladstone and Tokyo as estimated by:

- Argus, as outlined above, for years 1 and 2
- FTI Consulting for years 3, 4 and 5.

FTI Consulting uses a fundamental LNG shipping market model to develop LNG freight rate estimates over a 5-year forward period. FTI's methodology, including information on key assumptions, is published in FTI's methodology paper on the ACCC's website.[25] Forward LNG freight prices are determined by the equilibrium of estimates of supply and demand having regard to the cost of new LNG tanker builds and payback periods and expected future LNG supply and demand dynamics. FTI uses data on recent LNG shipping transactions to periodically calibrate the model.

Every 6 months, FTI provides estimates of forward LNG freight rates in US$/MMBtu for each calendar year over a 5-year period. As noted previously, the forward medium-term LNG netback prices extends to 5 years, with the forward period commencing at the time of each update. This means that each year for the forward netback period will generally not align with calendar years. To align FTI's calendar year LNG freight estimates with the years in the forward netback period, the ACCC uses an average of FTI's estimates for the two calendar years overlapping the netback year (weighted by the number of overlapping months).

Forward LNG freight rate estimates and written documentation of assumptions and inputs are published every 6 months in an information paper on the ACCC website alongside the ACCC's LNG netback price series.[26]

For the ACCC's forward medium-term LNG netback price series, estimates of forward LNG freight rates for a given future year are subtracted from estimated yearly medium-term LNG prices (i.e. the annualised ICE Brent futures quote for the corresponding year multiplied by GaffneyCline's LNG slope estimate) to give an average annual forward FOB price at Gladstone in US$/MMBtu.

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[24] For more information see Argus, 'Argus LNG Daily Methodology and Specifications Guide', https://www.argusmedia.com/-/media/Files/methodology/argus-lng-daily.ashx

[25] https://www.accc.gov.au/system/files/FTI%20Consulting%20methodology%20report%20-%20LNG%20freight%20rate%20estimates.pdf

[26] https://www.accc.gov.au/regulated-infrastructure/energy/gas-inquiry-2017-2025/lng-netback-price-series

3.3. Unit conversions

Once Gladstone FOB prices in US$/MMBtu are determined, it is necessary to convert these prices from US to Australian dollars, and to convert the units of energy from MMBtu to GJ. For all energy unit conversions the ACCC uses a conversion of 1 MMBtu = 1.055 GJ.

For the historical LNG netback price series, historical daily Gladstone FOB prices are converted to Australian dollars using exchange rates published by the RBA for corresponding days. For both of the forward LNG netback price series, each forward Gladstone FOB price is converted to Australian dollars using a five-day average (ending on the day of the JKM or Brent futures quote) of exchange rates published by the RBA. These conversions result in a Gladstone FOB price in A$/GJ.

3.4. LNG plant costs

For a given measure of Gladstone FOB prices in A$/GJ, the next step in the calculation of netback prices is to deduct LNG plant costs. For this, the ACCC uses estimates of short-run marginal LNG plant costs—that is, the costs that would be avoided by LNG producers if the excess gas that would otherwise be sold into Asian LNG markets were sold to the domestic market. These costs include the value of the gas that is consumed as fuel during the liquefaction process, as well as LNG plant operating expenditure.

To estimate short-run marginal LNG plant operating expenditure, the ACCC uses information obtained from the Queensland LNG producers on short-run marginal operating costs.

For the historical and both forward LNG netback price series, we calculate a simple average of the short-run marginal operating costs incurred by each LNG producer in the most recent 12-month period for which data is available. This average is subtracted from the Gladstone FOB price, which gives an effective price that is then used to determine the value of LNG plant fuel gas. This method assumes—consistent with LNG producer submissions during the ACCC's 2018 consultation—that LNG plant operating costs do not materially change over the short term.

To estimate the value of LNG plant fuel gas, the ACCC uses data obtained from the Queensland LNG producers on daily quantities of LNG plant feedgas and LNG production. This data is used to calculate LNG plant efficiency, which is a measure of the amount of LNG that is produced for every additional unit of gas that is fed into the LNG plant.[27]

Daily feedgas and LNG production data from each LNG producer is used to perform regression analysis, where feedgas data is regressed on LNG production data.[28] The regression coefficient provides an estimate of each producer's marginal LNG plant efficiency. For example, a coefficient of 0.95 means that LNG plant efficiency is 95% and each additional GJ of gas fed into the LNG plant will result in 0.95 GJ of LNG being produced.

For the historical LNG netback price series, LNG plant efficiency is calculated on a quarterly basis.[29] For the forward LNG netback price series, it is calculated annually.[30]

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[27] This contrasts with average LNG plant efficiency, which is a measure of the amount of LNG produced with a given quantity of feedgas over a given time period.

[28] Linear regression using Ordinary Least Squares.

[29] The timing of the data used to adjust for LNG plant efficiency is different for historical LNG netback prices in the series before and after the ACCC commenced publishing the price series in October 2018. For historical LNG netback prices before October 2018, the adjustment for LNG plant efficiency is made using data from contemporaneous quarters. For historical LNG netback prices after October 2018, the adjustment is made using data from the corresponding quarter of the previous year (with year-on-year data being used to account for any seasonal impacts on LNG plant efficiency). This is because the ACCC collects this data semi-annually and will not have contemporaneous data at the time of each update of the price series.

Using the LNG plant efficiency estimates for each LNG producer, an average of LNG plant efficiency is calculated. These averages of LNG plant efficiency are multiplied by Gladstone FOB prices—net of short-run marginal LNG plant operating costs—to give an effective price at the LNG plant inlet.

3.5. Pipeline transportation costs

Once an effective LNG plant inlet price is determined, the next step in the calculation of LNG netback prices is to account for short-run marginal pipeline transportation costs from the wellhead[31] to the LNG plant. These costs may include pipeline tariffs, operating expenditure and ancillary costs such as compression.

The ACCC uses information obtained from the three Queensland LNG producers on short-run marginal transportation costs from the wellhead to the LNG plant to calculate average short-run marginal costs for the LNG producers'. For both the historical and forward LNG netback price series, the average of short-run marginal transport costs derived from the most recent data obtained from LNG producers is subtracted from the LNG plant inlet price to give an LNG netback price at the wellhead.

To calculate an LNG netback price at Wallumbilla, the costs of transporting gas from the wellhead to Wallumbilla also need to be taken into account. However, the information obtained from LNG producers indicates that, currently, the short-run marginal costs they incur in transporting gas to Wallumbilla are negligible.

The ACCC has therefore taken short-run marginal costs of transporting gas from the wellhead to Wallumbilla to be zero in both the historical and forward LNG netback price series. This means that an LNG netback price at the wellhead can effectively be regarded as an LNG netback price at Wallumbilla.

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30 The approach used for the historical series is different to that of the forward series (for which the ACCC discloses annual estimates of LNG plant efficiency) so that it is not possible for Commodity Insights' raw JKM or freight cost information to be inferred.

31 References to wellhead should be read as ex-plant, i.e. at the point gas is ready to be injected into a pipeline to be sent to Wallumbilla or the LNG plant after it has been processed to remove impurities.

4. Using the LNG netback price series

Section 4.1 below provides users of the LNG netback price series with guidance on the interpretation and use of published netback prices. Section 4.2 provides some practical tips for using the LNG netback pricing spreadsheet. Section 4.3 provides worked examples of LNG netback price calculations using the ACCC's methodology described in section 3.

4.1. Interpreting and using published LNG netback prices

This section explains how the historical and forward LNG netback prices can be used in practice by gas market participants. It also explains some of the limitations associated with these reference prices.

4.1.1. Historical LNG netback prices

How these prices can be used

As set out in section 3.1.1, the historical component of the ACCC's LNG netback price series is based on the JKM.

The level of the JKM at a given time is an indicator of the market price of spot LNG cargoes delivered to northeast Asia in the following months. It is therefore a measure of the price that an east coast LNG exporter could achieve if excess gas were sold as a spot cargo in that month. When the JKM is netted back to Wallumbilla by subtracting the avoidable costs of shipping, liquefaction and transport, it represents the exporter's opportunity cost of supplying gas to the domestic at that point in time.

There are benefits to market participants in knowing recent and historical LNG netback prices. It can inform market participants on how export parity prices at Wallumbilla have moved over time, both in terms of price level and volatility. This is important information for market participants to understand, given that Asian LNG spot prices have historically been subject to significant fluctuations for various reasons, including:

- seasonality, with typically higher prices over the northern hemisphere winter
- short-term volatility, with prices having changed rapidly over short periods
- structural changes, with general price levels reflecting the supply and demand dynamics of the international LNG market
- movements in crude oil prices.

Further, by comparing these historical LNG netback prices with netback prices based on expectations of future Asian LNG spot prices, market participants should be better able to anticipate temporary or structural changes in LNG market supply-demand dynamics. This may put market participants in a better position to take timely action to mitigate any adverse price movements or to take advantage of any favourable price movements.

Limitations

While being useful for understanding how LNG netback prices at Wallumbilla have changed over time, historical LNG netback prices are not likely to be the most relevant reference price for negotiations concerning future gas supply. For this, it would be more appropriate to calculate LNG netback prices based on expectations of either short- or medium-term Asian LNG prices during the relevant supply period (discussed further in sections 4.1.2 and 4.1.3 below). This would better inform the parties in the negotiation of the supplier's opportunity cost of supplying the gas.

Further, as discussed in section 3.1.1 above, the JKM is assessed based on information collected daily from a range of LNG spot market participants such as producers, consumers, traders, brokers, shippers, and other active market participants. The ACCC does not have visibility over JKM assessments and the extent to which they are an accurate representation of Asian LNG spot prices. The ACCC takes the JKM as given, and does not have any input into the methods used to derive these prices, nor does the ACCC amend Commodity Insights' data in any way.

While the inputs used and final netback prices are relevant for comparing with gas prices in the east coast gas market, they would not be appropriate for use outside this market. This is because the LNG netback price series uses LNG freight cost estimates specifically for the purpose of netting LNG prices back to Gladstone. It also uses data on liquefaction and domestic transport costs obtained from LNG producers specifically relating to the Queensland LNG export facilities.

4.1.2. Forward short-term LNG netback prices

How these prices can be used

As set out in section 3.1.1, forward short-term LNG netback prices are derived using prices for JKM futures contracts quoted by ICE, as at the time of publication.

A JKM futures price for a given future month indicates futures market participants' expectation of the price of Asian LNG spot cargoes delivered in that future month. This price can be converted to an LNG netback price at Wallumbilla by adjusting for the expected avoidable costs of shipping, liquefaction and transportation.

The average of forward short-term LNG netback prices over a given period of future gas supply can be used by gas buyers (such as C&I users) to inform their negotiations with suppliers for shorter-term GSAs (up to 2 years).

Forward short-term LNG netback prices represent the price that an LNG exporter would expect to receive to be indifferent between selling the gas to a domestic buyer in a given month and selling the gas on the Asian LNG spot market in that month. Over a longer period of future supply (such as a year), the forward LNG netback prices over that period can be averaged to determine this price.

If a gas user were seeking gas supply over the next full calendar year, the LNG netback price series would allow them to calculate the average of forward LNG netback prices over that year. The user would then be able to use this average to, for example, assess price offers made by suppliers for that same period of supply (noting that other factors such as transportation costs, the terms and conditions of gas supply, and retailer charges may be relevant).

Limitations

The extent to which a forward short-term LNG netback price is relevant as a price marker in negotiations for future domestic gas supply may vary. Parties to a negotiation should satisfy themselves that an LNG netback price based on Asian LNG spot prices is the most appropriate reference point in their circumstances. If pricing dynamics in the domestic market change, a different pricing marker may be more appropriate. There may also be circumstances relating to specific negotiations that make other factors (discussed earlier) material to the outcome of the negotiation.

As noted in section 1, forward short-term LNG netback prices do not represent the ACCC's forecast of what domestic prices should or will be at any particular point in time. They represent an indication of expectations at a point in time using one specific measure – the

JKM futures price. The ACCC considers that this is an appropriate measure for a short-term domestic reference price, however there are other sources of expectations of future LNG spot prices, such as those provided by industry analysts.

Market participants seeking to use forward LNG netback prices based on JKM futures in their negotiations should also be aware of its limitations. JKM futures are financial contracts that are settled based on the realised level of the JKM for the relevant future month. Therefore, JKM futures are based on prices in financial markets rather than on prices for physical cargoes in commodity markets.

The JKM futures market is also currently relatively illiquid beyond around 12 months, compared to some of the more mature derivatives markets (for example, oil futures). This means that futures quotes for months beyond this are based on a relatively small number of transactions and therefore may be less indicative of market expectations about future prices.

Market participants should also be aware that JKM futures prices can change significantly over a short period of time. This means that it is important for market participants to refer to forward short-term LNG netback prices based on the latest JKM futures prices.

Further, as noted above in relation to historical LNG netback prices, the inputs used and final LNG netback prices at Wallumbilla published by the ACCC relate to the east coast gas market, and may not be appropriate for use outside this market.

4.1.3. Forward medium-term LNG netback prices

How these prices can be used

As set out in section 3.1.1, forward medium-term LNG netback prices are derived by multiplying GaffneyCline's estimates of oil slopes for medium-term LNG contracts by ICE-quoted Brent oil futures prices on an annual basis out to 5 years.

These prices represent an estimate of the price of LNG payable under medium-term LNG contracts for each year of a forward 5-year period. This price can be converted to an LNG netback price at Wallumbilla by adjusting for the expected avoidable costs of shipping, liquefaction and transportation.

Forward medium-term LNG netback prices over a given period of future gas supply can be used by gas buyers (such as C&I users) to inform their negotiations with suppliers for longer-term GSAs (up to 5 years). They represent the price that an LNG exporter would expect to receive to be indifferent between selling the gas to a domestic buyer over a given period and selling the gas into the Asian LNG market in that period.

If a gas user were seeking gas supply over a 2–5 year period, the LNG netback price series would provide the average of forward LNG netback prices over each year of that period. The user would then be able to use this average to, for example, assess price offers made by suppliers for that same period of supply (noting that other factors such as transportation costs, the terms and conditions of gas supply, and retailer charges may be relevant).

Limitations

The extent to which a forward medium-term LNG netback price is relevant as a price marker in negotiations for future domestic gas supply may vary. Parties to a negotiation should satisfy themselves that an LNG netback price based on medium-term LNG contract prices is the most appropriate reference point in their circumstances. If pricing dynamics in the domestic market change, a different pricing marker may be more appropriate. There may also be circumstances relating to specific negotiations that make other factors (discussed earlier) material to the outcome of the negotiation.

As noted in section 1, forward medium-term LNG netback prices do not represent the ACCC's forecast of what domestic prices should or will be at any particular point in time. They represent an indication of expectations at a point in time using one specific measure – LNG prices derived using an estimated oil slope combined with futures market expectations of Brent oil prices. The ACCC considers that this is an appropriate measure for a medium-term domestic reference price, however there may be other sources of expectations of future medium-term LNG prices, such as those provided by industry analysts.

Market participants seeking to use forward medium-term LNG netback prices based on this measure of LNG prices should also be aware of its limitations.

- GaffneyCline's estimates of oil slopes for medium-term LNG contracts are based as much as possible on actual LNG market transactions, normalised to represent deliveries to northeast Asia. However, these estimates are based on historical prices agreed under contracts for LNG deliveries over a 3–5 year period. LNG markets can be volatile, and market prices can change materially over short periods, for example due to shifting supply and demand fundamentals. This means that any estimates of future prices are inherently uncertain.
- GaffneyCline's methodology incorporates a potentially large variety of LNG contracts with different contract terms, pricing structures, sources and destinations. The methodology uses a range of assumptions to standardise LNG contracts so that they can be compared like-for-like and used to estimate the price of medium-term deliveries into northeast Asia. LNG price estimates will therefore reflect the methodology followed and the assumptions used.
- The ACCC recognises the potential for there to be insufficient information on recent medium-term LNG contracts at any given time. In this case, GaffneyCline's methodology considers prices under short-term LNG tenders, long-term LNG contracts, and the long-run marginal cost of LNG from the US Gulf Coast to supplement medium-term contract data.[32] While not directly comparable with medium-term LNG contracts in all cases, these alternative data sources are considered appropriate to compensate when there is insufficient information regarding medium-term contracts.
- GaffneyCline's oil slope estimates are combined with Brent oil futures to derive expected prices under medium-term LNG contracts. The Brent oil futures market is highly liquid and considered to provide a robust and representative market view of oil price expectations, particularly within a 5-year period.[33] However, market participants may have alternative sources for oil price forecasts such as those provided by industry analysts or may have their own in-house view. Market participants should also be aware that, while historically less volatile than JKM futures, oil futures prices can change significantly over a short period of time. This means that it is important for market participants to refer to forward medium-term LNG netback prices based on the latest Brent futures prices.

Further, as noted above, FTI's estimates of medium-term LNG freight rates are based on a forward-looking model of the LNG shipping market, with prices determined by the equilibrium of estimates of supply and demand. This means that forward LNG freight rates are subject to the same uncertainties as forecasts of LNG supply and demand. As noted above in the context of estimating LNG prices, LNG shipping markets can be equally volatile, and market prices can change materially over short periods, meaning that any estimates of future prices are inherently uncertain. FTI's methodology similarly uses a range of assumptions in its modelling of global LNG shipping fundamentals and its estimates of the cost of shipping

[32] For further information see GaffneyCline's methodology paper, https://www.accc.gov.au/system/files/GaffneyCline%20methodology%20report%20-%20LNG%20price%20estimates.pdf

[33] Oil futures prices can to some extent reflect carrying costs (e.g. interest and storage).

LNG from Gladstone to northeast Asia. LNG freight estimates will therefore reflect the methodology followed and the assumptions used.

Finally, as noted above, the inputs used and final LNG netback prices at Wallumbilla published by the ACCC relate to the east coast gas market, and may not be appropriate for use outside this market.

4.2. Practical tips for using the LNG netback price spreadsheet

The forward short-term LNG netback prices published on the ACCC website are based on JKM futures prices for each month extending out to 2 years. The forward medium-term LNG netback prices extend to 5 years and are based on an oil index reflecting expectations of prices under medium-term LNG contracts for delivery into northeast Asia. As set out in section 3.1, these estimates of LNG prices are netted back to Wallumbilla using a range of inputs and assumptions.

The ACCC has made its method for calculating forward LNG netback prices (including the inputs used) transparent so that users of the price series have the option of substituting the ACCC's inputs for their own alternatives, and determine alternative LNG netback prices.

Below are some practical tips that may be useful to users in making such adjustments. To make any adjustments, we recommend that users download the most recent version of the LNG netback price series Excel spreadsheet available from the price series web page.[34]

4.2.1. Using alternative inputs

In the LNG netback price series spreadsheet, users can replace any of the inputs and assumptions with alternatives. This includes forward LNG prices, LNG freight costs, exchange rates, LNG plant operating costs and fuel gas, and pipeline transportation costs. All input cells in the LNG netback price spreadsheet are highlighted blue.

For example, figure 4.1 below (taken from the LNG netback price series spreadsheet) shows JKM futures prices quoted on a particular day for given futures contract months. These can be replaced either with updated JKM futures prices quoted by ICE,[35] or with alternative measures of future Asian LNG spot prices.

Similarly, for medium-term LNG netback prices, Brent oil futures can be replaced with other estimates of future oil prices, and GaffneyCline's estimated oil slopes can be substituted with alternatives.

The effect of any changes to inputs will flow through to the final calculation of LNG netback prices at Wallumbilla.

[34] https://www.accc.gov.au/regulated-infrastructure/energy/gas-inquiry-2017-2025/lng-netback-price-series

[35] JKM futures quotes published at https://www.theice.com/marketdata/reports/144

Figure 4.1: Forward short-term LNG price inputs

ICE JKM futures				
Date of quote	Contract month	Settlement price (US$/MMBtu)	Open interest (no. of lots)	Open interest (PJ equivalent)
28 Sep 18	November 2018	11.300	3,418	36.06
28 Sep 18	December 2018	12.450	4,320	45.58
28 Sep 18	January 2019	13.150	2,215	23.37
28 Sep 18	February 2019	13.150	1,931	20.37
28 Sep 18	March 2019	11.800	1,218	12.85
28 Sep 18	April 2019	10.400	840	8.86
28 Sep 18	May 2019	9.550	840	8.86
28 Sep 18	June 2019	9.450	840	8.86
28 Sep 18	July 2019	9.450	670	7.07
28 Sep 18	August 2019	9.550	670	7.07
28 Sep 18	September 2019	9.650	670	7.07
28 Sep 18	October 2019	10.350	390	4.11
28 Sep 18	November 2019	10.950	390	4.11
28 Sep 18	December 2019	11.400	390	4.11

4.2.2. Averaging short-term LNG netback prices over a future supply period

For a given period of gas supply within the forward short-term LNG netback price forward period (up to 2 years), LNG netback prices for each month of the supply period can be averaged to estimate a domestic supplier's opportunity cost of supplying the east coast gas market over that period. As noted above, this can be used by gas buyers in negotiations with suppliers to assess price offers made by suppliers for that same period of supply (noting that other factors such as transportation costs, the terms and conditions of gas supply, and retailer charges may be relevant).

For example, figure 4.2 below (taken from the LNG netback price series spreadsheet) shows LNG netback prices at Wallumbilla based on JKM futures prices quoted on a particular day. If a gas buyer were seeking supply over a calendar year (2019 in this example) then the LNG netback prices for each month over calendar 2019 would be averaged (red highlighted cells).

Alternatively, if a gas buyer were seeking supply over a shorter period such as the winter months, then the LNG netback prices for each month over winter 2019 would be averaged.

Figure 4.2: Average of forward short-term LNG prices

LNG netback price calculations				
Forward netback month	AUD/USD exchange rate	Gladstone FOB price (A$/GJ)	LNG plant efficiency	Netback price at Wallumbilla (A$/GJ)
November 2018	0.7245	13.73	0.9450	12.88
December 2018	0.7245	15.13	0.9450	14.20
January 2019	0.7245	15.98	0.9450	15.00
February 2019	0.7245	16.01	0.9450	15.03
March 2019	0.7245	14.40	0.9450	13.51
April 2019	0.7245	12.71	0.9450	11.92
May 2019	0.7245	11.64	0.9450	10.90
June 2019	0.7245	11.45	0.9450	10.72
July 2019	0.7245	11.40	0.9450	10.67
August 2019	0.7245	11.49	0.9450	10.76
September 2019	0.7245	11.61	0.9450	10.88
October 2019	0.7245	12.47	0.9450	11.68
November 2019	0.7245	13.23	0.9450	12.41
December 2019	0.7245	13.82	0.9450	12.97

4.2.3. Extending the forward period

Users can extend the forward period for both short- and medium-term LNG netback prices. ICE quotes JKM and Brent futures prices beyond the forward period of netback prices published by the ACCC, which could be used for longer-dated forward LNG prices. Note however that liquidity in the JKM futures market may be limited for longer dated futures. The ACCC also publishes estimates of LNG freight rates out to a maximum of 5 years, so alternative estimates would be required for LNG netback prices beyond this.

Users may also substitute these extended measures of forward LNG prices for alternative measures, such as forecasts by commodity price reporting agencies or industry analysts.

4.3. LNG netback price at Wallumbilla: worked examples

This section provides worked examples showing the step-by-step calculation of historical and forward netback prices. The inputs used and LNG netback prices derived in this section are for illustrative purposes only.

4.3.1. Historical LNG netback prices

Step 1: Start with an LNG price

The ACCC's calculation of a historical monthly LNG netback price (say for September in a given year) starts with JKM price assessments in respect of LNG cargoes to be delivered in September of that year. These price assessments would be published by Commodity Insights on each day from 16 July to 15 August.

For this example, the netback calculation is done for 16 July. Assume that the JKM on 16 July was assessed at US$8/MMBtu.

Step 2: Subtract LNG freight costs

Commodity Insights' LNG freight cost assessment for Gladstone to Japan/Korea on 16 July is subtracted from the JKM as assessed on 16 July to give an FOB price at Gladstone.

Assuming an LNG freight cost of US$0.50/MMBtu, this would result in a Gladstone FOB price of US$7.50/MMBtu.

Step 3: Convert to A$/GJ

The Gladstone FOB price in US$/MMBtu for 16 July is divided by the AUD/USD exchange rate as published by the RBA for 16 July, and then divided by an MMBtu/GJ conversion factor to give a FOB price in A$/GJ.

Assuming an AUD/USD exchange rate of 0.75 and using an energy conversion of 1 MMBtu = 1.055 GJ, this would result in a Gladstone FOB price of A$9.48/GJ.

Step 4: Subtract LNG plant costs

The ACCC's estimate of short-run marginal LNG plant operating expenditure (averaged across the Queensland LNG producers) is subtracted from the 16 July Gladstone FOB price.

Assuming that the average of short-run marginal operating expenditure is $0.05/GJ, this would result in an FOB price net of operating expenditure of $9.43/GJ.

This price is then used to adjust for the value of gas consumed as fuel during the liquefaction process, which is done by multiplying the price by the ACCC's estimate of marginal LNG

plant efficiency over the corresponding quarter from the previous year (averaged across the Queensland LNG producers).

Assuming that the average of marginal LNG plant efficiency is 95 per cent, this would result in an effective price at the LNG plant inlet of $8.96/GJ.

Step 5: Adjust for transportation costs

The ACCC's estimate of short-run marginal transport costs between the wellhead and the LNG facility (averaged across the Queensland LNG producers) is subtracted from the effective LNG plant inlet price for 16 July.

Assuming that the average of short-run marginal transport costs between the wellhead and the LNG facility is $0.05/GJ, this would result in a price at the wellhead of $8.91/GJ.

As noted in section 3.1.5 above, based on information obtained from the LNG producers the short-run marginal costs of transportation between the wellhead and Wallumbilla is currently assumed to be zero. Therefore, the price at the wellhead of $8.91/GJ in this example represents the LNG netback price at Wallumbilla for 16 July.

Step 6: Average of daily netback prices

The process set out in steps 1–5 above is repeated for each JKM assessment day between 16 July and 15 August to give daily LNG netback prices at Wallumbilla for each day. These netback prices are averaged to give an LNG netback price for September.

4.3.2. Forward short-term LNG netback prices

Step 1: Start with an LNG price

The ACCC's calculation of a forward short-term LNG netback price for a given future month starts with an ICE JKM futures quote, at the time of calculation, for that future month.

For this example, the netback calculation is done for the month of July the following year. Assume that, at the time of calculation, the price of a JKM futures contract for July of the following year is quoted by ICE at US$6/MMBtu.

Step 2: Subtract LNG freight costs

Argus' forward LNG freight cost estimate for Gladstone to Tokyo for July of the following year is subtracted from the JKM futures price to give a forward FOB price at Gladstone.

Assuming a forward LNG freight cost of US$0.30/MMBtu, this would result in a forward Gladstone FOB price for July of the following year of US$5.70/MMBtu.

Step 3: Convert to A$/GJ

The forward Gladstone FOB price in US$/MMBtu for July of the following year is divided by a five-day average of the AUD/USD exchange rate as published by the RBA (ending on the day of the JKM futures quote), and then divided by an MMBtu/GJ conversion factor to give a FOB price in A$/GJ.

Assuming a five-day average AUD/USD exchange rate of 0.75 and using an energy conversion of 1 MMBtu = 1.055 GJ, this would result in a forward Gladstone FOB price of A$7.20/GJ.

Step 4: Subtract LNG plant costs

The ACCC's estimate of short-run marginal LNG plant operating expenditure (averaged across the Queensland LNG producers) is subtracted from the forward Gladstone FOB price.

Assuming that the average of short-run marginal operating expenditure is $0.05/GJ, this would result in an FOB price net of operating expenditure of $7.15/GJ.

This price is then used to adjust for the value of gas consumed as fuel during the liquefaction process, which is done by multiplying the price by the ACCC's estimate of marginal LNG plant efficiency over the most recent 12-month period where the ACCC has obtained data (averaged across the Queensland LNG producers).

Assuming that the average of marginal LNG plant efficiency is 95 per cent, this would result in an effective forward price at the LNG plant inlet of $6.79/GJ.

Step 5: Adjust for transportation costs

The ACCC's estimate of short-run marginal transport costs between the wellhead and the LNG facility (averaged across the Queensland LNG producers) is subtracted from the effective forward LNG plant inlet price.

Assuming that the average of short-run marginal transport costs between the wellhead and the LNG facility is $0.05/GJ, this would result in a forward price at the wellhead of $6.74/GJ.

As noted in section 3.1.5 above, based on information obtained from the LNG producers the short-run marginal costs of transportation between the wellhead and Wallumbilla is currently assumed to be zero. Therefore, the forward price at the wellhead of $6.74/GJ in this example represents the forward LNG netback price at Wallumbilla for July the following year.

4.3.3. Forward medium-term LNG netback prices

Step 1: Start with a Brent oil price

The ACCC's calculation of a forward medium-term LNG netback price for a given future year starts with a 12-month average ICE Brent oil futures quotes, at the time of calculation, for that future year.

For this example, we show the process for calculating netback prices in years 1 and 4 of the forward medium-term LNG netback price series.

Assume that, at the time of calculation, the annual average price for Brent oil futures quoted by ICE in year 1 is US$92.11/bbl. Assume that at the time of the calculation the annualised oil futures price for year 4 is US$73.93/bbl.

Step 2: Multiply by LNG slope to get implied LNG price

The annualised Brent oil futures price is multiplied by GaffneyCline's most recent estimated slope for LNG delivered into Asia. Assume that the estimated LNG slope is 12.8%.

Assuming the annualised Brent futures price for year 1 is US$92.11/bbl, multiply this by the LNG slope estimate of 12.8% to get the implied LNG price of $11.79/MMBtu. Similarly, for year 4, the annualised oil price of US$73.93/bbl multiplied by the LNG slope estimate of 12.8% results in an implied LNG price of $9.46/MMBtu.

Step 3: Subtract LNG freight costs

Argus' annual average forward LNG freight cost estimate for Gladstone to Tokyo for year 1, and FTI's annual forward LNG freight rate estimate for year 4, are subtracted from the implied LNG price in these years to give forward FOB prices at Gladstone.

Assuming a forward LNG freight cost of US$1.044/MMBtu in year 1, this would result in a forward Gladstone FOB price of US$10.75/MMBtu. Assuming a forward freight cost of US$0.97/MMBtu in year 4, this would result in a forward Gladstone FOB price of US$8.49/MMBtu

Step 4: Convert to A$/GJ

The forward Gladstone FOB price in US$/MMBtu for each year is divided by a five-day average of the AUD/USD exchange rate as published by the RBA (ending on the day of the Brent futures quote), and then divided by an MMBtu/GJ conversion factor to give FOB prices in A$/GJ.

Assuming a five-day average AUD/USD exchange rate of 0.71 and using an energy conversion of 1 MMBtu = 1.055 GJ, this would result in a forward Gladstone FOB price of A$14.35/GJ in year 1, and A$11.33/GJ in year 4.

Step 5: Subtract LNG plant costs

The ACCC's estimate of short-run marginal LNG plant operating expenditure (averaged across the Queensland LNG producers) is subtracted from the forward Gladstone FOB prices.

Assuming that the average of short-run marginal operating expenditure is $0.05/GJ, this would result in an FOB price net of operating expenditure of $14.30/GJ in year 1, and $11.28/GJ in year 4.

These prices are then used to adjust for the value of gas consumed as fuel during the liquefaction process, which is done by multiplying the prices by the ACCC's estimate of marginal LNG plant efficiency over the most recent 12-month period where the ACCC has obtained data (averaged across the Queensland LNG producers).

Assuming that the average of marginal LNG plant efficiency is 96 per cent, this would result in an effective forward price at the LNG plant inlet of $13.73/GJ in year 1, and $10.83/GJ in year 4.

Step 6: Adjust for transportation costs

The ACCC's estimate of short-run marginal transport costs between the wellhead and the LNG facility (averaged across the Queensland LNG producers) is subtracted from the effective forward LNG plant inlet prices.

Assuming that the average of short-run marginal transport costs between the wellhead and the LNG facility is $0.05/GJ, this would result in a forward price at the wellhead of $13.68/GJ in year 1, and $10.78/GJ in year 4.

As noted in section 3.1.5 above, based on information obtained from the LNG producers the short-run marginal costs of transportation between the wellhead and Wallumbilla is currently assumed to be zero. Therefore, the forward prices at the wellhead of $13.73/GJ in year 1, and $10.83/GJ in year 4 in this example represent the forward LNG netback prices at Wallumbilla for the respective years.