April 2021

'ACCC review of the LNG netback price series' – CME Group Submission

CME Group Inc. ("CME Group") is the parent of the Chicago Mercantile Exchange Inc. ("CME"). CME is registered with the Commodity Futures Trading Commission ("CFTC") as a derivatives clearing organization ("DCO") and is one of the largest central counterparty ("CCP") clearing services in the world. CME's clearing house division ("CME Clearing") offers clearing and settlement services for exchange-traded futures and options on futures contracts, as well as over-the-counter ("OTC") derivatives transactions, including interest rate swaps products. On July 18, 2012, the Financial Stability Oversight Council designated CME as a systemically important financial market utility under Title VIII of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

This paper provides information on natural gas and LNG benchmarks based on CME Group's experience and discussions with market participants. The purpose of the paper is to provide contextual information on the U.S. markets that may be relevant to the ACCC's consultation.

This paper is a summary. CME Group's Energy Products team would look forward to discussing the matters covered in this paper in detail with the ACCC.

Executive Summary:

- Henry Hub liquidity during Asian hours is unparalleled among natural gas benchmarks.
- The role of U.S. LNG in the Pacific spot market in increasing.
- Global LNG prices are converging, in part because of the emergence of significant U.S. supply based on Henry Hub pricing.
- While Henry Hub prices still differ from the current ACCC LNG netback prices, the gap has narrowed since the commissioning of several U.S. Gulf Coast projects and the forward price series reflects the same seasonality.
- Derivatives instruments for LNG freight rates from Gladstone to Tokyo are available.

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Introduction to CME Group:

CME Group is the world's leading and most diverse derivatives marketplace, made up of four exchanges, CME, CBOT, NYMEX and COMEX. Collectively, the exchanges offer a wide range of global benchmarks across all major asset classes.

The New York Mercantile Exchange - NYMEX, a U.S. regulated Designated Contract Market (DCM) offering energy futures and options, became a part of CME Group in 2008.

In 1990 NYMEX worked closely with the U.S. natural gas market participants to develop Henry Hub futures, which became the benchmark for U.S. natural gas and LNG. Henry Hub futures quickly became the most liquid natural gas futures in the world.

NYMEX is the primary venue for the hedging and management of price risk for the global natural gas market. CME Group offers a suite of physical and financial global natural gas products to trade including Henry Hub, NBP, TTF, Platts JKM, JCC as well as LNG freight futures based on the Baltic Exchange's assessments.

CME Group provides daily data about volume, open interest and settlement prices as well as education materials.

With a global presence, CME Group maintains a constant dialogue with clients across the world and different industries.

In the Asia-Pacific region, CME Group has offices in Singapore, Hong Kong, Beijing, Tokyo, Seoul and Sydney.

In Australia, CME Group and FEX Global have signed a clearing services agreement under which CME Clearing will provide clearing services to FEX Global[1].

[1] FEX Global is a Sydney-based exchange that will provide and operate a range of energy and commodity-based futures and options contracts focused primarily at servicing the Asia-Pacific region. CME Group has no commercial stake in FEX Global or its parent FEX Group. https://www.cmegroup.com/international/partnership-resources/fex-global.html

Section 1: Role of Henry Hub in the LNG Spot Market

The U.S. has experienced substantial growth in LNG liquefaction capacity between 2017 and 2020. One of the most important implications of these new U.S. LNG export projects has been the rising influence of the U.S. Henry Hub price on global gas prices.[2]

U.S. LNG exports are typically sold on a free-on-board (FOB) basis and do not typically include restrictions on destination.

The U.S. has become a key swing producer of LNG, and U.S. cargoes based on Henry Hub pricing have been sold to all importing countries.[3]

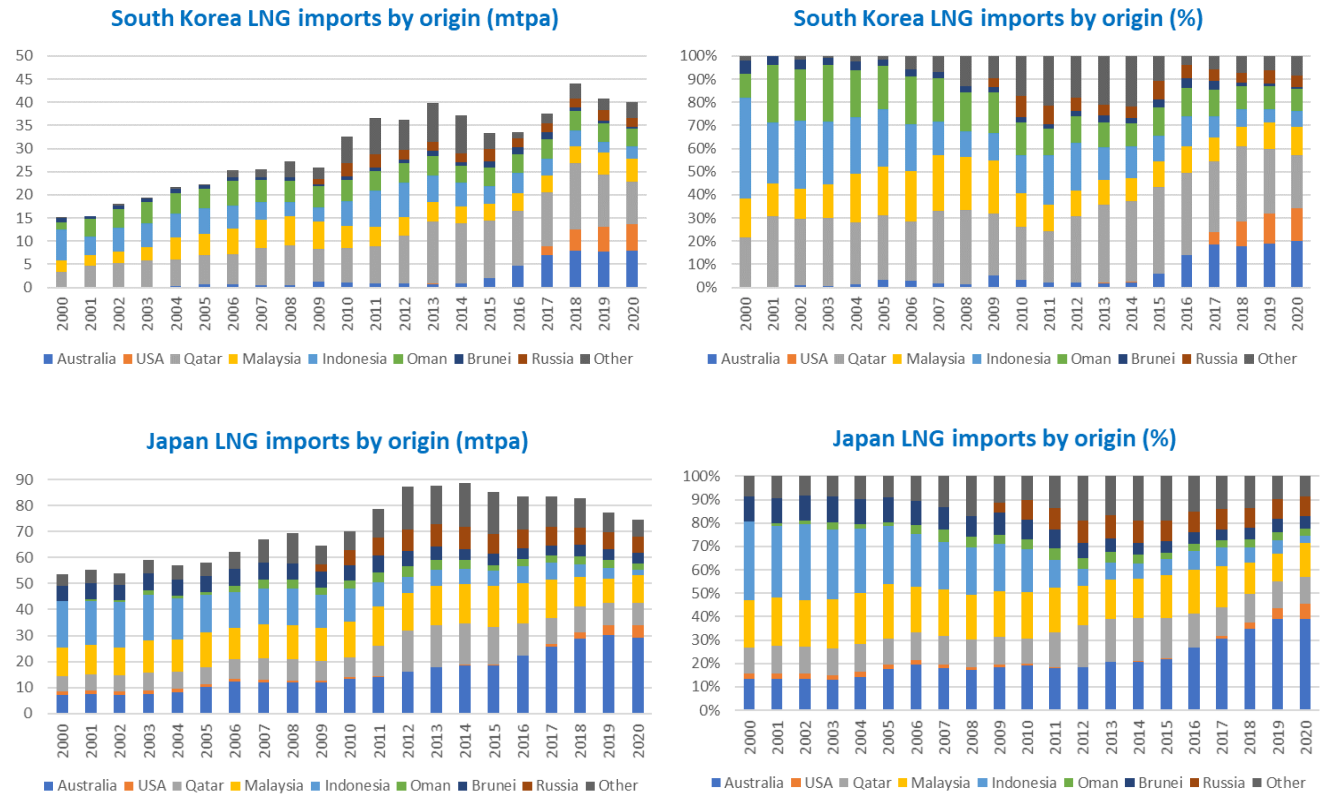
CME Group recently published an article exploring some of the consequences of U.S. natural gas exports growth.[4] In particular, we looked at how exports of LNG could help put a floor under the Henry Hub price and at the growing convergence among international prices for LNG in recent years, despite the recent spike.

1.a. Growing Role in Asia LNG Spot Market

U.S. LNG exports have become a regular source of supply for Japan and South Korea; two important markets for Australian LNG. Japan and South Korea are also the reference for the Platts JKM benchmark (and therefore the current ACCC LNG netback price).[5]

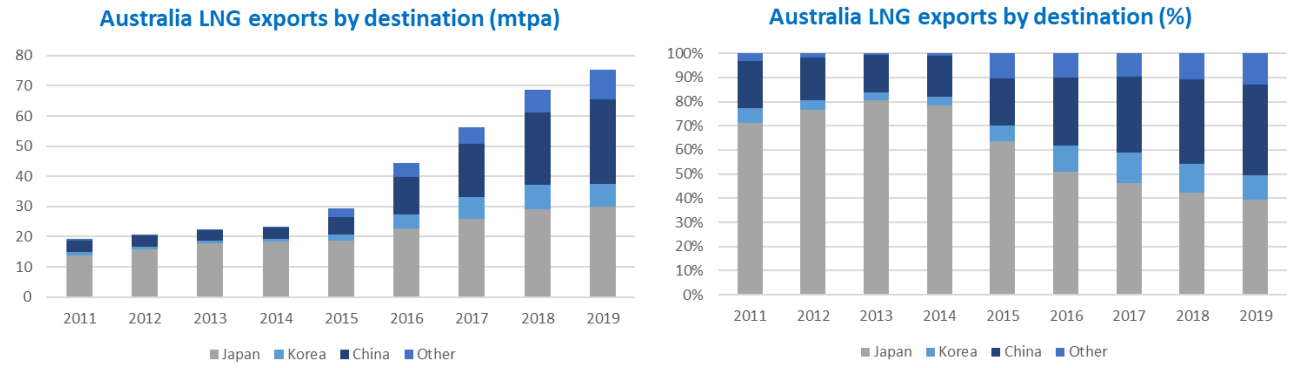
The Australian Bureau of Statistics (ABS) does not release information on destination countries for LNG exports, but the ACCC mentioned that in 2020, Japan was Australia's top export destination (38% of Australia's LNG exports), with China (37%) and South Korea (10%) as other top destinations.[6]

[2] Henry Hub Natural Gas Futures: Global Benchmark: https://www.cmegroup.com/education/articles-and-reports/henry-hub-natural-gas-futures-global-benchmark.html#
[3] The Global Rise of Henry Hub Liquidity: https://www.cmegroup.com/education/articles-and-reports/the-global-rise-of-henry-hub-liquidity.html
[4] U.S. Natural Gas Exports Underpin As Demand Slips: https://www.cmegroup.com/education/featured-reports/us-natural-gas-exports-underpin-as-demand-slips.html
[5] JKM assessments are based on cargoes delivered ex-ship (DES) to ports in Japan and South Korea. Prices of spot LNG cargoes delivered to Taiwan and China may be normalized to basis Japan/Korea: https://www.spglobal.com/platts/PlattsContent/_assets/_files/en/our-methodology/methodology-specifications/global_lng.pdf
[6] ACCC review of the LNG netback price series: https://www.accc.gov.au/system/files/ACCC%20LNG%20netback%20price%20series%20review%20-%20Issues%20paper_1.pdf



Source: KITA, Japan Customs

According to figures from the IGU World LNG reports, these three countries have been the main destinations of Australian LNG in the past few years.



Source: IGU World LNG reports

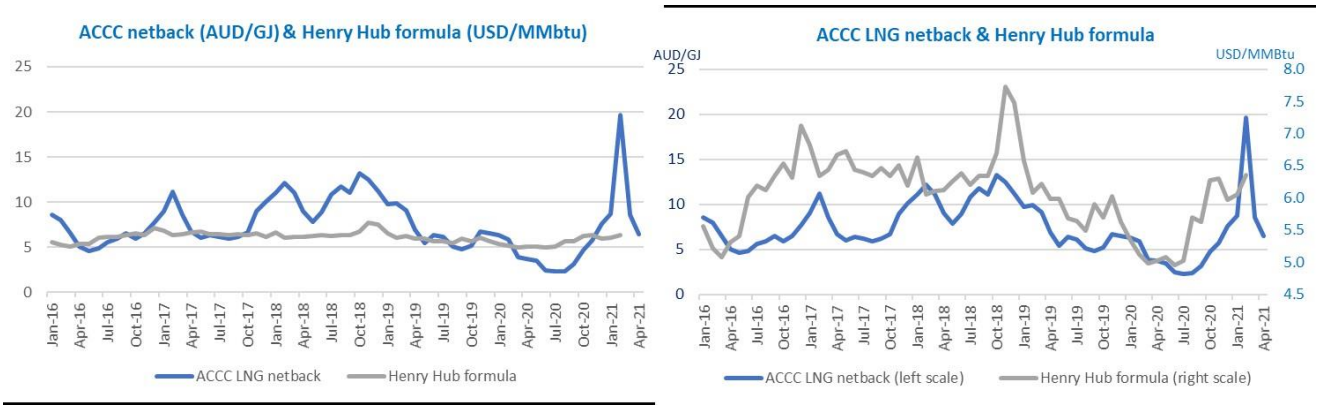
While not all U.S. cargoes delivered to Japan and South Korea are spot sales, all have a link to Henry Hub prices and are influencing LNG spot prices in this region, where U.S cargoes are widely viewed as an alternative to regional exporters.

1.b. Global Price Convergence

The ACCC publishes a monthly historical LNG netback price series based on using a monthly average of the daily prices published by a commodity price reporting agency, netted back to Wallumbilla using estimates of the cost of shipping, liquefaction and transportation.

Similarly, by calculating the monthly average of the daily settlement prices of Henry Hub front-month futures plus the typical charge of 15% paid by U.S exporters for gasification costs and a $3/MMBtu fee to represent transport costs, we find that the resulting Henry Hub formula is less volatile than the ACCC LNG netback, while reflecting a similar seasonality.

Henry Hub formula = 115% * [monthly average of NYMEX Henry Hub front-month future contract] + $3/MMBtu



Source: ACCC, CME Group

1.c. Import Netback

There are several proposed LNG import terminals for the east coast of Australia. The ACCC notes that it will consider the development of an import parity price separate to this review, once it becomes clearer if an import terminal will commence operation on the east coast and the arrangements that will apply to its commercial operations.

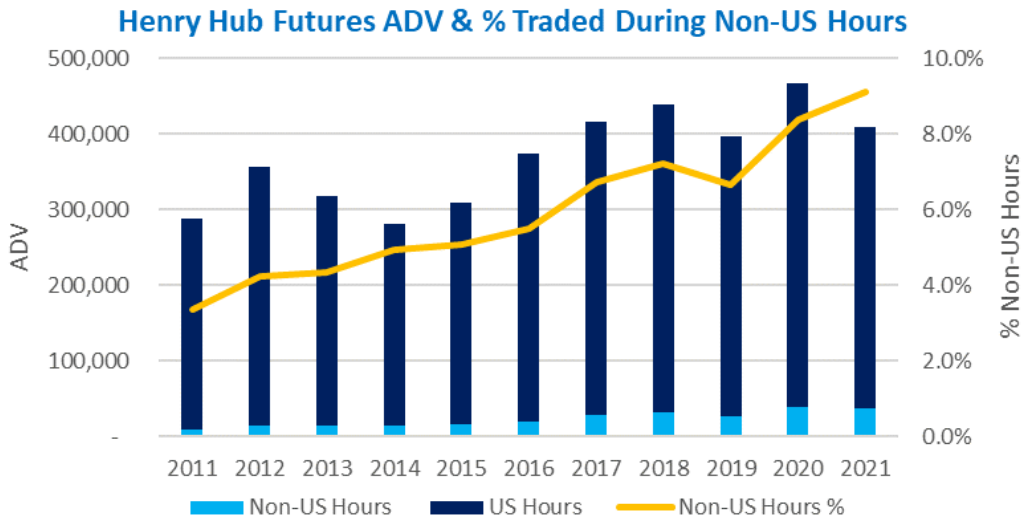
If such projects are implemented, U.S. LNG could become an alternative source of supply for the east coast of Australia, reinforcing the role of Henry Hub as a global benchmark.

Section 2: Henry Hub Futures Liquidity and Forward Curve

2.a. Liquidity

The average daily volume (ADV) of trade in Henry Hub futures in 2020 reached 467,000 contracts (each contract is for 10,000 MMBtu).

Henry Hub futures trading during non-U.S. hours has grown to 9% of total ADV in the first quarter of 2021, up from 3% in 2011 (17% CAGR). ADV during non-U.S. hours reached 39,000 lots during 2020, or the equivalent of 110 LNG cargoes.



Source: CME Group. (All data shown is volume executed electronically on Globex)

Compared to other natural gas and LNG futures prices, NYMEX Henry Hub futures remain by far the most actively traded natural gas futures contract in the world.

Trading volumes of futures contract for the European benchmark TTF, which like Henry Hub futures are physically settled, have increased as well recent years but lag behind Henry Hub.

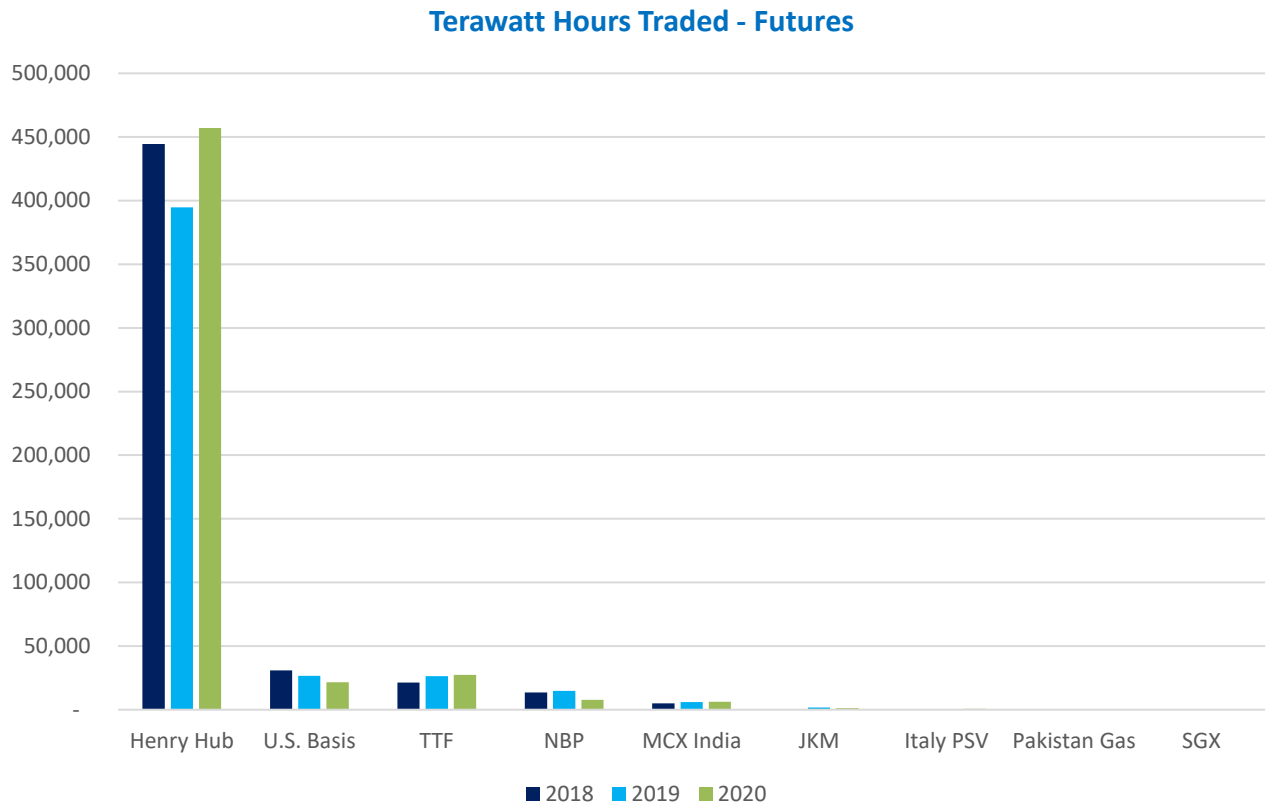
The volume of derivatives instruments for Platts JKM traded across exchanges remains marginal compared to Henry Hub and TTF despite a significant increase from 2015 to 2019. It is important to note as well that these derivatives volumes should not be confused with the number of daily bids, offers and trades occurring in the Platts price discovery mechanism that is used to determine JKM daily assessments.

The settlement price for NYMEX Natural Gas (NG) futures is based on trading activity on CME's Globex electronic trading platform during the settlement period (14:28:00 to 14:30:00 ET).

On average, several thousand contracts are traded during the settlement period. The active month settles to the volume-weighted average price (VWAP) of trade during settlement, rounded to the nearest tradable cent.[7]

[7] https://www.cmegroup.com/confluence/display/EPICSANDBOX/Natural+Gas

The extremely high level of trading activity in Henry Hub futures reflects the diverse and large pool of market participants. The unparalleled volumes in Henry Hub create a virtuous cycle, where customers are attracted to Henry Hub because of its high trading liquidity and reliability as a pricing benchmark. Their additional activity then further increases the liquidity and robustness of the benchmark.



Source: CME Group, ICE, Bloomberg

2.b. Forward Curve

The ACCC LNG netback price series is a measure of a supplier's opportunity cost of supplying gas to the domestic market, where the alternative is exporting the gas as LNG. Furthermore, the LNG netback price series represents market expectations at a point in time for the various inputs used in its calculation.

The ACCC currently publishes a monthly historical LNG netback price series and a fortnightly forward LNG netback price series for a forward period of two years.

Discussions of domestic GSAs might require a longer-term LNG netback as agreements can exceed two years.

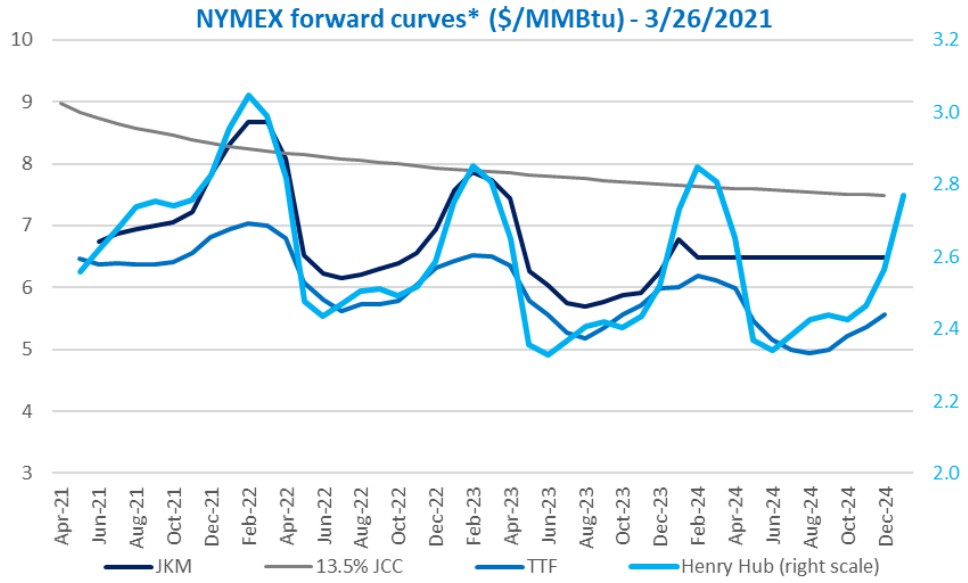
CME Group lists monthly Henry Hub futures contracts for the current year and the next 12 calendar years. Monthly contracts for a new calendar year are added following the termination of trading in the December contract of the current year.[8]

Daily settlement prices for each maturity with an open interest are reported by CME Group in the public domain for the past five trading sessions. Historical data can be accessed through CME DataMine.

As of early April 2021, there is open interest in NYMEX Henry Hub futures (NG) on every contract month up till the April 2029 contract, or eight years forward.[9]

2.c. Seasonality

The forward curve of Henry Hub futures reflects the same seasonality as a curve derived from JKM futures and TTF futures.



Source: CME Group. * For illustration only. Calculated from CME Group's daily settlement prices using standard conversion factors.

[8] https://www.cmegroup.com/trading/energy/natural-gas/natural-gas_contract_specifications.html

[9] https://www.cmegroup.com/trading/energy/natural-gas/natural-gas_quotes_settlements_futures.html

Section 3: LNG freight

The ACCC currently uses two sources of data for LNG freight costs — a historical LNG freight cost for calculating the historical LNG netback price series, and future LNG freight rates for calculating forward LNG netback prices.

Historical LNG freight costs, provided by Platts, are daily assessments of LNG freight costs between Gladstone and Japan. Forward LNG freight costs, provided by Argus Media, are weekly assessments of LNG freight costs between Gladstone and Tokyo, for each month of a 24-month forward period.

Market participants on the other hand typically refer to the LNG freight rates as assessed by the Baltic Exchange.

The Baltic Exchange is an independent source of maritime market information for the trading and settlement of physical and derivative contracts. Representing a global community of shipping interests, the Baltic Exchange provides a framework for the settlement of physical and derivative contracts.[10]

The Baltic Exchange assesses several key routes for LNG (Gladstone/Tokyo, Sabine Pass/Grain, Sabine Pass/Tokyo via Panama).

BALTIC EXCHANGE'S METHODOLOGY

- Daily rate in USD ($/day)
- 91,500 mt dwt TFDE propulsion.
- 160,000 cbm capacity.
- Basis delivery cold, ready to load.
- 0.1% boil off
- Max age 20 years.

CME Group listed the first-ever LNG freight futures at the end of 2019 based on Baltic Exchange assessments. These derivative contracts have been adopted by traders and CME Group recently listed additional contracts.[11]

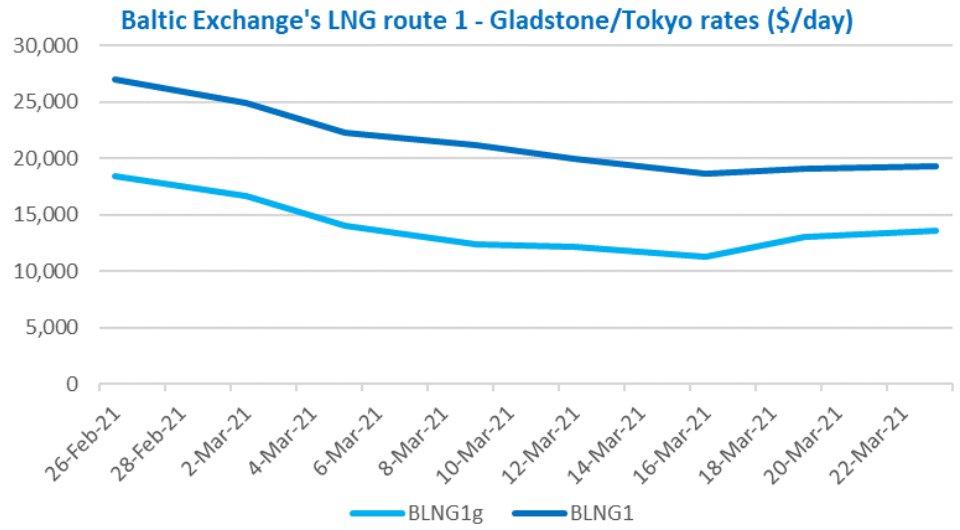
CME Group's LNG freight futures include two contracts for the Gladstone to Tokyo route (round voyage).

[10] https://www.balticexchange.com/en/index.html
[11] NYMEX LNG Freight futures – first successful year: https://www.cmegroup.com/education/articles-and-reports/nymex-lng-freight-futures-first-successful-year.html

Gladstone / Tokyo (round voyage)	
Delivery Gladstone, loading 25-40 days from Index date, for a derived round voyage via Tokyo of 23 days duration, with redelivery Gladstone, based on daily hire and lumpsum assessments with 1.25% total commission.	
ORIGINAL	NEW
combustion: Marine Fuel mode on laden and ballast.	combustion: Gas mode on Laden and Ballast at Boil Off Rate.
17 knots on 100 ton/day laden, 95 ton/day ballast.	17 knots on 210 cubic meter/day laden, 16 knots on 190 cubic meter /day ballast.
Port consumption: 20 tone/day idle, 40 tone/day working.	Port consumption: 42 cubic meter/day idle, 85 cubic meter/day working.
Assessment: BLNG1	Assessment: BLNG1g
Futures contract: BF1	Futures contract: BL1

Source: Baltic Exchange

CME's most recent listing follows discussions between the Baltic Exchange and its members on the combustion mode of TFDE-type LNG vessels. Most of the fleet currently uses the gas mode and rates differ significantly depending on the combustion mode as shown in the graph below.



Source: Baltic Exchange

For CME Group's BF1 and BL1 futures, monthly contracts are listed for the current year and the next 2 calendar years. CME lists monthly contracts for a new calendar year following the termination of trading in the November contract of the current year.[12]

CME Group publishes daily settlement prices for maturities with open interest. In parallel, historical forward curves can be accessed through CME DataMine.

[12] LNG Freight Route BLNG1 (Baltic) Futures: https://www.cmegroup.com/trading/energy/freight/lng-freight-route-blng1-baltic_contract_specifications.html ; LNG Freight Route BLNG1g (Baltic): https://www.cmegroup.com/trading/energy/freight/lng-freight-route-blng1g-lng-fuel-baltic_contract_specifications.html

CME Group maintains a constant dialogue with LNG freight traders and brokers and will work on possible extension of listed months for further maturities based on client demand and data availability.

Section 4: The Case for Hedging

One benefit of a price series is the ability to use this reference for contract negotiation, indexation and price risk management.

To achieve the latter, the components included in the price series must have an associated derivative or future market.

The current ACCC methodology does enable hedging of the LNG netback as the "*LNG plant costs*" and the "*Pipeline transportation costs*" are fixed and reviewed periodically by the ACCC.

Nor can the FOB price be hedged as ACCC uses data from Price Reporting Agencies for the "*LNG shipping costs/losses*" component (freight) that are not currently used in the derivatives market.

Only the "*Delivered ex-ship LNG price*" can be in theory hedged but this ability will be significantly limited by the low liquidity of JKM futures both during Australian hours and for long-dated exposure.

- As of March 26, 2021, CME Group has open interest of 4,737 lots of JKM futures, running from the first listed contract to the December 2023 contract.
- JKM derivatives deals submitted for clearing to CME Group are mainly traded after 8:00 pm Sydney.

CME Group currently lists JKM futures monthly contracts for the current and following five calendar years[13]. Beyond this maturity firms can, in theory, hedge JKM exposure under an ISDA agreement but few firms have credit lines extending beyond a few years.

As discussed in Section 1 above, NYMEX Henry Hub is active on screen during Australian hours, while monthly contracts are listed for up to 12 years.

Hedging can be done using different derivatives instruments. CME Group lists a set of instruments linked to Henry Hub, most notably:

[13] https://www.cmegroup.com/trading/energy/natural-gas/lng-japan-korea-marker-platts-swap_contract_specifications.html

- Henry Hub natural gas futures (NG): the standard and original contract, physically delivered, as discussed in this paper.
- Henry Hub Financial futures (HH): cash-settled futures with similar characteristics and settling to NG.
- Trading at Settlement (TAS): an order type that allows trades at par or at a differential to the daily settlement price in the underlying futures contract month.
- Henry Hub options: a suite of options, actively trading on-screen.

Conclusion

CME Group appreciates the opportunity to submit the foregoing information to the ACCC. We would look forward to discussing the issues raised further at the ACCC's convenience.

We believe that the following formula can act as a very useful proxy for the price of U.S. LNG, which is an increasing presence in Asia-Pacific:

*Henry Hub formula = 115% * [monthly average of NYMEX Henry Hub front-month future contract] + $3/MMBtu*

We also believe that CME's suite of LNG freight futures can be very useful to the ACCC as it designs its LNG netback model.

Annex 1: CME Group Contacts

CME Group in Australia:

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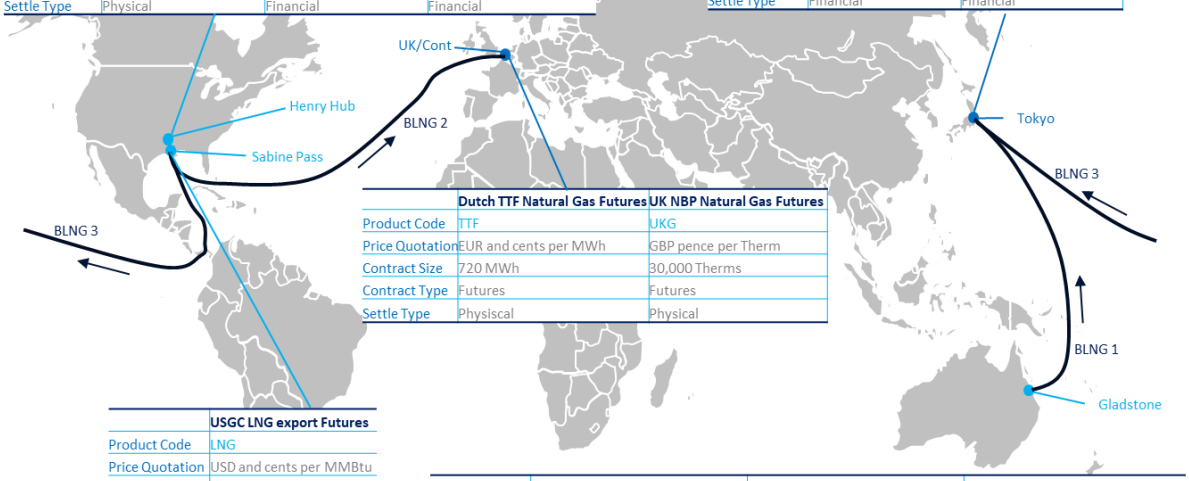
Sydney, Australia, 2000

[redacted] / T [redacted]

CME Group's energy team:

[redacted]

Annex 2: Key NYMEX Natural Gas and LNG Products



	Henry Hub Futures	Henry Hub Fin. Futures	Henry Hub Options
Product Code	NG	HH	LN
Price Quotation	USD and cents per MMBtu	USD and cents per MMBtu	USD and cents per MMBtu
Contract Size	10,000 MMBtu	10,000 MMBtu	10,000 MMBtu
Contract Type	Futures	Futures	European Option
Settle Type	Physical	Financial	Financial

	JCC (Detailed) Futures	JKM (Platts) Futures
Product Code	JCC	JKM
Price Quotation	USD and cents per barrel	USD and cents per MMBtu
Contract Size	1,000 barrels	10,000 MMBtu
Contract Type	Futures	Futures
Settle Type	Financial	Financial

	Dutch TTF Natural Gas Futures	UK NBP Natural Gas Futures
Product Code	TTF	UKG
Price Quotation	EUR and cents per MWh	GBP pence per Therm
Contract Size	720 MWh	30,000 Therms
Contract Type	Futures	Futures
Settle Type	Physiscal	Physical

	USGC LNG export Futures
Product Code	LNG
Price Quotation	USD and cents per MMBtu
Contract Size	10,000 MMBtu
Contract Type	Futures
Settle Type	Physical

	LNG Freight BLNG1 (Baltic) Futures	LNG Freight BLNG2 (Baltic) Futures	LNG Freight BLNG3 (Baltic) Futures
Product Code	BF1 / BL1	BF2 / BL1	BF3 / BL3
Price Quotation	USD per Charter Day	USD per Charter Day	USD per Charter Day
Contract Size	1 Charter Day	1 Charter Day	1 Charter Day
Contract Type	Futures	Futures	Futures
Settle Type	Financial	Financial	Financial