



LNG

Assessment Methodology

Updated Nov 21, 2016

Modification

1. Under "Type of trade form" of III Freight market, chartering period of "three months" was added in (2) Spot daily rates.
2. Writing structure was modified such as change of position of (Type of tankers) and (Route for (1)).
3. "Spot daily rates" was modified to "short-term daily rate".

Relevance of Rim Assessment Methodology

The purpose of all price assessments in reports issued by Rim Intelligence is to provide an indication to energy market players as to the levels at which transactions can take place so that trades can be done with high transparency and at reasonable prices. To achieve this purpose, we have set up “General Procedures for Price Assessment” as follows, and “Price Assessment Methodology” for each report. Detailed in the “General Procedures for Price Assessment” and “Price Assessment Methodology” for each report are processes and standards that we deem are necessary to achieve the above purpose. By following these processes and standards in making price assessments, we consider our Assessment Methodology to be appropriate.

Chapter 1: General Procedures for Price Assessment

Article 1: Purpose of price assessment

The purpose of all price assessments in our reports is to provide an indication to energy market players as to the levels at which transactions can take place so that trades can be done with high transparency and at reasonable prices.

Article 2: Conducting price assessment

To achieve the purpose outlined in Article 1, we have set up the following guidelines in our “General Procedures for Price Assessment”, and “Price Assessment Methodology” for each report. We follow these guidelines in making price assessments.

- Trades considered for price assessment
- Assessment window
- Priority in price assessment
- Selection of players providing market information
- Method of information gathering
- System of review by supervisor
- Reliability and adequacy of market information
- Policy of maintaining consistency in price assessment
- Trades not considered for price assessment
- Process of regular reviews and amendments to Assessment Methodology
- Changes/Amendments to price assessments
- Quantity
- Reasons for using specific units for quantity (barrel etc.)

Article 3: Transactions considered for price assessment

For each price index, our price assessment is based on quantities, delivery period and areas with the most liquidity. Further, details such as the value and quantity on which the assessment is based, market information which is used as a reference, and other platforms such as the Rim Trading Board and specific markets including trades carried out in Exchanges are included in the methodology of each report.

Article 4: Assessment window

For each price index, the time window considered appropriate for our price assessment is that which is deemed to be the most convenient and effective during trading hours in Asia, including Japan.

Article 5: Priority in price assessment

For each price index, among traded prices in transactions that take place between agreed parties or in other markets, bids and offers, the priority as to which price is considered first

for assessment is determined and details are given in the methodology of each report.

Article 6: Selection of players providing market information

When selecting players to obtain information from, we take into account the quantity handled and the amount of influence on the market, without any bias towards buyers or sellers. We gather market information from many players including Majors, oil and gas producers, oil companies, traders, dealers and end-users. Each report team determines that there is no bias in the players it obtains information from in terms of area and the type of information they have. Should the player be deemed biased, the reporter and team leader may, after obtaining approval from the president, remove him from the list of players providing market information.

Article 7: Method of information gathering

Our reporters possess suitable quality and skill from a fair and neutral standpoint. Reporters carry out information gathering mainly by telephone but also by email and chat. To ensure the credibility of the player from whom information is gathered, the reporter will call the player's company directly to confirm that the player is indeed working for that company.

Article 8: Role of Supervisor

Two or more supervisors are assigned to each report. Before each report is issued, at least one of the supervisors checks if the price assessment and its basis are in line with the Assessment Methodology and to ensure that consistency is maintained. After the review is conducted, a proof of the review in the form of an email sent by the supervisor to each report team is kept in the folder of each team.

Article 9: Selection of supervisor

When assigning a supervisor other than the president, in principle, the supervisor is selected from outside the relevant report team and has knowledge and experience in the product and market for which price assessment is conducted. The selection of supervisors requires approval from the board of directors.

Article 10: Maintaining quality of supervisor review

For reports for which the supervisor is not the president, the president conducts spot checks to maintain the quality of the supervisor's review. After a spot check, a proof of the spot check in the form of a PDF document signed by the president will be kept in the president's folder.

Article 11: Maintaining consistency in price assessment

Besides reviews by supervisors, assessment simulation is conducted regularly to maintain consistency among reporters in price assessment.

Article 12: Reliability and adequacy of market information

Each reporter performing price assessment determines whether a trade was done by the parties involved and whether the information was suspicious or unusual by checking with the relevant parties and other multiple parties, with further investigation carried out if necessary. If unusual market information regarding a trade by parties involved or suspicious information is found, additional information gathering will be carried out before making a judgment as to whether or not to remove the information for consideration for price assessment. Major issues are to be reported promptly to the supervisor and the president. Of these, important professional judgments will be recorded in each report team's information gathering memo, assessment process sheet etc. If it is necessary to

check whether the information provided is suspicious, we may consider obtaining information from the back office.

For certain markets with low liquidity, market information for price assessment may be obtained from a single source. Even in such a situation, we follow processes detailed in our Assessment Methodology to determine if such market information can be used for price assessment. We do not disregard the information in making price assessment merely because it is obtained from a single source.

Players giving market information are expected to provide all relevant information that meets the conditions for price assessment stated in our Assessment Methodology, which is published on our website.

Article 13: Making our Assessment Methodology available

The Assessment Methodology approved by the board of directors is published on our website, whereby external market players involved in trading, players providing market information and our subscribers can access.

Article 14: Regular review of Assessment Methodology

Our Assessment Methodology is reviewed at least once a year (during the board of directors' meeting held in October) or when substantial changes have taken place in the market. After each review, we may consider making amendments to our Assessment Methodology if deemed necessary. When reviewing our Assessment Methodology, we may consider views obtained from external market players and our subscribers.

Article 15: Amendments to Assessment Methodology

If amendments to our Assessment Methodology that affect the price assessment process are deemed necessary, discussions are conducted within each report team and amendments are submitted to the board of directors for approval. After the amendments are approved, a notice of the amendments and the effective date will be placed in our reports in principle one month before, but at least two weeks prior to the effective date.

After the amendments are approved, the Assessment Methodology with the amendments reflected has to be approved by the board of directors by the effective date.

When making amendments to our Assessment Methodology that affect the price assessment process, we accept inquiries regarding such amendments from external market players and our subscribers. These inquiries are, in principle, published in our reports or on our website, but if the party making the inquiries requests us not to do so, we may not disclose the details for confidentiality reasons.

For amendments to our Assessment Methodology that do not affect the price assessment process, after approval by the board of directors, the amendments will be announced in our reports and effected promptly.

Article 16: Amendments/Changes to price assessment

Price assessments in our reports will not be amended after they are published, except for typing and spelling mistakes.

Chapter 2: Price Assessment Methodology for LNG Report

Purpose of price assessment:

The purpose of price assessment is to reflect the actual market in which standard spot buying and selling take place on the day of publication.

Definition of price:

Even if no transactions take place, the value of a commodity may change. The price reflects the changing values of a commodity. The value of a commodity may change depending on supply/demand, production costs, the situation in other markets, and players' perspectives.

Assessment method:

Price assessment basically takes into account information on deals done, bids/offers and supply/demand situation obtained on the day of publication. Top priority is given to the latest deals done and bid/offer levels within the assessment window. In the absence of deals, bids and offers, buying and selling indications are used as a reference.

Values of commodities are determined by competition among sellers and buyers. Higher bids to be closer to market values than lower bids, and lower offers are considered to be closer to market values than higher offers.

Standard conditions such as cargo volume, loading or delivery period, quality and payment period are taken into account in price assessment.

Unit

All price units for LNG are in US dollar per million British thermal unit (\$/mmBtu). The LNG industry typically trades by using the \$/mmBtu unit, and Rim follows this convention. Units for JCC are US dollar per mmBtu (\$/mmBtu) and US dollar per barrel (\$/barrel).

Assessment period

A month is divided into two half-months:

First half (H1): first 15 days of the month

Second half (H2): all days after the 15th of the month

I . DES Japan Assessment Methodology

(Scope of Price Assessment)

The assessment of the DES Japan daily price is based on concluded deals and bids/offers in the DES Japan physical market and Japan OTC Exchange (JOE) LNG market. The assessment of the DES Japan daily price may also refer to concluded deals and bids/offers in other markets such as the DES Northeast Asia market.

(Price Assessment Window)

The window for assessment runs from 15:00 Tokyo time the previous trading day to 15:00 Tokyo time for the day the assessment is published.

(Price Assessment Methodology)

1) All trades that take place and all bids/offers placed on DES Japan physical cargo market and JOE LNG during the assessment window are applied to assess the DES Japan daily price with factors such as supply/demand situation also taken into consideration. Among them the most updated trades and bids/offers are given priority for assessment.

2) In the absence of actual trades, the DES Japan daily price is assessed based on the mean of the highest bid and the lowest offer placed in the DES Japan physical cargo and JOE LNG market as of the closing time for that day. In the event the spread between the highest bid and the lowest offer is too far apart and the mean is found irrelevant, the mean will not be applied and the DES Japan daily price will be assessed within the highest bid and the lowest offer. In such case, trades and bids/offers in the DES Northeast Asia will be referred.

3) In the event there are no actual trades concluded in the DES Japan physical cargo and JOE LNG market and no bids and offers in the DES Japan physical cargo and JOE LNG market during the assessment window, the DES Japan price will take into consideration actual trades, bids and offers in other markets such as the DES Northeast.

4) In the event that the lowest offer falls below the highest bid during the price assessment window in the DES Japan physical market and the JOE market, the DES Japan daily price will be assessed based on these lowest and highest values if they are deemed reasonable after a close examination of the market conditions at that time.

5) In the event that bids higher than and/or offers lower than values of actual trades that took place in the DES Japan physical market or JOE LNG market appear just prior to the close of the assessment window for that day, the assessment will be made based on those higher bids and lower offers as well as the actual trades, if those higher bids and higher offers are deemed reasonable following a close examination of market trends and market conditions.

6) Even in the event that a significant gap between concluded prices and bids/offers in the JOE LNG market and in the DES Northeast Asia market including the DES Japan market prevails, the DES Japan daily price will be assessed based on concluded deals and bids and offers in the physical markets. Concluded deals and bids and offers in JOE market will also be referred.

(Volume)

One contract on the JOE LNG is applied to 50,000mmBtu, equivalent to about 960mt, and to 250,000mmBtu, equivalent to about 4,800mt. For a physical cargo in DES Japan market, the maximum volume will be 3.12 million mmBtu or roughly 60,000mt, which can be loaded on standard-sized vessels with capacity around 140,000cbm. In addition, Rim may also take into account relatively larger Q-Flex and Q-Max vessels for the DES Japan assessment.

(Quantity of cargoes to be assessed)

Rim recognizes LNG cargoes of 9,000-12,000 kilo calorie/cbm as standard.

(Time Window)

The DES Japan delivery period is divided into twelve one-month periods. With regards to expiration of the front month contract of JOE market, the contract can be traded until the 15th of the prior month. In the event the 15th falls on a weekend or holiday, the last day of the contract will be the previous business day. From the 16th of each month the front month contract moves two months forward, that is, into the month after next. In the event, the 16th falls on a weekend or holiday, the first day of the contract will be the next business day. With regard to the period for physical cargoes in DES Japan, refer to section II-4 A. a). (Time Window to be assessed)

II Physical Cargo Assessment

1. Assessment Window

As of 17:00 Tokyo time on the day the assessment is published.

2. Assessment Method

Price assessment basically takes into account information on deals done, bids/offers and supply/demand situation obtained on the day of publication. Top priority is given to the latest deals done and bid/offer levels within the assessment window. In the absence of deals, bids and offers, buying and selling indications are used as a reference.

Values of commodities are determined by competition among sellers and buyers. Higher bids to be closer to market values than lower bids, and lower offers are considered to be closer to market values than higher offers.

Standard conditions such as cargo volume, loading or delivery period, quality and payment period are taken into account in price assessment.

Rim assesses market based on trading information obtained in the OTC market. Deals and bids/offers in the JOE LNG market are taken into account in price assessment.

3. Quality of cargoes to be assessed

Rim recognizes LNG with 9,000-12,000 kilo calorie/cbm as standard.

4. Volume

Rim assesses the price of a cargo of around 60,000mt onboard conventional 135,000-cbm LNG tankers. Rim also takes into account prices of cargoes loaded onto vessels out of capacities.

5. Markets to be assessed

A. Northeast Asia

a) Northeast Asia (DES)

(Type of trade form)

Delivery Ex-Ship (DES)

(Countries or areas)

Japan, South Korea, Taiwan and China

(Time Window)

If publication is in the first half of the month, assessment is for the second half of the next month and the first half and second half of the month after next.

If publication is in the second half of the month, assessment is for the first half and second half of the month after the next month and first half of the month that is 3 months ahead.

(Rim Northeast Asia Index)

Rim announces the "Rim Northeast Asia Index", a monthly cumulative average price of the above *three delivery periods on a daily basis. For instance, as of the 20th of the month, Rim announces the cumulative average of three delivery windows from the 1st to the 20th.

b) Rim Northeast Asia Forward

(Type of trade form)

Delivery Ex-Ship (DES)

(Countries or areas)

Japan, South Korea, Taiwan and China

(Time Window)

The Rim Northeast Asia Forward assessment is a daily assessment of prices three to nine months ahead of the month of the issue day of the report. Monthly spreads are derived from forward curves of the Japan Crude Cocktail (JCC), UK ICE Brent crude market, the National Balancing Point (NBP) natural gas futures market as well as supply and demand conditions.

c) Rim Northeast Asia Seasonal Index

Rim estimates the average price for each season (Spring, Summer, Autumn, Winter) based on the Northeast Asia Forward assessments for six months. Rim announces the average assessment of the prices of cargoes delivered in each season.

<u>Season time frame.</u>	<u>Appearance in report</u>
Spring (Apr - Jun)	Sep 16- Mar 15
Summer (Jul - Sep)	Dec 16- Jun 15
Autumn (Oct – Dec)	Mar 16- Sep 15
Winter (Jan – Mar)	Jun 16- Dec 15

B. Others

a) Middle East (FOB)

(Type of trade form)

Free on Board (FOB)

(Countries or areas)

Abu Dhabi, Qatar, Oman, and Yemen (other countries in the Middle East are also considered).

(Time Window)

If publication is in the first half of the month, assessment is for the first half and second half of the next month and the first half of the month after next.

If publication is in the second half of the month, assessment is for the second half of the next month and the first half and second half of the month after next.

b) Middle East (DES)

(Type of trade form)

Delivery Ex-Ship (DES)

(Countries or areas)

Kuwait, Dubai, Egypt and Jordan (other countries in the Middle East are also considered).

(Time Window)

If publication is in the first half of the month, assessment is for the first half and second half of the next month and the first half of the month after next.

If publication is in the second half of the month, assessment is for the second half of the next month and the first half and second half of the month after next.

c) India (DES)

(Type of trade form)

LNG Assessment Methodology
Effective Nov 21, 2016

Delivery Ex-Ship (DES)

(Countries or areas)

India; Pakistan also considered.

(Time Window)

If publication is in the first half of the month, assessment is for the first half and second half of the next month and the first half of the month after next.

If publication is in the second half of the month, assessment is for the second half of the next month and the first half and second half of the month after next.

d) DES Europe (DES)

(Type of trade form)

Delivery Ex-Ship (DES)

(Countries or areas)

Britain, France, Belgium, Spain and Portugal (other countries in Europe are also considered).

(Fixed and Market-linked price assessment)

Rim assesses DES Europe prices based on fixed price discussions as well as the premium/discount levels to the NBP futures. Rim indicates both the fixed prices and the premium/discount levels to the NBP futures. The closing price of NBP futures market on the previous business day is adopted.

(1) When the prices are assessed based on fixed prices, the premium/discount levels to the NBP futures are given as follows.

Premium/discount=fixed prices-NBP

(2) When the prices are discussed based on the premium/discount levels, the fixed prices are given as follows.

Fixed prices=NBP+premium/discount

(Time Window)

If publication is in the first half of the month, assessment is for second half of the current month and the first half and second half of the next month.

If publication is in the second half of the month, assessment is for the first half and second half of the next month and the first half of the month after next.

e) Atlantic (FOB):

(Type of trade form)

Free on Board (FOB)

(Countries or areas)

Trinidad & Tobago, Nigeria, Norway and other European areas. Peru on the west coast of South America, Algeria along the North African coast of the Mediterranean Sea, re-export terminals in Europe and the Americas are also considered.

(Time Window)

If publication is in the first half of the month, assessment is for second half of the current month and the first half and second half of the next month.

If publication is in the second half of the month, assessment is for the first half and second

half of the next month and the first half of the month after next.

f) South America (DES)

(Type of trade form)

Delivery Ex-Ship (DES)

(Countries or areas)

Brazil, Argentina and Chile. Mexico's east and west coasts and the Dominican Republic are also considered (freight rates for Mexico and Dominican Republic cargoes are taken into consideration).

(Time Window)

If publication is in the first half of the month, assessment is for second half of the current month and the first half and second half of the next month.

If publication is in the second half of the month, assessment is for the first half and second half of the next month and the first half of the month after next.

III. Freight Market

(Price Assessment Window)

As of 17:00 Tokyo time on the day the assessment is published.

(Assessment Method)

Price assessment basically takes into account information on deals done, bids/offers and supply/demand situation obtained on the day of publication. Top priority is given to the latest deals done and bid/offer levels within the assessment window. In the absence of deals, bids and offers, leasing and chartering indications are used as a reference.

Chartering rates are determined by competition among owners and charterers. Higher bids are considered to be closer to market values than lower bids, and lower offers are considered to be closer to market values than higher offers.

Standard conditions such as chartering timings and periods are taken into account in price assessment.

Rim assesses market based on trading information obtained in the OTC market.

(Type of trade form)

- (1) Spot rates for each route
- (2) Short-term daily rates for less than three months

(Type of tankers)

Conventional LNG tankers; carrying capacity of 135,000 to 150,000cbm.
LNG tankers with cost-efficient engines; carrying capacity of 160,000 to 170,000cbm.
Rim also considers freight rates of Q-Flex, Q-Max, and relatively smaller vessels.

(Basis of Assessment for (1))

(Route)

Middle East-Northeast Asia, Atlantic-Northeast Asia, and Middle East-Europe routes.

(Condition of assessment)

Rim assesses spot charter rates based on the following conditions:

- Number of days in a voyage and area for voyage
- Market for one voyage from loading point to discharging point.
- Number of days per voyage as follows:
 - (a) 30 days for a Middle East-Northeast Asia route
 - (b) 60 days for an Atlantic-Northeast Asia route
 - (c) 22 days for a Middle East-Europe route
- Rim sets the loading as well as discharge ports as follows:
 - (a) Middle East = Abu Dhabi, Qatar, Oman, and Yemen
 - (b) Northeast Asia = Japan, South Korea, Taiwan, and China
 - (c) Europe = Britain, France, Spain, Belgium, and Portugal
 - (d) Atlantic = Trinidad and Tobago, Nigeria, and Equatorial Guinea
- Factors included in freight assessment
 - (a) chartering rates: fixed value assessment determined by considering short-term chartering rates
 - (b) fuel cost, referring to bunker oil price assessments for places including Singapore and Fujairah in Rim Bunker report.
 - (c) boil off
 - (d) port charge at the loading and discharge ports
 - (e) for a Middle East-Europe route, Rim includes a Suez Canal charge

(Bunker market for fuel of tankers)

The assessment of 380cst fuel oil at Tokyo Bay, Singapore and Rotterdam from the previous business day is shown on the Rim Daily Bunker Oil report.

IV. JCC Price (Japan Crude Cocktail Price)

Rim indicates JCC prices as reference value.

JCC Price (Japan Crude Cocktail Price)

The forecast price includes insurance and freight for delivery to Japan.

(Forecast of JCC)

--- Rim forecasts the JCC price using Dubai crude as a base. Rim forecast the price based on the following conditions.

-Forecast method

- (1) Dubai crude oil price
- (2) Price difference with Dubai crude oil
- (3) Freight
- (4) Insurance

Rim determines JCC forecast price based on the above (1) – (4) conditions.