



Bunker Oil Assessment Methodology

Updated Oct 3, 2019

1. Reducing the quotation of posted price for 380cst prices by Petrobras

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
- Establishment and role of supervisors
- Selection of supervisors
- Maintaining quality of review by supervisors
- Maintaining consistency in price assessment
- Reliability and adequacy of market information
- Making Assessment Methodology available
- Regular reviews of Assessment Methodology
- Amendments to Assessment Methodology
- Changes/Amendments to price assessment
- Quantity
- Reasons for using specific units for quantity (barrel etc.)

Article 3: Trades 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: Establishment and 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.

Article 9: Selection of supervisors

The supervisor 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. The supervisor is not involved in price assessment and writing of commentary for the report of which he is in charge.

Article 10: Maintaining quality of review by supervisors

For reports for which the supervisor is not the president, the president conducts regular spot checks to maintain the quality of the supervisor's review. After a spot check, a proof of the spot check will be kept.

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 two or more members of 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 reviews 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 two or more members of the board of directors for approval. After the amendments are approved by two or more members of the board of directors, 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 by two or more members of the board of directors, the Assessment Methodology with the amendments reflected has to be approved by two or more members of 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 two or more members of the board of directors, the amendments will be announced in our reports and effected promptly.

Article 16: Changes/Amendments 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 Bunker Oil Report

Price Assessment Principle

Rim price assessments indicate the current range in which a standard spot transaction could take place on the day of publication.

Rim understands values of commodities change even in the absence of deals. Rim defines prices as measures to indicate fluctuating values of commodities.

Rim understands values of commodities are determined by a variety of factors such as supply-demand fundamentals, production costs, conditions in other markets and players' speculation.

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.

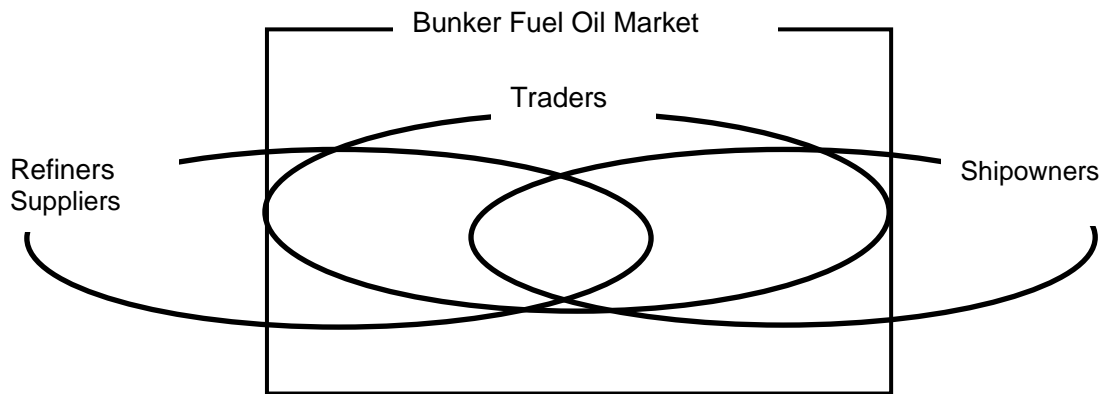
Rim assesses prices for bunker fuel oil traded in the spot market in main ports in North America, South America, Asia, Africa, Middle East and Europe. All prices are assessed based on information collected in the course of market research by Rim reporters each business day.

Prices for VLSFO can be assessed based on 380cst prices or LSMGO (MGO, LSMDO). For example, in the event only 380cst price information is available on a given day, VLSFO prices would be determined based on 380cst prices. In addition, in the event only LSMGO (MGO, LSMDO), VLSFO prices would be determined by LSMGO (MGO, LSMDO) prices.

All units of measurement for bunker fuel prices are in US dollar per metric ton (\$/mt). The bunker oil market typically trades based on this unit of measurement and Rim follows this convention.

Structure of the Bunker Fuel Oil Market

Rim understands that the bunker fuel oil markets are structured with three groups of business parties: Refiners/Suppliers, Traders, and Shipowners. Rim assesses bunker fuel oil prices at which a standard spot transaction could take place.



Rim defines a standard spot transaction as follows:

Case 1	A refiner or supplier sells a bunker fuel cargo to a trader who is buying on behalf of a shipowner on a spot basis.
Case 2	A refiner or supplier sells a bunker fuel oil cargo directly to a shipowner on a spot basis.
Case 3	A trader sells on behalf of a refiner or supplier to a shipowner on a spot basis.

Rim defines the three business parties as follows:

Refiner/Supplier	A company that produces or imports bunker fuel and sells into the bunker fuel markets.
Trader	A company that sells bunker fuel on behalf of a refiner/supplier and buys bunker fuel on behalf of a shipowner.
Shipowner	A company that buys bunker fuel for consumption by its own ships or ships it operates.

<North America>

Rim assesses bunker fuel oil prices for lots to be traded in Vancouver BC, Seattle/Tacoma, Los Angeles, San Francisco, New York, Philadelphia, Norfolk, Houston, and New Orleans.

The delivery basis and grades for prices assessed are as follows:

Port	Basis	Grade		
Vancouver BC	Ex-Wharf	380cst	VLSFO	LSMGO
Seattle/Tacoma	Ex-Wharf	380cst	VLSFO	LSMGO
Los Angeles	Ex-Wharf	380cst	VLSFO	LSMGO
San Francisco	Ex-Wharf	380cst	VLSFO	LSMGO
New York	Ex-Wharf	380cst	VLSFO	LSMGO
Philadelphia	Ex-Wharf	380cst	VLSFO	LSMGO
Norfolk	Ex-Wharf	380cst	VLSFO	LSMGO
Houston	Ex-Wharf	380cst	VLSFO	LSMGO
New Orleans	Ex-Wharf	380cst	VLSFO	LSMGO

Assessment Window	Rim's assessment window for North America bunker fuel oil prices closes at 12:30 Tokyo time on the day of publication.
Price Unit	All Rim North America bunker fuel oil prices are in \$/mt
Time Window	All Rim North America bunker fuel oil prices are for lots to be delivered to ships during the period from 3 to 7 days ahead of the publication day. * Assessments for bunker fuel oil delivery up to 6 business days prior to the end of the current month are for the current month of delivery. Assessments for the last 5 business days of the current month are for bunker fuel oil deliveries in the following month.
Standard Size	All Rim North America bunker fuel oil prices for 380cst and VLSFO are for volumes in the range of 100-2,000mt lots and for LSMGO in the range of 30-200mt, that Rim considers standard. Values for contracts for smaller or larger volumes may also be considered.
Quality Specifications	All Rim North America bunker fuel oil prices are for lots of which quality is equivalent to the ISO 8217: 2005 and later standard for each grade.

<South America>

Rim Assesses bunker fuel oil prices for lots to be traded in Panama.

The delivery basis and grades for prices assessed are as follows:

Port	Basis	Grade		
Panama	Ex-Wharf	380cst	VLSFO	LSMGO

Assessment Window	Rim's assessment window for South America bunker fuel oil prices closes at 12:30 Tokyo time on the day of publication.
Price Unit	All Rim South America bunker fuel oil prices are in \$/mt
Time Window	All Rim South America bunker fuel oil prices are for lots to be delivered to ships during the period from 3 to 7 days ahead of the publication day. * Assessments for bunker fuel oil delivery up to 6 business days prior to the end of the current month are for the current month of delivery. Assessments for the last 5 business days of the current month are for bunker fuel oil deliveries in the following month.
Standard Size	All Rim South America bunker fuel oil prices for 380cst and VLSFO are for volumes in the range of 100-2,000mt lots and for LSMGO in the range of 30-200mt, that Rim considers standard. Values for contracts for smaller or larger volumes may also be considered.
Quality Specifications	All Rim South America bunker fuel prices are for lots of which quality is equivalent to the ISO 8217: 2005 and later standard for each grade.

Rim quotes the posted prices by Petrobras for the following Brazilian ports.

Port	Basis	Grade	
Rio De Janeiro	Delivered	VLSFO	MGO
Rio Grande	Delivered	VLSFO	MGO
Salvador	Delivered	VLSFO	MGO
Santos	Delivered	VLSFO	MGO

<Europe>

Rim Assesses bunker fuel oil prices for lots to be traded in Rotterdam, Antwerp, Hamburg, Gibraltar, and Algeciras.

The delivery basis and grades for prices assessed are as follows:

Port	Basis	Grade		
Rotterdam	Delivered	380cst	VLSFO	LSMGO
Antwerp	Delivered	380cst	VLSFO	LSMGO
Hamburg	Delivered	380cst	VLSFO	LSMGO
Gibraltar	Delivered	380cst	VLSFO	LSMGO
Algeciras	Delivered	380cst	VLSFO	LSMGO

Assessment Window	Rim's assessment window for the Europe bunker fuel oil prices closes at 12:30 Tokyo time on the day of publication.
Price Unit	All Rim Europe bunker fuel oil prices are in \$/mt
Time Window	All Rim Europe bunker fuel oil prices are for lots to be delivered to ships during the period from 3 to 7 days ahead of the publication day. * Assessments for bunker fuel oil delivery up to 6 business days prior to the end of the current month are for the current month of delivery. Assessments for the last 5 business days of the current month are for bunker fuel oil deliveries in the following month.
Standard Size	All Rim Europe bunker fuel oil prices for 380cst and VLSFO are for volumes in the range of 100-2,000mt lots and for LSMGO in the range of 30-200mt, that Rim considers standard. Values for contracts for smaller or larger volumes may also be considered.
Quality Specifications	All Rim Europe bunker fuel prices are for lots of which quality is equivalent to the ISO 8217: 2005 and later standard for each grade.

<Middle East/Africa>

Rim Assesses bunker fuel oil prices for lots to be traded in Las Palmas, Tenerife, Kuwait and Fujairah.

The delivery basis and grades for prices assessed are as follows:

Port	Basis	Grade		
Las Palmas	Delivered	380cst	VLSFO	LSMGO
Tenerife	Delivered	380cst	VLSFO	LSMGO
Kuwait	Delivered	380cst	VLSFO	LSMGO
Fujairah	Delivered	380cst	VLSFO	LSMGO

Assessment Window	Rim's assessment window for Middle East/Africa bunker fuel oil prices closes at 12:30 Tokyo time on the day of publication.
Price Unit	All Rim Middle East/Africa bunker fuel oil prices are in \$/mt
Time Window	All Rim Middle East/Africa bunker fuel oil prices are for lots to be delivered to ships during the period from 3 to 7 days ahead of the publication day. * Assessments for bunker fuel oil delivery up to 6 business days prior to the end of the current month are for the current month of delivery. Assessments for the last 5 business days of the current month are for bunker fuel oil deliveries in the following month.
Standard Size	All Rim Middle East/Africa bunker fuel oil prices for 380cst and VLSFO are for volumes in the range of 100-2,000mt lots and for LSMGO in the range of 30-200mt, that Rim considers standard. Values for contracts for smaller or larger volumes may also be considered.
Quality Specifications	All Rim Middle East/Africa bunker fuel prices are for lots of which quality is equivalent to the ISO 8217: 2005 and later standard for each grade.

Rim quotes posted prices of Saudi Aramco for the ports below

Port	Basis	Grade		
Dammam/ Ras Tanura	Delivered	380cst	VLSFO	MGO
Jeddah/Yanbu	Delivered	380cst	VLSFO	MGO

The above ports in Saudi Arabia will be indicated as "NA" until VLSFO prices officially are released by Saudi Aramco. Those will be updated as soon as they will announce.

<Asia>

Rim Assesses bunker fuel oil prices for lots to be traded in Tokyo Bay, West Japan, and Ise Bay (Japan), South Korea, Far East Russia (Nakhodka, Vostochny and Vladivostok), Shanghai, Hong Kong, Singapore, Bangkok and Colombo (Sri Lanka).

The delivery basis and grades for prices assessed are as follows:

Port	Basis	Grade		
Tokyo Bay	Delivered	380cst	VLSFO	LSMDO
West Japan	Delivered	380cst	VLSFO	LSMDO
Ise Bay	Delivered	380cst	VLSFO	LSMDO
South Korea	Delivered	380cst	VLSFO	LSMGO
F.E. Russia	Delivered	380cst	VLSFO	MGO
Shanghai	Delivered	380cst	VLSFO	LSMGO
Hong Kong	Delivered	380cst	VLSFO	LSMGO
Singapore	Delivered	380cst	VLSFO	LSMGO
Bangkok	Delivered	380cst	VLSFO	LSMGO
Colombo	Delivered	380cst	VLSFO	LSMGO

Assessment Window	Rim's assessment window for Asia bunker fuel oil prices closes at 18:30 Tokyo one business day before the report is published. Assessment window for Shanghai, Bangkok and Colombo closes at 12:30 Tokyo time on the day of publication.
Price Unit	All Rim Asia bunker fuel oil prices are \$/mt
Time Window	All Rim Asia bunker fuel oil prices are for lots to be delivered to ships during the period from 3 to 7 days ahead of the day the report is published. * Assessments for bunker fuel oil delivery up to 6 business days prior to the end of the current month are for the current month of delivery. Assessments for the last 5 business days of the current month are for bunker fuel oil deliveries in the following month.
Standard Size	Asia bunker fuel oil prices for 380cst and VLSFO are for volumes in the range of 100-2,000mt lots and for LSMGO (including MGO or LSMDO) in the range of 30-200mt, that Rim considers standard. Values for contracts for smaller or larger volumes may also be considered.
Quality Specifications	All Rim Asia bunker fuel prices are for lots of which quality is equivalent to the ISO 8217: 2005 and later standard for each grade.

Rim quotes posted prices of CPC in Kaohsiung, Keelung, Taichung, and Others in Taiwan.

Port	Basis	Grade		
Kaohsiung	Delivered	380cst	VLSFO	MGO
Keelung	Delivered	380cst	VLSFO	MGO
Taichung	Delivered	380cst	VLSFO	MGO
Others	Delivered	380cst	VLSFO	MGO

Quality Specifications

The quality of the bunker oil to be assessed in the Rim Bunker Reports complies with the International Organization for Standardization (ISO) 8217: 2005 and later.

380cst : RMG380

Density at 15 degree C	Max 991.0kg/m ²
Kinematic Viscosity at 50 degree C	Max 380 mm ² /s
Flash Point	Min 60 degree C
Pour Point	Max 30 degree C
Carbon Residue	Max 18%
Ash Content	Max 0.15%
Water Content	Max 0.5%
Sulfur Content	Max 3.5%
Vanadium Content	Max 300mg/kg
Aluminum plus Silicon Content	Max 80mg/kg
Total Sediment Content	Max 0.1%

VLSFO : RMD 80 / RME180

Density at 15 degree C	980.0~991.0kg/m ²
Kinematic Viscosity at 50 degree C	20~180 mm ² /s
Flash Point	Min 60 degree C
Pour Point	Max 30 degree C
Carbon Residue	14~15%
Ash Content	Max 0.10%
Water Content	Max 0.5%
Sulfur Content	Max 0.5%
Vanadium Content	Max 350mg/kg
Aluminum plus Silicon Content	Max 80mg/kg
Total Sediment Content	Max 0.1%

LSMGO: DMA

Density at 15 degree C	Max 890.0kg/m ²
Kinematic Viscosity at 40 degree C	Max 6.0mm ² /s
Flash Point	Min 60 degree C
Pour Point	For the Winter spec, Max -6 degree C For the Summer spec, Max 0 degree C
Carbon Residue	Max 0.3%
Ash Content	Max 0.01%
Water Content	Max 0.3%
Sulfur Content	Max 0.1%

MGO: DMA

Density at 15 degree C	Max 890.0kg/m ²
Kinematic Viscosity at 100 degree C	Max 6.0mm ² /s
Flash Point	Min 60 degree C
Pour Point	For the Winter spec, Max -6 degree C For the Summer spec, Max 0 degree C
Carbon Residue	Max 0.3%
Ash Content	Max 0.01%
Water Content	Max 0.3%
Sulfur Content	Max 1.5%

LSMDO: DMB

Density at 15 degree C	Max 900.0kg/m ²
Kinematic Viscosity at 40 degree C	Max 11.0mm ² /s
Flash Point	Min 60 degree C
Pour Point	For the Winter spec, Max 0 degree C For the Summer spec, Max 6 degree C
Carbon Residue	Max 0.3%
Ash Content	Max 0.01%
Water Content	Max 0.3%
Sulfur Content	Max 0.5%