Spark

LNG Freight Methodology:

Version: 3.2

Last Updated: 11th November 2022

Note: This document should be read in conjunction with the Spark Governance Policies & Procedures document, which is available here.

Submitted rates should be provided on a round trip basis and should incorporate any positioning/repositioning assumptions. Rates should reflect a forward view of where the spot market will price for the relevant month/period.

2 Spot Contracts and 2 Forward Assessments:

2 Spot Contracts (**SparkS**):

- Spark30S
- Spark25S

2 Forward Assessments (**SparkFo**):

- Spark30Fo
- Spark25Fo

Contract and Submission Assumptions:

Contract Name	Contract Type	Assessment Frequency	Vessel Size (m3)	Basin / Location	Period	Currency	UOM	Contract Size
Spark25S	Spot	Daily(0800-1000 GMT)	160,000	Pacific	Delivery 15-45 days forward of assessment	USD	$/Day	1
Spark25Fo	Forwards	Tues (0800-1000 GMT)	160,000	Pacific	Spot fixings in specific Forward Month	USD	$/Day	1
Spark30S	Spot	Daily(0800-1000 GMT)	160,000	Atlantic	Delivery 15-45 days forward of assessment	USD	$/Day	1
Spark30Fo	Forwards	Tues (0800-1000 GMT)	160,000	Atlantic	Spot fixings in specific Forward Month	USD	$/Day	1

Prices can only be submitted when the assessment windows are open, which is from 0800-1000 (GMT) during assessment days. This is to allow linkage between European and Asian markets.

- **Hire Calculation:**

The Spark $/day LNG freight rates are round trip hire based on the following assumptions:

  - Unit: US dollars per day ($/day)
  - Vessel Type: 160,000 m3 TFDE
  - Duration: 25 days (Pacific) or 30 days (Atlantic)
  - Delivery Location: Cold delivery at load port
  - Vessel Age: Max 20 years old
  - Ballast Bonus: At prevailing market rate
  - Positioning Fee: At prevailing market rate
  - Ballast Fuel: LNG at Boil Off Rate
  - Boil Off Rate: 0.1% of cargo tanks at 98.5% capacity for 160,000m3 TFDEs
  - LNG Conversion Factor: 23
  - LNG Fuel Reference Prices:
    - **Spark25 contracts**: last available end of day settlement price of the JKM LNG (Platts) futures front month contract (PCC:JKM) as published by ICE Futures Europe
    - **Spark30 contracts:** last available day's daily settlement price of the Dutch TTF Gas 1st Line Financial Futures (USD/MMBTU) front month contract (PCC:TFU) as published by ICE Futures Europe
  - Charterer Payment: Hire Cost + Ballast Bonus + Positioning Fee
  - Spark Rate: (Charterer Payment - Ballast Fuel Costs) / Duration

Please note that the Vessel Type will be updated to '174,000 m3 2 Stroke with no onboard liquefaction capabilities' and the Boil Off Rate to '0.085% of cargo tanks at 98.5% capacity for 174,000 m3 2 Strokes' on 1st January 2024 following the Vessel Type and Boil Off Consultation. Details of the consultation and outcome can be found on our Governance and Compliance page here.

- **$/MMBtu Calculation:**

The Spark $/MMBtu LNG freight rates represent the total cost to charterer in $/MMBtu of LNG transported, with the following assumptions:

    - Discharge volume: 98.5% of Vessel Capacity minus boil-off for laden leg minus a heel of 3,000 m3
    - Speed: 17 knots
    - Fuel Strategy: gas mode on laden and ballast at Boil Off Rate
    - LNG Fuel Reference Prices:
        - **Spark25 contracts**: last available end of day settlement price of the JKM LNG (Platts) futures front month contract (PCC:JKM) as published by ICE Futures Europe
        - **Spark30 contracts:** last available day's daily settlement price of the Dutch TTF Gas 1st Line Financial Futures (USD/MMBTU) front month contract (PCC:TFU) as published by ICE Futures Europe
    - LNG Conversion Factor: 23
    - Port costs: based on latest costs provided by GAC (as seen on the Spark platform)
    - Charterer Payment: Spark rate ($/day) * Duration + Ballast Fuel Cost
    - Total Charterer Cost: Charterer Payment + Port Costs + Laden Fuel Costs
    - Spark rate in $/MMBtu: Total Charterer Cost / Discharge volume
- **Route Assumptions:**
    - Atlantic: Sabine Pass - Gate (25 days round trip)
    - Pacific: NWS - Tianjin (19 days round trip)
    - Load/Discharge Duration: 1 day load / 1 day discharge
    - Flex Days: 4 (Pacific) and 3 (Atlantic)
- **Spark Price Calculation:**
    - Simple average of eligible broker assessments computed at the end of the submission window.
    - For those that submit, a wider data set is available.
- **Other Curves:**
    - Simple average and a wider data set is also plotted for other categories of submitter when the relevant data is available (e.g. Portfolio Player, Owner curve) depending on the account permissions.
- **Assessment Inputs:**
    - All assessments are rounded to the nearest $250 and submissions are accepted in $250 increments.

Assessment Frequency and Settlement Mechanisms:

- **Inputs and Settlement Mechanism:**
    - **Spark25S and Spark30S Prompt Assessment:**
        - Spot Period: vessel delivery 15-45 days forward from the date of assessment.
        - Spot Frequency: Daily (between 0800-1000 GMT)
        - Spot Settlement: average of assessments between 1st day and last day of calendar month (inclusive).
    - **Spark25/30 Forward Contracts:**
        - Forward Curve: 12 months (M+1 to M+12)
        - Forward Curve Frequency: 1 time per week (Tuesday 0800-1000 GMT)
        - Rolling: M+1 to M+12 roll on the first business day of the month.

Holiday Days:

Spark follows the UK Public Holiday calendar. There will be no submissions on a UK public holiday unless clearly communicated by Spark.

Benchmarking:

As submission numbers increase, we will provide you with the ability to benchmark versus other categories of market participants. Anonymity is key so although we are starting with broad definitions, the more submissions we receive, the more granular this will become.

Submitter Categories (subject to change):

- **Brokers:** neutral assessments forming the Spark Price assessment.
- **Portfolio Players:** LNG market players with global portfolios and capability to charter and sub-charter LNG vessels.
- **Owners:** recognised, independent LNG vessel owners

Only recognised, eligible brokers form part of the Spark Price Assessment to ensure neutrality. Market Data is data received from a variety of market participants who are active in the LNG freight market. This ensures that only relevant data is provided adding further transparency to the market.

All new Brokers must be nominated by at least 5 market participants in order to contribute to the Spark Price assessment. Brokers must be actively involved in the spot market and must demonstrate this.

A survey will be sent out to all Spark users every 12 months (starting in September 2021) allowing the market to challenge the involvement of any brokers or suggesting the addition of new brokers.

Some examples of Spark methodology applied to physical fixtures.

For full details behind these calculations please see the Spark Calculator and associated methodology.

Contract Type: Spark30S:

- A vessel fixed at 50k/day with 100% fuel and 100% hire ballast bonus to load port (Sabine) and no positioning fee.
    - Spark30 rate: $50,000/day
- A vessel fixed at $50k/day with a $1m ballast bonus lump sum and no positioning fee.
    - Spark30 rate: $52,000/day
- A vessel fixed at 50k/day with 100% fuel and 100% hire ballast bonus to load port (Sabine) and 100% fuel and 100% positioning from Singapore via Panama including Canal cost.
    - Spark30 rate: $141,000/day

Please note that the assumed LNG price for the calculations is $6.87/MMBtu.

Examples of how to apply the SparkS Settlement Mechanism:

- Calendar Month: June 2022
- Settlement period opens: 1st June 2022
- Settlement period closes: 30th June 2022

Settlement Mechanism: average of assessments (daily) between 1st June 2022 and 30th June 2022 (inclusive).

Governance and Compliance

Spark believes that commodity pricing should be based on direct and independent submissions from approved, active market players. Spark delivers this via an intuitive, easily accessible platform, with Spark price assessments (the "**Spark Prices**") based on a clear and fit-for-purpose methodology.

Spark advocates for data-driven assessments that are not susceptible to individual judgement or bias. The Spark approach, which sets us apart from traditional PRAs, is designed to produce high quality, robust price assessments in both liquid and illiquid markets. Further information on Spark governance and compliance can be found in the Spark Governance Policies and Procedures document here.

Spark endeavours to standardise our approach to data collection and price formation wherever possible, whilst allowing for market-specific methodologies when required. This allows Spark to:

- Produce reliable, fair, data-driven and representative price assessments;
- Provide mechanisms aimed at preventing market manipulation;
- Provide greater levels of transparency in illiquid markets by providing a growing amount of anonymised, relevant data; and
- Avoid selective reporting where possible whilst recognising industry dynamics and lack of liquidity.

Spark Prices are automatically calculated based on the methodology outlined in this document. Market participants can directly enter price information on the platform, removing the need for journalists and assessors to gather data. This allows Spark's senior assessors to focus on identifying anomalous data, and ensuring the platform operates as expected. Data submissions that breach defined tolerance thresholds must be justified by the submitter. All justifications are recorded in the Spark administration system and are accessible by Spark senior assessors.

By following a data-centric method that relies predominantly on technology, Spark removes human error and judgement as much as possible from the Spark Prices.

In order to ensure Spark provides reliable, fair and representative price assessments, at least 50% of the approved and permissioned eligible submitters are required in order to calculate a Spark Price. In the event that threshold is not, Spark will roll forward the prior published price. Spark customers will be informed if such action is necessary.

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Revision History

Version	Date published	Changes
1.1	Dec 2019	- Inclusion of contract overview - Addition of Spark Calculation overview and other curve generation - Provision of how holiday days shall apply to any of the assessment days
1.2	March 2020	- Additional clarification on timing and broker eligiblity
2.0	April 2020	- Additional clarification on submission windows during public holidays - Updated UK Public Holiday Calendar
2.1	October 2020	- Clarification on curves and submitter categories - Clarification of examples - Addition of Owner curve
2.2	November 2020	- Clarification on broker eligibility process and survey - Clarification on settlement mechanism for S contract
2.3	February 2021	- Clarification of assessment periods - Clarification of the hire calculation - Update examples of settlement mechanisms - Updates Spark rate examples - Updated UK Public Holiday Calendar
2.4	February 2021	- Clarification of conversion factor and adjustment of Spark broker survey timing due to ICE listing - Addition of M+1 SparkFo assessment following market consultation
2.5	April 2021	- Updated source of port costs within $/MMBtu calculations
2.6	May 2021	- Updated examples within calculations
2.7	May 2021	- Amendments to examples
2.8	June 2021	- Reference to Governance Policy added; Governance & Compliance section added
2.9	November 2021	- Correction to UK Public Holiday Calendar
2.10	November 2021	- Addition of UK Public Holiday Calendar for 2022 and festive period schedule for 2022/23
2.11	January 2022	- Removal of UK Public Holiday Calendar and festive period schedules for 2021 - Changes to LNG Fuel Reference Price within the Hire Calculation section, pursuant to methodology consultation conducted in November 2021
2.12	31 January 2022	- Minor formatting changes

3.0	4th April 2022	- Update to Spark25S and Spark30S frequency to daily from twice per week. - Removal of SparkF contracts
3.1	12th September	- Updated UK Public Holiday Calendar following UK Government announcement of a Bank Holiday for the State Funeral of Queen Elizabeth II on 19th September 2022.
3.2	11th November	- Updated contract naming in Spot Contracts and Forwards section to make consistent with Spark naming convention. - Removal of holiday calendar dates - Update to include Vessel Type change to be implemented on 1st January 2024.