ICE LIBOR METHODOLOGY

1.   **Introduction**

ICE Benchmark Administration Limited (IBA) is the Benchmark Administrator of four systemically important benchmarks including ICE LIBOR (LIBOR) which is a widely used benchmark for short term bank borrowing rates.

The LIBOR methodology is designed to produce an average rate that is representative of the rates at which large, leading internationally active banks with access to the wholesale, unsecured funding market could fund themselves in such market in particular currencies for certain tenors.

Used globally, LIBOR is often referenced in derivative, bond and loan documentation, and in a range of consumer lending instruments such as mortgages and student loans. It is also used as a gauge of market expectation regarding central bank interest rates, liquidity premiums in the money markets and, during periods of stress, as an indicator of the health of the banking system.

2.   **EU Benchmarks Regulation requirements**

The EU Benchmarks Regulation (BMR) regulates the provision of, contribution to and use of benchmarks with the following overarching purpose:

"[…] in order to ensure the proper functioning of the internal market and improve the conditions of its functioning, in particular with regard to financial markets, and to ensure a high level of consumer and investor protection, it is appropriate to lay down a regulatory framework for benchmarks at Union level."

With reference to codes of conduct, Article 15(1) of the BMR states that:

"Where a benchmark is based on input data from contributors, its administrator shall develop a code of conduct for each benchmark clearly specifying contributors' responsibilities with respect to the contribution of input data and shall ensure that such code of conduct complies with this Regulation. The administrator shall be satisfied that contributors adhere to the code of conduct on a continuous basis and at least annually and in case of changes to it."

LIBOR is a benchmark based on input data from contributors and IBA's LIBOR Code of Conduct (Code) is published at:

https://www.theice.com/publicdocs/LIBOR_Code_of_Conduct_Issue_7_Current.pdf

Section 4.2 of the Code relates to types of input data and states that a contributor bank is required to formulate its LIBOR submissions in accordance with the methodology requirements published by IBA.   This ICE LIBOR Methodology document sets out the applicable requirements.

3. **The LIBOR Output Statement and the Waterfall Methodology**

Since becoming the administrator of LIBOR in February 2014, IBA has developed and consulted extensively on evolutionary measures to make LIBOR even more robust and sustainable.

IBA published the "Roadmap for ICE LIBOR" in March 2016, containing a framework to evolve LIBOR through the adoption of the "ICE LIBOR Output Statement". The Output Statement sets out a standardised, more transaction data-driven methodology for LIBOR panel banks' submissions in place of the previous LIBOR submission question.

Each LIBOR panel bank's submissions in response to the Output Statement are determined through the use of a "Waterfall Methodology", which utilises eligible transaction data where available, transaction-derived data otherwise, and, if neither is available, market and transaction data-based expert judgement, appropriately framed, using the bank's own internally approved procedure (based on a set of permitted inputs and agreed with IBA).

IBA's objective in evolving LIBOR through the use of the ICE LIBOR Output Statement has been to publish, in all market circumstances, a wholesale funding rate anchored in unsecured, wholesale funding transactions to the greatest extent possible.

Further information about the LIBOR submission and calculation methodology is contained in the Appendix.

4. **Review**

This ICE LIBOR Methodology document will be kept under review by IBA in conjunction with the LIBOR Oversight Committee.

METHODOLOGY

1.   **Introduction**

Objectives of the LIBOR Output Statement and Waterfall Methodology are to:

- Produce a wholesale funding rate, anchored in unsecured, wholesale funding transactions to the greatest extent possible;

- Publish a standardised, transparent and robust LIBOR methodology and a single, clear and comprehensive LIBOR definition; and

- Ensure the rate can adapt to changing market conditions and stakeholder needs.

LIBOR is based on Panel Bank submissions, determined in response to the Output Statement through the use of a standardised, transaction data-driven Waterfall Methodology (the "Waterfall Methodology"), as set out below:

Level 1 (Transaction-Based)

Where a Panel Bank has sufficient eligible transactions, a volume weighted average price ("VWAP") of such eligible transactions, with a higher weighting for transactions booked closer to 11:00 am London time. Eligibility criteria for transactions are specified by IBA.

Level 2 (Transaction-Derived)

Where a Panel Bank has insufficient eligible transactions to make a Level 1 submission, it will seek to make a submission based on transaction-derived data, including time-weighted historical eligible transactions adjusted for market movements and linear interpolation. Eligibility criteria for transaction derived data are specified by IBA.

Level 3 (Expert Judgement)

Where a Panel Bank has insufficient eligible transactions or transaction-derived data to make a Level 1 or a Level 2 submission, it will submit the rate at which it could fund itself at 11:00 am London time with reference to the unsecured, wholesale funding market. Each Panel Bank agrees its defined Level 3 submission methodology with IBA, basing its rate on transactions, related market instruments, broker quotes and other market observations.

Level 1 and Level 2 submissions are mathematically based on transaction data and the methodology is common to all contributing banks. There is no discretion for contributors.

A contributor bank must ensure that its LIBOR submissions are Level 1 and 2 (Transaction-based) where the bank has the minimum transactional data.

Banks must establish their Level 3 (Expert Judgement) benchmark submissions on the basis of internally approved procedures and inputs allowed by IBA. A bank must review this methodology as and when market circumstances require, to ensure that its LIBOR submissions remain credible and robust at all times.

2. **ICE LIBOR Output Statement***:*

ICE LIBOR OUTPUT STATEMENT

ICE LIBOR is the benchmark published under that name or as "LIBOR" and calculated by ICE Benchmark Administration Limited (IBA) on London business days.

It is a wholesale funding rate anchored in LIBOR panel banks' unsecured wholesale transactions to the greatest extent possible, with a waterfall to enable a rate to be published in all market circumstances:

Level 1:

A volume weighted average price (VWAP) of transactions in unsecured deposits and primary issuances of commercial paper and certificates of deposit since the previous submission, with a higher weighting for transactions booked closer to 11:00 London time.

Eligible counterparties are providers of wholesale unsecured funding including:

- banks

- central banks

- governmental entities

- multilateral development banks

- non-bank financial institutions

- sovereign wealth funds

- supranationals, and

- corporations as counterparties to a bank's funding transactions for maturities greater than 35 days.

Transactions in approved major funding centres are taken into account without price adjustment, subject to minimum transaction sizes and number of trades as specified by IBA.

Level 2:

Transaction-derived data, including time-weighted historical transactions adjusted for market movements and linear interpolation.

Level 3:

If the LIBOR panel bank has insufficient Level 1 and Level 2 transactions, it should submit the rate at which it could fund itself at 11:00am London time with reference to the unsecured wholesale funding market. In order to determine this rate the bank should follow its internally approved procedure agreed with IBA.

LIBOR is calculated as of 11.00 every London business day and normally published by IBA at 11.55 London time; it is a trimmed arithmetic mean that excludes the highest and lowest quartile of submissions. Each panel bank's submission carries an equal weight, subject to the trimming.

The panel banks' individual submissions are published by IBA after 3 months on a non-attributed basis.

Further details are published at www.theice.com/IBA.

IBA is authorised and regulated by the Financial Conduct Authority.

3. **LIBOR input data**

LIBOR submissions must be based to the greatest extent possible on wholesale unsecured funding transactions.

A contributor bank must formulate its submissions on eligible transactions where these meet the specifications set out below in terms of:

- the required quality and accuracy of the input data

- the required quantity of the input data

- the priority in which input data is to be used.

Contributor banks must follow the provisions in the "ICE LIBOR submission methodology" document provided to the banks by IBA. The main provisions are summarised below.

Eligible trades

Eligible trades are vanilla funding transactions in the following funding types:

- Unsecured term deposit

- Commercial paper (CP) - fixed rate and primary issuance, or

- Certificate of deposit (CD) - fixed rate and primary issuance.

A minimum of two trades with different counterparties are required for a transaction (Level 1) or a transaction derived (Level 2) submission.

For a Level 1 and Level 2 submission, the notional amount of a trade must equal or exceed the trade threshold for the currency in the table below:

Currency	Threshold
CHF	10 million
EUR	10 million
GBP	10 million
JPY	1 billion
USD	10 million

The thresholds apply to all tenors.

<u>Eligible counterparty types</u>

The counterparty type must be in one of the following categories:

- Banks

- Sovereign Wealth Funds

- Supranational Corporations, Central Banks and Multilateral Development Banks

- Government entities (including local /quasi-governmental organisations)

- Non-Bank Financial Institutions, including: Brokers, Building Societies, Money Market Managers and Insurers

- Corporates as counterparties to a bank's funding transactions and only for maturities greater than 35 calendar days (i.e. longer than 1 month tenor bucket). Transactions with corporates as counterparties with maturities of 35 days or less can only be included in a Level 3 submission if it is a part of a bank's internally approved procedure and must be used consistently.

Different counterparties are defined as having different legal entities and different immediate parent legal entities for the trades which have been aggregated.

A trade is ineligible if it is an internal trade (i.e. with a subsidiary of the bank), a retail trade or a trade with a counterparty which is not listed above.

The definition of subsidiaries is set out in Section 1159 of the UK Companies Act 2006.

Tenor bucketing

Eligible trades in other than Overnight and Spot Next Tenors

Eligible trades in other than the Overnight and Spot Next Tenors must be assigned to a LIBOR tenor based on their duration (start/value to maturity date) as follows:

Tenor	From	To
	Business Days	
ON/SN*	01	01
1W	05	05

Tenor	Calendar Days	
1M	25	35
2M	50	70
3M	80	100
6M	150	210
12M	330	390

For Level 1 submissions the overnight tenor can only include overnight trades, and the spot-next tenor only spot-next trades.

For overnight and spot-next tenors, where the tenor run for the submission day crosses a month-end, i.e. the start (value) date is in month "A" and the end (maturity) date is in month "B", then only trades which also have a value date in month "A" and a maturity date in month "B" should be included in the Level 1 VWAP calculation.

Trades in non-LIBOR Tenors

Trades which have maturities of less than 330 days but which do not fit into one of the above buckets may still be used for Level 2 and 3 submissions.

<u>Funding Centres</u>

A list of approved funding centres is maintained by IBA and will be reviewed with the LIBOR Oversight Committee and each bank periodically.

The list is based on the major cities in Canada, USA, EU (including Channel Islands), EFTA, Hong Kong, Cayman Islands, UK (in the event of Brexit) Singapore, Japan and Australia.

The funding centre of the trade must be one of the approved centres bilaterally agreed between each bank and IBA.

Transactions not in one of the approved funding centres may only be used in a Level 3 submission.

<u>Transaction Window</u>

The transaction window for each day's submission is the period from 11:00:01 (London time) on the previous submission date to 11:00:00 (London time) on the current submission date.

4.   Calculation Methodology

LIBOR panel banks' submissions for each currency and tenor combination are ranked by IBA and the upper and lower quartiles are excluded to remove outliers.

The relevant rate is then calculated as the trimmed arithmetic mean of the remaining submissions, rounded to five decimal places.

Each LIBOR panel bank's submission carries an equal weight, subject to the trimming.

Details are shown in the table below:

Number of contributors	Trimming methodology	Number of contributor rates averaged
16	4 highest and 4 lowest rates	8
15	4 highest and 4 lowest rates	7
14	3 highest and 3 lowest rates	8
13	3 highest and 3 lowest rates	7
12	3 highest and 3 lowest rates	6
11	3 highest and 3 lowest rates	5