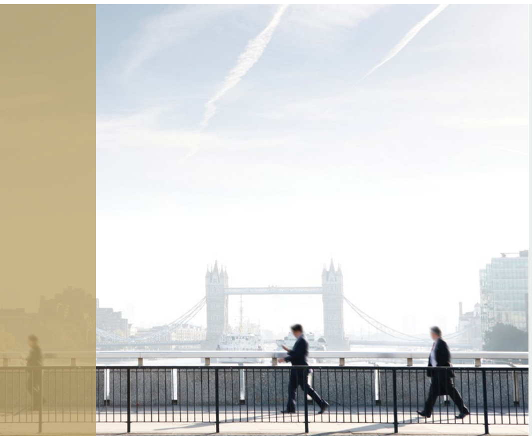

Preparing for Benchmark Rate Reform

FREQUENTLY ASKED QUESTIONS

1. BACKGROUND TO BENCHMARK RATE REFORM

- Interbank Offered Rates (IBORs) are benchmark interest rates used across the global economy for calculating interest and valuations in a wide variety of financial contracts, such as derivatives, bonds, loans and consumer lending products.
- These rates are also used for a vast number of financial instruments and products, including products that you may have entered into or may be considering entering into with BNY Mellon.
- One of the most widely used IBORs is LIBOR, which is quoted in British Pound Sterling (GBP), U.S. Dollar (USD), Euro (EUR), Swiss Franc (CHF) and Japanese Yen (JPY).
- These rates are derived from quotes submitted by a group of panel banks, and represent each bank's cost of obtaining a loan from another member bank in the London interbank market for each of the published tenors.
- Since the financial crisis, the aggregate amount of actual unsecured interbank borrowing transactions has declined sharply—sometimes to less than $1 billion per day. However, IBORs also act as a benchmark for short-term interest rates across a wide spectrum of cash and derivative products. The volume of these transactions exceeds $400 trillion globally.
- Global regulators are concerned about the robustness of these benchmark interest rates and expect market participants to plan for the cessation of LIBOR by the end of 2021. Regulators around the globe have initiated forums for market participants to identify alternative reference rates.

2. WHAT ARE IBOR RATES?

- IBORs are unsecured, short-term interest rates published for periods ranging from overnight to 12 months. In addition to being used for a vast number of financial instruments and products such as complex derivatives to residential mortgages, these rates are embedded in various financial activities, such as risk, valuation, performance modeling and commercial contracts. It has been called the "world's most important number."

3. WHAT IS LIBOR?

- The London Interbank Offered Rate (LIBOR) is a benchmark interest rate that is calculated using an average of panel bank submissions. LIBOR provides indication on the rate that banks pay to borrow unsecured money across five (5) currencies (British Pound Sterling, Euro, Japanese Yen, Swiss Franc and U.S. Dollar), seven (7) tenors (overnight, 1 week, and 1, 2, 3, 6 and 12 months) and used as a reference rate for financial contracts. Its administrator, ICE Benchmark Administration (IBA), publishes LIBOR rates every London business day. LIBOR is used across the global economy for calculating interest rates and valuations on for contracts such as derivatives, bonds, commercial loans and consumer lending products.

4. WHY ARE IBORS BEING REPLACED?

For decades, IBORs provided a reliable way to determine the cost of everything from student loans and mortgages to complex derivatives. Historically, these rates have been derived daily from a survey of up to 20 large banks that estimate how much it would cost to borrow from each other without posting collateral. Over time, fewer banks have entered into such unsecured loans and, lacking observable transactions, submitting banks had to use expert judgement or theoretical models to determine the daily IBOR rates. The appropriateness of this approach was undermined by the discovery of rate quote manipulation by some employees at a few panel banks.

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Seeing the flaws in the IBOR determination process, the UK's Financial Conduct Authority (FCA) in 2017 announced that after 2021, it would no longer compel banks to submit the rates to calculate LIBOR. Since the FCA's announcement, regulators within each country or region have organized working groups comprised of market participants from both buy-side and sell-side institutions. These groups have worked to identify replacement risk-free rates (RFRs) or alternative reference rates (ARRs) for their currency, alongside a phased transition plan to avert market instability. RFRs or ARRs should ideally have a high volume of observable transactions, be robust in all market conditions and be difficult to manipulate.

However, publication of IBOR rates may not necessarily end after 2021. Nothing prevents submitting banks from continuing to submit the relevant data and ICE Benchmark Administration from publishing the rates. However, submitting banks are conscious of the inherent conduct risk in making judgment-based submissions on a benchmark that determines the market value of a vast number of contracts. Even if IBORs are not discontinued, regulatory pressure to transition to new rates is expected to increase.

5. WHAT IS AN RFR?

RFR stands for risk-free rate. The acronym was introduced by the Financial Stability Board in their July 2014 publication on benchmark interest rate reform. The phrases 'near risk-free rates', 'risk-free rates' and 'alternative reference rates' are generally accepted as interchangeable and should be defined as reference rates that are being developed by international central bank-led working groups as alternatives to LIBOR.

RFRs have a number of differences when compared to LIBOR, including:

- Each currency has its own distinct RFR and administrator.
- RFRs are overnight rates, not rates for a longer term such as 3 or 6 months. As such, there is very little perceived credit risk or term premium associated with RFRs.
- Some market participants have expressed the need for RFR based term rates in order to know the applicable interest rate in advance of any payments to be made. Each of the RFR working groups is considering the feasibility to produce a robust term rate.
- RFRs are based on a large number of overnight money market transactions, so risks associated with expert judgment are avoided.
- The underlying volumes of transactions which determine the RFRs are much higher than LIBOR.
- While all LIBORs are unsecured rates not backed by any exchange of collateral, two of the five RFR working groups selected secured, or collateralized, rates for their currencies based on transactions in each of their respective government security repo markets.

6. WHAT IS THE INDUSTRY DOING TO REPLACE LIBOR?

Working groups convened by regulators have already converged on alternative reference rates. In the U.S., the Alternative Reference Rate Committee (ARRC) was assembled under the guidance of the Federal Reserve Board and the Federal Reserve Bank of New York (New York Fed). The Secured Overnight Financing Rate (SOFR), a new reference rate, was introduced by the New York Fed in cooperation with the U.S. Treasury Department's Office of Financial Research as the recommended replacement benchmark rate for derivatives transactions. The following industry links reference information on LIBOR:

- Alternative Reference Rates Committee (ARRC) (U.S.)
- Loan Syndications & Trading Association (LSTA) (U.S.)
- Mortgage Bankers Association (MBA) (U.S.)
- The Bankers Association for Finance and Trade (BAFT)
- Bank of England (UK)
- Financial Conduct Authority (UK)
- Loan Market Association (LMA) (EMEA)
- International Swaps and Derivatives Association (ISDA)
- UK Finance
- International Capital Market Association (ICMA)
- International Capital Market Services Association (ICMSA)
- Asia Pacific Loan Market Association (APAC)
- Asia Securities Industry and Financial Markets Association (APAC)

7. WHAT ARE THE DIFFERENT WORKING GROUPS IN EACH COUNTRY AND WHAT ALTERNATIVE REFERENCE RATES HAVE THEY NOMINATED?

Regulators have identified various ARRs as possible replacements, and are considering ways of effecting the transition away from IBORs. Currently, it is not possible to confirm the rates that will be used by the market as alternatives to IBORs or, in the case of ARRs, any adjustment spreads that may be applicable for each such transition. The proposed recommended replacement rates across the globe include:

- U.S.: existing USD LIBOR rate is replaced by SOFR (Secured Overnight Financing Rate)
- UK: existing GBP LIBOR rate is replaced by SONIA (Sterling Overnight Index Average)
- EU27/EEA: existing EONIA rate is replaced by €STR (Euro Short Term Rate) and EURIBOR was reformed to comply with the latest benchmark regulations
- Switzerland: existing CHF LIBOR rate is replaced by SARON (Swiss Average Overnight Rate)
- Japan: existing JPY LIBOR rate is replaced by TONAR (Tokyo Overnight Average Rate)
- Canada: existing IBOR rate is replaced by 'enhanced CORRA' (Canadian Overnight Repo Rate Average)
- Similar transitions are being planned in jurisdictions across the globe

Jurisdiction	Prior Benchmark (internally assumed end date)	Replacement Rate	Description	Current Status
	CDOR	CORRA Complimentary Reference Rate to operate alongside CDOR	▪ Secured ▪ Fully transactions based ▪ Cost overnight general collateral funding	Publication of CORRA with new methodology to be published in 06/2020 CDOR* to co-exist next to CORRA
	USD LIBOR	SOFR Secured Overnight Financing Rate	▪ Secured ▪ Fully transaction-based ▪ Covers multiple Treasury repo market segments	Transition plan has been outlined Publication of rate since 04/2018
	EONIA EURIBOR	€STR – Euro Short Term Rate EURIBOR (reformed)	▪ Unsecured ▪ Transaction based ▪ Volume weighted-trimmed mean of transactions ▪ Gathered from 52 of the largest European banks	Publication of €STR since 10/2019 EURIBOR has been reformed and will continue as a BMR* compliant rate
	JPY LIBOR	TONAR Tokyo Overnight Average Rate	▪ Unsecured ▪ Transaction based (call rate market) ▪ Calculated on market broker information ▪ Weighted by volume	Investigation of market practices and contract design of TONAR ongoing
	GBP LIBOR	Reformed SONIA Sterling Overnight Index Average	▪ Unsecured ▪ Fully transaction based ▪ Encompasses a robust underlying market ▪ Includes volume-weighted trimmed mean	Reformed SONIA since 04/2018
	CHF LIBOR	SARON Swiss Average Overnight Rate	▪ Secured ▪ Became reference interbank overnight repo in 2009 ▪ Reflects interest paid on o/n repo	TOIS now discontinued SARON swaps began trading in 04/2017

*BMR = Benchmarks Regulation

8. WHAT IS SOFR?

SOFR—the Secured Overnight Financing Rate—is the ARRC's recommended alternative to USD LIBOR. The New York Fed began publishing SOFR in April 2018. Unlike LIBOR, which has a term component for setting interest rates 1, 3, 6 or even 12 months out, the new SOFR rate is only an overnight rate. SOFR features a number of characteristics that LIBOR and other similar rates do not:

- It is derived from the large, active and well-defined overnight repo market with sufficient depth and ~$1 trillion of transactions per day to make it extraordinarily difficult to manipulate or influence.
- It is produced in a transparent, direct manner and is based on observable transactions rather than being dependent on expert judgment or derived through models.
- It is derived from a market that was able to weather the global financial crisis and that the ARRC believes will remain active enough that it can reliably be produced in a wide range of market conditions.
- It is published on each New York business day by the New York Fed on their website for the prior New York business day.
- On each New York business day, the New York Fed also publishes a compounded average of SOFR in arrears for 30, 60 and 180 days, as well as a SOFR Index that measures the cumulative impact of compounding SOFR on a unit of investment over time since the first day SOFR was published.

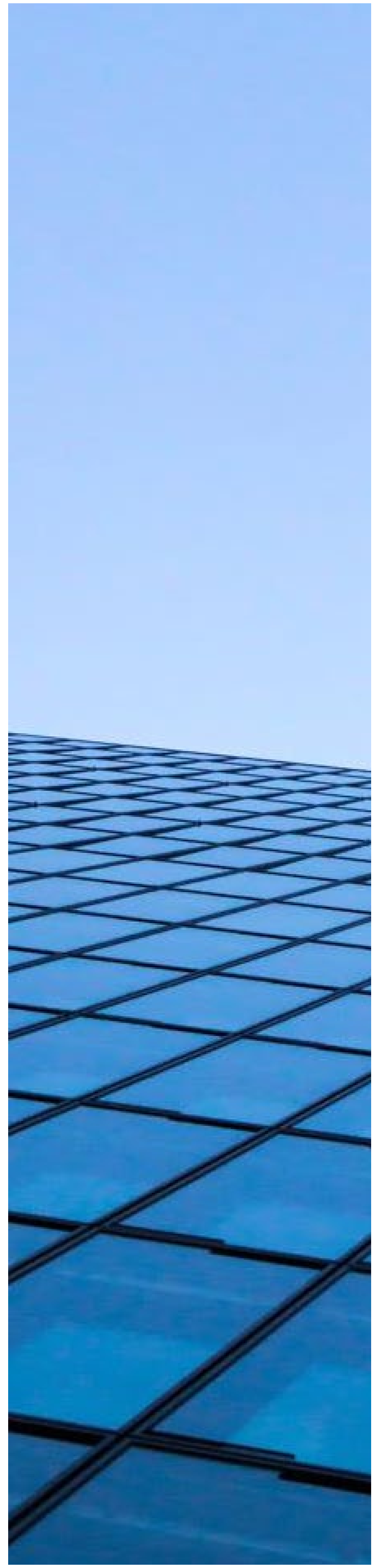
What is the difference between SOFR and LIBOR?

Where LIBOR relied on the expectations of bankers, SOFR is based on real transactions between many types of firms including broker-dealers, money market funds, asset managers, insurance companies, banks and pension funds. It is also different from LIBOR in that it is a secured rate, since the repo rates from which it is derived are collateralized by assets. It is an overnight rate, based specifically on overnight repurchase transactions for one business day. LIBOR, by contrast, is a forward-looking term rate with maturities ranging from 1 day to 1 year.

9. WHAT IS SONIA?

The Sterling Overnight Index Average, or SONIA, is the effective overnight interest rate paid by banks for unsecured transactions in the British sterling market. It is used for overnight funding for trades that occur in off hours and represents the depth of overnight business in the marketplace.

SONIA is calculated each London business day, and is the weighted average rate of unsecured overnight sterling transactions brokered by Wholesale Markets Brokers' Association members. It appears on the business day after the day the rate relates to, and is published at 9:00 a.m. London time. The minimum deal size for inclusion is £25 million. In April 2018, changes to SONIA meant that its remit was expanded to include overnight-unsecured transactions, which are negotiated bilaterally, as well as those arranged via brokers.



10. WHAT IS €STR?

€STR, the Euro short-term rate, is the European Central Bank's (ECB's) new unsecured overnight rate. The ECB publishes the rate no later than 9:00 a.m. CET on the next TARGET2 business day. This benchmark will be used to replace the Euro Overnight Index Average (EONIA) which will be discontinued in December 2021. Currently, both EURIBOR and EONIA are used to calibrate monetary policy, price trillions of euros worth of derivatives and, in some countries, determine interest rates on mortgages.

€STR is calculated for each TARGET2 day as a volume-weighted trimmed mean rounded to the third decimal. This is calculated by:

- Ordering transactions from the lowest rate to the highest rate
- Aggregating the transactions occurring at each rate level
- Removing the top and bottom 25% in volume terms
- Calculating the mean of the remaining 50% of the volume-weighted distribution of rates
- A pro rata calculation is applied to volumes that span the thresholds for trimming to ensure that exactly 50% of the total eligible volume is used in the calculation of the volume-weighted mean (Source: ECB website)

11. WHAT IS EURIBOR?

The Euro Interbank Offered Rate (EURIBOR) is a daily reference rate published by the European Money Markets Institute (EMMI). The 19 Panel Banks making up EURIBOR reflect the highest volume of business in the euro zone money markets. In recent months, the EURIBOR benchmark successfully completed the implementation of a hybrid methodology for calculating the EURIBOR Rate.

The new hybrid methodology consists of three (3) levels of contributions across the five (5) maturity rates (1 week, 1, 3, 6 and 12 months), reduced from 15 rates that were previously offered. These contribution levels account for euro money market transactions that reflect underlying interest as well as transactions that do not.

Factors considered for the new methodology include determining the rate for a given tenor, eligible transactions at a specific tenor, maturity of transactions at a specific tenor, and prior submissions to other contribution levels for a specific tenor in prior dates. (Source: EMMI Blueprint for the Hybrid Methodology for the Determination of EURIBOR, February 12, 2019).

12. WHAT IS SARON?

The Swiss Average Rate Overnight (SARON) was introduced in 2009 and officially adopted as a LIBOR replacement in December 2017. It is administered by SIX, which operates infrastructure for the Swiss financial center. SARON is the secured, overnight interest rate for the Swiss Franc (CHF) repo market. Term rates—spanning the spectrum up to 12 months—already exist for this alternate reference benchmark. SARON is based on concluded transactions and trade quotes posted on the SIX Repo trading platform, provided they lie within the parameters of the quote filter. The quote filter is parameterized in a way that limits the possibilities for manipulation.

SARON is continually calculated in real time and published every ten minutes. In addition, a fixing is conducted three times a day (12:00, 4:00 and 6:00 p.m. CET). The 6:00 p.m. fixing serves as a reference reading for derivative financial products and the valuation of financial assets. (Source: SIX Group publication)

13. WHAT IS CARR?

In March 2018, Bank of Canada announced the creation of the Canadian Alternative Reference Rate Working Group (CARR), which is sponsored by the Canadian Fixed-Income Forum (CFIF). The main objectives of CARR have been to review and enhance the existing Canadian overnight risk-free rate, the Canadian Overnight Repo Rate Average (CORRA), and to assess the need for and, if required, develop a Canadian term risk-free rate benchmark that is robust, reliable and resilient to market stress and manipulation. The enhanced CORRA rate is intended to act as a complementary reference rate for the Canadian market, which will operate alongside the Canadian Dollar Offered Rate (CDOR). The current proposed enhancements to CORRA are:

(a) the rate should remain risk-free (b) the rate should be calculated from more volume than CORRA currently is today (c) the rate should represent General Collateral (GC) funding (d) the rate should be simple and easy to explain

CORRA is determined by actual market transactions, and is used as a reference for overnight indexed swaps and related futures. It is calculated as an average based off designated inter-dealer brokers, including government of Canada collateral repo trades that happened from 6:00 a.m. to 4:00 p.m. ET that day.

The Bank of Canada will take over the responsibility for publishing the Canadian Overnight Repo Rate Average (CORRA), effective Monday, June 15, 2020. Beginning on this date, the Bank will provide this key interest rate benchmark for financial markets, at no cost, and make it available on the Bank's website as a public good.

14. WHAT IS "FALLBACK LANGUAGE" IN THE CONTEXT OF THE BENCHMARK REFORM?

In the U.S., the ARRC advises that the smoothest transition away from LIBOR will be one in which new contracts are written and existing contracts are amended to include reference rates other than LIBOR. However, LIBOR-based products continue to be issued and the ARRC has developed recommended 'fallback language' that can be used in new cash product (non-derivatives) contracts with the aim of reducing the risk of serious market disruption following LIBOR cessation.

The ARRC has issued recommended contractual fallback language for USD LIBOR denominated bilateral business loans, floating rate notes, securitizations, syndicated loans and adjustable rate mortgages.

In EMEA, following the implementation of the EU Benchmark Regulation (BMR), all new contracts referencing a benchmark should provide for a robust fallback. Legacy contracts, to the extent possible, should also be amended to incorporate adequate and robust fallback language.

15. WHAT KIND OF PREPARATIONS HAS CIBC MELLON/BNY MELLON MADE REGARDING LIBOR REPLACEMENT SO FAR?

We are working to facilitate an orderly transition from IBORs to alternative reference rates. Accordingly, we have created a global transition program with senior management oversight that focuses on:

- Evaluating and monitoring the impacts across our businesses, including transactions, products and services
- Identifying and evaluating existing financial instruments and contracts that may be affected
- Implementing information technology systems, models and analytics to prepare for a smooth transition to alternative reference rates

16. IS BNY MELLON PARTICIPATING IN INDUSTRY BODIES AND CONSULTATIONS ON THE ISSUE OF LIBOR REPLACEMENT?

We are actively engaged in various industry bodies that are developing solutions to help smooth the transition from LIBOR to alternative benchmarks. These include:

- International Swaps and Derivatives Association (ISDA)
- Alternative Reference Rates Committee (ARRC)
- The Bankers Association for Finance and Trade (BAFT)
- UK Working Group on Sterling Risk-free Reference Rates (UK RFR)
- The International Capital Market Service Association (ICMSA

For more information on CIBC Mellon's preparedness for LIBOR and CORRA, please contact a member of the CIBC Mellon Business Development team or your Relationship Executive or Relationship Manager at 416-643-5000, or visit www.cibcmellon.com.

ABOUT CIBC MELLON

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