Crude Oil Index Methodology Guide

ICE NGX Canada Inc.

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ICE NGX Crude Oil Index Methodology Guide

1. Introduction

This document sets out the methodology for the ICE NGX Crude Oil Indices.

1.1. Definitions and Interpretation

"business day" means a day that is not a weekend or a statutory holiday in Alberta;

"Index Period" means the period of time in which trading data is compiled for use in the generation of a particular Crude Oil Index; the Index Period may be a full calendar month, or a particular day or set of days, including the Pre-Nomination Crude Oil Trading Period;

"Pre-Nomination Crude Oil Trading Period" is defined as the Canadian business days from the first business day of the calendar month until the day before the initial deadline for Notice of Shipment (the "Initial NOS Deadline") with the relevant pipeline, typically the 20th calendar day of the month;

"Subscriber" means anyone who has access to one or more of the Indices;

"Third Party Information" means information of third parties that is licensed to ICE NGX for the development of the Crude Oil Indices, including but not limited to trade data from Contributors and the WM/Refinitiv 12Noon EST FX Benchmark;

"trading day" means a day that the relevant product is available for trading on the ICE NGX exchange platform;

"WM/Refinitiv 12Noon EST FX Benchmark" means the FX rate as published by WM/Refinitiv, by the same name, rounded to four decimal places;

"WTI CMA" means NYMEX WTI 1st Line Future (Calendar Month Average), as calculated and published by NYMEX.

1.2. Intellectual Property Rights

ICE NGX owns the right, title and interest in and to the following Canadian Crude Oil Indices.

ICE NGX 1a Index Name	ICE NGX 1b Index Name
ICE WCS 1a	ICE WCS 1b
ICE SW 1a	ICE SW 1b
ICE UHC 1a	ICE UHC 1b
ICE C5 1a	ICE C5 1b
ICE CAL 1a	ICE CAL 1b
ICE CLK 1a	ICE CLK 1b
ICE HLT 1a	ICE HLT 1b
ICE LSB 1a	ICE LSB 1b
ICE M 1a	ICE M 1b
ICE PSO 1a	ICE PSO 1b
ICE SYN 1a	ICE SYN 1b
ICE C5 ENB 1a	
ICE C5 FSK 1a	
ICE C5 PEA 1a	
ICE CLK EDM 1a	
ICE HITAN EDM 1a	

ICE NGX owns the right, title and interest in and to the following U.S. Crude Oil Indices.

ICE WCS CUS 1a	
ICE WCS NED 1a	
ICE LT SW GRN 1a	
ICE BLS NED 1a	
ICE BLS PAT 1a	

Third Party Information is provided as part of and in connection with the ICE NGX Crude Oil Indices and can be used by a Subscriber solely in relation to the Subscriber's subscription to the ICE NGX Crude Oil Indices and for no other independent purpose and, without prejudice to the generality of this statement, the Subscriber is prohibited from redistributing the Third Party Information and any information derived there from independently and separately from the ICE NGX Crude Oil Indices.

2. Methodologies

2.1. ICE NGX Crude Oil Indices - Canadian Locations

2.1.1. Overview

2.1.1.1. Index Data Source

The input data for the ICE NGX Canadian Crude Oil Indices is transaction data from OTC trades for physical delivery of crude oil brokered by the Contributor(s) to the Index.

Each of the Contributors set out below is the source of the input data from the trades brokered by that Contributor. Each of the Contributors has agreed to provide input data relating to every trade it brokers in the relevant grade and location.

The index-generating products are the grades referred to in the name of the relevant Index.

ICE NGX 1a Index	ICE NGX 1b Index	Notes
ICE WCS 1a	ICE WCS 1b	Includes differential to WTI CMA on Enbridge Transfer and Husky pipelines at Hardisty.
ICE SW 1a	ICE SW 1b	Includes differential to WTI CMA on Enbridge Transfer, Bonnie Glen, Federated, Peace, Pembina, Rainbow, Rangeland, Wizard Lake and Central AB pipelines at Edmonton.
ICE UHC 1a	ICE UHC 1b	Includes differential to WTI CMA on Enbridge (Transfer at Source-ENB and North Dakota-ND) and Minnesota pipelines at Clearbrook.
ICE C5 1a	ICE C5 1b	Includes differential to WTI CMA on Enbridge Transfer, Federated, Fort Sask, Peace, Pembina, and Rangeland pipelines at Edmonton and Peace pipeline at Namao.
ICE CAL 1a	ICE CAL 1b	Includes differential to WTI CMA on Central Alberta pipelines at Edmonton.

ICE CLK 1a	ICE CLK 1b	Includes differential to WTI CMA on Enbridge Transfer and Cold Lake pipelines at Edmonton and on Enbridge Transfer, Cold Lake, Gibson and Express pipelines at Hardisty.
ICE HLT 1a	ICE HLT 1b	Includes differential to WTI CMA on Gibson pipelines at Hardisty.
ICE LSB 1a	ICE LSB 1b	Includes differential to WTI CMA on Enbridge Transfer and Tundra pipelines at Cromer.
ICE M 1a	ICE M 1b	Includes differential to WTI CMA on Enbridge Transfer and Tundra pipelines at Cromer.
ICE PSO 1a	ICE PSO 1b	Includes differential to WTI CMA on Peace pipelines at Edmonton.
ICE SYN 1a	ICE SYN 1b	Includes differential to WTI CMA on Enbridge Transfer, Alberta Oil Sands, Suncor Oilsands, Horizon and Trans Mountain pipelines at Edmonton.
ICE C5 ENB 1a		Includes differential to WTI CMA on Enbridge Transfer pipeline at Edmonton.
ICE C5 FSK 1a		Includes differential to WTI CMA on Fort Sask pipeline at Edmonton.
ICE C5 PEA 1a		Includes differential to WTI CMA on Peace pipeline at Edmonton and Peace pipeline at Namao.
ICE CLK EDM 1a		Includes differential to ICE WCS 1a on Enbridge Transfer, Cold Lake, and Trans Mountain pipelines at Edmonton. Includes exTank transfers including Base Line Tank Terminal, Gibson, and North40 at Edmonton.
ICE HITAN EDM 1a		Includes differential to ICE WCS 1a on crude types Access Western Blend (AWB), Kearl Lake Dilbit (KDB), Surmont Heavy Dilbit (SHD) and Western Canada Dilbit, on Enbridge Transfer, Access,

| | | Waupisoo, Woodland, and Trans Mountain pipelines at Edmonton. |
| | | Includes exTank transfer including Base Line Tank Terminal, Gibson, and North40 at Edmonton. |

2.1.1.2. Contributors

The following are the Contributors to the ICE 1a and 1b Canadian Crude Oil Indices.

- CalRock Brokers Inc.
- One Exchange Corp.

2.1.1.3. Index Period and Hours

Only trades executed after 7:00 a.m. and before 3:00 p.m. MT on business days during the Index Period are included in the ICE NGX Canadian Crude Oil Indices.

The Index Period for the ICE NGX Canadian Crude Oil Indices is the first trading day of the month prior to delivery until the last day before the first Notice of Shipments ("NOS") date for the delivery month, inclusive.

The official NOS dates are published by Enbridge Pipeline prior to the start of each calendar year.

2.1.1.4. Assumptions

Because the Indices are calculated according to the respective methodology set out in this document and based on all trades executed by the Contributors during the Index Period and Index Hours, no assumptions are made and no extrapolation or interpolation of the Index Data is made.

2.1.1.5. Reference Unit

The reference unit for the ICE NGX Canadian Crude Oil Indices is: USD/bbl

2.1.2. 1a - Canadian Locations other than ICE CLK EDM 1a and ICE HITAN EDM 1a

2.1.2.1. Methodology: 1a

Other than the ICE CLK EDM 1a and the ICE HITAN EDM 1a, the ICE 1a Canadian Crude Oil Indices are calculated as the volume-weighted average of all transactions during the relevant Index Period in the relevant grade of crude oil at the relevant Canadian location.

2.1.2.2. Methodology Rationale: 1a

The intended industry and users of the relevant ICE 1a Canadian Crude Oil Indices value the volume-weighted average of executed, brokered on-screen or over-the-counter ("OTC") trades for physical delivery of the underlying commodity as a reflection of the price of a specified volume of that commodity.

2.1.3. 1a - ICE CLK EDM 1a and ICE HITAN EDM 1a

2.1.3.1. Methodology: ICE CLK EDM 1a

The ICE CLK Heavy Differential Average is a cumulative volume-weighted average of all Spread transactions during the relevant Index Period in the relevant grades of crude oil at the relevant Canadian locations.

The final calculation of the ICE CLK EDM 1a is expressed as the combined value of ICE WCS 1a Index + ICE CLK EDM Heavy Differential Average.

2.1.3.2. Methodology: ICE HITAN EDM 1a

The ICE HITAN Heavy Differential Average is a cumulative volume-weighted average of all Spread transactions during the relevant Index Period in the relevant grades of crude oil at the relevant Canadian location.

The final calculation of the ICE HITAN EDM 1a is expressed as the combined value of WCS ICE 1a Index + ICE HITAN Heavy Differential Average.

2.1.3.1. Methodology Rationale: ICE CLK EDM 1a and ICE HITAN EDM 1a

The intended industry and users of the ICE CLK EDM 1a and the ICE HITAN EDM 1a value the combined value of each trading day's volume-weighted average of executed, brokered on-screen or OTC trades for physical delivery of the underlying commodity at the relevant location for ICE WCS 1a plus the respective Heavy Differential Average, as a reflection of the trading price pattern of a specified volume of that commodity at the respective location.

2.1.4. 1b - Canadian Locations

2.1.4.1. Methodology: 1b

The 1b Canadian Crude Oil Indices are calculated as the simple average of the volume-weighted average of all transactions for each Trading Day during the relevant Index Period in the relevant grade of crude oil at the relevant Canadian location.

2.1.4.2. Methodology Rationale: 1b

The intended industry and users of the ICE 1b Canadian Crude Oil Indices value the simple average of each trading day's volume-weighted average of executed, brokered on-screen or OTC trades for physical delivery of the underlying commodity as a reflection of the trading price pattern of a specified volume of that commodity.

2.2. ICE NGX Crude Oil Indices - U.S. Locations

2.2.1. Overview

2.2.1.1. Index Data Source

The input data for the ICE NGX US Crude Oil Indices is transaction data from OTC trades for physical delivery of crude oil brokered by the Contributor(s) to the Index.

Each of the Contributors set out below is the source of the input data from the trades brokered by that Contributor. Each of the Contributors has agreed to provide input data relating to every trade it brokers in the relevant grade and location.

The index-generating products are the grades referred to in the name of the relevant Index.

ICE NGX 1a Index	Notes
ICE BLS NED 1a	Includes differential to WTI CMA on Energy Transfer, Seaway, Enbridge Transfer and Keystone pipelines at Nederland
ICE BLS PAT 1a	Includes differential to WTI CMA on Dakota Access, Enbridge Transfer and Keystone pipelines at Patoka
ICE LT SW GRN 1a	Includes differential to WTI CMA on Dakota Access, Enbridge Transfer and Keystone pipelines at Patoka
ICE WCS CUS 1a	Includes differential to WTI CMA on Enbridge Transfer, Plains Terminal and Keystone pipelines at Cushing
ICE WCS NED 1a	Includes differential to WTI CMA on Enbridge Transfer, Seaway, Keystone, Sunoco Terminal and Market Link Pipelines at Nederland

2.2.1.2. Contributors

The following are the Contributors to the ICE 1a US Crude Oil Indices.

- CalRock Brokers Inc.

2.2.1.3. Index Period and Hours

Only trades executed after 7:00 a.m. and before 3:00 p.m. MT on business days during the Index Period are included in the ICE NGX US Crude Oil Indices.

2.2.1.4. Weekends and Holidays

The Index Period for the 1a US Crude Oil Indices is the 26th calendar day of the month two months prior to the contract month until the 25th calendar day of the month prior to the contract month, inclusive.

If the 26th calendar day of the month two months prior to the contract month is a weekend or US holiday, the Index Period begins the first business day after the 26th calendar day.

If the 25th calendar day of the month prior to the contract month is a weekend or US holiday, the Index Period ends trading on the first business day prior to the 25th calendar day.

2.2.1.5. Reference Unit

The reference unit for the 1a US Crude Oil Indices is: USD/bbl

2.2.2. 1a - US Locations

2.2.2.1. Methodology

The 1a US Crude Oil Indices are calculated as the volume-weighted average of all transactions during the relevant Index Period in the relevant grade of crude oil at the relevant US location.

2.2.2.2. Methodology Rationale

The intended industry and users of the ICE 1a U.S. Crude Oil Indices value the volume-weighted average of executed, brokered on-screen or OTC trades for physical delivery of the underlying commodity as a reflection of the price of a specified volume of that commodity.

2.2.2.3. Contributors

The following are the Contributors to the ICE 1a US Crude Oil Indices.

ICE NGX Index Name	Contributors
ICE WCS CUS 1a	CalRock Brokers Inc.
ICE WCS NED 1a	

ICE BLS NED 1a	
ICE BLS PAT 1a	
ICE LT SW GRN 1a	

3. Criteria and Procedures for Determination

3.1. Relative Importance assigned to Criteria used in Determination

Each ICE NGX Crude Oil Index is calculated based on transaction data - specifically, transaction data from all trades that are brokered by the Contributor(s) to the Index during the relevant Index Period. Each trade reported to ICE NGX in accordance with this Methodology Guide is given the same importance, subject to the weighted average calculation.

3.2. Input Data

The input data for the ICE NGX Crude Oil Indices is transaction data from OTC trades for physical delivery of crude oil brokered by the Contributor(s) to the Index.

3.2.1. Input Data Source

Each of the Contributors is the source of the input data from the trades brokered by that Contributor. Each of the Contributors has agreed to provide input data relating to every trade it brokers in the relevant grade and location.

3.2.2. How Input Data is Used

For the 1a Crude Oil Indices, the input data is used to calculate the volume weighted average of all transactions during the relevant Index Period in the relevant grade of crude oil at the relevant Canadian or US location.

For the 1b Crude Oil Indices, the input data is used to calculate the simple average of the volume-weighted average of all transactions for each Trading Day during the relevant Index Period in the relevant grade of crude oil at the relevant Canadian location.

3.2.3. How Input Data is Contributed and Obtained

Input data is collected electronically from each Contributor to the relevant Index, from the Contributor's systems for entering and recording trades.

The source data file contains one row for each trade brokered by the Contributor and therefore each trade is only counted once in the calculation of the Index.

3.2.4. Time Period for Providing Input Data

Input Data will be included in the relevant Index if provided by a Contributor at or before 3:05 p.m. MT on a business day, up to and including the second business day following the end of the relevant Index Period.

This time period is sufficient for Contributors to provide the input data while facilitating timely determination and publication of the Index.

3.2.5. If Input Data is not Satisfactory or Sufficient

In the event no volume is transacted for the contract month during the Index Period, the final Index price will be determined by the market settlement price on the last trading day of the contract.

3.2.6. Contributor Concentration

Because the Crude Oil Indices are calculated based on all trades that are brokered by the relevant Contributor(s) during the relevant Index Period, the determination of the Index is agnostic to whether one or more of the Contributors contributes input data that constitutes a significant proportion of the total input data for the determination of the Index.

3.3. Inclusion of Transaction Data

3.3.1. Types of Transaction Data Included

The Crude Oil Indices are calculated based on bilateral OTC trades for physical delivery of crude oil brokered by the Contributors.

Only data relating to trades executed after 7:00 a.m. and before 3:00 p.m. on business days is included in the calculation of the Crude Oil Indices, except for corrected trades in error and busted trades notified by the Contributor to ICE NGX in accordance with ICE NGX's policies and this Methodology Guide.

Only data relating to trades in the relevant grade and location executed during the relevant Index Period and reported to ICE NGX on the day of trade in accordance with the ICE NGX's procedures and guidelines is included.

The source data file contains the following fields for each trade:

- Date/Time - The date and time of the trade.

- Price - The price for the crude oil agreed to in the trade.

- Volume - The daily delivery quantity of crude oil agreed to in the trade.

- Location - The location for delivery of the crude oil agreed to in the trade.

- Grade - The grade of crude oil agreed to in the trade.

ICE NGX may audit each Contributor at any time to confirm the trades reported to ICE NGX for inclusion in the relevant Index.

3.3.2. Minimum Quantity of Transaction Data

Because the Crude Oil Indices are calculated based on all transactions that are brokered by the Contributors during the relevant Index Period, there is no minimum quantity of Transaction Data.

In the event no volume is transacted for the contract month during the Index Period, the final Index price will be determined by the market settlement price on the last trading day of the contract.

3.3.3. Identification and Correction of Errors

Any errors discovered in the indices prior to NOS Day +2 business days (2 days after NOS day for the applicable index) will be corrected by ICE NGX. ICE NGX will post a notice to inform users of any correction to the affected Index.

If an error is discovered after the deadline, the Index will not be corrected and will remain as published.

3.3.4. Exclusion of Transaction Data

Input Data that is not reported prior to the delivery deadline set out in this Methodology Guide will not be included in the relevant Index.

ICE NGX, in its sole discretion, may exclude Input Data from a particular Contributor including in the following circumstances.

- ICE NGX is aware or reasonably believes there are or may be errors, misstatements or omissions in the Contributor's Input Data

- ICE NGX reasonably believes that including the Contributor's Input Data in the Index would be a violation of, or improper in the context of, ICE NGX's regulatory obligations as administrator of the Index

ICE NGX may investigate any Contributor's Input Data, including for the reasons above. Following satisfactory investigation, the Contributor's Input Data will be included in the relevant Index.

3.4. Calculation of Averages

3.4.1. Volume Weighted Average

All ICE NGX Crude Oil Indices utilize volume weighted averages either in the calculation of the Index or as a component of the calculation of the Index. Weighted averages are utilized in an effort to minimize any trading anomalies or distress trading activity that might otherwise distort the data sample.

The volume weighted average price is calculated using the following methodology:

(a) Multiply the Transaction price by the Transaction quantity for each trade in the source data file.

(b) Sum the product(s) achieved in step (a).

(c) Sum the Transaction quantity for each trade in the source data file.

(d) Divide the sum from step (b) by the sum from step (c).

$$Volume\ Weighted\ Average\ Price\ = \frac{Sum\ (Price\ x\ Quantity)}{Sum\ (Quantity)}$$

The weighted average prices are calculated first by automated electronic routines and subsequently cross-checked against a manual calculation for accuracy. Once verified, the weighted average prices are used in the generation of the Indices.

3.4.2. Daily Weighted Average

The 1b Crude Oil Indices are calculated as the simple average of the volume-weighted average price for each trading day during the calculation period.

This "daily weighted" average price is calculated using the following methodology:

(a) Calculate the volume-weighted average prices for each Trading day from the first of the month to the last day before the NOS date, inclusive.

(b) Sum the numbers calculated in volume (a).

(c) Sum the number of days in the period.

(d) Divide (b) by (c).

$$Daily\ Weighted\ Average\ Price = \frac{Sum\ Daily\ Volume\ Weighted\ Average\ Prices}{Sum\ (Number\ of\ Days)}$$

3.5. Assumptions

Because the Indices are calculated according to the respective methodology set out in this document and based on all trades that are brokered by the Contributor(s) during the relevant Index Period by the Contributors during the relevant Index Period and Index Hours, no assumptions are made and no extrapolation or interpolation of the Index Data is made.

3.6. Expert Judgment

Because the Indices are calculated according to the respective methodology set out in this document and based on all trades brokered by the Contributor during the relevant Index Period and Index Hours, there is no exercise of expert judgment in the

determination of an Index unless there is no transaction data for the relevant Index Period.

4. Limitation of Liability, Complaints

4.1. System Availability

4.1.1. Contributor Systems

One or more of the Contributors' systems may experience technological problems that may prevent brokered trades being entered into the Contributor's systems or reported to ICE NGX for inclusion in an Index in the usual manner as described in this document.

4.1.2. ICE NGX Systems

The ICE NGX systems may experience technological problems that require the temporary halting of data collection or calculation capability. This situation may prevent ICE NGX from obtaining the input data or determining the Indices in the usual manner as described in this document.

4.1.3. Alternative Means of Obtaining Input Data

In the event that technological problems relating to a Contributor's systems or ICE NGX's systems prevents the Contributor from reporting input data, or ICE NGX from obtaining input data from one or more Contributors, ICE NGX has procedures for obtaining input data by telephone. Trades reported by telephone during a system outage will be included in the determination of the ICE NGX Crude Oil Indices. The trades will then be obtained through the electronic system once it is available and operating sufficiently, and the Indices will be reviewed for accuracy. Any trades reported by telephone during an outage and included in the Index will be published by ICE NGX to ensure transparency.

4.2. Real-Time Index Feed

ICE NGX provides running weighted-average indicative values for certain Indices ("Real-Time Index Values"), to each Contributor to each such Index. These Real-Time Index Values are provided as a source of information to assist the Contributor's customers in making timely and informed decisions with respect to their trading activity. The Real-Time Index Values should not be construed as the Indices themselves, but rather a representation of the trading activity that will comprise the relevant verified and published Index.

4.3. Not Fair Market Value

ICE NGX does not make any representation to any person that either the Indices or the Real-Time Price Index Value derived from the input data represents fair market value or is indicative of fair market value.

4.4. Trading Irregularities

Each Contributor operates as a broker for the trades pursuant to regulatory approval or authorization and is responsible for protecting against trading irregularities, manipulative activity or activity aimed at manipulation of prices.

ICE NGX reserves the right to investigate any input data that may appear to indicate any trading irregularities, manipulative activity or activity aimed at manipulation of prices.

4.5. Limitation of Liability

Neither ICE NGX nor its agents, directors, officers and employees shall be liable to any person for any losses, costs or expenses arising from any matter relating to the calculation, methodology of calculation, compilation, or publication of any Index administered by ICE NGX and used for any purpose including the settlement of any transaction. ICE NGX does not make any express or implied warranties in respect of the results which may be achieved through the use of any Index or in respect of the value of any of Index at any given time, nor that any settlement prices established are at a fair, proper or correct amount. Neither ICE NGX nor its agents, directors, officers and employees shall, under any circumstances, be liable for errors or deficiencies in the calculation, methodology of calculation or publication of any Index nor shall ICE NGX be obligated to provide notice of, or publish, errors in any Index in any manner.

ICE NGX does not issue, endorse, sell or promote any product, trade or transaction brokered by a Contributor, nor does ICE NGX make any statement or view on their legality or suitability. Neither ICE NGX nor any of its agents, directors, officers and employees shall be liable to any person for any losses, damages, costs or expenses arising from any failure by a Contributor to report trades in accurately, correctly or in a timely manner for including in the Crude Oil Indices.

4.6. Complaint Procedures

Any concerns or complaints regarding ICE NGX Indices can be directed to **TO-ICENGX@ice.com** or **Legal-ICENGX@ice.com**.

5. Governance and Review of Methodology

5.1. Internal Review

This Methodology Guide is reviewed at least annually. This review is designed to ensure that each Index determined under this Methodology Guide accurately and reliably represents the value of the underlying interest of the Index for part of the market the Index is intended to represent.

5.2. Changes to Methodology

ICE NGX may make non-significant changes to this Methodology Guide in such manner and with such notice to any person as it may determine in its sole discretion.

For information relating to significant changes, see the ICE NGX Index Consultation Policy, available on the ICE NGX website at **www.ice.com/ngx/index**.

5.3. Approval of Changes to Methodology

A change to this Methodology Guide must be approved by the ICE NGX President.

5.4. Revision History

Version	Date	Summary of Changes
1.0	May 10, 2023	New document
1.1	April 1, 2024	Addition of ICE CLK EDM 1a and ICE HITAN EDM 1a