



# **ICE Risk Model (IRM) for ICE Clear**

## **Model and User Guide**

**Document Version 3.0**

**(Applicable to ICE Risk Model Versions 1.4.4.1 Onward)**

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## Change History

Document Version	Changes
1.7	<p>Updates to reflect changes introduced in ICE Risk Model Software version 1.3.0.6:</p> <p><b><u>WFPRCAP</u></b> - This version the option to cap the Weighted Futures Price Risk (WFPR) for a given ICE Risk Model Combined Contract within an inter-contract spread to be the minimum value of the scanning ranges applicable to any contract within that ICE Risk Model Combined Contract. This is controlled via a menu option that can be enabled/disabled by the user. The WFPR capped value is now reflected also in the Intercontract Spread report which now reports both the uncapped and capped WFPR values (ICS Report)</p> <p><b><u>Output of Positions resulting from Position Allocation</u></b> – A new menu option allows user to request that the positions created as a result of the Position Allocation process be written out to an output file; this is intended to assist in understanding the allocation process and to support users developing their own software.</p> <p><b><u>Value Losses Data File</u></b> – A new VL.CSV data file can be generated (VL Report). This is a data file providing a breakdown of value losses for each contract position; this is intended as an aide to analysing scanning losses. This contains the same information as the SVL report in a data format.</p> <p><b><u>Enhanced support for NYSE Liffe margining</u></b></p> <p><b><u>Method 02 Inter-Contract Spread</u></b> – This version implements fixes to the computation of Method 02 Inter-Contract spread credits. Method 02 spreads are utilised for certain Liffe products and this now means that ICE Risk Model fully supports calculation of Liffe contract margin.</p> <p><b><u>Results Data File</u></b> – The Results Data file (Results.csv) generated by ICE Risk Model now includes the Exchange Id in order to better support margins calculated for Liffe portfolios with 3 exchanges – “L”, “O” and “X”.</p> <p>NOTE that ICE Risk Model allows multiple Array files to be loaded at the same time allowing margin to be calculated across portfolios spanning multiple exchanges at the same time.</p>
1.8	Apply changes to embedded URLs in order to link to updated ICE web site.
1.9	<p>Updated the document to reflect the ICE’s rebranding of our risk management offerings to ICE Risk Model (IRM). The current implementation is not changing; this is merely a rebranding of ICE’s risk management offerings.</p> <p>Removed references to SP5 which has been previously deprecated.</p>
2.0	General review and update.
3.0	Inclusion of model assumptions, limitations, and more granular details on methodology

## 1. Introduction

This document describes ICE Futures and Options IRM® Margin Model (“IRM”) and information on the related technical details to replicate the model’s output.

ICE Clear Europe’s (the “CCP or Clearing House”) Futures & Options (“F&O”) uses IRM to calculate the core Initial Margin (“IM”) requirements for each F&O Clearing Member (“CM”).

If you have questions relating to any of the content presented in this document, or IRM more broadly, please contact:

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Note that the majority of this document applies equally to the calculation of margin for cleared Energy, Financials and Softs (“F&S”), and OTC FX contracts. Where different approaches are applicable, these are highlighted.

## 2. Model purpose and business context

IRM is a scenario-based and parameterised risk model used to evaluate the risk exposure to the Clearing House in the event of a defaulting portfolio.

### 2.1. Non-technical model summary

IRM calculates IM requirements for each clearing member's portfolios. IRM captures market risk through the identification of the outright, calendar spreads and calendar strategies as well as pairs of positions with potential diversification benefit.

IRM is used to calculate IM requirements overnight for collection the following morning. IRM is additionally used for intraday risk management to calculate intraday IM, a key input in the potential intraday margin calls.

### 2.2. Assumptions and Limitations

The main assumptions and limitations of IRM model are:

- The default IRM setting is 16 scenarios for the calculation of the Scanning Risk, as defined in section 3.2: the set of price and volatility movements to 16 scenarios to estimate the risk related to futures and options contracts.
- IRM assumes multiple scenario conditions to calculate the Scanning Risk: scanning components are calculated based on worse PnL from the 16 scenarios at logical level and then aggregated, effectively mixing various scenarios PnL in the aggregation logic.
- Margin parameters used within the IRM algorithm are calibrated using models relying on their set of assumptions. Please see <https://www.ice.com/clear-europe/risk-management>, Initial Margin Overview section, for details.
- In order to estimate the IRM Option's Price Risk under the 15<sup>th</sup> and 16<sup>th</sup> scenarios (i.e., only the extreme underprices are shocked, as described in section 3.1), it is assumed that an Option's PnL move can be approximated with the first order Greeks risks (delta, vega and theta) and the second order gamma risk. The higher order risks related to volatilities (i.e., Volga) are not accounted for. It should be noted, however, that these can be limited for the Vanilla Option's PnL explanation.

## 3. Model Theory and Approach

This section describes the F&O IRM methodology, providing details of how the underlying Genbat and Marbat processes operate to achieve the IRM IM calculation.

### 3.1. Model Overview

The F&O IRM model estimates the IM requirements of portfolios per currency and requires 2 different processes sequentially: Genbat which produces instrument Risk Arrays and Marbat which produces the portfolio IRM IMs.

#### 3.1.1. Genbat and the Risk Array

Genbat applies the IRM margin parameters and rates to top day settlement prices to generate the Risk Arrays used for margining in the Marbat process.

Risk Arrays are calculated by revaluation of contracts under scenario changes to underlying price, volatility and time. This Risk Array is a key input to the next process, Marbat.

Genbat generates the IRM Risk Array file and is arranged following a hierarchy of data records:

- Record Types from 10 to 16 that define the common data. Where IRM is used in a multi-

market (multi-exchange) environment, these records define data that is common across this environment (for example inter contract spreads that traverse multiple markets).

- Record Type 20 defines an Exchange (Market) and acts as a “grouping” for all the records. All records (Types 30, 40, 50, 60) that follow record 20 are defined within the context of the Exchange record.
- Record Type 30 groups in respect of a Combined Commodity. The record types from 31 to 36 define specific tiers and spreads relating to the Combined Commodity. Following this, then, the Risk Arrays themselves (Record 60, Series Details) are defined within a hierarchy for each Contract (Record 40) and Contract Expiry (Record 50).

### 3.1.1.1. Record 15: Scenario definition

The record 15 of the Risk Array contains the definition of the set of 16 scenarios later used in the record 60, which contains the PnLs calculated for each individual instrument (or contract) during the Genbat process.

These 16 scenarios are a set of price and volatility shocks designed to represent hypothetical market moves.

The scenario settings are reported as below in the Risk Array. Note that the Risk Array does not contain any headers within the file:

Record Type	ID	Short description	Paired scenario
15	1	F+0/3, vol+	2
15	2	F+0/3, vol-	1
15	3	F+1/3, vol+	4
15	4	F+1/3, vol-	3
15	5	F-1/3, vol+	6
15	6	F-1/3, vol-	5
15	7	F+2/3, vol+	8
15	8	F+2/3, vol-	7
15	9	F-2/3, vol+	10
15	10	F-2/3, vol-	9
15	11	F+3/3, vol+	12
15	12	F+3/3, vol-	11
15	13	F-3/3, vol+	14
15	14	F-3/3, vol-	13
15	15	F+Extreme	15
15	16	F-Extreme	16

Table 1: Extract of the Risk Array Record Type 15.

The scenarios are based on nine price variation possibilities:

- No variation
- Price increase or decrease of 1/3 of the Scanning Risk parameter
- Price increase or decrease of 2/3 of the Scanning Risk parameter
- Price increase or decrease of 3/3 of the Scanning Risk parameter.

For options these price changes are combined with the forward moving of one day, and two variations to the current volatility:

- Volatility shifted up by a percentage which is the upshift parameter
- Volatility shifted down by a percentage which is the down shift parameter.

As an example, under scenario ID 7, futures or underlying (F) are shocked up (+) 2/3 or 66.6% of the future or Underlying IRM scanning range. It is combined with a Volatility Up (+) shift as defined per the volatility up shift IRM parameter (as defined in the Record type 50).

### 3.1.1.2. Record 60: Series Details

Assuming the definition of the scenario detailed above, the Risk Array contains all the PnLs calculated for each individual instrument (or contract) during the Genbat process. These 16 PnLs are stored in record type 60.

Genbat combines the information reported in the below IRM input files to compute these PnLs.

- Products Definitions
- Pricing Models (refer to the F&O Pricing models for further details)
- Scenarios
- Dividends and Interest Rates
- Contracts details and Settlement prices
- IRM Parameters (margin rate parameters)

An example record type 60 is represented below, where a positive amount in Table 4 indicates a loss and a negative value indicates a gain.

Field name	Value	IRM input file origin
Record Type	40	Genbat construct field
PCC	OAC	Product
Contract Type	F	Product
Description	OAC-Aristocrat Leisure Ltd (Flex Div Adj Future Cash)	Product
Currency	AUD	Product
Tick Denominator	10000	Product
Minimum Price Fluctuation (in ticks)	1	Product
Tick Value	0.0001	Product
Delta Divisor	1000	Product
Decimal Locator	0	Genbat configuration
Strike Denominator	0	Genbat configuration
Scanning Range (in ticks)	17402	IRM Parameter
Settlement Style Method	2	Product

Table 2: Extract of the Risk Array Record Type 40.

Field name	Value	IRM input file origin
Record Type	50	Genbat construct field
Expiry	20180222	Contract and Settlement
Discount Factor	1	IRM Parameter
Vol Up shift	0.25	IRM Parameter
Vol Down shift	0.25	IRM Parameter
Number of expiry Group	1	IRM Parameter
Expiry group 1	20180222	Contract and Settlement
Expiry Group 2		

Table 3: Extract of the Risk Array Record Type 50.

Field name	Value	IRM input file origin
Record Type	60	Genbat construct field
Strike Price	0	Contract and Settlement
Contract Type	F	Product
Lot Size	1000	Contract and Settlement
Settlement Price	239226	Contract and Settlement
Composite Delta	1	Genbat output
Loss Value 1	0	Genbat output
Loss Value 2	0	Genbat output
Loss Value 3	-5801	Genbat output
Loss Value 4	-5801	Genbat output
Loss Value 5	5801	Genbat output
Loss Value 6	5801	Genbat output
Loss Value 7	-11601	Genbat output
Loss Value 8	-11601	Genbat output
Loss Value 9	11601	Genbat output
Loss Value 10	11601	Genbat output
Loss Value 11	-17402	Genbat output
Loss Value 12	-17402	Genbat output
Loss Value 13	17402	Genbat output
Loss Value 14	17402	Genbat output
Loss Value 15	-12181	Genbat output
Loss Value 16	12181	Genbat output

Table 4: Extract of the Risk Array Record Type 60.

### 3.1.2. IRM Portfolio Positions

IRM is designed such that a unique set of margin parameters are stored at the Logical Commodity Code level ('LCC') with each Physical Commodity Code (PCC) being mapped to an LCC. For example, Brent products will all be classified under LCC:BRN, which includes, inter alia, Brent futures contracts PCC:B and PCC:I. Where PCC:B is the standard future, and PCC:I is the 1<sup>st</sup> Line future. These 2 contracts will use the same IRM margin parameters as they have the same underlying risk factor.

Genbat collects data about options and futures positions grouping them under their respective LCC, expiries (as IRM allows a Discount Factor called SCRAF Ratio to discount the headline scanning range to be applied along the term structure<sup>1</sup>) and strikes. These are reported sequentially in the Risk Array from record type 30 to 60.

IRM portfolios are represented by PCCs grouped at LCC level. Table 5 below shows the composition of a synthetic portfolio considered as an example. It contains futures and options on different underlyings, referenced to different LCCs and PCCs.

The future positions with physical code B represent ICE's deliverable contract on Brent Crude futures (logical code: BRN); the futures with physical codes SYS and SZS refer respectively to a future on Fuel Oil 380 CST Singapore (logical code: SYS) and to a future contract on Fuel Oil 180 CST Singapore (logical code: SZS); the call option with physical code PHE refers to Henry Penultimate Fixed Price Future (logical code: HNG).

<sup>1</sup> Futures and Options contracts tend to be more volatile at the front of the curve. Allowing a single scanning to represent the full curve, especially using the most conservative rate along the curve, could be inappropriate for contracts at the back of the curve. See section on SCRAF Tiering in the following page.

Logical Code	Physical Code	Position	Expiry Date	Strike Price	Quantity
BRN	B	F	20171100	0	1
	B	F	20171200	0	-2
	B	F	20180100	0	1
	B	F	20181000	0	1
	B	F	20190300	0	-1
SYS	SYS	F	20171000	0	1
SZS	SZS	F	20171000	0	-1
HNG	PHE	C	20171200	3200	-10

Table 5: Composition of a synthetic portfolio.

### 3.1.3. Marbat and the Initial Margin Components

Marbat applies the Risk Arrays to Clearing Member positions to determine their potential losses, as detailed in the following section.

## 3.2. IRM Margin calculation

IRM Initial Margin (also referred to as 'Original Requirement') is comprised of several Intermediate Risk components. This section focuses on the individual calculation method for each of these.

In summary, the Intermediate Risk components are:

- Scanning range (Scan) - capturing outright or directional risk;
- Strategy spread (SS) - capturing risk of delta-neutral strategies (e.g. butterflies and condors);
- Inter-month spread (IMS) - capturing calendar spread risk;
- Spot charge (SC) - capturing reference price risk;
- Inter-contract spread (ICS) - capturing the risk offset between pairs of correlated instruments.

The IRM Initial Margin is the sum of the final risk of each Combined Commodity where the final risk is the max of the summed Intermediate Risk components and the Short Option Minimum, a minimum requirement held against short option positions.

In addition to the calculation of the Initial Margin and its components, this section outlines IRM concepts such as Net Deltas and Tiering structure.

### 3.2.1. Scanning Risk

The first risk component calculated in Marbat is the Scanning Risk. It is calculated for each position of the portfolio and produced at the LLC level and represents the outright or directional risk.

The Scanning Risk considers the Risk Array PnL vector (the 16 scenarios PnLs) of each individual contract. The scenario PnLs are multiplied by the IRM delta position of each instrument or contracts added up under each scenario, producing a Scanning Risk IM at the LCC level.

Marbat identifies the worst-case loss across the aggregated 16 scenarios at the LCC level and the largest loss is called the Active Scenario. If two scenarios have the same figure, the one with the lowest scenario number is the Active Scenario. Where the Scanning Risk amount is negative (i.e. it corresponds to a gain) or zero (no risk), the Scanning Risk amount is set to zero.

Note that if a SCRAF Tiering is defined for an LCC, a discount factor (or SCRAF Ratio) can be applied to the different maturities on the IRM Delta. See section 3.2.8 for further information on SCRAF Tiering.

Figure 1 is an example of the reported the PnLs of Brent Futures positions from Table 5 above for each future contract with different maturities. It illustrates that the Scanning Risk for these Brent futures shows no net losses or gains as the PnLs of opposite positions are equal and opposite in every different scenario (note these maturities belong to the same SCRAF Tier).

Expiry	G/T	Net Position	Delta	F-Extreme	F-3/3	F-2/3	F-1/3	F+0	F+1/3	F+2/3	F+3/3	F+Extreme
					Vol Up/Dn							
20171100	F	1	1.0000	2310	3300	2200	1100	0	-1100	-2200	-3300	-2310
					3300	2200	1100	0	-1100	-2200	-3300	
20171200	F	-2	-2.0000	-4620	-6600	-4400	-2200	0	2200	4400	6600	4620
					-6600	-4400	-2200	0	2200	4400	6600	
20180100	F	1	1.0000	2310	3300	2200	1100	0	-1100	-2200	-3300	-2310
					3300	2200	1100	0	-1100	-2200	-3300	
20181000	F	1	0.7879	1820	2600	1730	870	0	-870	-1730	-2600	-1820
					2600	1730	870	0	-870	-1730	-2600	
20190300	F	-1	-0.7879	-1820	-2600	-1730	-870	0	870	1730	2600	1820
					-2600	-1730	-870	0	870	1730	2600	
Totals For B												
					0	0	0	0	0	0	0	0
					0	0	0	0	0	0	0	0

Figure 1: Report of PnLs of Brent Futures, calculated by IRM for ICE.

Figure 2 displays the Scanning Risk for Henry Penultimate Fixed Price Future at the LCC level, in which for the PHE call option, the largest loss occurs under scenario 11 at \$2660.

Combined Contract: HNG "Henry Hub Nat Gas" (USD)										
Contract	Currency	F-Extreme	F-3/3	F-2/3	F-1/3	F+0	F+1/3	F+2/3	F+3/3	F+Extreme
			Vol Up/Dn							
PHE	USD	-1168	-1765	-1178	-528	183	950	1778	2660	1895
			-2160	-1593	-960	-260	503	1330	2218	
HNG	USD	-1168	-1765	-1178	-528	183	950	1778	2660	1895
			-2160	-1593	-960	-260	503	1330	2218	
Largest Loss Scenario: 11 (F+3/3 Vol Up)										
Scanning Risk: 2660										
Combined Contract Vega: -221										
WFPR Cap: 500.000000										

Figure 2: Scanning Risk report for Henry Penultimate Fixed Price Future.

### 3.2.2. Introduction to Net Delta

IRM aggregates IRM Deltas of futures and options for a given LCC into Net Deltas per tiers (SCRAF, IMS or ICS tiers - see section 3.2.8) in order to analyse calendar spreads not considered in the Scanning Risk.

Estimated position delta is given by the weighted average of the deltas produced at each of the 16 underlying price points in the Scanning Risk, and it is called IRM Delta. The Loss Covered percentages (i.e. Loss of a scenario over maximum loss for a given contract) represent the weights to compute the weighted average of options Delta.

The option delta is calculated by using the settlement prices and implied volatilities of each clearing day. By convention, for a call contract, delta is valued between 0 and 1, and for a put contract between -1 and 0. By definition, delta for future contracts is always equal to 1.

The calculation of the Net Deltas  $\Delta_{LCC,a,m}$  for a specific LCC, portfolio 'a' is performed at the most granular level aggregating all delta positions expiring with the same expiry month 'm' by:

$$\Delta_{LCC,a,m} = \sum_{e=i}^k P_{PCC,e} \cdot \Delta_{P,PCC,e} \cdot CS_{PCC,e} \cdot DR_{LCC,e} \quad (1)$$

where

$e$	Expiries within the expiry month m
$P_{PCC,e}$	Number of Position of the PCC (under the LCC) with expiry e
$\Delta_{P,PCC,e}$	Delta of the PCC with expiry e
$CS_{PCC,e}$	Contract Size (Or Lot Size) of the PCC with expiry e
$DR_{PCC,e}$	Discount rate (SCRAF Ratio) of the LCC for the expiry e.

Table 6 below considers all the relevant information to calculate the Net Deltas for Brent futures in Table 5 portfolio. It also considers a discount factor to apply on the deltas. Net Delta values are reduced to four decimal points.

Physical Code	Position	Month	Position Delta	Size	Discount Rate	Net Delta per expiry
B	F	20171100	1	1	1	$1 \times 1 \times 1 = 1$
B	F	20171200	1	-2	1	$1 \times (-2) \times 1 = -2$
B	F	20180100	1	1	1	$1 \times 1 \times 1 = 1$
B	F	20181000	1	1	78.79%	$1 \times 1 \times 0.7879 = 0.7879$
B	F	20190300	1	-1	78.79%	$1 \times (-1) \times 0.7879 = -0.7879$

Table 6: Net Deltas for Brent futures from Table 5 portfolio.

Table 7 below illustrates Net Deltas for other positions from portfolio in Table 5.

Physical Code	Position	Month	Position Delta	Size	Discount rate	Net Delta per month
PHE	C	20171200	0.5	-10	88%	$0.5 \times (-10) \times 0.88 = 4.4$
SYS	F	20171000	1	1	95.45%	$1 \times 1 \times 0.9545 = 0.9545$
SZS	F	20171000	-1	-1	95.45%	$(-1) \times 1 \times 0.9545 = -0.9545$

Table 7: Net Deltas for other position from Table 5 portfolio.

### 3.2.3. Spreads Calculation

The following methodology is common to Strategy spreads, Inter-month spreads and Inter-contract spreads:

#### i. Calculate Net Position Delta

The IRM Parameter file used in Genbat defines various strategy combinations and an order of spread priorities combinations. Genbat reformats the information in the Risk Array and maps actual contracts (Top day expiries) to the relevant set of strategies. Therefore, the Risk Array contains an explicit definition of strategies (i.e. combination of contracts).

The Risk Array record type identifying the spreads are:

- Record Type 31: Defines the Tiering, as per the IRM Parameter file map, to current contracts (from contract and settlement file), mapping expiries to tiers
- Record Type 32: Defines the leg spreads, i.e. the portfolios relating to the spread definition.

- Record Type 34: Defines the Inter-contract spread Tiering (applied to ICS)
- Record Type 35: Defines the actual Strategy spreads of actual contracts.

Spreads are identified depending on the available Net Delta positions in the tiers. If there is Net Delta available for the first legs of the spread, the spread direction is determined. Each spread consumes Net Position Delta, and each iterations consumes the remaining Net Position Delta until there is no more Net Position Delta available for spreads consumption.

The ordering is defined as follow:

- 1) Strategy spreads, following the Strategy spread order
- 2) Inter-month spreads, following Inter-month spread order
- 3) Inter-contract spreads, following the Inter-contract spread order.

## ii. Identify Spreads

From the relevant expiries identified within the tiers, Marbat identifies the number of Spreads at the LCC level for a given portfolio as the minimum absolute value between the Net Delta per representative expiries as calculated previously (equation 1) such that:

$$S_{LCC,a}^{i,j} = \text{Min}(|\Delta_{LCC,a,i}|, |\Delta_{LCC,a,j}|) \quad (2)$$

If

$$\text{Sign}(\Delta_{LCC,a,i}) = -\text{Sign}(\Delta_{LCC,a,j})$$

where

$S_{LCC,a}^{i,j}$	Spread between expiry i and expiry j
$\Delta_{LCC,a,i}$	IRM Net Delta of the LCC for expiry i
$\Delta_{LCC,a,j}$	IRM Net Delta of the LCC for expiry j.

Note that spreads are identified following a priority order (cheapest to most expensive) and Net Delta positions not consumed are kept for next priorities spreads until there are no more Net Delta positions available for spreads.

## iii. Calculate Spread Charges

Calculate the charge amount for the Spreads of each priority by multiplying the number of determined spreads by the associated spread charge rate.

## iv. Calculate the remaining Net Position Delta

Remove the Net Delta used for the calculated spread from the pool of available Net Delta for each tier. If there is a remaining Net Delta, it must be retained for further use.

### 3.2.4. Strategy Spreads

Strategy Spreads are used to identify delta-neutral combinations of positions such as butterflies and condors. Where available, the Strategy spread is calculated prior to the Inter-month spread. The Strategy spread calculation is based on several parameters that are available in the Risk Array with record type equal to 35 which contains:

- Strategy spread priorities
- The charge (or rate) per spread
- The total number of legs in the spread (for a Butterfly it is expected to have 1 Leg 1<sup>st</sup> month, -2 Leg middle month and 1 Leg last month, note the positions can be of either side i.e. -1,2,-1).

For each leg the following information is provided:

- The expiry
- The SCRAF Ratio
- The market-side indicator ('A' or 'B').

The market side indicator or Leg side is related to the sign of the Net Delta to form spreads. In case that legs are in the opposite sides, for example Leg1=A and Leg2=B then for the spread to be formed it is necessary that Net Deltas have opposite signs. In this case, if Leg A is long (positive) than B must be short (negative). If legs have same signs, for example Leg1=A and Leg2=A, this implies that also Net Deltas must have the same signs. The leg definition should always meet the following:

$$\text{sign}(A) = -\text{sign}(B) \quad (3)$$

From the Risk Array at record 35 the following information displayed in Table 8 is available for the Brent products.

<b>Priority</b>	1	2	...	63	...	151		...
<b>Charge</b>	550	1	...	38	...	50		...
<b>Number of Legs</b>	4	4	...	3	...	3		...
<b>Expiry1</b>	20171000	20171100	...	20221200	...	20171100		...
<b>SCRAF ratio</b>	1	1	...	1	...	1		...
<b>Market Side1</b>	A	A	...	A	...	A		...
<b>Expiry2</b>	20171100	20171200	...	20230100	...	20171200		...
<b>SCRAF ratio</b>	3	3	...	3	...	2		...
<b>Market Side1</b>	B	B	...	B	...	B		...
<b>Expiry3</b>	20171200	2018010	...	20230200	...	20180100		...
<b>SCRAF ratio</b>	3	3	...	3	...	1		...
<b>Market Side1</b>	A	A	...	A	...	A		...
<b>Expiry4</b>	20180100	20180200	...	20230300	...			
<b>SCRAF ratio</b>	1	1	...	1				
<b>Market Side1</b>	B	B	...	B				

Table 8: Risk Array record 35 for Brent.

### Step 1: Calculate Net Position Delta for each maturity month

To calculate the Strategy spread charge, initially the Net Position Delta availability should be assured for the legs of the spread. If there is, i.e. the Net Delta for the maturity date is not zero, then it is possible to calculate the Strategy spread:

Inter-month Tier	Month	Long Net Delta	Short Net Delta
2	20171100	1	
3	20171200		-2
3	20180100	1	
7	20181000	0.7879	
7	20190300		-0.7879

Table 9: Net Deltas.

### Step 2: Identify Strategy spreads for the combined contract

Spreads are processed by following the Risk Parameters file's priority order. Considering a synthetic portfolio, a Butterfly strategy is identified for Brent Futures at priority 151:

<b>Priority</b>	...	151		...
<b>Charge</b>	...	50		...
<b>Number of Legs</b>	...	3		...
<b>Expiry1</b>	...	20171100		...
<b>SCRAF ratio</b>	...	1		...

Market Side1	...	A		...
Expiry2	...	20171200		...
SCRAF ratio	...	2		...
Market Side1	...	B		...
Expiry3	...	20180100		...
SCRAF ratio	...	1		...
Market Side1	...	A		...
Expiry4	...			
SCRAF ratio	...			
Market Side1	...			

Table 10: Butterfly spread for Brent.

The next step is to pass through all legs to establish the amount of Net Delta that can be consumed. In the below example for the 20171100 expiry, there are 1.000 long Net Deltas, for 20180100 there are 1.000 long Net Deltas and for 20171200 there are 2.000 short Net Deltas.

Tier	Month	Long Net Delta	Short Net Delta
2	20171100	1	
3	20171200		-2
3	20180100	1	

Table 11: Net Deltas table.

The number of possible spreads is equal to:

$$\text{Number of Strategy Spread} = \text{Minimum} \left( \left| \frac{1.0000}{1} \right|, \left| \frac{-2.000}{1} \right|, \left| \frac{1.0000}{1} \right| \right) = 1,000 \quad (4)$$

### Step 3: Calculate the Strategy Spread Charge

The Strategy spread charge for priority equal to 151 is:

$$\text{Strategy Spread Charge} = 1.000 \text{ (spreads)} \times 50 \text{ (spread charge)} = \$50.$$

Therefore, the Strategy spread charge is \$50 as it is calculated by IRM below

Combined Contract: BRN "BRENT CRUDE OIL" (USD)								
Spread Priority	Number Of Legs	Expiry Group	Expiry Group	Expiry Group	Expiry Group	Delta Consumed	Charge Rate	Strategy Charge
151	3	20171100 1 A	20171200 2 B	20180100 1 A		1.0000	50	50
								50

Figure 3: Strategy spread calculation in IRM.

### Step 4: Calculate the remaining Net Position Delta

Finally, the consumed Net Delta from the first Strategy spread is deducted from the available Net Delta on each tier. The remaining delta is kept for other identified Strategy spreads until none is left available for strategy consumption.

Tier	Month	Net Delta per month	Strategy consumes	Remaining Delta
2	20171100	1	(1×1)=1	0
3	20171200	-2	(1×-2)=-2	0
3	20180100	1	(1×1)=1	0
7	20181000	0.7879		0.7879
7	20190300	-0.7879		-0.7879

Table 12: Remaining Net Delta.

In this case, no other spreads were identified for other instruments in the portfolio. The unused Net Delta will remain to identify any Inter-month spreads.

### 3.2.5. Inter-month Spread

IRM identifies calendar spreads risk via Inter-month risk. The margins applied are calculated at LCC level and are called Inter-month spread charges. All parameters are specified in the margin parameters table named [Intermonth Spread rates](#) and in the IRM Risk Array in records type equal to 32 which contains:

- Priorities and SCRAF tiers
- Charge (or rate)
- Number of legs. Each leg consists of three components.

For each leg there are:

- Tier Numbers
- SCRAF ratios
- Market Side (same as Strategy above)

<b>Priority</b>	1	...	9	...	36	...	64
<b>Spread Charge Rate</b>	90	...	381	...	318	...	1951
<b>Number of legs</b>	2	...	2	...	2	...	2
<b>Tier Number</b>	3	...	7	...	3	...	2
<b>SCRAF ratio</b>	1	...	1	...	1	...	1
<b>Market Side</b>	A	...	A	...	A	...	A
<b>Tier Number</b>	3	...	7	...	7	...	11
<b>SCRAF ratio</b>	1	...	1	...	1	...	1
<b>Market Side</b>	B	...	B	...	B	...	B

Table 13: Risk array example of record 32.

#### Step 1: Calculate Net Delta per tier

To calculate the Inter-month spread charge, the unconsumed Net Position Delta after the Strategy spread charge processing is used. The Net Deltas are now aggregated per inter-month tier as represented below for the Brent portfolio example:

Inter-month Tier	Long Net Delta	Short Net Delta
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0.7879	-0.7879
...	...	...

Table 14: Remaining Net Delta.

Spreads will be effectively formed if there are available positions in the tiers, presenting both the Long Net Delta and the Short Net Delta.

#### Step 2: Identify spreads

From the Risk Array file, the Inter-month priorities are defined, and below is an illustration for BRN LCC. Priority 1: Inter-month spread charge for priority 1 is represented by tier combination 3 / 3.

<b>Priority</b>	1	...
<b>Spread Charge Rate</b>	90	...
<b>Number of legs</b>	2	...
<b>Tier Number</b>	3	...
<b>SCRAF ratio</b>	1	...
<b>Market Side</b>	A	...
<b>Tier Number</b>	3	...
<b>SCRAF ratio</b>	1	...
<b>Market Side</b>	B	...

Table 15: Inter-month Spread charge.

Considering the priorities, tiers referring to the market sides A and B must have non-zero Net Deltas in order to be consumed for Inter-month. As per the previous Brent example, Net Deltas for tier 3 have already been consumed to produce a Strategy spread charge and therefore no Inter-month spread exist for this Inter-month combination.

SCRAF Tier	Long Delta	Short Delta
1	0	0
2	0	0
<b>3</b>	0	0
...	...	...

Table 16: Example of a spread with zero deltas.

Following the priority order, it can be seen that there is non-zero Delta at priority 9. For Priority 9 the Inter-month spread charge is represented by the tier combination 7-7:

<b>Priority</b>	...	<b>9</b>	...
<b>Spread Charge Rate</b>	...	381	...
<b>Number of legs</b>	...	2	...
<b>Tier Number</b>	...	7	...
<b>SCRAF ratio</b>	...	1	...
<b>Market Side</b>	...	A	...
<b>Tier Number</b>	...	7	...
<b>SCRAF ratio</b>	...	1	...
<b>Market Side</b>	...	B	...

Table 17: Inter-month Spread charge details.

### Step 3: Calculate the IMS Spread Charge

The number of Inter-month spreads is determined by comparing the absolute value of the total long Net Delta of tier A to the absolute value of the total long Net Delta of tier B and by selecting the minimum absolute value between the two. For the tier 7, there are 0.7879 long Net Deltas and 0.7879 short Net Deltas

Inter-month Tier	Long Delta	Short Delta
...	...	...
6	0	0
7	0.7879	-0.7879
...	...	...

Table 18: Long and Short Net Deltas.

The number of possible spreads is equal to:

$$\text{Number of Intermonth Spread} = \text{Minimum} \left( \left| \frac{0.7879}{1} \right|, \left| \frac{-0.7879}{1} \right| \right) = 0.7879 \quad (5)$$

#### Step 4: Calculate the IMS Charge

The Inter-month spread charge for priority 9 is equal to:

$$IMS\ Charge = 0.7879\ (spreads) \times 381\ (spread\ charge) = \$300.1899$$

Therefore, the Inter-month spread charge is \$ 300 as calculate by IRM.

Combined Contract: BRN "BRENT CRUDE OIL" (USD)									
Spread Priority	Number Of Legs	Tier	Tier	Tier	Tier	Delta Consumed	Charge Rate	Intermonth Charge	
9	2	7 1 A	7 1 B			0.7879	381.00000000000000	300	
									300

Figure 4: Inter-month Spread calculation in IRM.

#### Step 5: Calculate the remaining Net Position Delta

Finally, the Net Delta has been consumed for BRN and no other spreads can be formed for this Combined Commodity. Based on the example portfolio there are no other Inter-month spreads identified for the other instruments.

SCRAF Tier	Remaining Long Delta	Remaining Short Delta
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	$0.7879 - (-0.7879 \times 1) = 0$	$-0.7879 - (0.7879 \times 1) = 0$
...	...	...

Table 18: Remaining Net Delta.

### 3.2.6. Inter-contract Spread

Inter-contract spread considers two opposite positions of different LCCs which, defined together as a portfolio, generate lower charge than adding up the individual LCC Scanning charge. These portfolios are defined in the F&O IRM Parameter calibration, referenced in the IRM Parameter File input, and reported in the Risk Array as record type 14. These spreads priorities are also defined by decreasing credit rate (i.e. considering higher offset 1<sup>st</sup>). IRM identifies and calculates the Inter-contract spread in a similar fashion to IMS and Strategy spreads.

The Inter-contract spread is given by:

$$ICS = WFPR \times \text{Number of Spread} \times \text{SCRAF Ratio} \times \text{Credit Rate} \quad (6)$$

To be able to calculate the ICS, IRM requires the estimation of the Weighted Future Price Risk (WFPR):

$$\text{Weighted Future Price Risk} = \frac{\text{Price Risk}}{|\text{Net Delta}|} \quad (7)$$

Where the Price Risk component is derived by decomposing the Scanning Risk, assuming option PnL moves can be approximated with the first order Greeks risks (delta, vega and theta) and the

second order gamma risk particularly in 15 and 16 scenarios, as follows:

$$\text{Scanning Risk} = \text{Price Risk} + \text{Volatility Risk} + \text{Time Risk} \quad (8)$$

As a first step to derive the Price risk, IRM eliminates the Volatility Risk from the Scanning Risk by applying the Volatility Adjusted Risk. The Volatility Adjusted Risk is given by the average of the Scanning Risk Active Scenario and its Paired Scenario. Active Scenario and Paired Scenario have the same underlying price variation, but opposite volatility variations<sup>2</sup>. This allows IRM to isolate Volatility Risk from Scanning Risk. To recall, the active scenario is the highest loss generated in the Scanning Risk.

Active Scenario	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Paired Scenario	2	1	4	3	6	5	8	7	10	9	12	11	14	13	15	16

Table 19: Paired Scanning Scenario.

$$\text{Volatility Adjusted Risk} = \frac{\text{Active Scenario} + \text{Paired Scenario}}{2} \quad (9)$$

By taking the average of the Scanning Risk of Active and Paired Scenarios, IRM cancels out the Volatility Risk from the Scanning Risk and using equation 8 and re-arranging, we obtain:

$$\text{Volatility Adjusted Risk} = \text{Scanning Risk} - \text{Volatility Risk} = \text{Price Risk} + \text{Time Risk} \quad (10)$$

In order to estimate the Time Risk component, IRM takes into account the Scanning Risk scenarios that show no movements in the underlying price but do present opposite variations of the volatility. Scenarios 1 and 2 do not consider any underlying price movements but have volatility moving up and down. Therefore, the Time Risk is estimated as follows:

$$\text{Time Risk} = \frac{\text{Scanning Scenario 1} + \text{Scanning Scenario 2}}{2} \quad (11)$$

The Price Risk is estimated below:

$$\text{Price Risk} = \text{Volatility Adjusted Risk} - \text{Time Risk} \quad (12)$$

Once the Price Risk component has been identified, it is possible to calculate the WFPR and then the Inter-contract spread.

The risk parameters for the calculation of the Inter-contract Spread are available at record 14 of the Risk Array. They include:

- Priorities and tiers
- Charge rates
- Number of legs

For each leg there are:

- Combined Commodities combinations
- Tier Numbers
- SCRAF ratios
- Market Sides

<b>Priority</b>	1	...	820	...	74899
<b>Charge Rate</b>	1	...	0.98	...	0.26
<b>Number of Legs</b>	3	...	2	...	2

<sup>2</sup> It assumes that the average of opposite volatility variation neutralizes this risk.

<b>Combined Contract 1</b>	GST	...	SYS	...	CTS
<b>Tier Number 1</b>	1	...	1	...	2
<b>Spread Side 1</b>	A	...	A	...	A
<b>Delta/Spread Ratio 1</b>	1	...	1	...	1
<b>Combined Contract 2</b>	GSW	...	SZS	...	PAN
<b>Tier Number 2</b>	1	...	1	...	2
<b>Spread Side 2</b>	B	...	B	...	B
<b>Delta/Spread Ratio 2</b>	1	...	1	...	1
<b>Combined Contract 3</b>	SWS	...			
<b>Tier Number 3</b>	1	...			
<b>Spread Side 3</b>	B	...			
<b>Delta/Spread Ratio 3</b>	1	...			

Table 20: Risk parameters example contained in the Risk Array.

### Step 1: Calculate long Net Delta and short Net delta per Combined Commodity

To calculate the Inter-contract spread IRM aggregates the remaining Net Deltas of all LCC per Inter-contract tiers:

Physical Code	Tiers	Expiries	Long Net Delta	Short Net Delta
HNG	1	20171200		
SYS	1	20171000	$1 \times 1 \times 0.9545 \times 1 = 0.9545$	
SZS	1	20171000		$(-1) \times 1 \times 0.9545 \times 1 = -0.9545$

Table 21: Remaining Net Deltas.

### Step 2: Identify potential combinations

From the Risk Array, IRM is going through the priorities and reconcile a combination of SYS and SZS eligible for Inter-contract Spread.

<b>Priority</b>	...	820	...
<b>Charge Rate</b>	...	0.98	...
<b>Number of Legs</b>	...	2	...
<b>Combined Contract 1</b>	...	SYS	...
<b>Tier Number 1</b>	...	1	...
<b>Spread Side 1</b>	...	A	...
<b>Delta/Spread Ratio 1</b>	...	1	...
<b>Combined Contract 2</b>	...	SZS	...
<b>Tier Number 2</b>	...	1	...
<b>Spread Side 2</b>	...	B	...
<b>Delta/Spread Ratio 2</b>	...	1	...
<b>Combined Contract 3</b>	...		
<b>Tier Number 3</b>	...		
<b>Spread Side 3</b>	...		
<b>Delta/Spread Ratio 3</b>	...		

Table 22: Suitable Risk Array for the calculation of an ICS.

The number of Inter-contract spreads is determined by comparing the Net Delta of each participant Combined Commodity divided by the Delta per Spread Ratio for each leg of the priority and by selecting the smallest absolute value in respect of market side parameter. For the Combined Commodity SYS there are 0.9545 long Net Deltas and for the Combined Commodity SZS there are 0.9545 short Net Deltas.

$$N.ICS = \text{Minimum} \left( \left| \frac{0.9545}{1} \right|, \left| \frac{-0.9545}{1} \right| \right) = 0.9545 \quad (13)$$

**Step 3: Calculate the ICS Charge**

The IRM for ICE defines the WFPR as shown below:

Margin Group: IPE "ICE Clear Europe"										
Exch.	Comb. Contract	Tier	Scanning Risk	Paired Line	Futures Risk	Time Risk	Volatility Risk	W.F.P.R Net Delta	W. Futures Price Risk	Uncap W. F. Price Risk
I	SYS	3	20999	20999	20999	0	0	0.9545	22000.000000	
I	SZS	3	20999	20999	20999	0	0	-0.9545	22000.000000	

Figure 5: IRM for ICE WFPR.

The Inter-contract spread is then calculated:

$$ICS = WFPR \times \text{Number of Spread} \times SCRAF \text{ Ratio} \times \text{Credit Rate} \quad (14)$$

$$ICS = 22000 \times 0.9545 \times 1 \times 0.96 = 20159 \quad (15)$$

IRM for ICE presents it as shown below:

Priority / Method	Comb. Exch.	Contract	Ratio / Tier	Side	Delta Spreads	Remaining Delta	Offset Charge	Portfolio Risk	Credit Rate	% Saving	Futures Credit	Vega Spreads	Remaining Vega	Vega Rate
1783 10 I	SYS		3 1	A	0.9545	0.0000	0.0000	0	96.00	0.00	20159	0	0	0.00
1783 10 I	SZS		3 1	B	0.9545	0.0000	0.0000	0	96.00	0.00	20159	0	0	0.00

Figure 6: ICS calculation in IRM.

**3.2.7. Tiering**

Tiering is a feature which allows, for a given LCC, the application of a single margin rate across a bucket of multiple consecutive expiries. The margin rate selected corresponds to the highest rate under the LCC.

Figure 8 represents a typical future term structure. The green dot represents the closing price and the horizontal line represents the level of variance which can be considered as a benchmark of the portfolio's risk level.

Tiering allows a more granular approach in the use of margin rate, commensurate with the risk. Applying Tiering to the below example, the higher margin rate between the first 3 expiries would be used for Tier 1 (covering the 3 front month expiries). The same would be performed for Tier 2 and Tier 3.

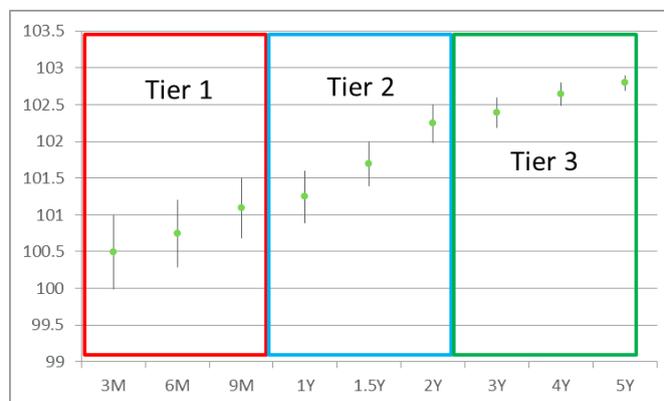


Figure 81: Tiering of term structure representation.

### 3.2.7.1. Types of tiers

The tiers are determined per LCC. There are three types of tier employed by IRM:

1. **SCRAF Tier** - a bucket of consecutive maturities sharing the same scanning range (discount factor to scanning range). These tiers are only used in the scanning calculation.
2. **Inter-month Tier** - a bucket of consecutive maturities which can be different from SCRAF Tiers definition:
3. **Inter-contract Tier** - a bucket of consecutive maturities which can be different from SCRAF Tiers and/or Inter-month definition.

Combined Commodity	SCRAF Tier	Inter-month Tier	Inter-contract Tier	Relative Period
BRN	1	1	1	1
	2	2	2	2
	3	3	3	3 - 4
	4	4	4	5 - 6
	5	5	5	7 - 9
	6	6	6	10 - 12
	7	7	7	13 - 18
	8	8	8	19 - 24
	9	9	9	25 - 36
	10	10	10	37 - 54
	11	11	11	55 - 87

Table 24: Example of Brent Tiering Definition.

The relative period defines the most granular risk factor used to derive the Margin rate. Note that relative period corresponds to constant maturity (i.e. relative period 1 will always be the front month). Given the maturity dates of the Brent Futures in the example portfolio considered in Table 5, tiers are distributed as follows:

Combined Commodity	Expiry Date	Relative period	Tier
BRN	20171100	2	2
	20171200	3	3
	20180100	4	3
	20181000	5	7
	20190300	6	7

Table 25 23: Brent futures form the previous example portfolio.

### 3.2.8. Positions Allocation

Positions allocation (also named **decomposition**) is a feature applied specifically to contracts which IRM cannot margin directly. These contracts require decomposition into individual legs which are then margined individually following the method described above. The allocation is captured in the Risk Array as Record Type 21.

The products eligible for position allocation are displayed below, with further information about the decomposition discussed in the following sections.

- Spread contracts (Spread futures, Spread options, Calendar Spread Option)
- Average contracts (Balmos, Erosion)
- Mini contracts
- First line contracts

- Packaged contracts (Combos)
- Any combination of the above
- ERIS Contracts

### **3.2.8.1. Spreads**

#### Spread Futures

It is possible to use position allocation to decompose the spread future in to its constituent legs.

#### Spread Options

This is the same concept as the spread futures, but for the options. In this case, the option decomposes into the underlying futures of each leg, with a delta equal to that of the option delta. A put will have a negative sign for the allocation compared with the call.

#### Calendar spreads options (CSOs)

The Calendar spread Option ('CSO') is decomposed into 3 legs: the 2 underlying legs of the spread and the CSO itself. The 2 underlying spreads are margined using the defined Scanning range and Inter-month rate, while the CSO is margined using its own Scanning range capturing 2<sup>nd</sup> order risk (i.e. gamma).

### **3.2.8.2. Average contracts**

#### Balmos

Balance of the month contracts are the average of the reference prices for the remainder of the month. Each PCC is defined per starting day and each has its own Scanning range.

#### Daily Balmos

Daily Balmos have 1 PCC, with separate expiry dates. They have similar configuration to daily contracts (generic contract type of 'D'), but these products do not roll daily, and the expiry label is the start of the averaging window to the end of the month. All of the 'dailies' for the current month will then roll off together.

#### Erosion

These products are a simple allocation of a product onto itself with a reduced delta. This is used in order to capture eroding price volatility due to an averaging settlement price.

### **3.2.8.3. Mini contracts**

Some contracts are identical to other contracts in every way except the lot size. In this case the same parameter should be used and this is defined by decomposing the mini contract onto the equivalent, larger contract, using a smaller ratio.

### **3.2.8.4. First line contracts**

Due to the expiry mismatch in some of the regular benchmark futures contract, first line contracts are similar products set up to match the calendar months. In this case, each first line expiry is composed of two consecutive regular futures and decomposes into these accordingly.

### **3.2.8.5. Packaged contracts**

#### Combos

Some products trade in packages of futures (Calendars/Quarters). These combos are position allocated onto the constituent legs.

### 3.2.9. Spot Charge (Prompt Charge)

IRM includes a spot month charge for contracts with reference price risk which covers the price risk between the last trade date and the final settlement price.

The spot month charge is calibrated with a historical simulation model using historical price data between the COB last trade date and final settlement date. Spot Charge is a charge applied at the LCC and active before a specified number of days before expiry. This is available in the risk array in record type 33.

### 3.2.10. Rounding

IRM model applies a minimum tick value round up principle. For example, in the scanning loss calculation, if a loss is \$10.1 and the minimum tick value is \$0.5, the loss will be then \$10.5.

### 3.2.11. Currency

IRM Initial Margin requirements are aggregated at currency level.

### 3.2.12. Short Option Minimum

IRM includes an additional step in Initial Margin calculation which calls for a minimum amount on short option positions. The Short Option Minimum charge is calculated by first summing all short Call and short Put net positions within the LCC. The total of short option positions obtained for the Combined Commodity is then multiplied by Delta Scaling Factor and the Short Option Minimum Rate defined for the LCC. The record type 30 of the Risk Array relates to the SOM.

$$\text{SOM Charge} = \text{Short option positions} \times \text{SCRAF Ratio} \times \text{SOM Rate} \quad (22)$$

### 3.2.13. Final Requirement

The final Initial Margin requirement is the sum of the final risk of each Combined Commodity, where the latter is defined as the largest value between the Intermediate Risk and the Short Option Minimum.

$$\text{Final Initial Margin Req.} = \sum_{LCCs} \text{Max (Intermediate Risk, SOM)} \quad (23)$$

Intermediate Risk is the sum of all the risk elements calculated above for each LCC.

Combined Contract	BRN	HNG	SYS	SZS	
Currency	USD	USD	USD	USD	
Scenario	0	11	13	11	
Scanning Risk	0	2660	20999	20999	
Strategy Spread Charge	50	0	0	0	
Inter-month Spread Charge	300	0	0	0	
Spot Charge	0	0	0	0	
Inter-contract Credit	0	0	-20159	-20159	

<b>Short Option Charge</b>	0	10	0	0	
<b>Intermediate Risk at Combined Commodity level</b>	<b>350</b>	<b>2660</b>	<b>840</b>	<b>840</b>	
<b>Final Risk at Portfolio level</b>					<b>4690</b>

Table26: Intermediate Risk calculation based on the example portfolio.

#### 4. Technical requirements

All market participants and users, as well as others with an interest in understanding how ICE Clear margins its products, can download the IRM software.

Users are required to accept the terms of the license as part of the installation process. Users are not charged for use or download of the software, but there are limitations to using the software in commercial applications.

IRM utilises the Microsoft .NET Framework, version 3.5. Users must install this software prior to installing IRM.

The technical details are:

- Windows Server 2003; Windows Server 2008; Windows Vista; Windows XP, Windows 7 (32bit and 64bit), Windows 10 (32bit and 64bit)
- Microsoft .NET Framework version 3.5
- 400 MHz Pentium processor or equivalent (minimum); 1GHz Pentium processor or equivalent (recommended)
- 96 MB Memory (minimum); 256 MB Memory (recommended)
- Up to 500 MB of available hard disk space may be required (including .NET)
- 800 x 600, 256 colours Display (minimum); 1024 x 768 high colour, 32-bit Display (recommended)

#### 5. Installation Process

IRM can be downloaded from the Risk management section of the ICE website: <https://www.ice.com/clear-europe/risk-management>

Scroll down to the “ICE Risk Model Overview” section and click the “Download v...” button at the end of the section.

Or simply click this [link](#).

#### 6. ICE Risk Model Parameter File(s)

In order to use IRM to calculate initial margins, the user is required to input two files into the IRM tool, the first of which is the risk parameter file (also referred to as the IRM Array file). The IRM Array files are available under the risk management section of the respective jurisdiction. For example, ICE Clear Europe IRM array files for Energy and F&S products are available under:

ICE Risk Model Array Files and Margin Rates: <https://www.ice.com/clear-europe/risk-management>

Files can be downloaded from the web site via any web browser. Additionally, this web page is stored as a favorite within the IRM tool and can be accessed from within the tool by selecting “Favourites” and selecting the relevant Clearing House risk arrays. The web page will appear within the tool window.

IRM array files are available for each business day for download.

The Energy and F&S array files are available in a fixed record format (SP6) and in CSV format (CSV). The CSV format file is smaller in size, and it is recommended that this format be used.

When calculating margin requirements posted by ICE Clear on the morning of the current business day the IRM file from the previous business day should be used. Files from historic dates are also available.

**NOTE:** Save the array file to an easily accessible place on your PC. For use by IRM, it is recommended that you save the file to “My Documents\ICE Risk Model\data” as this is the default location that the program will look for the array file(s).

**NOTE:** When calculating margin for an F&S portfolio you may need more than one IRM Array file. For example, if your portfolio contains both FTSE Futures and FTSE Options you will need both the “LIF” or “Financial Futures and Options” and “OPT” or “Equity Options” array files.

Further information about the different formats of IRM array files and the various alternatives for obtaining them (including ICE MFT) can be found in the following documents.

ICE Risk Model Array File Formats

<https://service.ice.com/s/article/ice-risk-model-array-file-formats-23356> ECS, Reporting and MFT Technical User Guide <https://service.ice.com/s/article/ice-clear-user-guides-22426>

Both documents are published on the ICE Community site.

Please note you will need to request access to ICE Community to access these documents, you can do so from here <https://service.ice.com/s/>.

## 7. Positions File

The second file IRM requires as an input, is the positions file. This file needs to be produced by the user and uploaded into IRM as either a CSV file or a fixed-format text file. CSV files are preferred as they may be easily edited using programs such as Microsoft Excel.

The following information, by column, is required in the position file:

- A. **Position/Trade Flag** - this is always P.
- B. **Account Name/Identifier** - the name of the account (portfolio identifier), this can take any value, such as the user's company name. The file may contain positions for multiple Account Names; a separate margin figure is calculated for each account.
- C. **Exchange Code** - “I” for ICE Energy; “L” for Financials; “O” for Equity Options; “X” for Commodities; “F” for FX; “G” for ICE Clear Singapore; “N” for ICE Clear U.S.; “T” for ICE Clear Netherlands.
- D. **Exchange Contract Code** - this is the physical commodity code of the contract.  
A full list of the ICE Energy and F&S physical commodity codes are available from the following address: <https://www.ice.com/products>.  
There is a separate set of commodity codes for OTC FX. These are available from the OTC FX product guide.
- E. **Contract Type** - this field can take one of the following values: “F” for futures, “C” for call options, “P” for put options, “M” for monthly contracts and “D” for daily contracts, and for OTC FX contracts “N” for NDFs.
- F. **Expiry Date YYYYMMDD** - a year and month is sufficient for futures, for example 20220400 for April 2022 future. Daily contracts require the DD field to be completed as appropriate. For OTC FX this is the final maturity date of the NDF contract.
- G. **Strike Price** - for futures/NDFs, enter “0” in this field, or leave it blank. For options the strike price in ticks is required. For example, for a \$75.50 Brent option a value of “7550” should be entered, for Gas Oil options “65000” represents a strike price of \$650 and for ECF options “9500” represents a strike price of EUR 95.00.

Please note that net liquidation value of options is not included in the calculation of initial margins.

- H. **Net Position** - the net number of lots the account is long or short within an individual contract at expiry date level, a negative sign is required for short positions. Positions for options should be netted at strike price level. The IRM tool calculates margin requirements on a net basis for positions under the same account in column *B*.

For OTC FX this is the terms notional amount on an NDF trade. Positive implies you are buying the terms currency, negative implies you are selling the terms currency. You can enter positions as trades or as net amount by value date for each currency pair (commodity code).

**Regime and Customer Type** – *OPTIONAL (N/A for ICUS)*. The combination of Regime and Customer Type (if specified) is used to determine the amount of additional margin that is added to the computed initial margin depending upon the type of customer. If no Regime/Customer type is specified for a position, no additional margin is added.

- I. **Regime**  
**DCO** or **RCH** (FCMs should specify DCO)
- J. **Customer Type**  
**H** – Hedger. Use rate applicable to Hedgers  
**S** – Speculator. Use rate applicable to Speculators  
**M** – Member. Use rate applicable to Members.

**Example.** Below is an example of a position file created in Excel:

	A	B	C	D	E	F	G	H	I	J
1	P	ICE	I	EFO	C	20220300	9500	1		
2	P	ICE	I	B	F	20220400	0	1		
3										

Figure 92: Position file example.

The position file shown represents a 1 lot long call position in March 2022 EUA options at a strike price of EUR 95.00 and a 1 lot long position for April 2022 Brent futures.

If you use Excel to create the positions, you **MUST** save the data as a CSV file:

Click “File” → “Save As...”, then drop down the “Save As Type” box and select “CSV (Comma delimited)”. Click “Save”.

If you create the position file using some other means (e.g., write the positions into a file from your own software), you must write the values as comma-separated values. The position file shown in the example above would look like the following, if you opened the file in Notepad (for example):

```
P,ICE,I,EFO,C,20220300,9500,1 P,ICE,I,B,F,20220400,0,1
```

## 8. Using ICE Risk Model

### 8.1. Download ICE Risk Model Parameter File

The first step, if you have not already done so, is to download the IRM parameter file (IRM array file). This can be carried out from within IRM by selecting “Favorites” and selecting the relevant Clearing House risk arrays and the download web page will appear within the IRM browser window.

Select the IRM array file you require and save it locally on your PC; it is recommended that you save it to “My Documents\ICE Risk Model\data”.

See section 6 for further information about IRM array files.

### 8.2. Load Risk Parameters (ICE Risk Model Arrays)

The next step is to load the IRM array file(s) into the application. To load the IRM array file into the application, either:

Select “File” (on the application menu) → “Load Risk Parameters” or Click , then “Load Risk Parameters”.

Navigate to the IRM array file and select it. IRM will now load the IRM arrays.

Repeat this step for additional IRM arrays as required.

**NOTE** that you can load multiple IRM array files. For example, when calculating margins for a F&S portfolio you might need to load the “LIF” or “Financial Futures and Options”, “FOX” or “Soft Commodities Futures and Options” and “OPT” or “Equity Options” array files in order to compute margin across a portfolio that comprises financials, FTSE Futures, FTSE Options, Equity Options and Commodity positions.

### 8.3. Load Position Files

In a similar manner, upload the position file:

Select “File” (on the application menu) → “Load Positions” or Click , then “Load Positions”.

Navigate to your position file and select it. IRM will now load your positions.

Repeat this step to load further position files.

### 8.4. Calculate Margin

Once you have loaded IRM Array(s) and position(s) into IRM, it has all the required information needed to calculate the initial margin requirement.

At this point you **MUST** select the proper setting for the WFPR Cap option. The WFPR Cap option is accessed through the Tools menu: *Tools* → *Apply WFPR Cap*.



For margining of ICE Energy contracts, this option should be enabled; it should be ticked (see below)  
Now run the margin calculation by either:

Clicking “Margin” (on the application menu) → “Calculate” or Clicking the  icon.

If your position file contains positions in contracts for which no IRM Array is found, then, these positions will be excluded from the margin calculation and warnings will be written to the log file.

### 8.5. Viewing Reports

Once IRM has calculated the margin requirement, the user can select which reports to generate. You can select your chosen reports, by ticking those you require, and generate only those reports by selecting “Margin” → “Report Generation” → “Generate Selected Reports” (or clicking ).

Alternatively, selecting “Margin” → “Report Generation” → “Generate All” will cause IRM to generate all reports.

The user is now able to view the reports generated by selecting “View” → “Reports” → and selecting the report you wish to view, or by clicking .

Report options include:

- Summary By Margin Group
- Summary by Combined Contract
- Summary by Scanning Risk
- Summary Value Losses
- Series Value Losses
- Combined Contract Tier Details
- Strategy Spread Charge Details
- Intermonth Spread Charge Details
- Prompt Date Charge Details
- Inter-contract Spread Credit Details
- Expiry Group Delta Details

Each report will show a breakdown of how a particular charge or credit is calculated.

For OTC FX, the following reports will be blank, as the IRM set up for these products does not include Strategy Spreads, Prompt Date charges etc.

- Strategy Spread Charge Details
- Prompt Date Charge Details
- Expiry Group Delta Details

### 8.6. Other Options and Functions

Various options are accessed under the **Tools** menu.

### 8.6.1. Nearest Strike Option

Under normal circumstances, any position for which no IRM array is found will be ignored during the margin calculation process and will generate a warning in the log file.

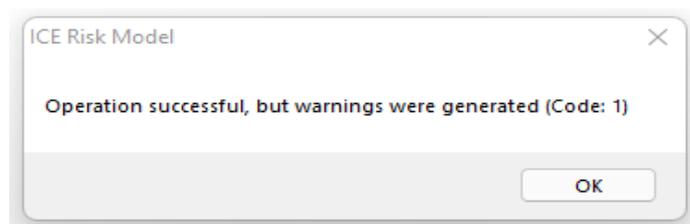
However, this behaviour can be modified in the case of options contracts. If your position file contains options positions which have options positions with strike prices for which no IRM array is found within the IRM array file, then IRM provides the facility, called “Use nearest Strike”, which causes those positions to be processed using the array for that strike price closest to that of the position. This option is only recommended for intra-day what-if type analysis as it will only give an approximation that may not be comparable to the real margin called by the Clearing House at end of day.

Entries will be written to the Log file to record the substitute arrays that were applied. It is the user’s responsibility to judge whether this yields an appropriate approximation.

Note that this is not applicable for OTC FX.

### 8.6.2. Viewing Log File

Any errors or warnings issued during any part of the process are output to a log file, the error notification will look like the below. The log file may be viewed by selecting “View” → “Log File” on the application menu.



The tool will by default cancel margin calculation when there are over 200 errors in the process, this warning threshold can be amended in “Tools” → “Warning Threshold” which may help in troubleshooting.

### 8.6.3. Changing results File Name

You can change the default name of the results file generated by IRM by selecting “Tools” → “Results File” and typing a new name in the file name box (default name Results).

### 8.6.4. Changing Warning Threshold

By default, the processing of margins will stop after 200 warnings have been generated.

You can change this threshold by selecting “Tools” → “Warning Threshold” and entering a different value in the box (default value 200).

### 8.6.5. Delta Split Allocation

Position allocation is the process whereby the portfolios provided in the position file are transformed according to the Position Allocation records within the IRM array file. By default, IRM carries out this

process. This can be disabled (not recommended) by disabling this option.

### 8.6.6. Output Allocated Positions

To assist in better understanding the Position Allocation process (referred to above), the positions that are created as a result of the transformation process can optionally be written to an output data file. By default, this file is written to the IRM data directory and is named *ppf.csv* in “My Documents\ICE Risk Model\data”.

### 8.6.7. Apply WFPR Cap

IRM can constrain the amount of the WFPR used to calculate IRM Inter-Contract Spread Credits (Method 10). Whether this capping is applied can be enabled/disabled through this option.

## 9. Using ICE Risk Model in Batch Mode

An alternative way to calculate margins is by using the command line version of IRM, a program called “Marbat” which can be found in the same program directory as IRM; by default, this is “C:\Program Files\ICE Clear\ICE Risk Model”.

Running this program with no command line arguments causes it to output its ‘usage’; a list of all command line parameters and options.

The Marbat command line syntax is as follows:

```
Marbat -rf arrayfile [arrayfile2 arrayfile3 ...] -pf positionfile [positionfile2  
positionfile3 ...] [-of outputfilename] [-od] [-ol] [-lf logfile] [-wt threshold] [-  
ws] [-ns] [-wfprcap] [-v] Where items contained in [...] are optional.
```

Marbat command line options:

<b>-rf</b>	load the given risk parameter file(s)
<b>-pf</b>	load the given position file(s)
<b>-of</b>	name of output file (optional) - default is 'results.{csv xml}'
<b>-od</b>	output detailed results (optional) - default is to not output
<b>-lf</b>	name of log file (optional) - default is 'mblog.xml'
<b>-ol</b>	output log file (optional) - default is to not output
<b>-wt</b>	set the warning threshold (optional) - default is 200
<b>-ws</b>	warning stop (optional) - default is to carry on
<b>-ns</b>	use array for Nearest Strike if no array for the actual option strike is available.
<b>-wfprcap</b>	apply capping to WFPR in computation of Method 10 spreads
<b>-v</b>	display version string

Note that it is assumed that anyone using Marbat.exe is familiar with the Windows Command line environment. In the following examples you must substitute “C:\Program Files\..... \Marbat.exe”

with the proper/fully qualified path where the *Marbat* executable is located; add this path to the “path” environment variable; or set default directory to the location etc. You can create a copy of the *Marbat* executable in an alternative location; simply copy *Marbat.exe* and *IceRiskModel.dll* to your chosen location.

**Basic usage example:**

```
C:\Program Files\.....\Marbat.exe ^
-pf My_Positions.csv ^
-rf IPE0909F.csv ^
-wfprcap
```

The margin results would be written to a file called *Results.csv* in the default directory. This example applies WFPR capping as required for Energy margining.

**A more complex example:**

```
C:\Program Files\.....\Marbat.exe ^
-pf My_Positions.csv ^
-rf LIF0909F.csv OPT0909F ^
-of myResults -od
```

In this example two array files are specified (LIF0909F and OPT0909F) and the results are written to myResults.csv. In addition, the `-od` flag means that the detailed XML output is created and this is written to myResults.xml. Finally, note that the `-wfprcap` flag is not specified as this should not be specified for F&S products.

When installed using standard installation settings, Marbat.exe will be found in:

- For 32 Bit Windows platforms: "C:\Program Files\ICE Clear\ICE Risk Model"; or
- For 64 Bit Windows Platforms "C:\Program Files (x86)\ICE Clear\ICE Risk Model"

**Notes:**

- The name of the output results files may be changed. For example, to rename the output file the `-of` option is used as shown below:

```
C:\Program Files\.....\Marbat.exe -pf data\Position_file.csv -rf
data\Parameter_file.DAT -of Renamed_results.csv
```

- A more detailed (xml) file of results will be produced if the `-od` option is used, for example:

```
C:\Program Files\.....\Marbat.exe -pf data\Position_file.csv -rf
data\Parameter_file.DAT -od
```

This will produce a file called 'results.xml' in addition to the default 'results.csv'.

- A log file can be created using the `-ol` command; for example:

```
C:\Program Files\.....\Marbat.exe -pf data\Position_file.csv -rf
data\Parameter_file.DAT -ol
```

This will produce a file called 'mblog.xml'.

- Warnings may be issued such as when the margin calculator is unable to locate the risk data for a position in a given positions file. The default behaviour will carry on, until 200 warnings have been generated. However, by using the `-wt` option, it is possible to change the setting and force the margin calculator to stop once it detects a warning – this is achieved by the –

ws command.

- If the positions are in more than one file, use the `-pl` option, giving the name of a file that itself contains a list of files. For example:

```
C:\Program Files\.....\Marbat.exe -pl positions.dat -rf data\IF080423.DAT
```

If the 'positions.dat' file contained the following:

```
abc.csv def.csv
```

The margin calculator would load 'abc.csv' followed by 'def.csv'.

The same can be achieved with risk parameter files: the equivalent option is `-rl`.

- Finally, it is possible to establish the version of the command line program being used with the `-v` option:

```
C:\Program Files\.....\Marbat.exe -v
```

## 10. ICE Risk Model Margin Report Details

### Summary by Margin Group

The following provides an overall summary of the charges by ICE. For example, for the positions entered in the position file the clearing member would have an initial margin of 3,150 EUR plus 7,600 USD.



Summary Margin Report By Margin Group 09 Feb 2022

ACCOUNT: ICE

Margin Group	Currency	Scanning Risk	Strategy Spread Charge	Intermonth Spread Charge	Prompt Date Charge	Intercontract Credit	Short Option Charge	Base Initial Margin	Clearing House Margin	Initial Margin
IPE	EUR	3150	0	0	0	0	0	3150	3150	3150
IPE	USD	7600	0	0	0	0	0	7600	7600	7600
Account Totals:										
	EUR							3150	3150	3150
	USD							7600	7600	7600

Figure 103: Summary Margin Report by Margin Group.

### Summary by Combined Contract

This gives the summary of all the charges by contract.



## Summary Margin Report By Combined Contract

09 Feb 2022

ACCOUNT: ICE

Margin Group: IPE "ICE Clear Europe"

Exchange: I "ICE Energy"

Combined Contract	Ccy	Scanning Risk	Strategy Spread Charge	Intermonth Spread Charge	Prompt Date Charge	Inter-contract Credit	Short Options	Charge Rate	Short Option Charge	Base Initial Margin	Clearing House Ratio	Clearing House Margin	Customer Ratio	Initial Margin
BRN	USD	7600	0	0	0	0	0	1	0	7600	1.000	7600	1.000	7600
ECF	EUR	3150	0	0	0	0	0	1	0	3150	1.000	3150	1.000	3150
	EUR									3150		3150		3150
	USD									7600		7600		7600

Figure 114: Summary Margin Report by Combined Contract.

## Summary by Scanning Risk

The following gives the final results for each contract, split into the 16 scenarios. It also identifies the Largest Loss Scenario and the resultant Scanning Risk.



Summary Scanning Risk

09 Feb 2022

ACCOUNT: ICE

Margin Group: IPE "ICE Clear Europe"

Exchange: I "ICE Energy"

Combined Contract: BRN "Brent Crude Future" (USD)

Contract	Currency	F-Extreme	F-3/3	F-2/3	F-1/3	F+0	F+1/3	F+2/3	F+3/3	F+Extreme
			Vol Up/Dn							
B	USD	5320	7600	5070	2530	0	-2530	-5070	-7600	-5320
			7600	5070	2530	0	-2530	-5070	-7600	
BRN	USD	5320	7600	5070	2530	0	-2530	-5070	-7600	-5320
			7600	5070	2530	0	-2530	-5070	-7600	

Largest Loss Scenario: 13 (F-3/3 VolUp)

Scanning Risk: 7600

Combined Contract Vega: 0

WFPR Cap: 7600.000000

Combined Contract: ECF "EUA Future" (EUR)

Contract	Currency	F-Extreme	F-3/3	F-2/3	F-1/3	F+0	F+1/3	F+2/3	F+3/3	F+Extreme
			Vol Up/Dn							
EFO	EUR	1271	955	-49	-1256	-2671	-4291	-6111	-8118	-4510
			3150	2634	1851	751	-691	-2478	-4588	
ECF	EUR	1271	955	-49	-1256	-2671	-4291	-6111	-8118	-4510
			3150	2634	1851	751	-691	-2478	-4588	

Largest Loss Scenario: 14 (F-3/3 VolDown)

Scanning Risk: 3150

Figure 12: Summary Scanning Risk.

## Summary Value Losses

The following is a breakdown of the Scanning Risk calculation for all futures and options per contract, giving the results for all 16 scenarios. The results of the delivery month are then summed for each contract. The options values are summarised from the Option Value Losses report.

		Summary Value Losses												09 Feb 2022	
		ACCOUNT: ICE													
		Margin Group: IPE "ICE Clear Europe"													
		Exchange: I "ICE Energy"													
		Combined Contract: BRN "Brent Crude Future" (USD)													
		Contract B "B-Brent Crude Future" (USD)													
Expiry	G/T	Net Position	Delta	F-Extreme	F-3/3 Vol Up/Dn	F-2/3 Vol Up/Dn	F-1/3 Vol Up/Dn	F+0 Vol Up/Dn	F+1/3 Vol Up/Dn	F+2/3 Vol Up/Dn	F+3/3 Vol Up/Dn	F+3/3 Vol Up/Dn	F+Extreme		
20220400	F	1	1.0000	5320	7600	5070	2530	0	-2530	-5070	-7600	-7600	-5320		
					7600	5070	2530	0	-2530	-5070	-7600	-7600			
Totals For B															
				5320	7600	5070	2530	0	-2530	-5070	-7600	-7600	-5320		
					7600	5070	2530	0	-2530	-5070	-7600	-7600			
		Combined Contract: ECF "EUA Future" (EUR)													
		Contract EFO "EFO-EUA Futures Options (Futures Style Margin)" (EUR)													
Expiry	G/T	Net Position	Delta	F-Extreme	F-3/3 Vol Up/Dn	F-2/3 Vol Up/Dn	F-1/3 Vol Up/Dn	F+0 Vol Up/Dn	F+1/3 Vol Up/Dn	F+2/3 Vol Up/Dn	F+3/3 Vol Up/Dn	F+3/3 Vol Up/Dn	F+Extreme		
20220300	O	1	0.4280	1271	955	-49	-1256	-2671	-4291	-6111	-8118	-8118	-4510		
					3150	2634	1851	751	-691	-2478	-4588	-4588			
Totals For EFO															
				1271	955	-49	-1256	-2671	-4291	-6111	-8118	-8118	-4510		
					3150	2634	1851	751	-691	-2478	-4588	-4588			

Figure 13: Summary Value Losses.

## Series Value Losses

The example below is similar to the Summary Value Losses report, but it breaks down the losses by each expiry date.

Series Value Losses													09 Feb 2022
ACCOUNT: ICE													
Margin Group: IPE "ICE Clear Europe"													
Exchange: I "ICE Energy"													
Combined Contract: BRN "Brent Crude Future" (USD)													
Contract B "B-Brent Crude Future" (USD)													
Expiry	C	Net	Delta	F-Extreme	F-3/3	F-2/3	F-1/3	F+0	F+1/3	F+2/3	F+3/3	F+Extreme	
	T	Strike Position			Vol Up/Dn								
20220400	F	1	1.0000	5320	7600	5070	2530	0	-2530	-5070	-7600	-5320	
					7600	5070	2530	0	-2530	-5070	-7600		
Totals for B													
				5320	7600	5070	2530	0	-2530	-5070	-7600	-5320	
					7600	5070	2530	0	-2530	-5070	-7600		
Combined Contract: ECF "EUA Future" (EUR)													
Contract EFO "EFO-EUA Futures Options (Futures Style Margin)" (EUR)													
Expiry	C	Net	Delta	F-Extreme	F-3/3	F-2/3	F-1/3	F+0	F+1/3	F+2/3	F+3/3	F+Extreme	
	T	Strike Position			Vol Up/Dn								
20220300	C	9500 1	0.4280	1271	955	-49	-1256	-2671	-4291	-6111	-8118	-4510	
					3150	2634	1851	751	-691	-2478	-4588		
Totals for EFO													
				1271	955	-49	-1256	-2671	-4291	-6111	-8118	-4510	
					3150	2634	1851	751	-691	-2478	-4588		

Figure 14: Series Value Losses.

## Combined Contract Tier Details

The example below shows the Net Delta in each Inter-contract tier for each contract.



### Combined Contract Tier Details

09 Feb 2022

ACCOUNT: ICE

Margin Group: IPE "ICE Clear Europe"

Exchange: I "ICE Energy"

Combined Contract: BRN "Brent Crude Future" (USD)

Combined Contract Vega: 0

IC Tier Number	Start Date	End Date	Net Delta	Orig Vega	Tier Vega
1	00000000	20220400	1.0000	0	0
2	20220500	20220500	0.0000	0	0
3	20220600	20220600	0.0000	0	0
4	20220700	20220800	0.0000	0	0
5	20220900	20221000	0.0000	0	0
6	20221100	20221200	0.0000	0	0
7	20230100	20230300	0.0000	0	0
8	20230400	20230600	0.0000	0	0
9	20230700	20230900	0.0000	0	0
10	20231000	20231200	0.0000	0	0
11	20240100	20240300	0.0000	0	0
12	20240400	20240800	0.0000	0	0
13	20240900	20250300	0.0000	0	0
14	20250400	20260900	0.0000	0	0
15	20261000	99999999	0.0000	0	0

Tier Number	Start Date	End Date	Total Long Delta	Total Short Delta
1	00000000	20220400	1.0000	0.0000
2	20220500	20220500	0.0000	0.0000
3	20220600	20220600	0.0000	0.0000
4	20220700	20220800	0.0000	0.0000
5	20220900	20221000	0.0000	0.0000
6	20221100	20221200	0.0000	0.0000
7	20230100	20230300	0.0000	0.0000
8	20230400	20230600	0.0000	0.0000
9	20230700	20230900	0.0000	0.0000
10	20231000	20231200	0.0000	0.0000
11	20240100	20240300	0.0000	0.0000
12	20240400	20240800	0.0000	0.0000
13	20240900	20250300	0.0000	0.0000
14	20250400	20260900	0.0000	0.0000
15	20261000	99999999	0.0000	0.0000

Figure 15: Combined Contract Tier Details BRN.

Combined Contract: ECF "EUA Future" (EUR)

Combined Contract Vega: 1098

IC Tier Number	Start Date	End Date	Net Delta	Orig Vega	Tier Vega
1	00000000	99999999	0.4280	1098	1098

Tier Number	Start Date	End Date	Total Long Delta	Total Short Delta
1	00000000	20221200	0.4280	0.0000
2	20230300	20231200	0.0000	0.0000
3	20241200	99999999	0.0000	0.0000

Tier Number	Expiry Date	Long Delta	Short Delta
1	20221200	0.4280	0.0000

Figure 16: Combined Contract Tier Details ECF.

### Intermonth Spread Charge Details

The document below is a breakdown of the Intermont Spread Charges for the positions held. For example, the charge for an intermonth spread with 1 lot long position for Apr 22 Brent Futures and 1 lot short position for Aug 22 Brent Futures.



#### Intermonth Spread Charge Details

09 Feb 2022

ACCOUNT: ICE

Margin Group: IPE "ICE Clear Europe"

Exchange: I "ICE Energy"

Combined Contract: BRN "Brent Crude Future" (USD)

Spread Priority	Number Of Legs	Tier	Tier	Tier	Tier	Delta Consumed	Charge Rate	Intermonth Charge
30	2	1 1 A	4 1 B			0.8898	1.00000000000000	1

Figure 17: Intermont Spread Charge.

## Inter-contract Spread Credit Details

This report gives the breakdown of any Inter-contract Spread Credits you may receive for your portfolio. In this case, a portfolio with 1 lot long May 22 Brent futures and 1 lot short June 22 WTI futures.



### Intercontract Spread Credit Details

09 Feb 2022

ACCOUNT: ICE

Margin Group: IPE "ICE Clear Europe"

Comb.	Scanning	Paired	Futures	Time	Volatility	W.F.P.R.	W. Futures	Uncap W. F.	Orig	Tier
Exch Contract Tier	Risk	Line	Risk	Risk	Risk	Net Delta	Price Risk	Price Risk	Vega	Vega
I BRN 2	7280	7280	7280	0	0	0.9581	7598.000000		0	0
I WBS 4	7210	7210	7210	0	0	-0.6739	10699.000000		0	0

Priority/	Comb.	Ratio/	Delta	Remaining	Offset	Portfolio	Credit	%	Futures	Vega	Remaining	Vega	Vega	Total		
Method	Exch	Contract	Tier	Side	Spreads	Delta	Charge	Risk	Rate	Saving	Credit	Spreads	Vega	Rate	Credit	
18318	10 I	BRN	2	1 A	0.6739	0.2842	0.0000	0	86.03	0.00	4405	0	0	86.00	0	4405
18318	10 I	WBS	4	1 B	0.6739	0.0000	0.0000	0	86.03	0.00	6203	0	0	86.00	0	6203

Figure 18: Inter-contract Spread Credit.

## 11. Net Liquidating Value

Net liquidating Value (NLV) is calculated by ICE Clear for all premium paid up-front options, also referred to as 'equity-style options'. For these types of option contracts, variation margin is not paid or received on a daily basis, unlike futures-style options. The premium is paid from the buyer to the seller of the option when the option is first traded. NLV is calculated as follows:

$$NLV = \text{Market price of option} \times \text{contract size} \times \text{number of lots}$$

For more information, please see the NLV description document available from here: [https://www.ice.com/publicdocs/clear\\_europe/Net\\_Liquidating\\_Value\\_Guide.pdf](https://www.ice.com/publicdocs/clear_europe/Net_Liquidating_Value_Guide.pdf)