



Clearing Manager

Financial Transmission Rights

Prudential Security Assessment Methodology

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Version No: 4.6	14/08/2014	
Date updated:	19/09/2015	Added part 4 to the calculation of exposure.
Date updated:	19/05/2016	Updated part 3 and 4 of Method 1 for DSP calculations on the initial margin requirement.
Date updated:	20/11/2020	Reviewed content cosmetic changes performed.
Date updated:	5/12/2022	Reviewed content cosmetic changes performed.

The content of this version of the methodology has been adjusted from the Authority-approved version dated 11 April 2014 to:

- Insert the minimum value of \$0.01 for Option FTR Products, which was consulted on for the April 2014 version and reported to the Authority as agreed by participants, but not inserted into the methodology at the time
- Update some references and language to reflect that this version will be operative from 1 November 2014.

The April 2014 version (the latest consulted on and Authority-approved version) reflects:

- the change in the Daily Settlement Price (DSP) assessment sub-methodology 1) for Obligation Products as approved by the Electricity Authority and advised to the Clearing Manager on 18 October 2013 and implemented on 12 December 2013
- updated initial margin rates as per the December 2013 review
- a change in the initial margin calculation for those holdings where all final prices are known
- changes made resulting from the *Clearing Manager's Review and Consultation of various FTR related methodologies and developments* of February 2014, and
- a transition from pre-market to existing-market status.

All other content remains the same.

In September 2015 the methodology has been updated with the addition of section 4 to the formula for the calculation of option DSPs.

In May 2016 the methodology has been updated with a variation to section 3 and 4 of the formula for the calculation of option DSPs, following a consultation by the clearing manager.

In November 2020 the document was reviewed to ensure consistency and as there has been no significant changes to the methodology the document was altered only cosmetically.

1. General

This FTR Prudential Security Assessment Methodology (*Assessment Methodology*) has been prepared in accordance with clause 14.19A of the Electricity Industry Participation Code 2010 ('the Code')¹. It describes how prudential security requirements are assessed for Financial Transmission Rights ('FTRs') in association with the FTR Allocation Plan 2014 (*Allocation Plan*).

The methodology described in this document is designed to comply with clause 14.19A(2) of the Code, namely, with the principle that the amount taken into account (for FTRs) is an estimate of the value

¹ The Code references in this section are correct as at August 2014. The same Code clause is foreshadowed to move to Schedule 14A.1 clause 12 on 24 March 2015 when the Settlement and Prudential Security Code Amendment 2013 comes into force.

(positive or negative) of the FTR at the time that the estimate is made and the potential for that value to change prior to settlement.

FTR prudential security requirements are calculated independently of the requirements for the balance of the wholesale electricity market, however prudential security requirements for spot electricity, ancillary services, lodged hedges, and FTRs are aggregated to determine an Industry Participant's total exposure.

In this document, Code or *Allocation Plan* defined terms are capitalised. Terms which are accorded particular meanings in this document are shown in italics for clarity.

2. *Validity and reviews*

FTR holdings will be assessed in accordance with this *Assessment Methodology* from 1 November 2014 until it is superseded by a replacement *Assessment Methodology*.

The Clearing Manager will review the *Assessment Methodology* beginning one week following the publication of a new *Allocation Plan* following the conclusion of each *Allocation Plan* review.

For each review, the Clearing Manager will assess the performance of the existing *Assessment Methodology* and incorporate proposed changes, if any, in a draft variation. The Clearing Manager will develop any variation in accordance with the Code. For the avoidance of doubt, in the case where no changes are recommended by the Clearing Manager, the Clearing Manager will consult with FTR Participants and consider submissions before providing a recommendation to the Authority.

3. *Spot, lodged hedge, and FTR exposures are aggregated by participant*

The Clearing Manager assesses prudential security requirements for industry participants as being the net of:

- estimated spot market exposure as described in the Clearing Manager's functional specification and relevant policies
- estimated near-term exposure for hedges lodged with the Clearing Manager (assessed for the same period as the spot market exposure as described in the Clearing Manager's functional specification and relevant policies), and
- estimated FTR exposure as described in this methodology.

4. *FTR exposure assessment*

A. Principles

The adopted methodology shall:

- be applicable to multiple hubs
- respond dynamically to changing market inputs, and
- avoid introducing 'methodology-driven' volatility into the assessment process.

B. FTR exposures are netted

An FTR Participant's FTR exposure is assessed as the sum of the exposures, positive or negative, for each FTR held by that participant on the FTR Register and any side payments.

Prudential assessments and balances are updated each Business Day (as defined in the *Allocation Plan*) by 11 am to reflect updated information and FTR Participant actions. Industry Participants are able to view balances via secure web portal.

C. FTR exposure calculation

The Clearing Manager assesses a participant's exposure across all FTR holdings. This aggregate assessment is equivalent to the sum of the maximum exposure to each FTR holding less any offsetting charges described in the initial margin section E below.

For the purpose of assessing exposure to each FTR held by an FTR Participant, maximum exposure is defined as:

$$EXP_f = (MIM_f + AC_f - DSP_f) \times \frac{V_f \times TP_p}{2}$$

Where: Is the:

P FTR Period

f FTR that is a specific FTR Product (FTR Type, Source Hub and Sink Hub), for FTR Period p

EXP_f Exposure assessed for FTR f , in \$

MIM_f Maximum Initial Margin for FTR f , being the Clearing Manager's assessment of the assumed liability from holding an FTR, in \$/MWh

AC_f Acquisition Cost for FTR f , in \$/MWh

DSP_f Daily Settlement Price, being the Clearing Manager's assessment of the Hedge Value of FTR f on any given day prior to settlement, in \$/MWh

V_f The Volume of FTR f , in MW

TP_p Number of Trading Periods in FTR Period p , accounting for any daylight saving

transitions

2 A factor to convert from half-hour trading period length to hours.

D. Daily Settlement Price

The Daily Settlement Price (DSP) is calculated for each FTR product on the FTR Register. This value will be published on the Clearing Manager's public website.

The calculation of the DSP is separated into three distinct *assessment periods* reflecting the availability of relevant information. Furthermore, the methodology is designed to favour the best information available – market prices are used where available and estimated movements in market price are utilised where no trading data is available.

Inputs include:

- auction clearing prices
- spot market final prices
- ASX futures prices
- forecast prices from a predictive model
- Clearing Manager's spot market prudential security price projection methodology
- prices derived from reconfiguration auctions, if they are available.

Inputs exclude:

- Revenue Adequacy estimations
- prices disclosed upon Assignment
- prices from secondary trading (other than from reconfiguration auctions).

The methods for determining the DSP to be applied for each *assessment period* are described below.

Method	Period	Description
I	During the period ending one month before the start of the FTR Period	<p>1. The DSP shall be equal to a <i>Price Setting Trade</i>¹ price where that trade has occurred after the start of the last Business Day for either the product in question or where a product is related by way of period and nodal combination, a price derived on a non-arbitrage basis.</p> <p>2. Where a <i>Price Setting Trade</i> is not available, the FTR value for each FTR Product is to be set according to the following formula:</p> <p>For Obligation Products:</p> $DSP_d = DSP_{d-1} + \sum_1^n (P_{nd} - P_{nd-1}) w_n$ <p>For Option Products:</p> <p><i>Until 1 December 2016:</i></p> $DSP_d = DSP_{d-1} \frac{P_{nd}}{P_n}$ <p><i>From and including 1 December 2016:-</i></p> <p>If P_{nA} is less than PST_A, and at least either P_{nd} or P_{nd-1} is greater than zero:</p> $DSP_d = DSP_{d-1} + \left(\frac{P_{nA}}{PST_A} \right) (P_{nd} - P_{nd-1})$ <p>Else if P_{nA} is less than PST_A, and both P_{nd} and P_{nd-1} are equal to zero:</p> $DSP_d = DSP_{d-1} + \left(\frac{P_{nA}}{PST_A} \right) (\Delta P)_n$ <p>Else:</p> $DSP_d = DSP_{d-1} \frac{P_{nd}}{P_{nd-1}}$ <p>Where</p>

		<p>P_{n_A} is the <i>reference value</i> for comparison method n calculated at the time of the latest <i>price setting trade</i>.</p> <p>PST_A is the latest price setting trade</p> <p>ΔP_n is the last non-zero daily change in the <i>reference value</i> for comparison method n</p> <p>P_{n_d} is the <i>reference value</i> for comparison method n calculated on day d</p> <p>$P_{n_{d-1}}$ is the <i>reference value</i> for comparison method n calculated on the previous Business Day [For Option Products the minimum value is \$0.01]</p> <p>$DSP_d$ is the <i>DSP</i> being calculated for day d [For Option Products the minimum value is \$0.01]</p> <p>$DSP_{d-1}$ is the previous Business Day's <i>DSP</i></p> <p>w_n is the weighting for comparison method n</p> <p>Comparison method 1 uses <i>ASX reference values</i>. Profiles will be applied to ASX Benmore and Otahuhu quarterly futures prices to yield an expected monthly <i>ASX reference value</i>. Where available, the ASX Base Load Quarterly Futures will be utilised. For nodal combinations where one or both nodes do not have ASX Base Load pricing, a <i>locational adjuster</i> will be used to extrapolate ASX node pricing to non-ASX nodes. This adjuster will be based on historic average quarterly price differences between the same-island ASX value and node in question.</p> <p>Comparison method 2 uses <i>predictive pricing model³ reference values</i>. The <i>predictive pricing model reference value</i> applied for Obligation FTRs is the average price projected for the relevant FTR period. The <i>predictive pricing model reference value</i> applied for Option FTRs utilises a Monte Carlo option valuation methodology.</p> <p>For Obligation Products, the ASX reference value (comparison method 1) and the <i>predictive pricing model</i> reference value (comparison method 2) will each assume a 50% weighting.</p>
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		<p>That is, $w_n = 0.5$ for both comparison methods 1 and 2.</p> <p>For Option Products: -</p> <ul style="list-style-type: none"> a) The <i>predictive pricing model</i> reference value (comparison method 2) is used only. That is, $n = 2$ and the <i>predictive pricing model</i> reference value is used for ΔP_n, P_{nd}, and P_{nd-1} with a weighting of 100%. b) the Daily Settlement Price will have a minimum value of \$0.01. <p>3. <i>Until 2016, for Option Products:</i> When the DSP exceeds - the highest price setting trade for any FTR option product, the DSP is reset to the current PPM for that product.</p> <p>¹A <i>price setting trade</i> is an FTR trade which is deemed to represent market value. For the purposes of this methodology, a <i>price setting trade</i> is an auction trade (including reconfiguration auction trade) which meets minimum volume or value thresholds as published in Clearing Manager policies. The policies will establish the minimum FTR quantity or the minimum value a trade must achieve in order to be considered a <i>price setting trade</i>.</p> <p>²A <i>reference value</i> is derived from either a <i>predictive pricing model</i> or ASX futures prices. The underlying inputs are manipulated as described in this methodology and Clearing Manager policies to arrive at <i>reference values</i> which are expected to be aligned with FTR values.</p> <p>³The <i>predictive pricing model</i> is a deterministic model which projects price outcomes for as many nodes and lines as are required to model nodal prices and constraints that will or may impact on FTR hub prices, at a resolution consistent with the accuracy required for accurate valuations (eight blocks per day) for the period from the next calendar month to the end of the latest FTR Period associated with FTRs which have been auctioned. The model will be capable of producing a large number of price paths suitable for the valuation task (minimum of 400 price paths). Inputs will include projected grid configuration and constraints, generation offers (derived from capacity and marginal cost measures such as stochastic water values for large hydro plants, fuel and other costs, generation profiles for small and embedded generators including wind farms), demand projections, reservoir storage, historical</p>
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		hydrological inflows since 1931, generation and transmission outages and, when required for the purposes of obtaining accurate valuations, instantaneous reserves and other inputs as defined in the Clearing Manager Policies. The model will produce modelled dispatch and prices consistent with the methodology specified in the Code (nodal dispatch and pricing). Modelled water values, storage management for security of supply and demand response will be consistent with, or based upon, observed or expected behaviour (e.g. during dry years and public conservation campaigns).
II	During the month before the start of the FTR period	A calculated FTR settlement based upon the Clearing Manager's spot market prudential security price projection methodology (CMSMPSPPM) is phased in and the use of Method I is phased out. On the first day of the month, a weighting of 5% is applied to the CMSMPSPPM. This increases in a linear manner to 100% by the end of the month.
III	From the FTR period until settlement	A calculated FTR settlement using Final Prices where available – the CMSMPSPPM is used to project prices for other days.

E. Initial margin determination

The Clearing Manager will assess an initial margin for each FTR which is intended to cover, to the extent reasonably possible, the market risk of holding an FTR for the duration of time from when the value of an FTR is assessed until the FTR can be liquidated in case of default.

Initial margin assessed in aggregate

The Clearing Manager assesses a participant's initial margin requirements across all FTR holdings as follows:

$$\text{Total Initial Margin} = \sum_f MIM_f \times \frac{V_f \times TP_p}{2} - \text{Cross Commodity Charge}$$

Where: Is the:

p FTR Period

f FTR that is a specific FTR Product (FTR Type, Source Hub and Sink Hub), for FTR Period p

MIM_f *Maximum Initial Margin* for FTR f , being the Clearing Manager's assessment of the market risk from holding an FTR, in \$/MWh as described in the document

V_f	The Volume of FTR f , in MW
TP_p	Number of Trading Periods in FTR Period p , accounting for any daylight saving transitions
2	A factor to convert from half-hour trading period length to hours
<i>Cross Commodity Charge</i>	An offsetting charge which reduced the total initial margin from the level it would be if all FTRs were assessed separately for initial margin purposes.

The Cross Commodity Charge is calculated as a reduction in the total initial margin due to offsetting FTR positions. The offsetting will be applied for Obligation FTRs for the same period which have opposite flows.

$$Cross\ Commodity\ Charge = \sum_{\substack{f\ for \\ matched \\ pair \\ obligation \\ FTRS}} MIM_{f\ pair} \times \frac{V_f \times TP_p}{2}$$

Where:	Is the:
p	FTR Period for the offsetting FTR pair
$pair$	An offsetting Obligation FTR pair that is characterised by a specific FTR Product (FTR Type, Source Hub and Sink Hub), for FTR Period p
$MIM_{f\ pair}$	<i>Maximum Initial Margin</i> for offsetting FTR pair, being the Clearing Manager's assessment of the market risk from holding an FTR, in \$/MWh
V_f	The offsetting volume of FTR $pair$, in MW
TP_p	Number of Trading Periods in FTR Period p , accounting for any daylight saving transitions
2	A factor to convert from half-hour trading period length to hours.

An FTR product group is a group of FTRs of the same FTR Type and season further subdivided into two sets, the near term for which the FTR period will begin less than or equal to 5 months in the future and the remainder comprising the distant term. Winter is from April to September and summer is from October to March.

Initial margins are static and calculated every six months

Initial margin requirements are reviewed six monthly on the next business day, and remain static between reviews.

Calculation of initial margin requirement

The *maximum initial margin* requirement for each product group will be calculated by evaluating the set of gains or losses implied by changes in FTR Daily Settlement Prices calculated by the Clearing Manager. The changes in expected FTR value are assessed over a period of 14 calendar days. The Clearing Manager will not incorporate weekend values in this calculation.

The Clearing Manager will retain daily settlement values to support this calculation. Initial margin requirements are calculated so that the probability of loss given default, calculated from the available gains and losses associated with a particular FTR product and season is 15%.

The assessment is applied to at least 60 days but not more than 730 days of DSP data.

For Option FTRs, the initial margin requirement will be capped at the DSP for the respective Option FTR.

Where the methodology to calculate DSPs has been revised at any point over the period of analysis the Clearing Manager will back-cast these changes over the entire period of analysis.

Existing initial margin requirements

Initial margin rates are subject to 6 monthly reviews. The current rates can be accessed via the clearing manager's website.

For introductions of additional nodal combinations, the Clearing Manager will publish indicative initial margin requirements for these additional combinations 2 months before the first auction in which new nodal combinations will be available and will reconfirm these requirements one week before the first auction. The inputs will be calculated on the same basis as stipulated in the Daily Settlement Price methodology.

For the time where all final prices in an FTR period are known, the initial margin will equal zero.

Initial requirements to be met before bidding

The Clearing Manager will advise the FTR Manager of the initial margin requirements for each FTR Product to be auctioned. Participants must have a sufficient FTR excess to cover the initial margin requirements for bids in accordance with the *Allocation Plan*.

5. Clearing Manager policies relating to FTR prudential security assessment

In order to promote transparency and restrict the discretion of the Clearing Manager, the Clearing Manager publishes policies describing detail not provided in this methodology. This *Assessment Methodology* takes precedence over information provided in the policies. Information published in the policies includes:

- parameters for establishing a price setting trade
- the specific *predictive model* and inputs utilised

FTR Prudential Security Assessment Methodology

- reference method weightings
- the basis for determination of profiles applied to ASX prices, and
- initial margin policy.

6. Publication of information

The following information will be published for general viewing via the Clearing Manager's website:

- DSP values for active FTR Products, each Business Day
- current initial margin requirements, once available, and
- type and nature of model inputs affecting the *predictive pricing model*.

The following information will be available to registered and authorised representatives of FTR Participants:

- FTR exposure
- spot market and lodged hedge exposure
- prudential security holdings
- excess or deficit prudential security, and
- recent exposure and holdings history (graphically).

7. Urgent variations to the Assessment Methodology

The Clearing Manager may apply to the Authority in accordance with clause 14.19C(4)² of the Code and seek an urgent variation from the *Assessment Methodology* if it determines that the application of the current *Assessment Methodology* will result in a materially over- or understated representation of risk. Materiality will be determined in relation to the impact on participants or the overall market.

The Authority may approve an urgent variation in accordance with clause 14.19C(7) of the Code. Urgent variations expire nine months after they are made.

Non-urgent and permanent variations may be approved by the Authority in accordance with clause 14.19C(5) and clause 14.19B(4) of the Code.

²The Code references in this section are correct as at August 2014. The references to the same clauses are foreshadowed to move to Schedule 14.1 from 24 March 2015 when the Settlement and Prudential Security Code Amendment 2013 comes into force.