Settlement and prudential security methodologies

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Version 1.1

Version Control

Version	Date	Status	Comment
1.0	25/07/2014	Approved by Authority	Initial release
1.1	15/04/2015	Draft submitted to the Authority for approval	Co-generation dispatch arrangements variation to the methodology for determining the general prudential requirement. Annual adder.
1.1	25/11/2021	Document reviewed	Document reviewed
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Contents

1. Introduction

The clearing manager is required by the Electricity Industry Participation Code 2010[1] to formulate and publish four methodologies relating to settlement and prudential security, as follows:

- under clause 14.2, the methodology for determining settlement retention amount
- under clause 14A.5, the methodology for determining the forward estimate of the minimum amount for which security will be required to be provided by a participant,
- under clause 8 of Schedule 14A.1, the methodology for determining the general prudential requirement, and
- under clause 12 of Schedule 14A.1, the methodology for determining the minimum security required in respect of FTRs

This document contains the first three of these methodologies. The FTR methodology is published separately[2] and will be incorporated into this document in a future version.

Changes made to the methodology for this version are highlighted in red.

1 See https://www.ea.govt.nz/code-and-compliance/the-code/

[2] See https://www.nzx.com/services/energy-markets/clearing-manager

2. Methodology for determining the settlement retention amount

The settlement retention amount (SRA) is calculated pursuant to 14.21 of the Code.

SRAs are calculated for each participant. The calculation is set to ensure that the clearing manager holds sufficient funds on settlement day to manage any single default. An SRA is calculated as a percentage of the amount payable to the participant by the clearing manager.

For each participant (p) other than the grid owner:

$$(1)\ SRA_p = AOgen_{CM_p} \times Max\ [SRAratio_{gen}] + AOftr_{CM_p} \times Max\ [SRAratio_{ftr}]$$

Where:

$AOgen_{CM_p}$ represents the amount to be applied by the clearing manager to the participant (p) relating to amounts referenced in 14.56(e) of the Code,

$AOftr_{CM_p}$ represents the amount owed by the clearing manager to the participant (p) relating to amounts referenced in 14.57(1)(a) of the Code, and

the SRA for the grid owner is zero.

the *Max* [$SRAratio_{ftr}$] is the largest $SRAratio_{ftr}$, where $SRAratio_{ftr}$ is calculated for all related participant groups (rpg) in accordance with formula 2a

the *Max* [$SRAratio_{gen}$] is the largest $SRAratio_{gen}$, where $SRAratio_{gen}$ is calculated for all related participants in accordance with formula 2b

$$(2a)\ SRAratio_{ftr} = Max\left[0, \frac{\sum_{p\ in\ rpg}\left(X_{FTR_p} - F_{FTR_p}\right) - R_{loss\ and\ constraint}}{FTR_{required} - \sum_{p\ in\ rpg} AO_{CM(FTRs)_p}}\right]$$

Where

$\sum_{p\ in\ rpg} X_{(FTR} - F_{FTR)}$ represents the aggregate FTR pool shortfall in a related participant group, in respect to the current billing period

$R_{loss\ and\ constraint}$ represents the total residual loss and constraint excess as defined in Clause 14.57(1)(b) of the Code

$FTR_{required}$ is the sum of amounts required to settle FTRs in respect of the billing period as defined 14.57(2)(c) of the Code, and

$\sum_{p\ in\ rpg} AO_{CM(FTRs)}$ is the sum of amounts owing to related participants in respect of that billing period for amounts described in clauses 14.20(2)(h) or (i) of the Code.

AO_p amounts have pre-payments subtracted from them as per clause 14.30(2)(b).

X_{FTR} and F_{FTR} amounts are defined in clause 14.55 but on the assumption that the shortfall is equal to the total net owing by the related participant group in respect of current period FTR amounts.

$$(2b)\ SRAratio_{gen} = Max[0, \frac{GSTreserve_{rpg} + \sum_{p\ in\ rpg}\left(AO_{P_p} - AO_{CM_p} - Xftr_p\right)}{Genfunds_{required} - \sum_{p\ in\ rpg} Genfunds_p}]$$

Where

$SRAratio_{gen}$ is the largest ratio selected amongst all ratios calculated for related participant groups

$GSTreserve$ is an amount sufficient to meet the clearing manager's goods and services tax (GST) exposure which would result from the shortfall. GST exposures develop as the Energy Clearing House Limited files its GST returns on an invoice basis. GST is to be retained for any non-payments to the clearing manager as well as to cover any reductions in GST input credits which relate to scaled payments

$\sum_{p\ in\ rpg}\left(AP_{P_p} - AP_{CM_p} - X_{ftr_p}\right)$ represents the aggregate shortfall in a related participant group which is not attributed to the FTR pool

$Genfunds_{required}$ represents the total funds required for complete settlement of the amount described in 14.56(1)(e) of the Code plus any associated GST, and

$Genfunds_p$ represents the total funds required for complete settlement of the clearing manager to participant (p) amounts

described in 14.56(1)(e) of the Code and any associated GST.

AO_p amounts have pre-payments subtracted from them as per clause 14.30(2)(b).

X_{FTR} amounts are defined in clause 14.55 but on the assumption that the shortfall is equal to the total net owing by the related participant group in respect of current period non FTR amounts.

Related participants groups are determined by the clearing manager and used in formula 2a and 2b above.

The clearing manager is not required to publish or declare which participants are considered to be related for this clause, but the methodology must be specified.

The clearing manager intends to treat as related participants for calculating the Settlement Retention Amount, participants that:

1. Share ownership or management,
2. Have forms of security for prudential purposes that create an exposure to each other, and
3. Have arrangements or practices which the clearing manager considers that if one participant were to fail to make payment on settlement day, would suggest that another participant may also not pay.

3. Methodology for determining the forward estimate of the minimum amount for which security will be required

The clearing manager is required to estimate prudential security for each business day and for each of the following three business days (14A.5, Schedule 14A.1 Part 2).

This section describes the methodology for establishing a forecast exposure estimate three business days into the future.

The method utilises the average change in the estimate of prudential security over the last 7 days (segregated into business/non-business day averages). The estimate will include prepayments, the invoiced settlement amount from the day of settlement (if a positive number) and amounts to be settled from prudential (once confirmed).

For each participant, forecast exposure for day d $((1)ForcastExposure_d)$ is described as follows:

$$(1)ForcastExposure_d = G_o + G_e + FTRexposure - payments_d + wd \times G_{oincrement_{businessday}} + di \times G_{oincrement_{non-businessday}}$$

Where

G_O is the most recently calculated general outstandings amount,

G_e is most recently calculated general exit period margin,

d is the number of days in the future for which the estimate is calculated (i.e. today plus d days),

wd is the number of business between day d and today (being 1, 2, or 3),

di is the number of non-business day, if any, between day d and today,

$FTR_{exposure}$ is the participant's most recently calculated FTR exposure, and

$payments_d$ are any cleared funds prepayments or settlement payments to be received by the clearing manager by day d, as per the settlement statement or as advised by the participant,

$$(1a)G_{oincrement_{businessday}} = \frac{\sum_{i=1}^{7}\left(G_{o_{n+1-i}} - G_{o_{n-i}}\right)}{\sum_{i=1}^{7} 1} forall(n-i) = businessday,$$

and

$$(1b)G_{oincrement_{non-businessday}} = \frac{\sum_{i=1}^{7}\left(G_{o_{n+1-i}} - G_{o_{n-i}}\right)}{\sum_{i=1}^{7} 1} forall(n-i) \neq businessday$$

Where

n is the current date, and

$G_{o_{n+1-i}}$ was the general outstandings component assessed on day n+1-i and n is today.

4. Methodology for determining the general prudential requirement

The clearing manager's general prudential exposure of a participant or group of related participants is the sum of the estimate of financial outstandings and the exit period prudential margin.

$$(1) G_{exp} = G_o + G_e$$

Where

G_o is the clearing manager's estimate of outstanding general financial exposure, and

G_e is the exit period margin.

Estimate of outstanding financial exposure

The estimate of outstanding financial exposure is the sum of:

- the estimate of purchased energy quantities times price (E_{po})
- less the estimate of sold energy quantities times price (E_{so})
- the estimate of net ancillary service charges (AS_o)
- less the estimate of the value of hedges to be settled (HSA_o), and
- the net value of washups owed to the clearing manager (W_o) .

$$(2) G_o = E_{po} - E_{so} + AS_o - HSA_o + W_o$$

Where

$$(2a) \mathrm{E_{po}} = E_{pb} + \sum_{tp,n} \left(\mathrm{P_{n,tp}} \times \mathrm{QP_{n,tp}} \times 1.15\right)$$

$$(2b) \mathrm{E_{so}} = E_{sb} + \sum_{tp,n} \left(\mathrm{P_{n,tp}} \times \mathrm{QS_{n,tp}} \times 1.15\right)$$

Where

E_{pb} represents any billed but not settled purchased energy amounts inclusive of GST (no account taken for pre-payments)

E_{sb} represents any billed but not settled sales amounts inclusive of GST

tp represents all unsettled and unbilled trading periods up to the end of the previous day

$P_{n,tp}$ represents final prices, or if final prices are not available, interim prices, or if interim prices are also not available, the exit period price plus adder as published by the clearing manager for node n and trading period tp

$QS_{n,tp}$ represents the clearing manager's estimate of a participant's electricity sales for node n and trading period tp, and

$QP_{n,tp}$ represents the clearing manager's estimate of a participant's electricity purchases for node n and trading period tp.

$$(2c)\ AS_o = AS_b + AS_{daily\_avg} \times d$$

Where AS_b represents any billed but not settled ancillary service charges (net), and AS_{daily_avg} represents the net daily average ancillary service payment to the clearing manager over the last settled billing month and d represents the number of days since the end of the last settled billing period less any days included in invoiced but not settled amounts.

$$(2d) HSA_o = HSA_b + \sum_{tp,n} - HSA settlement\ value_{tp,n}$$

Where HSA_b represents any billed but not settled hedge settlements owed to the participant (net), tp represents all trading periods up to the end of
the prior day which have not yet settled and n represents lodged HSA 'n' for all lodged HSAs and the HSA settlement value is the value the participant is due to be paid according to the terms of the hedge settlement agreement for that period when calculated using final prices, or if final prices are not available, interim prices, or if interim prices are also not available, the exit period price plus adder. Amounts owed by the clearing manager for an HSA are positive amounts.

$$(2e)\mathrm{W_o} = \sum_{bp} \mathrm{W_{bp}}$$

Where for all billing periods, $\mathrm{W_{bp}}$ is the net published but not yet settled washup amount owed by a participant for billing period bp.

The clearing manager's estimate of volumes

The estimated consumption quantity for trading period tp, node n, and participant p:

$$(3)\ \mathrm{QP_{tp,n,p}} = \begin{cases} \mathrm{QP_{recon_{tp,n,p}}} & \text{for trading periods where reconciliation data available} \\ \mathrm{QP_{cob_{tp,n,p}}} & \text{V recon data unavailable and change of business noted for node n} \\ QP_{tp,n} \times Lshare_{tp,n,p} + Q_{DCLS_{tp,n,p}} & \text{V recon data unavailable and no change of business} \\ \mathrm{QP_{wind,CoGenB_{tp,n,p}}} & \text{V recon data unavailable and nodes with grid connected wind or type B co} - \text{generators} \end{cases}$$

Where

$\mathrm{QP_{recon_{tp,n,p}}}$ is consumption reconciliation information for trading period tp, node n, and participant p

$\mathrm{QP_{cob_{tp,n,p}}}$ is the consumption information applied by the clearing manager in consultation with the participant where the participant is a new purchaser or had advised a significant change of business, as per clause 14A.16 and 14A.17,

$Q_{DCLS_{tp,n,p}}$ are nominated dispatch bids in the cleared bids and offers from the system operator for trading period tp, node n, and participant p

$Lshare_{tp,n,p}$ is the market share of participant p at node n calculated across blocks of six trading periods with respect to load for the latest reconciliation month for which the clearing manager has reconciliation data, and

$QP_{tp,n}$ is the deemed consumption at node n in trading period tp where

$$(3a)\ QP_{tp,n} = \begin{cases} Max\left[L_{MA_{tp,n}} + G_{unoff_{tp,n}} + G_{CoGenB_{tp,n}} + G_{int_{tp,n}}, 0\right] & \text{for nodes with direct consumers} \\ L_{MA_{tp,n}} + G_{CoGenB_{tp,n}} + G_{int_{tp,n}} + Max[G_{embedded_n} - G_{avg\ offered_n}, 0] & \text{for all other nodes} \end{cases}$$

Where

$L_{MA_{tp,n}}$ = half hour metering information as described in 13.141(bi) as uploaded by the pricing manager to WITS for that node and trading period

$G_{unoff_{tp,n}}$ = defined as below

$G_{CoGenB_{tp,n}}$ = relevant cleared type B co-generation offers identified by trading period tp and node n in the cleared bids and offers from the system operator

$G_{int_{tp,n}}$ = relevant cleared intermittent offers identified by trading period tp and node n in the cleared bids and offers from the system operator

$G_{embedded_n}$ = the average embedded generation per tp recorded for node n in the most recent month contained within reconciliation information held by the clearing manager

$G_{avg\ offered_n}$ = average cleared offers in the cleared bids and offers from the system operator per tp for node n, for the corresponding month for which embedded generation data is available, and

$QP_{wind,CoGenB_{tp,n,p}}$ for nodes with grid connected intermittent generation or type B co-generation; this is the average consumption per tp recorded for participant p and node n, in the most recent month contained within reconciliation information held by the clearing manager.

The estimated generation quantity for trading period tp, node n, and participant p:

$$(4)\ QS_{tp,n,p} = \begin{cases} QS_{recon_{tp,n,p}} & \text{for trading periods where reconciliation data available} \\ QS_{cob_{tp,n,p}} & \text{V recon data unavailable and change of business noted for node n} \\ QS_{tp,n,p} & \text{V recon data unavailable and no change of business volumes apply} \end{cases}$$

Where

$QS_{recon_{tp,n,p}}$ is generation reconciliation information for trading period tp, node n, and participant p

$QS_{cob_{tp,n,p}}$ is the generation information applied by the clearing manager in consultation with the participant relating to a significant change of business notified by a participant as per 14A.17

$$(4a) QS_{tp,n,p} = ClearedOffers_{tp,n,p} + G_{unoff_{tp,n,p}}$$

Where

$ClearedOffers_{tp,n,p}$ are the relevant cleared offers identified by trading period, node, and participant in the cleared bids and offers from the system operator, and

$$(4b) G_{unoff_{tp,n,p}} = \begin{cases} participant\ data & has\ been\ supplied \\ G_{unoff\_proj_n} & data\ not\ supplied \end{cases}$$

Where:

$$(4c) G_{unoff\_proj_n} = \frac{\sum_{i=1}^{21} G_{unoff\_supplied_{tp,n}}}{\sum_{i=1}^{21} \text{trading periods for day } i}$$

for trading periods (tp) on 21 days (today -i) where the clearing manager holds participant supplied unoffered generation data. If there are no trading periods for which the clearing manager holds unoffered generation data supplied by the participant, $G_{unoff\_proj} = 0$.

Calculation of the exit period margin

G_e is the exit period margin described in equation 1. With respect to energy, it is comprised of exit period base price times an estimated quantity at each node plus an adder times total quantity.

$$(5) G_e = \sum_{tp,n} P_{exit\ n,tp} \times Q_{n,tp} + A_{annual} \times \sum_{tp,n} Q_{n,tp} + AS_f + HSA_f$$

Where

tp represents all trading periods across all days in the participant's registered exit period

n represents all relevant nodes

$P_{exit\ n,tp}$ is the clearing manager's exit period price for each trading period of each day (tp) in the exit period and each node

$Q_{n,tp}$ is the clearing manager's exit period net purchase quantity estimate for each trading period of each day in the exit period and each node from equation 3 and 4 above $(QP_{n,tp} - QS_{n,tp})$ (averaged over 21 days by business/non-business day and trading period), and

A_{annual} is the clearing manager's weighted average 'adder' which applies in the exit period.

$$(5a)\mathrm{P}_{\mathbf{exit\ n,tp}} = futuresPrice_{qtr,island} \times f_{m,island} \times f_{d_{type},island,quarter} \times f_{tp,d_{type},quarter,island} \times f_n$$

Where

$futuresPrice_{qtr,island}$ calculated as the average of daily closing prices of the quarterly ASX New Zealand Electricity Futures Otahuhu price (for North Island nodes) and quarterly ASX New Zealand Electricity futures Benmore price (for South Island nodes). The average is taken across 20 days in the calendar month before the price is set by the clearing manager. These values will be published quarterly no later than two months before the quarter in which they will apply. The sample period for determining derived prices is 10 years of historical data starting from 1 October 2010.

$f_{m,island}$ is the month profile for each island with respect to the quarterly prices where prices are taken at Benmore (South Island) or Otahuhu (North Island). It is calculated by dividing the month's historical average price by the historical quarterly average price.

$f_{d_{type},qtr,island}$ is a factor which represents the relative price levels of business and non-business day prices for each island in each quarter. It is determined by calculating the average price (Otahuhu or Benmore) for business and non-business days in each quarter and dividing by the overall average quarterly price (Otahuhu or Benmore).

$f_{tp,d_{type},quarter,island}$ is a intra-day profile factor which is calculated for each quarter, day-type and island. It is determined by calculating the average price for that trading period, grouped by quarter and business and non- business day for both Otahuhu and Benmore; and dividing by the average
business/non-business day price for each quarter for both Otahuhu and Benmore.

f_n is a location factor which is calculated for each node in each island with respect to Benmore in the South Island and Otahuhu in the North Island in the manner as described in clause 13.221 of the Code apart from the substitution of island area for grid zone area.

Factors are calculated and published before 1 November of the year preceding the calendar year in which they will be applied. The sample period for determining factors other than f_n is 10 years of historical data starting on 1 October 2010.

$$(5b)\ AS_f = AS_{daily\_avg} \times d_{exit\_period}$$

Where AS_{daily_avg} represents the net daily average ancillary service payment to the clearing manager over the last settled billing months and d_{exit_period} is the participant's registered exit period.

HSA_f is the sum of the forecast value of all HSA contacts the participant is a party to during their exit period.

$$(5c)\ HSA_f = \sum_{exit\ period\ days} -HSA_{forecast\_value}$$

Where $HSA_{forecast\_value}$ is the sum of the daily value of all HSAs the participant is a party to, using the applicable exit period base price plus the adder in place of the floating price. (The clearing manager calculates HSA amounts owed for an HSA as a positive amount requiring this to be reversed here).

Calculation of the adder

A_{annual} is a price ($/MWh) not less than $0/MWh, which is determined as per Schedule 14A.1 clause 10 (5).

The hypothetical retailer is set as a consumer of a fixed proportion of the load at all nodes, with a 19 day prudential exit period.

The adder will be published by the clearing manager on the clearing manager portal at times as described by Schedule 14A.1 clause 10 (6).

The clearing manager will calculate A_{annual} annually, using data from at least 3 years, up to 10 years before, with no year being prior to 2011.