CCP.A Central Counterparty Austria

Test Policy and Model Validation

Electricity Spot Market

Document Title	Document Class
Test Policy and Model Validation Electricity Spot Market	Policy

Document Information

Document Owner	**Chief Risk Officer (CRO)**
Document Approver	**General Management**

Document Review Cycle

annually / on occasion

Change Log[1]

Version	Date	Change Description
V1.0	09.11.2021	Initial creation
V1.1	27.06.2022	Details on the assessment of test results and measures to be taken in case of negative test results included.
V1.2	13.10.2022	Annual review Back Tests now include the Market Coupling Counterparties

[1] *The Change log is only used for final versions.*

Content

1. Introduction

CCP.A regularly reviews the models and parameters adopted to calculate its margin requirements, default fund contributions, collateral requirements and other risk control mechanisms in order to ensure that the risk management models in use are reliable, based on solid assumptions and reflect the reality as much as possible.

CCP.A also regularly tests its default management procedures and takes all reasonable steps to ensure that all clearing members understand them and have appropriate arrangements in place to respond to a default event.

Key points of the model validation are:

- Regular review of risk management policies and procedures
- Conduction of tests and analysis of results
- Integration of Clearing Members
- Information to National Competent Authorities
- Public disclosure of key aspects

2. Models to be Validated and Applied Methodology

CCP.A's model validation policy specifies and documents the procedures used to test the calculation methodology for margin requirements, default fund and other financial resources for clearing of electricity spot market products as well as the framework for calculation of required liquid financial resources.

This policy includes the frequency of each testing activity and a process description on how to conduct tests and review test results.

2.1 Margin Calculation

All Clearing Members of CCP.A must provide collateral for securing the clearing risk. The margin requirements are calculated at least daily based on the balance of open trades (open net payment obligations) and risk parameters specified in the *Margin Calculation Methodology Electricity Spot Market* available on CCP.A's website.

The margin requirements are calculated per clearing account based on:

- Net payment obligation
- Trading volume fluctuation
- Trading volume mean value

Important parameters are:

- Confidence level: 99%
- Look back period for margin calculation: 365 days
- Anti-procyclicality margin buffer: 25%
- Time horizon for calculation: 3 days + holiday adjustment

To validate its margin model, CCP.A uses back testing. Back testing is performed daily.

2.2 Default Fund Calculation

CCP.A maintains a pre-funded Default Fund to cover losses that exceed the losses covered by the margin requirements in case of a Clearing Member's default on the electricity spot market, including the opening of an insolvency procedure.

CCP.A's Default Fund is calculated to cover the simultaneous default of the ***three*** largest Clearing Members on the electricity spot market and is held separately from the Default Fund installed for the clearing of securities transactions. The methodology how the total size of the Default Fund is determined and the allocation of this amount to the individual members is published on CCP.A's website (see document "*Default Fund Calculation Electricity Spot Market*").

For computing and validating the model for the Default Fund contributions, CCP.A uses stress testing and reverse stress testing. The stress testing process is performed daily. The reverse stress test process and the evaluation of results takes place quarterly.

2.3 Overall Available Resources

The total available resources to cover defaults consist of margin requirements, Default Fund contributions and CCP.A's own resources. The order of usage is compliant with the waterfall principle defined in EMIR (see document "*Default Waterfall*").

To validate the overall resources of the default waterfall, the results of the stress tests and reverse stress tests are used.

2.4 Default Procedures

CCP.A tests and reviews its default procedures to ensure they are both practical and effective. To validate the general default procedures and to ensure that the clearing members are familiar with the default procedures, CCP.A simulates a default of a clearing member in its simulation environment using a pre-defined screenplay, including some "what if" scenarios. To the extent possible, members are integrated in this simulation (e.g. communication process, realisation of collateral etc.).

The procedures, which CCP.A undertakes in the event of a Clearing Member's default, are summarised in the document *Procedure in the Event of Member Default Electricity Spot Market*. CCP.A's *General Terms and Conditions Electricity Spot Market* stipulate the circumstances under which CCP.A will declare a default and what kind of action will be taken for each kind of default.

The insolvency test is performed at least on an annual basis and includes the following basic steps:

1. CCP.A declares default of a Clearing Member
2. CCP.A immediately informs EXAA and Wiener Börse AG
3. EXAA suspends the member from trading immediately
4. Wiener Börse AG suspends the exchange membership
5. National Competent Authorities are informed
6. Open payment obligations are covered by using resources according to the default waterfall
    a. cash collaterals and all cash balances from defaulting clearing member
    b. commercial bank guarantees issued for the defaulting clearing member
    c. securities deposited as collateral and securities from defaulting clearing member
    d. contributions to the default fund from defaulting clearing member
    e. own dedicated resources of CCP.A
    f. contributions to the clearing fund from non-defaulting members on pro rata basis

3. Testing Programs

3.1 Back Tests

The purpose of back testing is to check the adequacy of the margin calculation. Back testing is performed on 2 functional levels:

- Level 1: Back test on clearing member level
- Level 2: Back test on price risk buffer level

3.1.1 Level 1 Back Test

Since electricity cannot be stored and subsequently used as collateral, CCP.A bears the full credit risk of the defaulting clearing member. Therefore, the credit exposure of the clearing members shall be covered with collateral at all times. CCP.A collects margins in advance based on the historical fluctuation of net payment positions and their average values.

The provided collateral is set as position limit in the trading system. During the auctions the cumulated open payment obligation is calculated based on

- Indicative prices during the 10:15 am auction and
- Estimated prices during the 12:00 pm market coupling auction

In case the position limit is exhausted, EXAA deletes the orders entered into the trading system until the portfolio value falls below the position limit.

In the back testing the calculated margin requirement on a given day *t-1* is being compared with the cumulated open payment obligations on *t*, thus measuring whether the margin requirement computed on *t-1* would have been sufficient to cover for losses incurred in case of the Clearing Member's default. In addition, the collateral amount provided by a clearing member on *t* which is set as position limit in the trading system is back tested against the cumulated open payment obligations on *t* in the same way. A net loss exceeding the margin requirement / the collateral provided is defined as "uncovered loss". The allowed number of breaches should be consistent with the applied confidence level of at least 99% chosen by CCP.A.

The model is said to be adequate, if the observed number of breaches is equal or lower than the expected breaches for the specified confidence interval. A higher number of breaches gives an indication of an underestimation and that the parameters of the margin model or the calculation of price buffers for evaluation of position limits shall be adjusted. The most significant back test is the back test on position limit level because on this level a material loss can arise to CCP.A.

CCP.A uses the statistical test concept of testing the null hypothesis at a pre-specified level of significance. The significance level is specified by the CRO and currently amounts to 5%.

If the probability of a "type 1 error" is below the pre-specified level of significance, the model for collateral calculation and position limit utilisation will be questioned. The probability of type 1 error is the probability to reject the hypothesis, even if it is correct. The higher p(error1), the better the model fits the hypothesis.

The null hypothesis is "If CCPA performs n back tests, the expected number of breaches would be (100%-99%) * n".

This hypothesis is tested for a significance level of 5%.

For a given set of observations, the probability to observe n exceptions is calculated. If this probability is below the significance level, the model shall be questioned.

There is also a Level 1 Back Test for the Market Coupling Counterparties in order to check for possible breaches.

3.1.2 Level 2 Back Test

While EXAA has full price control during the own 10:15 am auction, the 12:00 pm auction utilises a centralised European market coupling algorithm to determine prices, which combines supply and demand curves from several countries and exchanges. For the exposure valuation during the 12:00 pm auction, this means that it must be based on estimated prices. For the price estimation, CCP.A calculates conservative risk buffers considering historic price variations.

CCP.A conducts regularly tests on the appropriateness of the risk buffers for the estimation of prices during the 12:00 pm auction.

Therefore, the actual daily price variation (between 10:15 am and 12:00 pm) of all traded products is compared to the risk buffer applied on *t*. This is done monthly taken the price variations in the past 365 days into account.

If the price variation is higher than the applied risk buffer, a breach is counted. The number of observed breaches shall support the null hypothesis: "The applied r-factor is sufficient to cover price spread variations at a confidence level of 99%" at a significance level of 5%.

There is also a Level 2 Back Test for the Market Coupling Counterparties in order to check for possible breaches.

3.2 Stress Tests

CCP.A performs stress tests with stress scenarios and stressed parameters to the models used for estimation of risk exposures to make sure its financial resources are sufficient to cover those exposures under extreme but plausible conditions.

3.2.1 Relevant Risks for Default Fund Calculation

To limit its credit exposures arising from clearing of electricity spot market products, CCP.A maintains a pre-funded Default Fund to cover losses that exceed the losses covered by the margin requirements in case of a Clearing Member's default.

Electricity spot market products are commodities with special characteristics. Electricity cannot be stored and, unlike financial instruments or other commodities, realised in case of member's default on payment. The main risk in case of a Clearing Member's default arises from the defaulting Clearing Member's open payment positions not being fully covered by the Clearing Member's collateral.

CCP.A has identified the counterparty default risk and the trading volume fluctuation as relevant for the calculation of the size of the Default Fund on the electricity spot market. In addition, further relevant risks have been identified and addressed.

3.2.2 Relevant Risks for Calculation of Liquid Financial Resources

The highest liquidity risk for CCP.A arises when one or more clearing members are unable to meet their payment obligations within the scope of the clearing procedures, but CCP.A, as the central counterparty, is under the obligation to unconditionally meet its payment obligations towards other Clearing Members (intraday).

3.2.3 Stress Scenarios

3.2.3.1 Credit Stress Test

The stress tests for Default Fund calculation on the electricity spot market are based on shocking the trade volume fluctuations of the Clearing Members. Hereby, the stress testing is performed under the assumption that the ***three*** largest Clearing Members (in terms of payment obligations) would default simultaneously.

In order to determine its exposure caused by uncovered payment obligations under extreme but plausible conditions, CCP.A uses historic and hypothetical scenarios:

- Historic Observation method

  In the historic scenario, stress events are represented by trading days on which the actually observed value of the clearing member's open payment obligations was not entirely covered by its margin requirement calculated on the previous day. For this purpose, the clearing members' calculated margins are compared with their actual payment obligation, uncovered losses are identified and the total of the 3 clearing members with the largest uncovered amounts with the same value date within the pre-defined lookback period represents the maximum shortfall under stressed conditions.

- Hypothetical Exposure Factor method:

  In the hypothetical scenario, the loss arising from uncovered payment obligations is modelled by computing the difference between hypothetical margin and margin in normal conditions. For this purpose, the calculated margin requirement under normal conditions is multiplied by a constant factor (K-times the size of the current margin requirement calculated under normal conditions). The highest calculated value in case of default of the three clearing members on the same value date within the pre-defined lookback period is taken.

3.2.3.2 Liquidity Stress Test

The minimum liquidity needs of CCP.A are calculated for the scenario simultaneous payment default of the ***two*** Clearing Members with the highest liquidity risk exposure. On the electricity spot market, the NEMOs / MC CCPs are considered in the same way as Clearing Members in the liquidity stress test.

To determine these two Clearing Members, CCP.A calculates the cumulated payment obligations across all cleared markets.

3.2.4 Other Relevant Risks

Prior to admission of electricity spot market products traded on EXAA to clearing, CCP.A has performed a comprehensive risk assessment based on the specific characteristics of these products,

the clearing members and processes involved in clearing and risk management. The following risks have been identified as relevant for clearing of electricity products.

3.2.4.1 Concentration Risk including Group Entities

Only single legal entities can become a Clearing Member of CCP.A. Even if two Clearing Members belong to the same group, they are separate legal entities regarding their Clearing Membership and regarding their margin requirements and default fund contributions. There are no "group rebates" on collateral or any other obligations. Therefore, if one or both of them default, the risk and the applied procedures are not different to that of the simultaneous default of other Clearing Members.

In case that several Clearing Members have the same ownership structure or are 100% owned by another Clearing Member, CCP.A monitors their total exposure during the stress tests.

3.2.4.2 Interdependencies and Multiple Relationships

Currently clearing members are energy utility or energy trading companies and therefore they do not hold multiple relationships with CCP.A.

In the event that in the future credit institutions become clearing members and provide clearing services to energy companies trading at EXAA, their multiple relationships with CCP.A and the possible interdependencies will be considered. For example, such interdependencies occur when a clearing member is at the same time liquidity provider or custodian bank of CCP.A.

3.2.4.3 Wrong-way risk

To avoid wrong-way risk, clearing members are not permitted to use as collateral their own securities or securities issued by an entity from their same group. In addition, if the clearing member is a credit institution, it is not allowed to provide a bank guarantee to cover its margin requirements.

3.2.4.4 Market Risk of Securities Accepted as Collateral

CCP.A accepts bank guarantees, cash collateral and securities collateral to cover margin requirements. The securities collateral is deposited in accounts pledged in favour of CCP.A, where CCP.A may sell them in case of a Clearing Member's default in order to receive cash to fulfil the obligation of the failing Clearing Member.

The market risk of collateral assets is the risk, that the liquidation value of the securities collateral is less than expected and does not cover the obligations.

This market risk is addressed by applying adequate haircuts and accepting only high-quality securities. CCP.A has sound rules and procedures for accepting and valuing its collateral, as described in the *Collateral Policy Electricity Spot Market*.

3.2.4.5 Default of Settlement Bank

CCP.A uses the services of Oesterreichische Kontrollbank (OeKB AG) as a Settlement Bank for processing in- and outgoing payments stemming from electricity trading and fees. Furthermore, OeKB AG is a Collateral Custodian Bank according to CCP.A's *General Terms and Conditions Electricity Spot Market* and responsible for the safekeeping of cash collateral. A default (insolvency) of OeKB AG is very unlikely as OeKB AG is a credit institution with highest rating (such as the rating of Republic of Austria), CCP.A performs a due diligence of OeKB AG on an annual basis. In the unlikely event of a disturbance of OeKB AG, CCP.A will use another commercial bank for the processing of payments.

Furthermore, the Clearing Members will be advised to cover margin calls by transferring the needed amount to CCP.A's dedicated account.

3.2.4.6 Default of Liquidity Provider

Similar to the insolvency of the Settlement Bank, the default of a liquidity provider is a risk scenario CCP.A has considered in its risk management framework and internal control system.

3.2.5 Assessment of Stress Test Results

Stress tests provide information on the risk exposure under stressed conditions and give information on the financial capacity, which will be needed to cover the simultaneous default of one or more Clearing Members on the electricity spot market. Hence, the stress test results influence the following procedures and policies:

- The size of the Default Fund on the electricity spot market
- The amount of CCP.A's dedicated other financial resources (skin-in-the-game) in the Default Waterfall for defaults on the electricity spot market
- The liquidity needs

Therefore, the assessment of the stress test results has to be done for each of these specific purposes. Basically, the same statistical test which is used to assess the back test results of margin requirement and position limits is applied to assess the size of the default fund or liquidity needs by taking the stress test results into consideration.

3.2.5.1 Assessment of results to verify the financial resources of the Default Waterfall

According to the *Default Fund Calculation Electricity Spot Market*, CCP.A's default fund is calculated on a monthly basis and is sized to cover the loss due to the simultaneous default of the 3 Clearing Members with the largest exposure, which exceeds their individual margins.

A null hypothesis test shall be performed monthly: "CCP.A's total financial resources are sufficient to cover the default of the 2 Clearing Members with the largest exposure in 99% during the last 12 months".

The "other financial resources" (skin-in-the-game) of CCP.A amount to EUR 1.875.000 and are allocated to the securities and the electricity spot markets in proportion to their current Default fund sizes. The sum of Default Fund, dedicated skin-in-the-game and the individual collateral provided by the defaulting Member shall cover the losses of the simultaneous default of the 2 Clearing Members in stressed conditions.

The daily amount in stressed conditions (maximum amount resulting from historical and hypothetical stress scenarios) for the 2 Clearing Members (cover-2) is calculated and summed up. The sum gives the maximum loss (i.e. necessary resources), which has to be covered by the Default Fund as well as by CCP.A's other financial resources and is compared to the sum of default fund + skin-in-the-game (i.e. available resources). If the necessary resources are larger than the available resources, an exception (breach) is counted.

The number of observed exceptions shall be in line with the pre-defined significance–level, i.e. if the probability of Error Type 1 is below 5%, the actions described in Chapter 3.5 have to be made.

Example:

Date: 20220504

DF Amount:	7.525.943
Skin in the game:	475.000
DF Waterfall Total:	8.000.943

Result of Stress Tests on 20220504

Max Loss 1st TN	4.849.975
Max Loss 2nd TN	2.351.257
Max Loss 3rd TN	2.021.640
Sum of Max Loss 2nd+3rd	4.372.897

The default fund amount (EUR 7.525.943) covers the potential loss of the largest Clearing Member (> as sum of 2nd +3rd) according to EMIR Art. 42 (3) and to Regulation (EU) 153/2013 Art. 53 (2).

No breach is counted.

The default fund waterfall total (EUR 8.000.943) covers the potential loss for the sum of the 2 largest Clearing Members (EUR 7.201.232) according to Regulation (EU) 153/2013 Art. 53 (1).

No breach is counted.

3.2.5.2 Assessment of results to verify the liquid resources

CCP.A's liquidity needs under stressed conditions are calculated daily. They are determined by the scenario simultaneous default of 2 Clearing Members with the largest payment obligations. The calculated liquidity need during stressed conditions is compared to the available liquid resources (cash assets and credit lines). Breaches (i.e. daily -" payment obligations exceed the available liquid resources) are counted and shall be in line with the confidence level of 99%.

Null hypothesis: "CCP.A's liquid resources are sufficient to cover the payment obligations in stressed conditions for the 2 largest Clearing Members in 99% of the past 12 months".

If P(Error1) < 5%, then the liquid resources are insufficient. The actions needed to be taken are described in Chapter 3.5 of this document.

For each day, the liquidity needs are calculated under stressed conditions. The sum of the amount of the 2 largest Clearing Members is added and compared to CCP.A's available liquid resources. If the liquidity needs exceed the available resources, a breach is counted.

Assume that in the past 12 months (i.e. 220 days) 5 exceptions have been counted. The same mathematics as described in the section "Assessment of back test results" is used to validate the observed exception against the expectations.

P(Error1) = 1- BINOMVERT (4;220;1%; true) = 7,5%

As p(error1) is higher than the pre-defined significance level of 5%, the liquid resources are sufficient. Otherwise, the procedures described in Chapter 3.5 will take place.

3.3 Reverse Stress Tests

CCP.A conducts reverse stress tests which are designed to identify under which circumstances the combination of margin, Default Fund and other financial resources may provide insufficient coverage of credit exposure and for which its liquid financial resources may not be sufficient.

The reverse stress test methodology consists in a reprocessing of the stress tests using a "trial and error" approach until the objective is met. In the hypothetical scenario, the relevant risk factor (which is the trading volume fluctuation and the trading volume mean value) will be shocked by multiplying the margin requirement by a constant factor which is higher than the one used in stress testing. In the historical scenario, the simultaneous default of *n* Clearing Members is assumed.

The results of the reverse stress tests enable CCP.A to identify the conditions, under which a predefined threshold (in EUR) is reached. The threshold gives the breakeven point between the available financial resources and necessary resources to cover the simultaneous default of *n* Clearing Members.

3.4 Test Schedule

Model to be tested	Test	Objective	Test frequency	Assessment of results
Margin model	Back tests	To assess reliability of margin model by comparing observed outcomes with expected outcomes	daily	monthly
Model for computing DF and overall resources	Stress tests	To calculate min size of DF	daily	monthly
Liquidity needs calculation	Liquidity stress tests	To ensure that CCP.A has sufficient liquid assets to cover settlement obligations toward CMs in case of default of 2 largest CMs	daily	daily
Model for computing Default Fund and overall resources	Reverse stress tests	To ensure that margin, DF and skin-in-the game are sufficient to cover loss of 3 largest CMs	quarterly	quarterly
Default procedures	Simulation of events	To ensure default procedures are practical and effective	annually	annually

3.5 Use of Results and Actions to be Taken

CCP.A has established criteria to assess whether its models, methodologies and liquidity risk management framework have been successfully validated. These criteria include the analysis of test results as well as clear statistical tests such as testing the null hypothesis on a pre-specified level of

significance for the margin requirements, the default fund size, the amount of total resources as well as the liquidity needs.

CCP.A has defined the actions it could take, given the results of the tests.

The following trigger events require immediate actions:

- Back tests do not show sufficient coverage of margins
- Stress tests show that the liquid resources are insufficient to cover the payment obligations of 2 largest Clearing Members
- Stress tests show that the total financial resources are insufficient to cover the simultaneous default of 2 Clearing Members in stressed conditions

If there is no reasonable explanation for the negative test results, the following measures can be taken:

- Change of parameters for margin calculation, Default Fund calculation or calculation of liquid financial resources
- Complete validation of risk model
- Change of model for margin calculation, Default Fund calculation or calculation of liquid financial resources

All changes to risk parameters or models are discussed with the Risk Committee and reported to the NCA.

3.5.1 Use of Back Test Results

Trigger event: the probability of p(error1) < 5%, the number of observed breaches in position limits is too high to support the Null Hypothesis.

Following actions will be taken:

1. CRO will send an immediate information to the General Management and the Risk Committee

2. CCP.A will set high awareness on market activity, margin requirements and collateral deposits

3. CCP.A will analyse the breaches

   - Which members have caused the breaches?
   - Have there been any extraordinary events?
   - How “severe” are the breaches?
   - How high is the uncovered loss compared to the available collateral?
   - Would the collateral has been sufficient, if the clearing member’s default fund contribution is used?

4. CRO will report to the General Management and the Risk Committee

If there is a reasonable explanation for the breaches or, if the collateral including the default fund contribution would have been sufficient, the model and the parameters may not have to be changed. This decision shall be taken by the General Management.

If there are not any reasonable explanations, the following measures can be taken:

- Change parameters for price buffer calculation
- Conduct complete validation of margin models and parameters and propose changes
- Call for an ad-hoc meeting of the Risk Committee and discuss the matter

5. CCP.A will inform FMA on the results, the analysis and on the taken actions

3.5.2 Use of Stress Test Results

3.5.2.1 Stress test consequences related to the total financial resources

Trigger event: If p(error1) < 5%, the total financial resources are insufficient to cover the simultaneous default of 2 Clearing Members in stressed conditions.

Following actions will be taken:

1. CCP.A will set high awareness on market conditions and activities

2. CCP.A will analyse the breaches

   - Which members caused the breaches?
   - How severe are the breaches?
   - Are there any reasonable explanations?

3. CRO will report to the General Management and the Risk Committee

4. The General Management will decide on risk mitigation activities

Such activities may include the following measure:

- Take member specific actions
- Take general actions like increase default fund contributions or increase CCP.A's "Skin in the game"
- Conduct complete validation of stress scenarios
- Modify /Add /Delete Stress Scenarios
- Modify /Add /Delete risk factors for Stress Tests
- Call for an ad-hoc meeting of the Risk Committee and discuss the matter

5. CCP.A will inform FMA on the analysis of the results and on the taken actions

3.5.2.2 Stress test consequences regarding the liquid financial resources

Trigger event: If p(error1) < 5%, the liquid resources are insufficient to cover payment obligations in case of the simultaneous default of 2 Clearing Members in stressed conditions.

Following actions will be taken:

1. CRO will send an immediate information to the General Management and the Risk Committee

2. CCP.A will set high awareness on market activity and payment obligations

3. CCP.A will analyse the breaches

- Which members caused the breaches?
- How severe are the breaches?
- Are there any reasonable explanations?

4. CRO will report to the General Management and the Risk Committee

5. The General Management will decide on risk mitigation activities. Such activities may include the following measure:

- Call for an ad-hoc meeting of the Risk Committee and discuss the matter
- Take Member specific actions, e.g. require additional cash collateral from Member
- Take general actions not related to specific Clearing Members like increase of credit facilities
- Conduct complete validation of stress scenarios
- Modify /Add /Delete Stress Scenarios

6. CCP.A will inform FMA about the analysis of the results as well as the taken actions

4 Public Disclosure

CCP.A has published its risk policies including the default management procedures and the general principles for their validation on its website www.ccpa.at.

Quantitative information, including aggregated test results is published following the "CPMI-IOSCO quantitative disclosure framework for CCPs" on CCP.A's website (section "Statistics" https://www.ccpa.at/cpmi-iosco/). In this section, also the Self-Assessment of CCP.A's compliance with CPSS-IOSCO principles for PFMIs and disclosure framework associated to the PFMIs is published.