# Explanatory document for all TSOs' of Nordic CCR proposal for amendment to the methodology for the market-based allocation process of cross-zonal capacity for the exchange of balancing capacity for the Nordic CCR in accordance with Article 41(1) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

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# 1. Introduction

All TSOs of the Nordic Capacity Calculation Region (CCR Nordic) have prepared a proposal to be submitted to CCR Nordic NRAs as an amendment to the methodology for the market-based allocation process of cross-zonal capacity for the exchange of balancing capacity for the Nordic CCR in accordance with Article 41(1) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing.

This explanatory document will give a short background of the ACER decision (ACER decision No 22-2020) on the forecasting methodology and the amendment previous submitted by the Nordic TSOs, which the CCR Nordic NRAs rejected. The explanatory document will further explain the reasoning behind the proposed amendment, and provide an assessment of the parameters in accordance with Article 6(4) of the ACER decision. The assessment compares the accuracy of forecasted market value of cross zonal capacity from ACER decision with accuracy of forecasted market value calculated in accordance with parameters used for the assessment in accordance with Article 6(4) of the ACER decision. The assessment hence provides information on whether the already approved dynamic mark-up is appropriate or would need changes.

The Nordic aFRR capacity market is planned to go-live in Q4 2022, and therefore the assessment is done on historic data without real knowledge about the impact on the market. The results of the assessment show that changing the assessed parameters gives only marginal improvements to the accuracy of the ACER approved methodology. The Nordic TSOs will monitor the efficiency of the forecasting methodology, including the dynamic mark-up when the Nordic aFRR capacity market goes live. The monitoring will include a comparison of the forecasted and actual market values of cross-zonal capacity for the exchange of energy. If the TSOs find it necessary, a proposal to improve the accuracy of the forecasted market values, including different mark-up values per bidding zone border, will be made.

The proposed amendment to Article 6 on determination of the forecasted market value of cross-zonal capacity for the exchange of energy in single day-ahead market includes amendment for historical time series from 30 days to 60 days. This is done to increase the accuracy of the methodology based on the assessment. In addition, it includes amendment of a change to the initial mark-up from 1 EUR/MWh to 5 EUR/MWh in order to safeguard the day-ahead market at aFRR capacity market go-live. Otherwise, dynamic mark-up parameters as defined in Article 6 of the ACER decision will remain as they are in the current forecasting methodology.

# 2. Background

## 1.1 TSOs amendment proposal in year 2021

The Nordic TSOs were tasked by ACER decision on methodology for the market-based allocation process of cross-zonal capacity for the exchange of balancing capacity (ACER decision no 22-2020 dated 5th August 2020) to submit an amendment based on one of the alternative principles pursuant to Article 39(5).

The requested amendment proposal was to include at least an assessment related to the dynamic mark-up value, for each bidding zone border and for each direction. The mark-up in the ACER decision no 22-2020 has been defined as follows:

- for negative or zero market spread the mark-up will be 0.1 EUR/MWh
- for positive market spread the mark-up will be 1 EUR/MWh

The positive mark-up can vary between 1 and 5 EUR/MWh. In case the average forecast error over the last 30 days differs with more than 1 EUR/MWh compared to the mark-up applied the day before, the TSOs shall increase or decrease the mark-up with 1 EUR/MWh. In this calculation, 95% of the forecast errors are taken into account.

The requested amendment proposal had to be supported by an evaluation of the accuracy of the forecasted market value related to different historical time series, different validity periods of mark-ups and different reference days.

The Nordic TSOs submitted the amendment proposal to the NRAs by mid-July 2021 reflecting the requirements set for amendment in the ACER decision no 22-2020. The amendment proposal from 2021 and explanatory document related to this amendment proposal are annexed to this explanatory document.

The assessment showed that longer historical time series give marginally better results on average. However, the TSOs concluded that the improvement is marginal and did not support change in the mark-up methodology, where 30 days historical time series is applied to calculate forecasted market value of cross-zonal capacity.

Application of different reference days showed that the custom model produces lower average errors for Monday and Saturdays compared to current reference day model. Overall, this outcome did not support the change in the mark-up methodology, where the previous day has been assigned as reference day for defining the forecasted market value of cross-zonal capacity.

The Nordic TSOs concluded from the assessment that substantial improvement of forecasting methodology requires significant modelling effort and application of non-publicly available information as inputs – probably with machine learning – and thus introducing substantially increased complexity with less transparency compared to the current simple forecasting methodology.

The Nordic TSOs concluded that the forecasting methodology included in the ACER decision 22-2020 should be kept as it is and confirmed this by the amendment proposal.

## 1.2 NRAs' view on the amendment proposal

The CCR Nordic NRAs (hereafter "NRAs") informed the TSOs on 9 December 2021 on the initiation of enforcement procedures vis-à-vis the Nordic TSOs for lack of compliance with the ACER Decision 22-2020. The NRAs informed that they had assessed the amendment proposal and found that the proposal had no legal content. In other words, the proposal did not contain any provision that amends the methodology approved in the ACER decision 22-2020. Therefore, the NRAs could not approve the proposal and found that it can be argued that the TSOs have not complied with the methodology as approved by the ACER decision 22-2020. Information received on 9 December 2021 included a position paper agreed by the NRAs explaining in detail the considerations behind NRAs' position.

Afterwards each NRA has concluded with their national administrative framework this amendment process either by a decision or other actions. In practice this implies that a new process to comply with the ACER decision 22-2020 has to be initiated.

## 1.3 Procedure to ensure the adoption of terms and conditions required by the ACER decision 22-2020

The NRAs informed on 9 February 2022 that as a result of the submission of a methodology with no legal content, the NRAs find that the situation at hand is to be considered as described by Article 4(7) of the EB Regulation.

As a result of the Article 4(7) of the EB Regulation, it is the task of the NRAs to take appropriate steps for the adoption of the required terms and conditions. This also implies that there are no specific deadlines, as the Article 4(7) contains no such, and the procedure covers situations where the deadlines in Article 5 and 6 of the EB Regulation have not been met. In the situation at hand, the NRAs are not setting further deadlines but want the process to proceed with minimal delay.

On 9 February 2022 the NRAs have also sent additional document to guide TSOs when preparing an amendment proposal (non-paper "On the market-based allocation process of cross-zonal capacity for the exchange of balancing capacity for the Nordic CCR in accordance with article 41 in Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing"). This non-paper includes general comments and specific comments.

# 3. New amendment proposal

## 3.1 ACER decision 22-2020

In accordance with the ACER decision 22-2020 market-based allocation process of cross-zonal capacity is applied for the Nordic FRR capacity market. Requirements for market-based allocation process has been set in Article 41 of EB regulation. In this allocation process, the market value of cross-zonal capacity is based on the forecasted and actual market values.

During the ACER approval process Finnish and Swedish NRAs raised concerns on the accuracy of the forecasted market value for the exchange of balancing capacity. ACER understood that the main concern from these NRAs was related to a risk of under-estimating the day-ahead market spread for the actual trading day by using the market spread of the reference day as a forecast, as this can lead to forecast errors that can be substantially different for different bidding zone borders and that the 1 EUR/MWh mark-up proposed by the TSOs would not be enough to prevent over-allocation of cross-zonal capacity to the balancing capacity market. Because a fixed higher value for the mark-up would disregard the borders with lower average forecast errors, ACER concluded that the forecasting methodology should move towards a method with different mark-up values per bidding zone border. Therefore, ACER included a requirement set in Article 6(3) to have different mark-up values per bidding zone border. Thus, there will be different mark-up values for each bidding zone border depending on the day-ahead market spread and dynamic mark-up values. Article 6(3) also implies that those bidding zone borders with higher forecast errors will have higher dynamic mark-ups.

Furthermore, ACER included a requirement in Article 6(4) requesting the TSOs to amend within 12 months the forecasting methodology supported by assessment with a number of assessments on the accuracy of the forecasted market value.

From the ACER decision 22-2020 the TSOs have understood that at the minimum the TSOs have to assess if the parameters in Article 6(3) for the calculation of the dynamic mark-up would be appropriate or would need changes. The assessment should at least show:

(a) the accuracy of the forecasted market value when applying different ranges of historical time series as input data for determining the mark-ups, per bidding zone border and per direction;
(b) the accuracy of the forecasted market value when applying different time intervals for defining and updating the mark-ups, per bidding zone border and per direction;
(c) the accuracy of the forecasted market value when applying different reference days; (d) the accuracy of the forecasted market value when applying additional relevant factors influencing demand and generation patterns in the different bidding zones;
(d) the estimated welfare effect for a range of confidence levels of the positive forecast errors, per bidding zone border and per direction.

From the TSOs perspective the ACER requirement to the amendment was to keep the mark-up dynamic, as already approved by ACER, and in addition assess whether additional parameters should be changed.

However, the NRAs did not approve an amendment confirmed by an assessment that the current calculation parameters were appropriate to define dynamic mark-up. This interpretation of 'no legal content' by the NRAs has led to this new amendment process.

In this new amendment process the TSOs have used the assessment made previously as the NRAs have not taken any position if assessments required by Article 6(4) are inadequate or additional reviews are needed for this new amendment. When assessing different parameters, the TSOs have now taken into account also incremental changes in the accuracy compared to the previous assessment.

## 2.2 Forecasting methodology of ACER decision 22-2020

Article 6 of ACER decision 22-2020 describes how forecasted market value of cross-zonal capacity is defined. The forecasted market value shall be based on principle (b) of Article 39(5)[1]. This principle requires the use of a forecasting methodology, which enables the accurate and reliable assessment of the market value of cross-zonal capacity. The forecasted market value of cross-zonal capacity for the exchange of energy between bidding zones shall be calculated based on the expected differences in market prices of the day-ahead and, where relevant and possible, intraday markets between bidding zones.

In accordance with Article 6 of the ACER decision 22-2020, forecasted market value of cross-zonal capacity consists of two components:

- The initial forecasted market value of cross-zonal capacity defined for each direction, each bidding zone border and for each day-ahead market time unit as defined in accordance with Article 6(1) of ACER decision 22-2020
- A dynamic mark-up in order to take into account the uncertainty of the forecasted market value of cross-zonal capacity for each direction and for each bidding zone border as defined in accordance with Article 6(2) and Article 6(3) of ACER decision 22-2020

[1] Article 39(5) of EB Regulation: The forecasted market value of cross-zonal capacity shall be based on one of the following alternative principles:
(a) the use of transparent market indicators that disclose the market value of cross-zonal capacity; or
(b) the use of a forecasting methodology enabling the accurate and reliable assessment of the market value of cross-zonal capacity.

The forecasted market value of cross-zonal capacity for the exchange of energy between bidding zones shall be calculated based on the expected differences in market prices of the day-ahead and, where relevant and possible, intraday markets between bidding zones. When calculating the forecasted market value, additional relevant factors influencing demand and generation patterns in the different bidding zones shall be taken duly into account.

The forecasted market value of cross-zonal capacity for each bidding zone and each direction shall be equal to the sum of these two components.

In accordance Articles 6(2) and Article 6(3) of the ACER decision 22-2020, the dynamic mark-up varies between 1 EUR/MWh and 5 EUR/MWh, when day-ahead market spread between bidding zones is positive. In this case, the dynamic mark-up will be determined for each bidding one border based on the average forecast error of the last 30 days where the 5% highest forecast errors are excluded). If the calculated forecast error differs 1 EUR/MWh or more from the value calculated for the previous day, the mark-up will be increased/decreased accordingly. If the market spread is negative (or zero), the mark-up will be 0,1 EUR/MWh.

The ACER decision 22-2020 implies that there will be different mark-up values for each bidding zone border depending on the day-ahead market spread and dynamic mark-up values calculated in accordance with Article 6(3). This also implies that those borders with higher forecast errors will have higher dynamic mark-ups.

Article 6(4) of ACER decision 22-2020 required CCR Nordic TSOs to submit amendment proposal for NRA approval by 5 August 2021. Proposal for amendment should be based on one of the alternative principles given in Article 39(5). The amendment should at least include calculation of dynamic mark-up value for each bidding zone border and for each direction. The amendment proposal should be supported by an assessment of five topics listed in the ACER decision.

Summary of the assessment with amended conclusions taking also into account incremental changes in the accuracy is in the flowing sub-chapter.

## 2.3 Outcome from assessment required by ACER decision 22-2020

In the ACER decision 22-2020, the forecasted market value of cross-zonal capacity is based on Article 39(5) principle (b). The TSOs have applied the same principle when the new amendment proposal in accordance with Article 6(4) of the ACER decision has been drafted. The amendment proposal is supported by the assessment requested in Article 6(4) covering the listed items from (a) to (e).

The assessment conducted by the TSOs has been included in the chapter 3 of the explanatory document submitted to the NRAs together with previous amendment proposal. The assessment required by Article 6(4) of the ACER decision 22-2020 has been made by comparing accuracy of forecasted market value of cross-zonal capacity from ACER decision 22-2020 with accuracy of forecasted market value calculated in accordance with parameters used for the assessment in accordance with Article 6(4) of the ACER decision 22-2020. The results of this assessment for items from (a) to (e) of Article 6(4) are presented in the following sub-chapters.

### *(a) the accuracy of the forecasted market value when applying different ranges of historical time series as input data for determining the mark-ups, per bidding zone border and per direction*

ACER decision 22-2020 applies 30 days historical time series of day-ahead market results to forecast mark-up values between bidding zones. The accuracy of forecasted market value has been evaluated with 15, 60 and 120 days historical time series. The accuracy of these historical time series has been compared to the accuracy given by 30 days historical time series of ACER decision 22-2020. The accuracy of forecasted market value of cross-zonal capacity has been measured with the standard deviation of the error. The smaller the value of the standard deviation, the better the accuracy is. The standard deviation of the error has been calculated for each bidding zone border and for each direction and the average value of standard deviations for each border and each direction gives the overall accuracy when different historical time series (15, 30, 60 and 120 days) has been compared.

Results of this assessment has been presented in the chapter 3.3 of the explanatory document in Annex 2 and also Table 1 of this document. Average standard deviation varies between 2,77 and 2,78 EUR/MWh and best accuracy is achieved with 30 and 60 days historical time series – slightly better accuracy with 60 days historical time series. The accuracy is worse with 15 and 120 historical time series.

The assessment supports to change 30 days historical time series to 60 days historical time series in the new amendment proposal although the increase in accuracy is incremental.

*(b) the accuracy of the forecasted market value when applying different time intervals for defining and updating the mark-ups, per bidding zone border and per direction*

In the ACER decision 22-2020, validity period of mark-up is one day. The accuracy of the validity period has been evaluated with following intervals:

- validity period 7 days
- validity period 28 days
- two validity periods per a day, one for peak and one for off-peak hours

Results of this assessment has been presented in the chapter 3.4 of the explanatory document in Annex 2 and also Table 1 of this document. Average standard deviation varies between 2,77 and 2,79 EUR/MWh and best accuracy is achieved with 1, 7 and 28 days validity period. Table 1 shows that accuracy decreases with validity time decrease, i.e., accuracy is worst with two validity periods per day.

To ensure that the change of validity period follows better the changes in day-ahead market spread, the TSOs will propose to keep current 1 day validity period although e.g., 7 days validity period gives slightly better accuracy. The TSOs will monitor the effect of validity period to the accuracy of the forecasted market value when reporting the efficiency of the forecasting methodology in their first report in accordance with Article 12(5) of the ACER decision 22-2020 and will make proposal to improve the accuracy of the forecasted market values, where necessary.

*(c) the accuracy of the forecasted market value when applying different reference days*

In the ACER decision 22-2020, reference day is previous market day (D-1). The accuracy of the reference day has been evaluated with following reference days:

- reference day D-7
- weighted average consisting of days D-1, D-7 and D-8
- customised reference day as follows: Monday D-3; Tuesday – Friday D-1; Saturday and Sunday D-7

Results of this assessment has been presented in the chapter 3.5 of the explanatory document in Annex 2 and also Table 1 of this document. Average standard deviation varies between 2,77 and 3,27 EUR/MWh and best overall accuracy is achieved by applying previous day as reference day. Application of customised reference day for certain bidding zone borders together with previous days reference day for the remaining bidding zone borders may increase the accuracy slightly, but the TSOs will not propose to include this non-harmonised approach for the new amended dynamic mark-up methodology. Application of customised reference day for all bidding zone borders decreases the overall accuracy compared to current application of reference day.

The assessment supports to keep reference day as it is in current forecasting methodology in the new amendment proposal.

*(d) the accuracy of the forecasted market value when applying additional relevant factors influencing demand and generation patterns in the different bidding zones*

The TSOs have studied (and presented in the chapter 3.7 of the explanatory document in Annex 2) if the methodology of the ACER decision 22-2020 can be substituted with a different methodology. Here the ARIMA modelling has been explored. This model applies also Article 39(5) principle (b) for the forecasted market value of cross-zonal capacity.

Results of this modelling has been presented in the chapter 3.7.1 of the explanatory document in Annex 2. ARIMA modelling increases the accuracy of the forecasted market slightly value when compared to simple and transparent model selected for the ACER decision 22-2020. Increase in the ARIMA modelling accuracy increases the complexity of the modelling at the cost of transparency.

The TSOs have studied in the chapter 3.7.2 of the explanatory document in Annex 2 if the accuracy of the forecasted market value can be increased applying publicly available generation and demand forecasts. Figure 3.7.1 and Table 3.7.1 of the explanatory document in Annex 2 show that accuracy of forecasting methodology cannot be increased without non-publicly available input parameters.

The TSOs have concluded that without substantial use of non-publicly available information and machine learning techniques the accuracy of forecasting methodology cannot be improved from current reference-day based forecasting methodology.

It should be remembered that application of co-optimised allocation process, where balancing capacity will be allocated at same process as day-ahead market, may substitute market-based allocation process in accordance with EB regulation in the future. The proposal from all TSOs by December 2022 to harmonise the methodology for the allocation process of cross-zonal capacity pursuant to Articles 41 may also change substantially the forecasting methodology. Thus, the TSOs have decided not to make substantial changes to forecasting methodology at this stage.

*(e) the estimated welfare effect for a range of confidence levels of the positive forecast errors, per bidding zone border and per direction*

The TSOs have estimated in the chapter 3.8 of the explanatory document in Annex 2 the effects to the welfare, where the forecasting methodology of the ACER decision 22-2020 has been compared against 'the perfect foresight' model.

The sensitivities of estimated welfare effects have been evaluated for year 2018. The results have been presented in Table 3.8.1 of the explanatory document in Annex 2. The study shows that mark-up has negative effects to the welfare for both markets (aFRR CM and DA markets). This result is expected as dynamic mark-up has been developed to safeguard day-ahead markets. It should be noted that maximum volume of cross-zonal capacity allocated for exchange of balancing capacity as defined in accordance with Article 5 of the ACER decision 22-2020 shall also safeguard day-ahead market.

Safeguarding day-ahead markets may also be realised by applying 5 EUR/MWh as initial forecasted market value of cross-zonal capacity instead of 1 EUR/MWh. At the go-live of Nordic aFRR capacity market, this would – especially together with the application of 60 days historical time series – introduce an additional safeguard to the day-ahead market. 2.4 Conclusion for new amendment

Table 1 concludes the results from the assessment conducted in accordance with Article 6(4) of the ACER decision 22-2020.

The new amendment includes amendment for historical time series from 30 days to 60 days and application of 5 EUR/MWh for positive market spread as an initial forecasted market value of cross-

zonal capacity at the Nordic aFRR capacity market go-live. Otherwise, dynamic mark-up parameters as defined in Article 6 of the ACER decision 22-2020 will remain as they are in the current forecasting methodology.

| | | Current | Dfiferent historical time series | | | Different time intervals for mark-up updates | | | | Different reference days | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Border | No mark-up | (30d1d) | 15d1d | 60d1d | 120d1d | (30d1d) | 30d7d | 30d28 | 30d1peak | (30d1d) | 30d1dD-7 | 30d1dweighted | 30d1dcustom |
| NO1 -> NO2 | 0,19 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,27 | 0,28 | 0,24 |
| NO2 -> NO1 | 3,49 | 3,5 | 3,51 | 3,52 | 3,56 | 3,5 | 3,5 | 3,5 | 3,51 | 3,5 | 3,51 | 4,08 | 3,46 |
| NO1 -> NO5 | 0,14 | 0,18 | 0,18 | 0,18 | 0,1 | 0,18 | 0,18 | 0,18 | 0,18 | 0,18 | 0,29 | 0,23 | 0,21 |
| NO5 - > NO1 | 3,68 | 3,74 | 3,73 | 3,76 | 3,8 | 3,74 | 3,74 | 3,74 | 3,74 | 3,74 | 3,88 | 4,37 | 3,69 |
| NO1 -> SE3 | 6,15 | 6,39 | 6,4 | 6,37 | 6,41 | 6,39 | 6,39 | 6,37 | 6,44 | 6,39 | 7,59 | 7,24 | 6,13 |
| SE3 -> NO1 | 2,44 | 2,52 | 2,54 | 2,52 | 2,47 | 2,52 | 2,52 | 2,52 | 2,54 | 2,52 | 2,87 | 3,05 | 2,69 |
| NO2 -> NO5 | 0,8 | 0,7 | 0,76 | 0,69 | 0,68 | 0,7 | 0,7 | 0,69 | 0,7 | 0,7 | 0,82 | 0,88 | 0,71 |
| NO5 - > NO2 | 1,39 | 1,45 | 1,44 | 1,45 | 1,47 | 1,45 | 1,45 | 1,45 | 1,45 | 1,45 | 1,79 | 1,75 | 1,45 |
| NO3 -> NO4 | 0,84 | 0,87 | 0,87 | 0,88 | 0,89 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 1,2 | 1,08 | 1,03 |
| NO4 -> NO3 | 2,58 | 2,7 | 2,71 | 2,7 | 2,65 | 2,7 | 2,7 | 2,7 | 2,74 | 2,7 | 3,52 | 3,28 | 2,8 |
| NO3 -> SE2 | 4,03 | 4,15 | 4,17 | 4,15 | 4,18 | 4,15 | 4,15 | 4,14 | 4,17 | 4,15 | 5,01 | 5,09 | 4,12 |
| SE2 -> NO3 | 2,41 | 2,49 | 2,5 | 2,5 | 2,45 | 2,49 | 2,49 | 2,49 | 2,5 | 2,49 | 2,84 | 2,97 | 2,66 |
| NO4 -> SE1 | 4,69 | 4,86 | 4,88 | 4,86 | 4,89 | 4,86 | 4,85 | 4,84 | 4,91 | 4,86 | 6,09 | 5,95 | 4,86 |
| SE1 -> NO4 | 2,44 | 2,52 | 2,52 | 2,53 | 2,52 | 2,52 | 2,52 | 2,52 | 2,53 | 2,52 | 2,93 | 2,99 | 2,72 |
| DK2 -> SE4 | 4,98 | 5,07 | 5,09 | 5,08 | 5,02 | 5,07 | 5,07 | 5,06 | 5,1 | 5,07 | 5,67 | 6,1 | 5,47 |
| SE4 -> DK2 | 4,88 | 5,04 | 5,08 | 5,03 | 5,05 | 5,04 | 5,03 | 5,02 | 5,08 | 5,04 | 5,87 | 6,09 | 5,21 |
| SE1 -> SE2 | 0,18 | 0,19 | 0,19 | 0,19 | 0,19 | 0,19 | 0,19 | 0,19 | 0,19 | 0,19 | 0,22 | 0,23 | 0,19 |
| SE2 -> SE1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE1 -> FI | 9,87 | 10,22 | 10,22 | 10,16 | 10,29 | 10,22 | 10,21 | 10,2 | 10,33 | 10,22 | 10,89 | 11,5 | 9,32 |
| FI -> SE1 | 0,03 | 0,01 | 0,03 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 |
| SE2 -> SE3 | 4,85 | 4,99 | 5 | 4,98 | 5,02 | 4,99 | 4,98 | 4,97 | 5,01 | 4,99 | 5,94 | 5,88 | 4,91 |
| SE3 -> SE2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE3 -> SE4 | 4,52 | 4,7 | 4,71 | 4,69 | 4,72 | 4,7 | 4,7 | 4,69 | 4,74 | 4,7 | 5,45 | 5,52 | 4,71 |
| SE4 -> SE3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Average | 2,691 | 2,772 | 2,782 | 2,770 | 2,775 | 2,772 | 2,770 | 2,766 | 2,790 | 2,772 | 3,194 | 3,274 | 2,775 |

Table 1. Summary of assessment from chapter 3 of Annex 2, where results from different historical time series, different time intervals for mark-up value updates and different reference days have been included. Explanation for columns: x = number of days in forecast error calculation, y = mark-up validity period, 30d1d is 30 days history data, 15d1d is 15 days history data, 60d1d is 60 days history data, 120d1d is 120 days history data, 30d7d is7 days validity period, 30d28 is 28 days validity period, 30d1peak is 2 mark-ups per day (peak/off-peak hours), 30d1dD-7 is reference day D-7, 30d1dweighted is reference day D-1 + D-7 - D-8, 30d1dcustom is reference day Mon=D-3, Tue,Wed,Thu, Fri=D-1, Sat, Sun=D-7.