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METHODOLOGY FOR PROCUREMENT OF COUNTERTRADE ENERGY

Contents

ENERGINET
Myndighedsenheden

Annexes

1. Summary

The Danish countertrade practice is based on Danish special regulation, which uses bids submitted to the Nordic power regulation market (NPRM). However, as part of the obligatory transition to trading balancing energy on the European balancing platform MARI from Q3 2024, an Activation Optimisation Function (AOF) will be introduced to the Nordic platform by November 2022. By that date it will no longer be technically possible to carry out Danish special regulation. A new methodology for procurement of countertrade energy must therefore be implemented by then.

The starting point for assessing possible countertrade methodologies has been the concerns and challenges experienced by Energinet when using Danish special regulation for countertrade. Thus, even if it were still possible to use bids submitted to the Nordic platform, challenges and concerns have grown over the past few years, necessitating a re-evaluation of the current practice and a search for a more sustainable methodology to be used going forward.

Fundamentally, the challenges of the current practice revolve around a small market for countertrade energy in the current Danish countertrade practice and the fact that procurement of countertrade energy is made very close to the operational hour.

Having assessed the legal requirements and considerations pertaining to TSOs' procurement of countertrade energy, it can be concluded that they commit TSOs to using marked-based solutions and enhancing competition. In Energinet's assessment, an intraday-based methodology will ensure this. Thus, using the existing intraday market to procure countertrade energy presents itself as an obvious solution to mitigating current challenges and ensuring regulatory compliance.

Early in the process, it was considered whether Energinet should initiate and pursue a Nordic solution, establishing a separate TSO-TSO countertrade market with the other Nordic TSOs. The idea was rejected as it neither garnered support from all Nordic TSOs nor did it consider the deadline for implementation of a new countertrade methodology. Further, it was assessed that, based on the legal requirements and the need for a new methodology, a TSO-TSO countertrade model would not be superior to an intraday-based methodology.

2. Background

2.1 Energinet's current countertrade practice

Procurement of countertrade energy is currently executed in the balancing time frame, using Danish special regulation.

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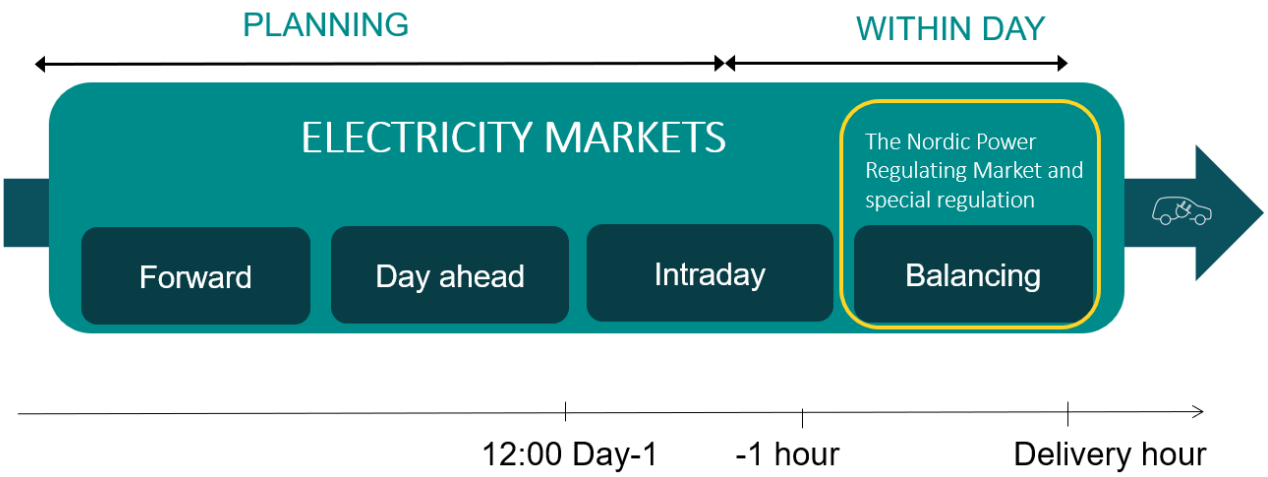
Myndighedsenheden



The basis for Danish special regulation is the Nordic Power Regulating Market (NPRM). In brief, the NPRM operates on the same fundamental principles as the day-ahead market. Balance responsible parties (BRPs) in the Nordic bidding zones submit their bids for upward and downward regulation to the Nordic TSOs, and the bids are combined in a single order merit curve, which forms the basis for TSO activation.

The NPRM currently uses 60-minute market time units (MTUs) and closes for submission of bids 45 minutes before the operational hour. Liquidity in the market is determined close to the operational hour as market participants generally move bids not activated in the intraday market to the NPRM when the intraday market closes (one hour before the operational hour).

"Special regulation" implies that in every hour Energinet's control centre staff manually activate unused balancing bids for upward or downward regulation to cover other needs for energy than balancing, which is done after the NPRM has closed and the marginal price of balancing has been determined,. Bids used for special regulation are settled pay-as-bid above the marginal price of balancing (in case of upward regulation).

The NPRM is designed with the primary purpose of ensuring TSOs a means to balance the system. Its make-up (and the timeframe close to the operational hour) reflects a need to ensure that bids reflect an actual ability to physically regulate power infeed or extraction. For that reason, participation in the NPRM is subject to the fulfilment of the requirements provided in chapter 2.2 of regulation C2[1]. These requirements include the ability to fully activate any bid within maximum 15 minutes from having received an activation order, and bids must include information that enables clear identification of supplier and bid references[2].

Alignment between the Nordic TSOs on their use of mFRR bids submitted to the Nordic Operational Information System (NOIS) is required to ensure sufficient liquidity for balancing purposes. Such agreements have been made between the Nordic TSOs in the System Operation Agreement (SOA)[3] and in the Nordic Balancing Philosophy[4] . Both agreements

[1] Markedsforskrifter | Energinet, also translated here: Regulation C2 The balancing market and balance settlement (1).pdf, however, translations are not updated

[2] See regulation C3, Markedsforskrifter | Energinet

[3] Operations Reports (entsoe.eu), Annex Electricity Balancing

[4] Nordic_Balancing_Philosophy_160616_Final_external.pdf (entsoe.eu)

state that the activation of mFRR for reasons other than balancing needs, e.g. for congestion management, must not influence the Nordic marginal prices in the NRPM, and is thus only permitted if executed as special regulation[5]. Congestion caused by a reduced transmission capacity to/from a bidding zone after day-ahead market closure is explicitly mentioned as an example of the scope of use of special regulation.

The public consultation on "Special regulation as countertrade model on DK1-DE/LU following Joint Declaration" in February - March 2018, states that:

"*Currently, it is neither feasible nor desirable for the other Nordic TSOs to enable the participation of these bids in the special regulation market*[6]" ["these bids" are referring to non-Danish bids in the NPRM to support the JD].

Energinet thus cannot use special regulation bids in the NRPM from market participants located in other countries than Denmark for structural countertrade to specifically accommodate the Joint Declaration and TenneT Commitment (see section 2.2 for more information on the agreements). Energinet can only activate mFRR bids from Danish market participants for special regulation when performing structural countertrade ("Danish special regulation").

Danish special regulation forms the basis for the Danish countertrade practice currently used by Energinet.

2.2 The background to the Danish countertrade practice

The primary purpose of the NRPM is to ensure TSOs sufficient energy for balancing purposes. Special regulation is permitted; it is, however, subject to agreed restrictions/limitations to ensure that the NRPM's primary purpose remains unaffected.

Until 2017, Energinet used special regulation in line with its original purpose, e.g. to remedy unexpected grid congestion. Special regulation was used for countertrade when an interconnector tripped or if faults in the internal grid led to reduced cross-zonal transfer capacity ("unexpected countertrade"). Use of countertrade for such purposes is mentioned in SO GL where countertrade is included on the list of available remedial actions to ensure secure operation of the system[7].

In 2017, the Joint Declaration (the JD) was agreed between Germany and Denmark. This agreement is described in detail in section 2.3.2 and, therefore, it should merely be mentioned here that the JD comprises (i) obligations for TenneT and Energinet to make fixed (but gradually increasing) amounts of transmission capacity on the DK1-DE/LU border available to the market in the day-ahead time frame, and (ii) an obligation to countertrade if more transmission capacity is sold than what can actually/physically be transferred.

After Denmark and Germany entered into the JD, an impact assessment[8] was made to assess different ways to procure the countertrade energy necessitated by the JD. Given the urgency of its implementation and the limited duration of

[5] The use of mFRR bids outside of the merit order list is generally called "special regulation" in the Nordic countries. However, when Energinet uses the term special regulation in relation the procurement or sale of energy to ensure countertrade on Danish borders in the following, it is defined as mFRR bids which are settled pay-as-bid above the marginal price of balancing. Avoiding that these activations directly influence the Nordic marginal prices in the NRPM is possible by using the more expensive unused balancing bids (mFRR bids).

[6] Now in consultation: Special regulation as countertrade model on DK1-DE following Joint Declaration | Energinet

[7] SO GL A 22, 1. (f)a

[8] Energinet and TenneT publish final impact assessment of different countertrade models for DK1-DE | Energinet

the JD (expected expiry in 2020), it was agreed that Energinet was to use Danish special regulation to procure the countertrade energy needed for realization of the countertrade obligations pertaining to DK1-DE/LU.

The fact is, however, that Energinet currently procures significant amounts of energy for structural countertrade in an isolated Danish market, using a tool designed to procure relatively small amounts of energy just before the operational hour.

2.3 The need for a new methodology for the procurement of countertrade energy

2.3.1 Increased countertrade volume

The obligations under the JD implied a rapid increase in countertrade on DK1-DE/LU. For the reasons explained in detail in section 2.3.2 below, the volume of countertrade has continued to increase since.

Almost all the downward regulation activated in 2018-2021 is special regulation as a result of countertrade requests from TenneT.

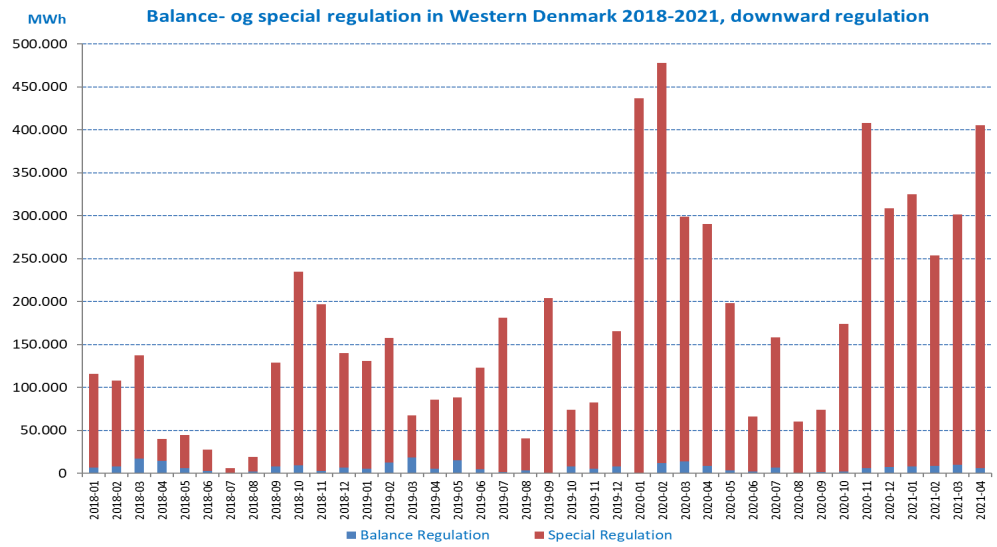


Figure 2: The use of special downward regulation in DK1 after 2017.

2.3.1.1 Operational security

Energinet's control centre performs a range of tasks to ensure secure operation of the Danish grid. The control centre's dedicated task is to ensure secure operation of the grid in the current and next hour.

Manually activating bids constitutes a risk to operational security. If, for example, an upward regulation bid is activated instead of a downward regulation bid, this results in an imbalance in the system.

In the past, Energinet's control centre has been able to downward regulate multiple GWh immediately before the operating hour without faults. Nevertheless, the current level of energy trading performed by the control centre immediately before the operating hour exceeds, in Energinet's assessment, what is prudent, considering the operational security risk.

To the extent possible, for operational security reasons, it is deemed necessary to relieve the control centre of the obligation to manually trade large volumes of energy close to the operating hour or to at least reduce the scope of said task.

2.3.2 Joint Declaration and TenneT Commitment (on DK1-DE/LU)

The JD[9] was made in 2017 between the Danish Ministry of Energy, Utilities and Climate on the one side and the Federal Ministry of Economic Affairs and Energy of the Federal Republic in Germany on the other. It expresses the parties' commitment to ensuring that minimum capacities on DK1-DE/LU are made available to the day-ahead market. The political declaration took effect on 3 July 2017 and remains in effect as a political declaration between Denmark and Germany. However, on 30 April 2021, the Danish Ministry relieved Energinet of its legal obligations under the Joint Declaration[10]

In December 2018, TenneT made commitments to the European Commission to further increase the capacity available to the market on the DK1-DE/LUK border (the "TC"[11]). The TC followed the Commission's initiation of proceedings based on its preliminary assessment of 19 March 2018[12] that TenneT had limited the commercial capacity on the DK1-DE/LU interconnector, resulting in a partitioning of the internal market and discrimination against grid users based on their place of residence.

Since the entry into force of the JD and the TC, Energinet and TenneT have offered agreed amounts of minimum capacity on DK1-DE/LU to the day-ahead market[13]. Under said agreements, if one of the TSOs calculate an NTC lower than the agreed minimum capacity on the border for any given hour, the TSOs shall disregard the calculated NTC for the day-ahead market and place the agreed minimum capacities at the disposal of the day-ahead market.

The obligation to ensure minimum capacities to the day ahead market requires that capacity is made available to the market even when it is evident that the internal grid cannot physically handle the flow in case of full allocation. The JD and the TC specify that the over-allocation, i.e., market allocation which cannot physically flow due to internal grid congestions, can be countertraded by the TSOs.

As Energinet's legal obligation to guarantee a certain capacity and also the obligation to assist with countertrade have been removed from the JD, only the minimum capacities under the TC, see table 1, are relevant.

As TenneT and Energinet have now commissioned the East Coast Project, TenneT's guaranteed hourly NTC will change according to the TC as follows: Using a linear trajectory principle, TenneT's guaranteed hourly NTC will increase in annual steps of equal size, corresponding to the overall increase of the East Coast Line (575 MW)[14]. Thus, TenneT's guaranteed hourly NTC will increase as follows:

9 MINIMUM AVAILABLE HOURLY CAPACITIES FOR DE-DK WEST ACCORDING TO JOINT DECLARATION AND TENNET'S COMMITMENT

10 After the original expiration date was prolonged

11 Kommissionens beslutning fra 7.12.2018: https://ec.europa.eu/competition/antitrust/cases/dec_docs/40461/40461_461_3.pdf

12 Antitrust: Commission opens investigation into German grid operator TenneT for limiting cross border electricity capacity with Denmark

13 MINIMUM AVAILABLE HOURLY CAPACITIES FOR DE-DK WEST ACCORDING TO JOINT DECLARATION AND TENNET'S COMMITMENT

14 Note that the hourly NTC is calculated by taking the minimum of the individually NTC for Energinet and TenneT. TenneTs NTC is calculated daily and can result in a value anywhere between the minimum capacities and the calculated maximum NTC

ENERGINET
Myndighedsenheden

Starting date	New minimum available hourly capacity according to the TC
01/2021	1.396 MW
01/2022	1.492 MW
01/2023	1.588 MW
01/2024	1.684 MW
01/2025	1.780 MW
01/2026	1.875 MW

Table 1: Minimum available hourly capacity due to the finalization of the East Coast Project. TenneT's guaranteed hourly NTC will increase by an additional 750 MW in a linear trajectory with the future commissioning of the West Coast Line.

The TC expires in September 2027[15].

2.3.2.1 Obligation to countertrade under TenneT Commitment

As the TC has been agreed between TenneT and the EU Commission, it does not impose an obligation on Energinet to assist TenneT with countertrade. However, the TC states that TSO have to support each other to the best of their abilities, and it is specifically mentioned that

"*The TenneT Guaranteed Hourly NTC of 1300 MW requires a Phase-in Period to allow TenneT in cooperation with Energinet to implement and apply an adequate countertrading process (…)*[16]"

In its press release[17] on the investigation of TenneTs practices on the DK1-DE/LU border, which lead to Commission Decision of 7 February 2018 to accept TenneT's commitment proposal, the Commission stated that the investigation

"*complements the Commission's effort to address the systematic limitation of cross-border capacity on electricity interconnectors across the EU*"

and further that

"*the Commission has proposed to update the Electricity Regulation as part of the 'Clean Energy for All Europeans' package […]. Among other things, it aims at improving the rules on cross border capacity in order to maximise the capacity made available and to ensure that the TSOs do not unnecessarily limit the volume of cross-border capacity".*

The press release suggests that the TC is closely connected to the obligation imposed in general on TSOs under the Electricity Market Regulation from 2019 (in article 16), i.e. the "70% rule".

15 Kommissionens afgørelse fra 7.12.2018 A1, afsnit 79

16 Commitments Decision in AT.40461 DE/DK, Proposal of Commitments under Article 9 of Council Regulation (EC) no. 1/2003, section 8.

17 Antitrust: Commission accepts Tennet commitments (europa.eu)

The link to the 70% rule implies that Energinet's obligation to assist TenneT with countertrade under the TC is similar to the general obligation on TSOs to assist each other with countertrade under the 70% rule.

2.3.2.2 Nature of countertrade under Joint Declaration and TenneT Commitment

As established in section 2.2, historically, Energinet has primarily procured energy for countertrade purposes due to faults and other unexpected incidents/ special situations in the system.

Countertrade conducted to comply with the JD and the TC is different by nature. The need occurs even when the transmission system is in normal state and becomes known relatively shortly after the day-ahead market closes. On the border DK1-DE/LU, requests for countertrade because of TC are communicated around 15:30 p.m. on D-1 (for all hours of the delivery day).

The above-mentioned type of countertrade, which occurs even when the transmission system is in normal state and becomes known when the day-ahead market closes, is hereinafter referred to as structural countertrade. Countertrade needs that arise due to unexpected incidents in the grid, as mentioned in section 2.2, are referred to as unexpected countertrade hereinafter.

For the sake of clarity, it must be noted that EU regulation and national Danish law do not distinguish between these categories of countertrade.

2.3.3 The 70% rule

In line with the Commission's press release accompanying the announcement of the TC[18], the Electricity Market Regulation introduced the 70% rule. Article 16 reads in excerpt:

4. The maximum level of capacity of the interconnectors and the transmission networks affected by cross- border capacity shall be made available to market participants complying with the safety standards of secure network operation. Countertrading and redispatch, including cross border redispatch, shall be used to maximise available capacities to reach the minimum capacity provided for in paragraph 8. […]

8. Transmission System Operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones. Without prejudice to […] this paragraph shall be considered to be complied with where the following minimum levels of available capacity for cross -zonal trade are reached:

- *(a) For borders using a coordinated net transmission capacity approach, the minimum capacity shall be 70% of the transmission capacity respecting operational security limits after deduction of contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of article 18(5) of Regulation (EC) no 714/2009;*
- *(b) For borders using a flow-based approach, the minimum capacity shall be a margin set in the capacity calculation process as available for flows induced by cross- zonal exchange. The margin shall be 70% of the capacity respecting operational security limits of internal and cross-zonal critical network elements, taking into account*

[18] See section 2.3.2

contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) no. 714/2019. [underlines are added by Energinet].

The regulation thus commits all European TSOs, effective from 1 January 2020, to ensure a certain amount of commercially available transmission capacity on all national borders; and an obligation to use countertrade to maximise available capacities to reach minimum capacity.

2.3.3.1 Consequences of the 70% rule for Energinet countertrade

As a consequence of the 70% rule, Energinet is committed to enable structural countertrade on all of Energinet's national borders, if requested to do so by neighbouring TSOs.

The future volumes, which can be expected to be requested by neighbouring TSOs because of the 70% rule, are difficult to predict. As indicated above in section 2.3.1, volumes depend on grid development, the interpretation of the 70% rule, and the extent to which derogations are granted. The following derogations have been granted to neighbouring TSOs of Energinet:

- Sweden was granted a derogation from the 70% rule for 2021 for their interconnectors: DE/LU, DK1, DK2, LT, NO1 and PL.
- TenneT (Netherlands) was granted a derogation from the 70% rule for 2021, applicable to all Dutch CNECs (Critical Network Elements) included in the CWE and Core day-ahead capacity calculation processes and for all cross-border HVDC cables.
- The Electricity Market Regulation is not applicable in Norway (yet).

Derogations granted are valid for one year, cf. Electricity Market Regulation article 16(9). This indicates that new countertrade requests may come from Svenska kraftnät and Tennet B.V. (the Netherlands) if said TSOs are not granted derogations for 2022 or 2023.

50 Hertz Transmission and Energinet have not applied for a derogation from the 70% rule.

The TC formally expires in 2027. The 70% rule, however, implies a legal obligation for TenneT to maintain 70% commercial availability on DK1-DE/LU after the expiry of the TC. All else being equal, this means that Energinet expects the need for downward regulation in DK1, resulting from structural countertrade requests, to be at similar levels on DK1-DE/LU even after 2028, but to decrease when the German grid is reinforced further, or increase if the volume of renewable energy exceeds the capacity of planned grid expansions.

Energinet may also have structural countertrade needs which needs to be solved by countertrading with its neighbouring TSOs. The 2020 ACER MACZT report, which monitors the margin available for cross-zonal electricity trade in the EU, states that: "*Low levels of relative MACZT are also observed in Denmark (see Figure 15); however, issues with the quality of data provided by the TSO and in the calculation may have led to underestimated MACZT levels for this country*"

In general, Energinet expects volumes of structural countertrade to increase as a consequence of the 70% rule.

ENERGINET
Myndighedsenheden

2.3.3.2 Time frame/markets to apply the 70% rule

The Electricity Market Regulation does not explicitly establish the time frames/markets where TSOs are obliged to make commercial capacity available to comply with the 70% rule.

Energinet assesses that making 70% capacity available in the day-ahead market is regulation-compliant and, in any event, the optimal solution to support the aim of the regulation and the 70% rule itself, i.e. to maximize cross-zonal trading opportunities as a core element in ensuring an efficient internal electricity market[19].

In its Recommendation No. 01/2019 of 8 August 2019 on the implementation of the minimum margin available for cross-zonal trade pursuant to article 16(8) of Regulation (EU) 2019 and pursuant to ACER Regulation article 16(2), ACER establishes guidance for TSOs on the implementation of minimum capacity and for regulatory authorities on methods for monitoring the TSOs' implementation of minimum capacity[20].

It follows from the recommendation[21] that ACER monitors TSOs compliance with the 70% rule only in the day-ahead time frame. This, in turn, indicates that ACER find that the 70% rule is complied with if 70% commercial capacity is made available to the market in the day-ahead time frame.

This finding is further supported by the content of the CCR Core CCM, which was finalized by ACER[22] and only applies the 70% rule to the day-ahead time frame and not the intraday-tidsrammen[23].

Further, in light of the Commission's acceptance of the TC that increases minimum capacities in day-ahead only, Energinet currently has no reason to question if TSOs comply with the 70% rule if the 70% requirement is only applied in the day-ahead time frame.

Consequently, the present intraday methodology is based on this interpretation[24]. Energinet will re-evaluate the methodology in case it turns out that the 70% rule is applicable in intraday, e.g. in relation to the current revision of CACM.

2.3.3.3 Legal obligation on TSOs to countertrade

Pursuant to article 16(4). of the Electricity Market Regulation,

"[…] Countertrade and redispatch, including cross-border redispatch, shall be used to maximize available capacities to reach the minimum capacity provided for in paragraph 8 […]"

The regulation does not detail or specify further the obligation imposed on TSOs to assist one another with structural countertrade or cross-border redispatch. In these circumstances, the nature of the obligation imposed on TSOs must be interpreted in view of the treaty, committing member states to

19 Cross-zonal capacity - 70% target (europa.eu)

20 Recital (4)

21 Relevant excert from the recommendation provided in Annex 1.

22 Annexes to the DECISION OF THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS No 02/2019 (europa.eu)

23 Capacity Calculation Regions (entsoe.eu)

24 See section 4.6.4 for remarks to ACER's CACM 2,0-proposal regarding capacity allocation and capacity constraints.

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Myndighedsenheden

"[..] take any appropriate measure, general or particular, to ensure fulfilment of the obligations arising out of the Treaties or resulting from the acts of the institutions of the Union" and

[…] facilitate the achievement of the Union's tasks and refrain from any measure which could jeopardise the attainment of the Union's objectives."

Thus, the treaty states that Energinet shall apply an appropriate methodology for the procurement of energy for countertrade which reduces the need for Energinet to reject structural countertrade requests.

Even if the principle of proportionality may, in certain circumstances, justify the rejection of countertrade, for example if security of supply or system security is threatened, TSOs shall be committed to, in general, apply a methodology to procure energy for structural countertrade purposes which reduces the risk of having to reject countertrade in normal circumstances.

In this context, it is relevant to consider the volume of Danish bids in the NRPM. On more than one occasion after the entry into force of the JD, incidents have occurred where the liquidity of Danish mFRR bids submitted to the NPRM was insufficient to cover the need for upward regulation due to countertrade in Danish bidding zones.

The following figure shows the duration curve for upward regulation in DK1.

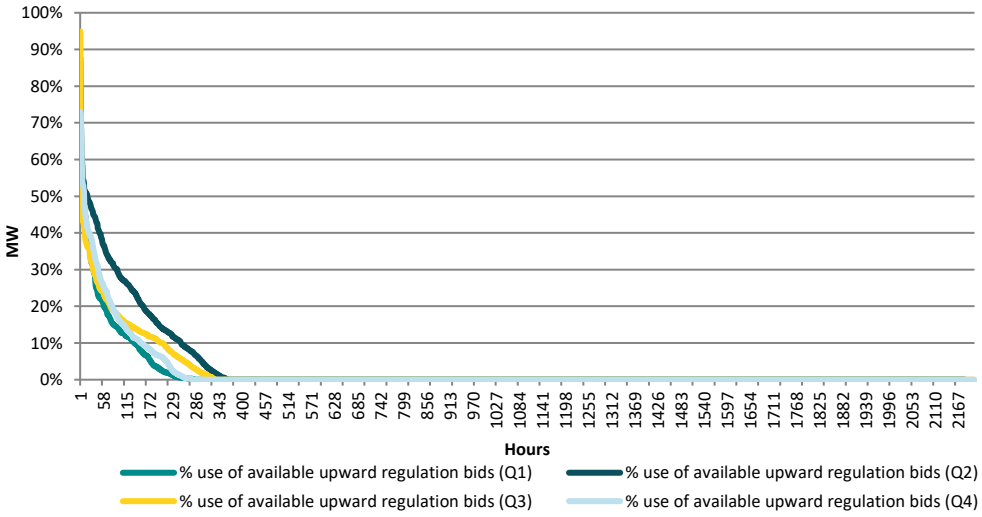

Figure 3: Duration curve of % use of offered upward regulation in DK1.

From 3 July 2020 to 31 August 2020, Energinet was unable to assist Tennet with countertrade under the Joint Declaration when upward regulation was needed in DK1. This was a result of many planned outages of thermal power plants and HVDC connection outages due to faults.

This illustrates that the relatively small market of the current countertrade model entails a risk that insufficient bids lead to rejection of countertrade requests which could potentially be avoided if the market was larger. An identical argument can be made for downward regulation, cf. the following paragraphs.

The following duration curve shows the liquidity of the regulating power market in DK1, and the use in percentages of offered downward regulation. The curve is not split into use for special regulation and balancing.

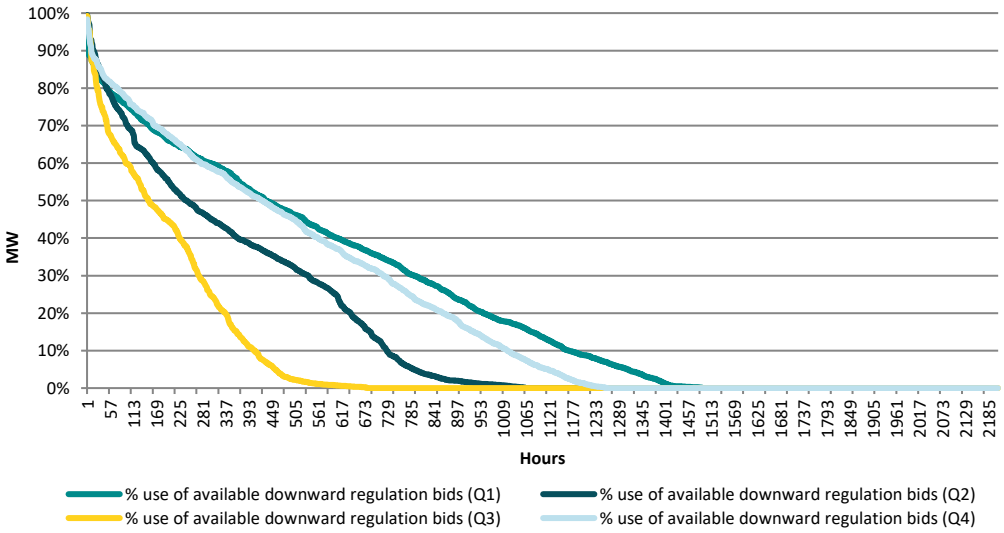

Figure 4: Duration curve of % use of offered downward regulation in DK1.

Figure 4 shows that in 49 hours in Q1, 47 hours in Q2, 25 hours in Q3 and 74 hours in Q4 Energinet activated more than 80% of all offered downward regulation bids in DK1 and that the highest level of bid activation was 99.5% in a single hour. The figure also shows that in almost 700 hours in Q1, more than 1100 hours in Q2, more than 1500 hours in Q3 and almost 1000 hours in Q4 none of the offered downward regulation bids in DK1 were used.

If a larger market with higher bid volumes for downward and upward regulation were to be available, such a market could potentially provide a better alternative with less risk of rejecting countertrade requests.

2.3.4 Prices

The price of downward regulation to accommodate TenneT's countertrade request has increased significantly (become more negative) since 2017:

	2020	2019	2018	2017
Countertrade (downward) requested from TenneT (GWh)	3.901	1.914	1.598	1.210
Netted with Nordic upward balancing need => netting (GWh)	853	602	484	429
Downward regulated by Danish market participants (GWh)	3.048	1.312	1.114	781
Avg. price for all danish downward regulation (Euro/MWh)	-23	-12	-9	-8
Avg. price for netting in the balancing market (Euro/MWh)	17	38	37	27
Avg. Spot price/day ahead market price in DK1/ (Euro/MWh)	25	38	44	30

Table 2: Increasing negative price of Danish downward regulation

The negative prices mean that suppliers of downward regulation are paid for buying energy.

When considering section 2.3.3.3. on the shortage of upward regulation bids in the current Danish special regulation practice, this price development gives rise to a consideration of whether prices would converge close to the day ahead market price if procurement of energy for countertrade purposes were to take place in a larger market.

The annual average spot price and the annual average price of netting[25] in the balancing market are listed in table 2 as reference prices. If there were more participants in the market, price convergence, as seen between the balancing and spot prices, would have occurred for the price of downward regulation as well.

The significant negative price increase indicates that it would be appropriate to look into whether it is possible to include more market participants in the competition for countertrade energy to ensure a more cost-efficient handling of the large volumes of downward regulation due to structural countertrade.

2.3.5 Development of balancing platforms

2.3.5.1 The Nordic platform for balancing energy

As established in section 2.1, the Nordic TSOs have already established a joint market for balancing energy. The prior existence of a joint Nordic balancing model implies that the transition process to the MARI platform needs to be coordinated between the Nordic TSOs.

The Nordic TSOs have agreed on a transition process which implies that changes are made to the current Nordic platform which reflect or equal MARI features and operational rules applicable to MARI to support a swift transition to the European platform and thus the harmonised European balancing market.

Agreed changes include the introduction to the Nordic platform of an Activation Optimisation Function (AOF), which is currently scheduled for November 2022, and the introduction of 15-minute market time units (MTUs), currently scheduled for May 2023.

As of go-live of the AOF, the selection and activation of mFRR energy bids will happen automatically in the Nordic countries. After the implementation of the AOF in the Nordic platform, operators at Energinet's control centre no longer have the possibility to manually activate unused mFRR energy bids for special regulation.

From the implementation date of the 15-minute MTU in the balancing market, the time span between activation platform results and sending activation orders to BRPs will be reduced to only half a minute, and BRPs will have 5 minutes to initiate full activation time[26].

2.3.5.2 MARI platform

Article 20 in the EB GL establishes the procedure for European TSOs' joint development of a European platform for the exchange of mFRR balancing energy, the Manually Activated Reserves Initiative (the MARI platform). Once established, all EU TSOs are obligated to

- *submit all balancing energy bids from all standard products for mFRR;*
- *exchange all balancing energy bids from all standard products for mFRR, except unavailable bids pursuant to Article 29(14);*
- *strive to fulfil their need for balancing from the frequency restoration reserves with manual activation,*

[25] When DK1 or the Nordic synchronous area has a positive system balance, Energinet and the other Nordic TSOs use countertrade energy to reduce the need for upward regulation (netting in the balancing energy market with the system balance). Any residual countertrade energy is after that handled as special regulation. The price of netting in the balancing energy market equals the RK-price in DK1.

[26] See Updated version, September 2021: Implementation guide mFRR EAM – nordicbalancingmodel, Implementation Guide mFRR energy activation market - BSP

cf. EBGL article 20(6).

Planning to apply for a derogation from the deadline for the transition to MARI set forth in EBGL article 20(6), the Nordic TSOs goal is to replace the Nordic platform with the MARI platform by Q2 2024 at the latest[27]. The Nordic TSOs' planned derogation request is justified by the initiatives launched to prepare for the transition from trading on the Nordic platform to trading on MARI, as set out in section 2.3.5.1 (introduction of the AOF and of 15-minute MTU on the Nordic platform). The application for a derogation is expected to be submitted to the Danish utility regulator ultimo January 2022.

The use and detailed design of MARI is influenced by agreements and legislation, including the All TSOs' pricing proposal developed pursuant to EB GL article 30 (1)[28] and the implementation framework (IF) for a European platform including annexes approved by ACER[29]. Further, it is influenced by decisions made by the MARI Steering Committee, i.e. representatives from all EU TSOs, within the applicable legal framework.

Using ACER's draft of a recommendation of 01/2020, the MARI Steering Committee discussed whether and to what extent TSOs should be allowed to use MARI for system constraint purposes.

The Steering Committee decided to exclude energy procured to accommodate structural countertrade from being traded on the platform. It is currently being discussed if MARI will be available to accommodate unforeseen incidents, eg. interconnector faults.

It has been agreed by the MARI Steering Committee that the use of MARI for structural countertrade, restrictions, and limitations, will be codified in a set of operational rules. Content-wise, it is therefore expected that the Steering Committee's above-mentioned decision(s) will be included in a set of operational rules, and that TSOs are thus excluded, by agreement, from using MARI for structural countertrade.

In practice, the MARI interface will work as follows: First, the TSOs collect bids from the balancing service providers (BSPs) and estimate their need for mFRR. Bids and needs are then sent to the platform where the AOF in an auction matches bids and needs, taking into account available cross-zonal transmission capacities. All mFRR product bids in the common merit order list are activated according to merit order. The AOF results are sent back to the TSOs. Based on the results, the TSOs sent activation orders to the BRP´s.

Both scheduled activations based on estimated imbalances and direct activation due to unforeseen incidents are done based on bids submitted to MARI and settled at the marginal price of balancing. The MTU in MARI is 15 minutes.

2.3.5.2.1 Challenges of using Danish special regulation after MARI

Once the Nordic TSOs join MARI, the time span from results being received from the AOF to actual activation will be reduced to only 30 seconds, and the MTU will be 15 minutes, meaning that the process of receiving bids, sending them to MARI and following activating them, will take place four times every hour. For technical/practical reasons, it is not possible to execute Danish special regulation in these circumstances.

27 ROADMAP AND PROJECTS

28 Microsoft Word - ACER Decision on the Methodology for pricing balancing energy (europa.eu)

29 Annexes to the DECISION OF THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS No 03-2020 (europa.eu)

Danish special regulation means that bids used for upward or downward regulation are the surplus bids after TSOs have covered their need for balancing energy. Bids used for Danish special regulation are settled pay-as-bid above the marginal price (in case of upward regulation) and does thus not influence the marginal price for balancing.

The original TSO proposal submitted to ACER[30] included a similar option – i.e. an option to allow the harvest of surplus bids after an MTU and settle these pay-as bid. This option was rejected by ACER, underlining that bids submitted to MARI must be activated following the merit order and must be settled at the marginal price.

ACER's decision does not rule out procurement of countertrade energy on MARI (if activated at the marginal price for balancing). However, such a decision has been made by the MARI Steering Committee.

As stated in section 2.3.5.2, mFRR bids cannot be withheld etc. to be used for structural countertrade.

2.4 Environment and climate

In general, thermal power stations have the highest marginal production costs as they use coal, gas, or biomass to produce power. By contrast, wind turbines have the lowest marginal production costs as wind does not cost anything.

In a large, competitive market with many different production types, wind turbines are therefore typically not competitive when it comes to downward regulation, as producers with a large marginal cost of production would be willing to pay not to produce (keeping in mind that they would earn the profit between the day-ahead market price and the saved cost of not actually delivering). Also, hydropower is expected to be willing to stop production at a price below the day-ahead price, as that would ensure earnings, while saving the water for days with more attractive power prices (low wind production), thereby reducing the need for thermal power on these days.

However, the limited competition in the Danish countertrade practice has led to negative prices, which has made it attractive for wind turbines also to stop production.

	2020	2019	2018	2017
Countertrade (downward) requested from TenneT (GWh)	3.901	1.914	1.598	1.210
Netted with Nordic upward balancing need => netting (GWh)	853	602	484	429
Downward regulated by Danish market participants (GWh)	3.048	1.312	1.114	781
- Reduced production from thermalpower	35%	46%	53%	64%
- Consumption increase by electric boilers	17%	22%	21%	22%
- Reduced production from wind turbines	48%	32%	26%	14%

Table 3: Share of production type regulated downward in the Danish bidding zones to cover requests for countertrade

Whether wind turbines produce power or not does not directly affect CO_2 emissions, as wind turbines do not emit CO_2. However, if hydropower was stopped instead, then the water could be saved for less windy days, thereby reducing the need for generation based on fossil fuels.

[30] All TSOs' proposal on methodologies for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process pursuant to Article 30(1) and Article 30(3) of Commission Regulati (entsoe.eu)

Against that background, it should be examined whether the concentrated market in the current Danish countertrade practice may have resulted in an increase in wind curtailment to cover the increasing need for downward regulation in DK1, and whether the intraday methodology to procure countertrade energy can reduce European CO-emissions. This is assessed in Annex 3.

2.5 Preliminary conclusion

Since the NRPM is set to be harmonised with the rest of Europe as part of the transition to a European-wide balancing energy market, the Danish countertrade practice cannot continue after November 2022 when the Nordic AOF starts parallel operation. By then, it will no longer be technically possible to activate mFRR bids for Danish special regulation after the AOF has run. This implies that a new methodology for procurement of countertrade energy is needed, which by November 2022 can ensure the necessary activations of downward or upward regulation because of countertrade.

As current countertrade volumes will not decrease in the near future and procuring said volume using the Danish countertrade practice is suboptimal, the problems must be addressed and solved (or at least reduced) in the new methodology for procurement of countertrade energy.

The problems may be grouped as follows:

- The current market for structural countertrade energy is small; liquidity is a growing concern, and prices are negative, suggesting that more market participation and more competition would be desirable
- Climate and environmental concerns
- Pressure on the control centre has increased, leading to a growing acknowledgement of the fact that measures are necessary to reduce the risk of errors[31].

The methodology for procurement of countertrade energy must also take into account the "new" basis for countertrade, i.e. the 70% rule, which means that Energinet must be able to receive and handle requests for large volumes of structural countertrade from all neighbouring TSOs.

3. Legal basis for the countertrade methodology

3.1 EU law

The Lisbon Treaty article 4, 3. reads:

"Pursuant to the principle of sincere cooperation, the Union and the Member States shall, in full mutual respect, assist each other in carrying out tasks which flow from the Treaties.

The Member States shall take any appropriate measure, general or particular, to ensure fulfilment of the obligations arising out of the Treaties or resulting from the acts of the institutions of the Union.

The Member States shall facilitate the achievement of the Union's tasks and refrain from any measure which could jeopardise the attainment of the Union's objectives." [underlines added by Energinet].

Recital (2) of the Electricity Market Regulation[32] reads:

[31] As the relief immediately offered by implementation of the AOF in the Nordic Balancing Platform will not become effective since the Nordic Balancing Platform cannot be used for structural countertrade.

[32] The European parliament and the Council regulation (EU) 2019/943 of 5. June 2019 on the internal market for energy

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"The Energy Union aims to provide final customers – household and businesses – with safe, secure sustainable, competitive and affordable energy [..]"

Article 2 no. 27 of the Electricity Market Regulation defines countertrade as

"a cross-zonal exchange initiated by system operators between two bidding zones to relieve physical congestion"

It follows from article 16 1-2, 4 and 8 of the Electricity Market Regulation that

"1. Network congestion problems shall be addressed with non-discriminatory market-based solutions which give efficient economic signals to the market participants and transmission system operators involved. Network congestion problems shall be solved by means of non-transaction-based methods, namely methods that do not involve a selection between the contracts of individual market participants. When taking operational measures to ensure that its transmission system remains in the normal state, the transmission system operator shall take into account the effect of those measures on neighbouring control areas and coordinate such measures with other affected transmission system operators as provided for in Regulation (EU) 2015/1222.

2. Transaction curtailment procedures shall be used only in emergency situations, namely where the transmission system operator must act in an expeditious manner and redispatching or countertrading is not possible. Any such procedure shall be applied in a non-discriminatory manner. Except in cases of force majeure, market participants that have been allocated capacity shall be compensated for any such curtailment.

[…]

4. The maximum level of capacity of the interconnections and the transmission networks affected by cross-border capacity shall be made available to market participants complying with the safety standards of secure network operation. Countertrading and redispatch, including cross-border redispatch, shall be used to maximise available capacities to reach the minimum capacity provided for in paragraph 8. A coordinated and non-discriminatory process for cross-border remedial actions shall be applied to enable such maximisation, following the implementation of a redispatching and counter-trading cost-sharing methodology.

[…]

8. Transmission system operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones. Without prejudice to the application of the derogations under paragraphs 3 and 9 of this Article and to the application of Article 15(2), this paragraph shall be considered to be complied with where the following minimum levels of available capacity for cross-zonal trade are reached:

(a)for borders using a coordinated net transmission capacity approach, the minimum capacity shall be 70% of the transmission capacity respecting operational security limits after deduction of contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009;

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(b)for borders using a flow-based approach, the minimum capacity shall be a margin set in the capacity calculation process as available for flows induced by cross-zonal exchange. The margin shall be 70% of the capacity respecting operational security limits of internal and cross-zonal critical network elements, taking into account contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009.

The total amount of 30% can be used for the reliability margins, loop flows and internal flows on each critical network element." [underlines added by Energinet].

Further, it follows from the Electricity Market Regulation article 59, 1. and 1.b) that

"*The Commission is empowered to adopt implementing acts in order to ensure uniform conditions for the implementation of this Regulation by establishing network codes in the following areas:*

[…]

b) capacity-allocation and congestion-management rules implementing Article 6 of Directive (EU) 2019/944 and Article 7 to 10, Articles 13 to 17 and Articles 35 to 37 of this Regulation, including rules on day-ahead, intraday and forward capacity calculation methodologies and processes, grid models, bidding zone configuration, redispatching and countertrading, trading algorithms, single day-ahead and intraday coupling, the firmness of allocated cross-zonal capacity, congestion income distribution, cross-zonal transmission risk hedging, nomination procedures, and capacity allocation and congestion management cost recovery;" [Underlines added by Energinet]

It thus follows explicitly from the Electricity Market Regulation, which is directly applicable in Denmark, and which imposes obligations on Energinet as designated Danish TSO, that capacity constraints, including congestion, must be handled using non-discriminatory market-based solutions and must be solved by means of non-transaction-based methods, i.e. methods that do not involve a selection between the contracts of individual market participants.

Further, Energinet shall ensure a maximum level of capacity on interconnections and the transmission grids affected by cross-border capacity and said capacity must be made available to market participants. Redispatch and countertrade, including cross-border redispatch, must be used to maximise available capacities to reach the minimum capacity (70%).

To enable such maximization, a coordinated and non-discriminatory procedure must be applied. Reference is also made to Article 1 on the subject matter and scope of the Electricity Market Regulation, establishing the aim of the Regulation as setting the basis for an efficient achievement of the objectives of the Energy Union and, in particular, the climate and energy framework for 2030 and fundamental principles for well-functioning integrated electricity markets which allow all resource providers and electricity consumers non-discriminatory market access, empower consumers, ensure competitiveness on the global market as well as demand response etc. and set fair rules for cross-border exchanges in electricity, thus enhancing competition within the internal market for electricity, and facilitate the emergence of a well-functioning and transparent whole-sale market.

The above must be read with the Regulation recital (27) in mind, which states that:

"Uncoordinated curtailments of interconnector capacities increasingly limit the exchange of energy between Member States and have become a serious obstacle to the development of a functioning internal market for electricity […]*"*

3.2 National law

The legal framework for Energinet's activities, including procurement of energy to countertrade, is established in the Danish Electricity Supply Act section 1[33]:

"1. The purpose of the act is to ensure that the national power supply is organized and carried out considering security of supply, social economy, environment, and consumer protection. Within this framework, the act must ensure consumers access to cheap power and maintain consumers' possibility to influence administration of the values in the power sector.

Subsection 2. In accordance with the aims set forth in section 1, the act must, in particular, promote sustainable energy use, including energy consumption reduction and the use of combined heat and power, renewable energy and environmentally friendly sources, and ensure the efficient use of financial resources, and establish competition on markets for power production and trade, aggregation and energy storage."

The legal basis for procurement of countertrade energy is found, among other things, in section 27 a:

"Subsection 1. Energinet is responsible for ensuring the established level of security of (power) supply and for monitoring the development thereof.

Subsection 2. When procuring energy and other services to ensure the established level of security of (power) supply, Energinet applies market-based methods, cf. the rules established pursuant to section 27d, subsection 1, 2. sentence. If only one provider can provide the services described in subsection 1, Energinet shall pay the regulated price."

Consequently, the responsibility for the security of supply in Denmark rests with Energinet, that procures services for countertrade to fulfil that responsibility, including ensuring stable and secure power system operation. Authority is provided by the Minister of Climate, Energy and Utilities, subject to his supervision, cf. Danish Electricity Supply Act sections 27a and 51, and the Danish Act on Energinet[34]. Pursuant to the Danish Electricity Supply Act section 51, the Minister (Danish Energy Agency[35]) supervises compliance with the Electricity Market Regulation.

Further, pursuant to the Danish Electricity Supply Act section 28, subsection 2 no. 3, Energinet must, when performing its activities

"cooperate with the other countries' responsible system operators on the establishment of mutual, equal principles for power supply and on tariffs, access and transit, market issues etc., coordinate transmission connections, hereunder the handling of balancing and capacity issues, and enter into necessary joint agreements on system operation, thus ensuring exploitation of the benefits of interconnected systems."

[33] Regulation nr. 984 of 12. May 2021 on security of supply

[34] Regulation nr. 118 of 6. February 2020 on Energinet with further amendments

[35] Some ministerial obligations in the Danish Electricity Supply act are delegated to the Danish Energy Agency in accordance with "regulation no. 1068 of 25. October 2019 on the tasks and powers of the Danish Energy Agency

Further, under the Danish Electricity Supply Act, it is a fundamental requirement that Energinet makes use of transparent, non-discriminatory, and market-based solutions when procuring energy to perform its tasks, cf. the Danish Electricity Supply Act section 18, subsection 1, no. 16. The requirement is repeated in the Executive Order on transmission system operation and the use of the power transmission grid etc. section 19, subsection 4[36].

Furthermore, pursuant to the Danish Electricity Supply Act section 31, subsection 1, Energinet must

"[…] support, when performing its activities, the best possible conditions for competition in the markets for power generation and power trade, cf. section 1 subsection 2".

It thus follows from the Danish Electricity Supply Act that Energinet is committed, in its activities, including when countertrading, to applying the methodology which provides the best possible conditions for competition in the power generation and power trade markets. Based on fundamental principles of competition law, this implies a commitment to ensuring access for as many participants as possible, the optimal supply situation, and, thereby, the most intense competitive situation.

This is in line with the considerations listed in section 2, subsection 1 in the Danish Act on Energinet which commits Energinet to include considerations on security of supply, climate, and environment as well as transparency and equal access for all users of the system and efficiency in its operational duties. It is further supported by the legislative material pertaining to the Danish Act on Energinet, which, in excerpt, reads[37]:

"The purpose of this rule is to highlight considerations and requirements which Energinet is committed to consider and balance when performing its activities.

[…]

The provision establishes security of supply as a superior consideration for Energinet, however the provision does not impose specific obligations on Energinet in respect of means to ensure security of supply. Such specific requirements are included in the Danish Electricity Supply Act and the Danish Natural Gas Supply Act.

The provision further implies that Energinet in general includes considerations on climate and environment in its administration. Energinet shall include its climate footprint in its general considerations. Thus, to the extent possible, operation and expansion of the energy infrastructure must be based on climate friendly technologies. Likewise, Energinet shall be committed to focus on the effects in respect of the climate objectives, also when performing other activities.

[…]

As a fundamental consideration, Energinet shall also ensure efficiency in its administration. Efficiency means a cost-efficient administration as well as socio-economic performance of its tasks.

It follows from the above excerpts, that Energinet shall balance the numerous considerations included in the Danish Electricity Supply Act and the Danish Act on Energinet as well as EU-legislation when performing its tasks, which include

[36] The Danish Electricity Supply Act no. 2245 of 29. December 2020 section 18.

[37] Provision nr. 99 of 12. November 2020 on the Danish Act on Energinet, the Danish Electricity Supply act and the Act the Danish Natural Gas Supply Act,

procurement of services to enable countertrade; Also, Energinet shall be committed, in general, to aim at accommodating the set climate objectives.

3.3 Relevant considerations in respect of the methodology for countertrade

As established in the above section, Energinet, in its role as Danish TSO, is committed to ensuring the level of security of supply set by the Minister, cf. the Danish Electricity Supply Act section 27a and the Danish Act on Energinet section 2, subsection 1.

If more options are available to procure the energy needed for countertrade, Energinet shall base its choice between them on the application and balancing of the other considerations mentioned above.

To that end, it must be noted that establishing competition, which also extends beyond national borders within the EU, is a profound requirement under EU legislation. This also applies to countertrade as mentioned in the Electricity Market Regulation. Thus, if more methodologies are equally appropriate in terms of security of supply, Energinet shall be committed to ensuring that the competitive situation, offered by the respective possible methodologies, is taken into consideration. Energinet must support the solution which, without prejudice to the outcome of the other relevant considerations, gives all relevant resource providers non-discriminatory access to participation. Finally, Energinet must promote cross-border competition, cf. also the Danish Electricity Supply Act section 31.

Further, the Danish Electricity Supply Act seems to presuppose that competition considerations further demand socio-economic efficiency. That would be in line with general competition principles. Socio-economic efficiency is thus also a consideration when selecting a new countertrade methodology.

Competition and well-functioning markets must benefit final consumers' energy price.

Finally, the recent re-wording of section 1 in the Danish Act on Energinet[38] commits Energinet to consider climate in its task performance; thus, climate must also be taken into consideration when deciding on a new methodology for countertrade.

4. The intraday methodology

With the methodology for procurement of countertrade energy, Energinet will buy or sell countertrade energy in the intraday market. This will make Energinet a significant player in the intraday market, making it important that the methodology is compliant with the REMIT regulation as described in section 5.10.1.

Within this regulatory framework, Energinet has different options when it comes to when and how often countertrade can be requested, how capacity adjustment on the border is done, how much information is published to the market, the degree of automation, trading times and trading strategy. This is described in the following.

4.1 Scope of the methodology

The methodology covers Energinet's procurement of countertrade energy.

[38] https://www.retsinformation.dk/eli/lta/2020/2211

Countertrade means a cross-zonal exchange initiated by system operators between two bidding zones to relieve physical congestion. The methodology is therefore to be used when Energinet buys or sells energy in DK1 and DK2 to relieve bottlenecks in the electricity grid on the request of a neighbouring TSO. This applies for both structural and unexpected countertrade requests.

The methodology also applies when Energinet requests an adjacent TSO to assist with countertrade.

Regardless of whether Energinet or a neighbouring TSO is the requesting TSO, the methodology only covers the procurement by Energinet of countertrade energy on the Danish side of the border. The methodology does not cover how the counterparty chooses to procure countertrade energy on their side of the border.

The existence of structural countertrade and unexpected countertrade makes it necessary to consider if the same countertrade process should be applied to both types. The table below illustrates which types of countertrades are within the scope of proposal. In short, only countertrade needs which can be procured in the intraday market are within the scope of the proposal The process for procurement of structural and unexpected countertrade is not the same.

Other countertrade needs are handled as imbalances.

	Structural	Unexpected
Countertrade needs arising close to IDGCT (**cannot be handled in intraday using the methodology**).	~~If TSOs, for example due to their planning process, request countertrade later than the defined times for requesting CT set by Energinet.~~	~~The trip of an interconnector or internal critical network element (CNE) cannot be countertraded in the intraday market for the first couple of hours after the trip as IDGCT is one hour before operational hour.~~
Countertrade needs known well ahead (**can be handled in intraday using the methodology**). ID GCT is one hour before the operational hour.	Countertrade needs deriving from Tennet Commitment and the 70% rule, which is requested prior to the deadline for requesting structural CT.	A need for CT as a result of a trip of an interconnector or internal critical network element (CNE) may be requested when the need occurs and is countertraded in the intraday market for all requested hours (D-0) which can be traded before ID GCT.

Table 4: The scope of the intraday methodology is limited to countertrade needs which can be traded in the intraday time frame. Countertrade must be requested approximately 2 hours before the operational hour to be traded on intraday.

4.2 The intraday market

The Danish intraday market is, through the single intraday coupling, connected to a large number of European intraday markets (SIDC). This cross-zonal European intraday market uses implicit cross-zonal capacity allocation which allows continuous matching of bids and offers (hereafter just referred to as bids) entered by market participants in any bidding zone with bids submitted in any bidding zone, to the extent that necessary cross-zonal transmission capacity is available in the intraday market.

Market participants can either (i) enter a bid in the order book or (ii) accept bids already entered. Bids already placed in the system will be settled at the entered price (pay-as-bid) when matched with a newly entered bid.

The implicit capacity allocation implies that cross-zonal trades trigger an adjustment of the "already allocated capacity" (AAC)[39] on the concerned interconnectors, thus the available capacity is adjusted continuously as trades take place. For example, if an interconnector has 1000 MW southbound and 1000 MW northbound available capacity in the intraday market and a 500 MW trade is made in the southbound direction, then available capacity on the interconnector is instantly updated to 500 MW southbound and 1500 MW northbound.

4.3 Detailed description of the methodology

The current section 4.3 describes the intraday methodology in chronological order from a TSO's request for countertrade is received by Energinet to trading in intraday and finally ending with the settlement.

Please note that unless otherwise explicitly stated, the procedure in this section must be read mutatis mutandis to describe Energinet's procurement of countertrade energy in DK1 and DK2 for its own needs.

4.3.1 Methodology design basics

Based on requests for countertrade from a neighbouring TSO, Energinet will trade the countertrade energy in the intraday market by following an active trading strategy where volumes requested in one slot can be traded during the entire trading slot and not just at one specific time.

Structural countertrade and unexpected countertrade are handled according to different procedures.

For structural countertrade, the requesting TSO will face specified request gate closure times (14.30 (D-1)) for the first slot. Following these GCTs for requests, a "trading slot" will open in which Energinet will be active in the intraday market (say 15.00 D-1 to 22.00 (D-1))[40] for a specific subsequent traded period (hours 1-24 (D))[41]. The number of GCTs and thus slots, slot lengths, and traded periods will be arranged between the TSOs and will not be publicly available. Examples of how this could be set up with 2 or 3 slots are provided in Figure 5 and Figure 6.

The transition from 1-hour MTU to 15 minutes MTU mentioned in section 2.3.5.1 does not necessitate changes to timings of the slots for requesting countertrade. The trading period will however consist of 96 quarters instead of 24 hours.

For unexpected countertrade, the procedure is more flexible. Countertrade can be requested at any given time. Energinet needs approximately two hours to be able to trade the energy in the intraday market. This ensures half an hour to receive, confirm and publish the volumes, and another half an hour to trade the energy in the intraday market. In total one hour before ID GCT[42]. Energinet will procure countertrade energy in the intraday market for as many hours the requesting TSO finds it necessary. Requests for unexpected countertrade less than two hours before ID GCT will be handled as a system imbalance.

The bids placed by (or on behalf of) Energinet in the intraday market will be non-complex hourly (or quarter-hourly bids after the transition to 15-minute MTU, see 2.3.5.1). Energinet can be active in the intraday market as soon as capacity is

[39] See annex 5 for abbreviations and definitions

[40] Illustrated with turquoise and called trading slot in figure 5 and 6

[41] Illustrated with red and called traded period in figure 5 and 6

[42] ID GCT is the gate closure time in intraday for submission of bids (see generally annex 5 for abbreviations and definitions). In intraday GCT is 1 hour before the operational hour.

released on the Nordic borders at 15:00 (D-1). Structural countertrade requests must be submitted by 14.30 (D-1) for the traded period (H1-H24 (D)). Updates to the countertrade volumes can be requested until half an hour before to the trading slots (but only for hours which are possible to trade in that slot).

In principle, it would be possible to trade all countertrade energy continuously from the opening of the intraday market until an hour before ID GTC. However, Energinet will not procure structural countertrade continuously as TSOs need to perform manual processes following any MTU in which it has procured energy for countertrade purposes. As Energinet assesses that this is more cumbersome than the added value warrants, a design choice has been made to trade structural countertrade energy in defined slots during the continuous intraday trading and thereby limit the need for manual adjustments.

Below are two illustrations of how these slots for structural countertrade could be executed operationally (figure 5 illustrates the operational execution in case of two slots, and figure 6 in case of three slots.

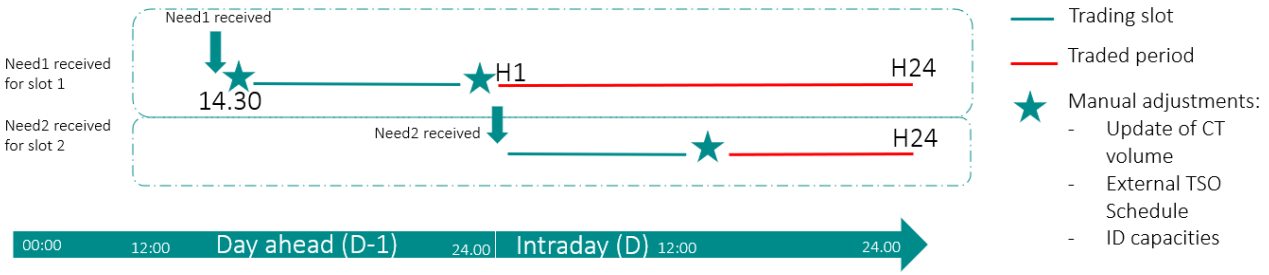

Figure 5: An illustration of the interdependencies between the request for countertrade, trading slots, manual adjustments, and update of countertrade volume if two slots are applied.

With two slots, it will be possible to request countertrade at 14.30 and then further possible to update the need for countertrade once within the operational day. This implies that the requesting TSOs will be able to update the requested volume for some hours (traded period in slot 2, eg. (T10-T24) in the operational day, while not for all hours during the operational day (T1-T24).

In case not all was traded, or an additional CT volume has been received after a trading slot, the updated CT volume is transferred to the next slot and will trigger an update of the external TSO schedule and an update of the SDIC capacities on the relevant border (marked by a star in figure 5 & 6, and described in section 4.3.2).

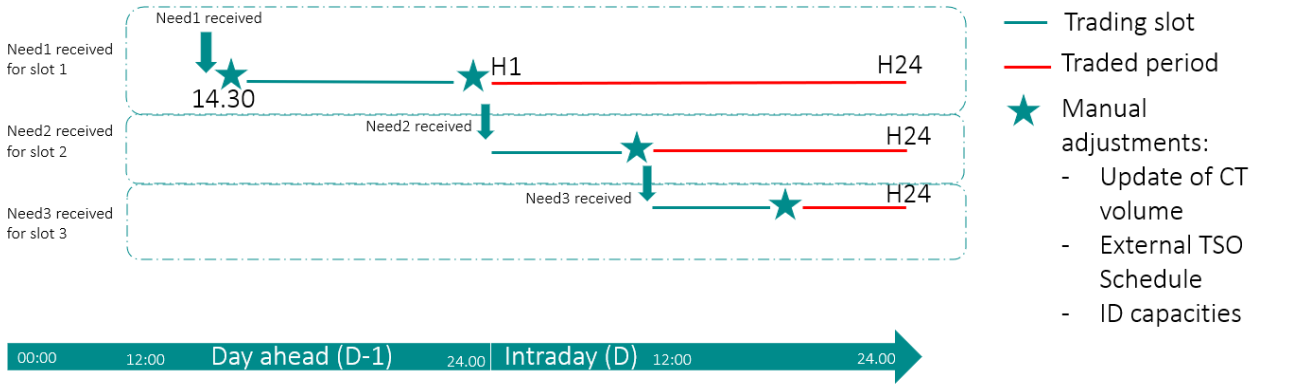

Figure 6: An illustration of the interdependencies between the request for countertrade, trading slots, manual adjustments, and update of countertrade requests if three slots are applied.

With three slots, it will be possible to request countertrade at 14.30 and then further possible to update the need for countertrade twice within the operational day (marked by the stars in slot 1 and 2). It is thereby possible to update the countertrade request for the last hours on the operational day, which was requested 14.30 (D-1) twice during the operational day.

The increased flexibility gained with three time slots in terms of one more opportunity to update the countertrade request, and the prospect of trading countertrade volumes in several slots (only applicable for the last hours of the day), must be considered in relation to the associated increased workload of the operator (described in sections 4.3.2.3 and 4.3.2.6). The number of slots for structural countertrade will be decided upon together with the neighbouring TSO.

Trading will be initiated after 15:00 (D-1) once it has been checked that capacity has been released on the Nordic borders.

4.3.2 Procedure for handling structural requests for countertrade

In the following, all the steps and manual adjustments from receiving the countertrade request until trading time can begin are described. There will be a minimum of half an hour from the request until the trading slot opens.

Figure 7: Illustrates that in the following sections the request of countertrade and the manual adjustments prior to trading are described

4.3.2.1 Structural countertrade requests from neighbour TSOs

When the day-ahead market closes at 12:00 on the day ahead, and once the market coupling results (commercial schedules) have been received by the TSOs, the TSOs know how much capacity has been allocated in the day-ahead market, making assessment of the need for structural countertrade possible.

A requesting TSO must request structural countertrade for the first slot no later than 14.30 to allow for coordination and validation of the countertrade volumes before publishing and trading as detailed in the following sections.

Subject to the choice of the requesting TSO, unmatched volumes in the first slot also relevant to the second slot may be transferred to the second slot. A requesting TSO may also, at its own discretion, choose to countertrade part of its need in the first slot and the remaining need in the second.

At the end of the final trading slot, Energinet will withdraw unmatched bids for the hours and inform the requesting TSO that the volumes could not be traded. The requesting TSO must then reduce the countertrade and take operational measures to ensure operation within security limits.

4.3.2.2 Acceptance of countertrade volumes

Following the request for countertrade, the requesting TSO will update external TSO schedules. Energinet uses the updated external TSO schedules to confirm the requested countertrade volumes.

Energinet's acceptance of a countertrade request implies confirmation to the requesting TSO that Energinet will place a bid for the said amount of energy in the market in accordance with the request. Prior to confirmation, Energinet will assess that the countertrade request does not pose a threat to system security.

Energinet's acceptance and confirmation of a countertrade request does not guarantee that the requested energy volumes are, in effect, traded. This is only ensured if, and when, the bid placed by Energinet is matched. As such, the countertrade is not firm until Energinet communicates this to the requesting TSO.

4.3.2.3 Update of external TSO schedule

Countertrade impacts the intended cross-zonal flow which must be reflected in the external TSO schedule to provide operators with a correct expectation of the later flow.

Energinet will update the external TSO schedules after accepting countertrade request and only adjust the schedules and capacities in case the requested countertrade volumes could not be traded, or if updates/new countertrade requests are received in any of the slots.

SIDC and market participants do not have access to external TSO schedules. External TSO schedules are operational time series used to forecast the balance of the system.

ENERGINET
Myndighedsenheden

4.3.2.4 Publication of volumes prior to trading

Following the confirmation to the requesting TSO (section 4.3.2.2) and the update of external TSO schedules (section 4.3.2.3), Energinet will publish volumes to notify market participants. Volumes will be published by Energinet at least ten minutes before trading is initiated, i.e. at least ten minutes before the initiation of trades in each slot.

4.3.2.5 Netting of countertrade requests

If there are two requests for countertrade in the same hour and in the same Danish bidding zone, these two countertrade needs must be netted before trading is initiated.

The reference price used for netting will be the Danish DA price in the bidding zone where countertrade is requested.

Thus, if Energinet receives a request from TenneT for downward regulation in DK1 and a request from Statnett for upward regulation in DK1, respectively, for the same hour, both requests will be published on the publication platform prior to trading in SIDC. However, the requests will be subtracted from one another before bids are submitted to SIDC.

The settlement price used for netting is the day ahead-price in the bidding zone where countertrade was requested.

4.3.2.6 Capacity adjustment prior to submission to SIDC

As a result of implicit capacity allocation described in section 4.2, the requesting TSO must adjust the capacity on the interconnector, and the adjusted capacities must be submitted by the appointed[43] TSO (or Regional Security Coordinator on specific interconnectors for some interconnectors), before Energinet initiates the procurement of countertrade energy in SIDC. If the capacity adjustment does not take place, then countertrade in the opposite direction of the market flow, trigger a re-release of capacity in the market flow direction undermining the countertrade, and thus does not lead to a reduced flow on the interconnector.

The submission of capacities to SIDC after the day-ahead market closure is handled differently on Danish borders[44]. Procedures for submission of capacities are agreed upon between adjacent TSOs.

However, with regards to adjusting capacity (NTC and AAC) to account for countertrade prior to sending the capacity to SIDC, there is currently only a solution in place on DK1-DE/LU.

4.3.2.6.1 Current capacity adjustment solution on DK1-DE/LU

On DK1-DE/LU, the following solution for adjusting the capacity in relation to countertrade is in place. The solution will be replaced by a new capacity adjustment solution (see section 4.3.2.6.2).

The formula for calculating available transfer capacity is ATC = NTC – AAC[45].

[43] Appointed TSO means the TSO which is responsible for sending the calculated NTC and AAC to SIDC on each border.

[44] The Nordic Operational Information System, NOIS, submits capacity to SIDC on all Nordic borders. Energinet submits capacities for DK2-DE, whereas TenneT (Germany) and TenneT (Netherlands), respectively, submit capacity to SIDC on DK1-DE/LU and DK1-NL. This implies that if Energinet submits the NTC on DK1-DE/LU or DK1-NL, coordination with TenneT (Germany) and TenneT (Netherlands), respectively, is required, as these TSOs must manually update the capacities submitted to SIDC. If Energinet updates NTC on DK2-DE, no further coordination is needed, as Energinet already has capacities from 50Hertz.

[45] See abbreviations and definitions in annex 5

Countertrade will generally be needed when physical NTC is below the day-ahead AAC which, all else equal, will lead to the calculation of a negative ATC.

An example of how capacity is currently adjusted for countertrade on DK1-DE/LU

TenneT has calculated the physical NTC to be 600 MW; however, due to the 70 % rule, capacity provided to the day-ahead market must be at least 1100 MW.

SDAC: Energinet and the adjacent TSO submit NTC = 1100 MW to day-ahead, and 1000 MW is allocated (AAC = 1000MW).

SIDC: The requesting TSO uses the physical NTC, calculated to be 600 MW.

Countertrade: 400 MW countertrade is requested by the requesting TSO to reduce the flow to 600MW in the market flow direction.

SIDC: The requesting TSO submits the physical NTC of 600 MW NTC_{ID} to SIDC, and SIDC calculates (600 MW - 1000MW) = - 400 MW ATC_{ID} in SIDC in the day-ahead market flow direction.

Note that 2100 MW (1100+1000 MW) will still be made available to the intraday market in the opposite direction of the market flow. This means that, with the current capacity adjustment solution, too much capacity is made available in the opposite direction, as the actual capacity available is reduced to 1700MW (1100+600) due to countertrade.

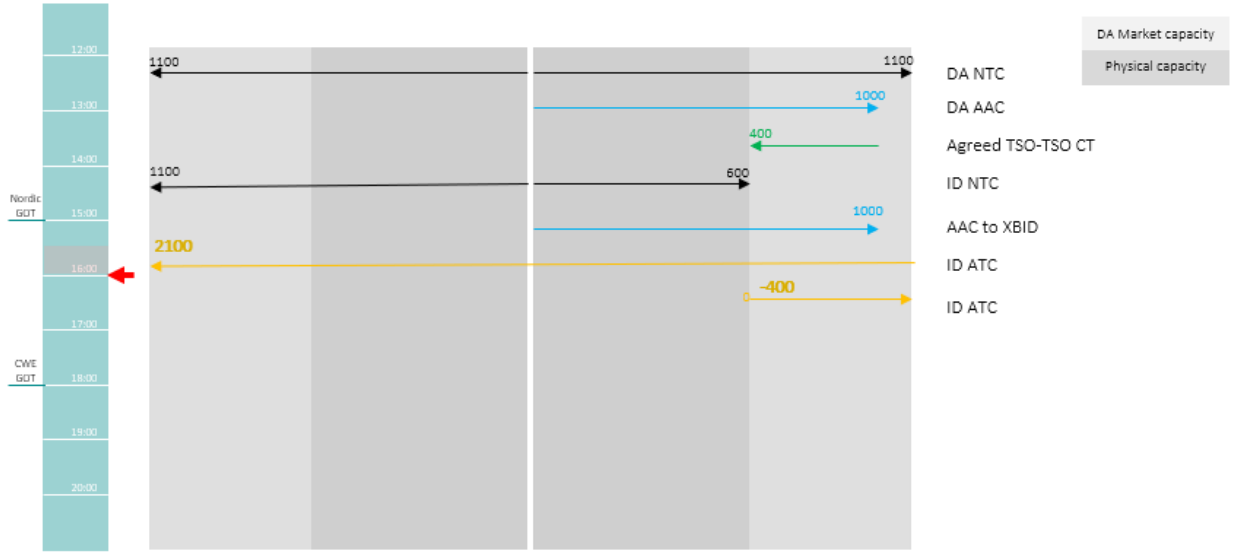

Figure 8: SIDC will calculate a negative available transfer capacity (ATC) of -400 MW in the intraday market, when net transfer capacity submitted to intraday (ID NTC) is adjusted to 600 MW.

In Figure 8 above, the blue arrows (AAC_{DA}) show the DA flow direction. The black arrows illustrate the net transfer capacity for both day-ahead (NTC_{DA}) and intraday (NTC_{ID}), and after the countertrade only 600 MW will flow in the market flow direction. -400 MW (yellow arrow) available transfer capacity is left for the intraday market in the market flow direction. In the opposite direction, 2100 MW (yellow arrow) is available for the intraday market.

ENERGINET
Myndighedsenheden

4.3.2.6.2 New capacity adjustment solution

Due to the disadvantages of the current capacity adjustment solution for the bidding zone border DK1-DE/LU described in section 5.10.5, Energinet and TenneT have agreed to transition to the solution described in this section (the "new capacity adjustment solution) subject to the conditions set out in section 4.3.2.6.2.1.

When adjusting the capacity for the intraday market, adjustments can either be made to the NTC, the AAC or both, as the formula for calculating the available transfer capacity is ATC = NTC – AAC, as mentioned in 4.3.2.6.1.

The above-mentioned practice, updating the NTC_{ID} to the actual physical capacity in the intraday timeframe, will also be used in the new solution. In addition, the AAC_{ID} will be adjusted to account for the agreed countertrade. This will ensure that SIDC will calculate 0 MW ATC_{ID} (instead of a negative ATC_{ID}) if the requested countertrade equals the difference between AAC_{DA} and NTC_{ID}.

Below is an example of how the solution will work:

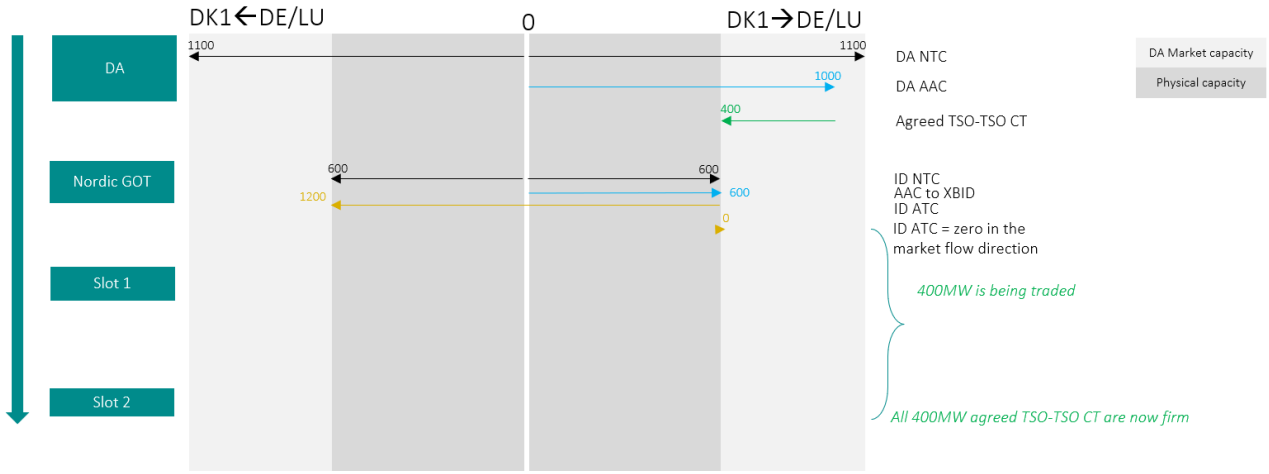

Figure 9: ATC_{ID} is 0 MW in the market flow direction after taking countertrade into account. The capacity in the opposite direction of the market flow is 1200 MW, as there is a physical flow in the market flow direction of 600 MW.

In the example illustrated in Figure 9, the AAC_{ID} sent to SIDC (the blue arrow) is 600 MW and the net transfer capacity (NTC_{ID}) sent to SIDC (the black arrow) is 600 MW, as the calculated physical NTC_{ID} is 600 MW and the AAC_{ID} is adjusted for the requested countertrade of 400 MW. The result is that available transfer capacity (ATC_{ID}) calculated in SIDC is 0 MW (bottom yellow arow) in the day-ahead market flow direction, and 1200 MW (top yellow arrow) in the opposite direction. In practice, this adjusts the capacity for the intraday market to the actual physical NTC. If the ATC_{ID} is adjusted to 0 MW, and trades in the opposite direction of the market flow are performed in the intraday market, the new capacity, equalling the volume of the trade, will be released in the intraday market. By also adjusting the AAC_{ID} to account for the countertrade, all the disadvantages of the current capacity adjustment solution can be overcome.

Annex 6 includes examples of adjustments to capacity in different cases (eg. the inability to trade the total requested countertrade volume or new countertrade request).

ENERGINET
Myndighedsenheden

4.3.2.6.2.1 The legal basis for capacity adjustment mechanisms

CACM article 10(2) determines that

"No later than 10 months after the approval of the proposal for a capacity calculation region in accordance with Article 15(1), all TSOs in each capacity calculation region shall submit a proposal for a common coordinated capacity calculation methodology within the respective region. […]"

Regional capacity calculation methodologies determine how capacity given to the day ahead and the intraday market shall be calculated. The Danish utility regulator approves capacity adjustment mechanisms on the Danish borders until the regional CCMs enter into force[46].

The new capacity adjustment mechanism is submitted for regulatory approval on DK1-DE/LU with an implementation deadline of 6 months after approval by the Danish utility regulator (DUR) and on all other Hansa borders with effect from approval by the Danish utility regulator, cf., however section 4.3.2.6.3. Alternatively – if the Danish utility regulator cannot approve the new capacity adjustment mechanism described in 4.3.2.6.2 – the current capacity adjustment practice described in 4.3.2.6.1 is submitted for regulatory approval on the Hansa borders.

In all circumstances, regulatory approval shall cover the period of time until Hansa CCM[47] enters into force, currently expected in 2024[48]

Energinet is aware that the new capacity adjustment solution is not compliant with the CCR Hansa CCM as countertrade is neither a part of the mathematical description in article 12 nor included in article 15 "Rules for Taking into Account Previously Allocated Cross-Zonal Capacity in the Intraday Time Frame". Energinet and TenneT have agreed to propose an amendment of the Hansa CCM to include countertrade in article 15, implying that countertrade may be included in the calculation of AAC. If the proposal is implemented the new capacity adjustment solution will comply with the Hansa CCM.
In consequence thereof one capacity adjustment mechanism may apply now (after DUR´s approval) and another when Hansa CCM enters into force. In Energinet current assessment however, the prospect of amending the Hansa CCM is good, implying that the new capacity adjustment solution in practice may apply before as well as after entry into force of the CCM Hansa (even if the legal basis is different).

4.3.2.6.3 New capacity adjustment model on other borders than DK1-DE/LU

Energinet has initiated dialogue with all TSOs with bidding zones bordering DK1 or DK2 to pursue an agreement on a capacity adjustment solution on the interconnector. The solution proposed by Energinet when pursuing such agreements is similar to the new capacity adjustment solution.

However, the final content of a capacity adjustment solution is, as described in section 4.3.2.6.2.1, subject to agreement between the adjacent TSO in respect of the period of time until the CCM enters into force on a border (subject to the Danish Electricity Supply Act article 73a (1) in respect of the Danish borders).

[46] the Danish Electricity Supply Act article 73(1)

[47] Microsoft Word - 20180918 CCR Hansa CCM Amended Legal Document - FINAL (entsoe.eu)

[48] Implementation of the Hansa CCM is a stepwise process following the milestones listed in its article 19. One of the milestones is the implementation of the flow-based CCMs of CCR Core and of CCR Nordic, including Advanced Hybrid Coupling (AHC) for the CCR Hansa interconnectors. Implementation of AHC is currently planned for 2024.

This implies that even though the methodology is submitted for regulatory approval it is not given that the capacity adjustment solution is, in effect, implemented on all Hansa borders, or that it will be applied the entire time until Hansa CCM enters into force. Energinet submits the methodology on all Hansa borders to ensure that an approved capacity adjustment mechanism is in place and may be applied until it is replaced, subject to the request of a neighbour TSO, by another arrangement (perhaps with a different content) and the necessary regulatory approvals are obtained with respect to that specific agreement.

It is a prerequisite for Energinet to procure energy to cover a neighbouring TSOs countertrade need, that a capacity adjustment solution is applied when trading the energy on the intraday market.

This also applies on the external Danish borders covered by the Nordic CCM[49]

It is Energinets understanding that the content of the Nordic CCM is based on the basic assumption that countertrade is performed in the balancing timeframe (as special regulation), such that it has not actively been considered whether countertrade may be included in the AAC in intraday. As the Nordic CCM is expected to enter into force Q1 2023, it is Energinets assessment, that it is most relevant to work for a Nordic clarification of the question for the time being.

In case Energinet receives a request from a Nordic TSO, concerning the establishment of a capacity adjustment mechanism on a Danish border, which can be applied until the Nordic CCM enters into force, Energinet will submit the mechanism agreed upon to DUR for regulatory approval, as soon as Energinet and the neighboring TSO agrees upon the content thereof.

4.3.3 Trading

In the following, the procurement of countertrade energy in the intraday market will be described.

Figure 10: Illustrates that the following sections concerns the trading slot

The trading of countertrade energy will be initiated at any given point in time after cross-border capacity has been provided on the Nordic borders. Essentially at some point after 15.00.

[49] All TSOs' of the Nordic Capacity Calculation Region proposal for capacity calculation methodology in accordance with Article 20 (2) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion mana (nordicenergyregulators.org)

Trading will be performed as active trading, i.e. Energinet will trade as any other market participant, aiming to fulfil its need for energy at the best possible price.

Trading may be performed using an intelligent trading algorithm developed to fulfil specific requirements to ensure that Energinets need for countertrade energy is covered at the best possible price[50].

4.3.3.1 Pricing

The requesting TSO can decide on a (not publicly available) maximum and minimum price that the requesting TSO is willing to buy or sell countertrade energy for, respectively.

4.3.4 Unexpected countertrade

Unlike structural countertrade, unexpected countertrade can be requested or agreed upon at any given point in time if an interconnector or internal CNE relevant to cross-zonal capacity trips. Requests with a shorter deadline than two hours will be handled in the balancing market. Energinet will attempt to procure energy in the intraday market before ID GCT when the requests have a longer deadline than two hours. Energy will be procured for the all the hours the requestion TSO deems necessary.

The procedure for handling structural countertrade requests, described in section 4.3.2, is also applicable for unexpected countertrade except for the following modifications:

- In section 4.3.2.1, countertrade will be mutually agreed between the involved TSOs in case of an interconnector trip. If the fault is on an internal CNE, affecting the physical flow on a border, countertrade will be requested by the TSO with the fault.
- In section 4.3.2.2, countertrade is always firm as the flow on the interconnector must be reduced. Volumes which could not be traded in intraday will become imbalances, contrary to structural countertrade described in 4.3.2.1.
- The capacity adjustment in case of an interconnector trip is as follows: Both NTC and AAC will be set at zero (ATC=0), and the SIDC system halt function is applied, as no capacity can physically flow on the interconnector.
- As an addition to the publication of volumes prior to trading in section 4.3.2.4, the TSOs on the border will also determine who will publish an Urgent Market Message (UMM) on NUCS[51] to inform the market of the unexpected volumes which will be countertraded on SIDC.

An example: At 15:56 p.m., Skagerrak trips.

Energinet will handle countertrade for the first 2-3 hours (subject to an individual assessment by the control centres on each side of the interconnector) after the trip (approximately 15:56 -17:00 p.m. within the current day) by activating bids in the balancing market. For the remainder of the expected outage, the full flow from the day-ahead and intraday markets as of 17:00 D-1 and until (in the worst case) the end of the next day (D) must be traded in the intraday market for all relevant hours. The following day will be handled by limiting the interconnector capacity allocated to the day-ahead market to zero by both TSOs, eliminating the need for further countertrade.

[50] The requirements to a trading algorithm, if relevant, shall ensure Energinets compliance with the REMIT regulation. Energinets effort to ensure REMIT compliance is not subject to regulatory approval and will therefore be discussed with the Danish Utility Regulator in a different format than the methodology.

[51] See annex 5

4.3.5 Publication of traded countertrade volumes

The volumes countertraded (both structural and unexpected) will be published as required by the transparency regulation.

4.3.6 Backup - Issues in the day-ahead or intraday market affecting countertrade

4.3.6.1 Backup - delay of market results

If the market coupling results are delayed, leading to partial or full decoupling and/or shadow auctions, structural countertrade can be requested as unexpected countertrade by the requesting TSO, allowing the countertrade request to be submitted at any point in time after market coupling results have been produced. The hours which can be traded in SIDC is determined by the timing of the countertrade request.

Below is an example of a delay in the market coupling results, which will only result in reduced trading time in the first slot.

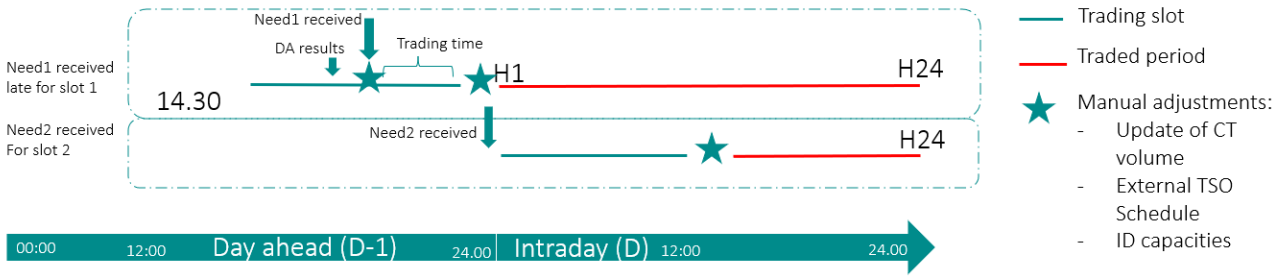

Figure 11: Market coupling results delayed.

If decoupling is declared, resulting in shadow auctions on the borders, and the market results are delayed until after the first slot has ended, then the first lot of hours within the operational day cannot be countertraded since these can only be traded in the second slot.

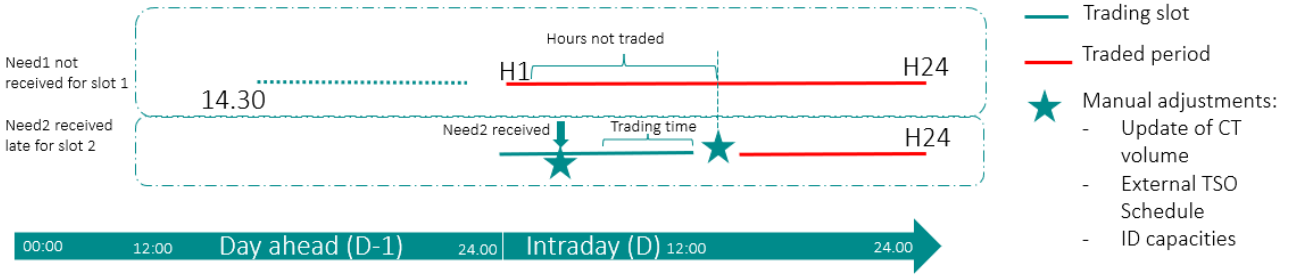

Figure 12: Market coupling results received later than the first slot.

This results in several hours (e.g., H1-H6) that cannot be traded on intraday. In such rare cases it will be agreed upon with the requesting TSO, whether the relevant hours shall be handled through the balancing market, or whether other remedial actions can be applied (e.g., redispatch).

4.3.6.2 Backup - SIDC out of operation

If SIDC, due to maintenance or a fault, is out of operation for a short period, e.g., the first couple of hours during the first slot, the time left to trade the requested volumes will be shorter than usual as is also the case if market coupling results are delayed. This is illustrated in Figure 11.

If SIDC, due to maintenance or a fault, is out of operation for a long period, e.g., the entire first trading slot, Energinet cannot assist with countertrade for the first hours of the day of operation. If SIDC is back in operation for the second trading slot, then all the following hours can be countertraded according to the slots. This is illustrated in Figure 12. Hours which could not be traded in intraday is handled the same way as if market coupling results are delayed till after the first slot (described in 4.3.6.1).

An example:
A UMM was published by the NEMOs (Nominated Electricity Market Operators), stating that the SIDC systems would be out of operation for maintenance on 28 April from 08:00 a.m. to 18:30 p.m. CEST at the latest, and that the option to do any intraday cross-border trading would be unavailable.

In this case, Energinet would agree with the requesting TSO whether the purchase of countertrade energy is to be performed without capacity on the borders, or whether the volume is to be countertraded after 18.30 when the SIDC system is back in operation, thus decreasing the trading time in the first slot.

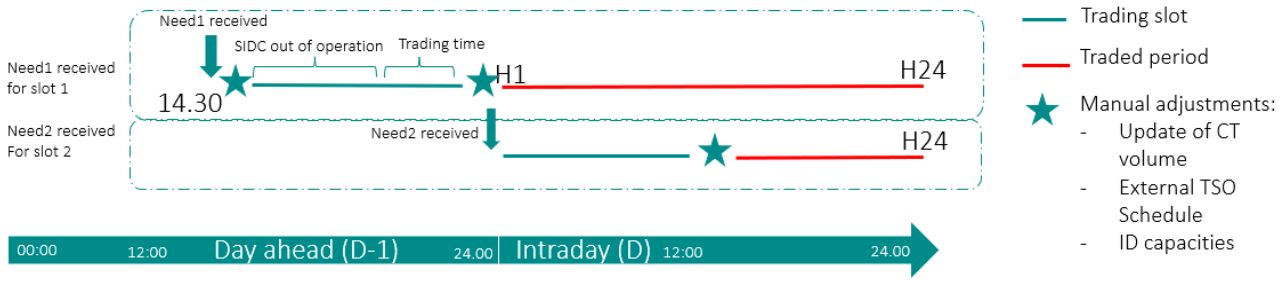

Figure 13: Request received on time, but trading time is postponed until cross-border capacity is available on SIDC.

If SIDC is completely out of operation for, for example, 24 hours, Energinet will reject structural countertrade requests as volumes cannot be traded on SIDC.

4.4 Costs of intraday trading

Costs of procuring the countertrade energy in intraday is paid by the requesting TSO.

In case of unexpected countertrade (on the interconnector), the current practice of splitting the costs for upward and downward regulation on either side of the border will continue.

4.5 Implementation of the methodology

As explained in section 2.3.5.1, the AOF is scheduled to go into operation on the Nordic platform November 2022. The intraday methodology for procurement of countertrade energy needs to be fully implemented by that time.

To ensure that liquidity in the intraday market is increased to match Energinet's countertrade volumes by November 2022, a gradual transition to procurement of countertrade energy in the intraday time frame will begin in August 2022. Countertrade volumes traded in the intraday time frame will gradually increase until November 2022, when all structural countertrade volumes will be traded in the intraday market.

4.6 Adjustments to the intraday methodology

4.6.1 ACER's proposal to revise CACM

If the revised CACM establishes that 70% minimum capacity applies to the intraday time frame, Energinet will re-evaluate this methodology.

5. Assessment of the methodology

5.1 Available options in the balancing time frame

As set out in section 2.3.5.2, the transition to MARI is obligatory. The Nordic platform will be discontinued when the Nordic TSOs go live on MARI. The MARI Steering Committee has decided that structural countertrade is not permitted on MARI.

Due to the early implementation of the MARI requirements into the Nordic platform, using Danish special regulation for structural countertrade is technically/practically not possible after November 2022.

There are no mFRR-based/balancing time frame-based methodologies/tools already available that comply with the regulatory requirements and deadline.

Early in the process, it was considered and discussed whether a specific Nordic market for procurement of countertrade energy could be established (the "Nordic TSO-TSO" countertrade model). Energinet chose not to pursue the Nordic TSO-TSO model since the other Nordic TSOs did not express commitment to setting up such a market (as was the case in 2017). To the current understanding of Energinet, Statnett is working towards implementing an intraday solution and finds that countertrade close to the delivery hour represents an unnecessary operational risk. Svenska kraftnät has not expressed a preference for a specific model at this stage. Fingrid expects that that structural countertrade is not necessary on its borders, but Fingrid is looking into the possibility of using the intraday market when unexpected countertrade is needed.

In these circumstances and considering the deadline for implementation of a new countertrade methodology (including the uncertainties related to content of agreements between TSOs, necessary IT development etc.), Energinet found that it would not be prudent to pursue the development of an entirely new (Nordic) market.

Further, it was assessed that the Nordic TSO-TSO countertrade model would neither offer better solutions to the challenges in the Danish countertrade practice than an intraday-based solution nor provide a better basis for competition.

5.2 Procurement in intraday

Procuring structural countertrade energy in the existing intraday market can be implemented by November 2022. The below analysis demonstrates that the intraday methodology remedies the challenges of the current Danish countertrade practice and, further, that it complies with the regulatory requirements.

ENERGINET
Myndighedsenheden

5.3 Introductory remarks to the assessment

When comparing the summary in section 2.5 on the challenges of the Danish countertrade practice to the legal requirements and considerations pertaining to an intraday methodology for the procurement of countertrade energy as set forth in section 3.3, there are certain similarities. Energinet has chosen to present the assessment in relation to the legal requirements. Assessments of the ability of the methodology to handle the issues in the current Danish countertrade practice are made in the relevant sections below.

A meaningful assessment of the methodology's compliance with legal requirements and considerations requires, for the most part, comparison. However, as concluded in section 5.1, there are currently no viable alternatives to an intraday-based methodology, and therefore no relevant basis of comparison. For that reason, when required to assess meaningfully a legal requirement or consideration, the current Danish countertrade practice is used as a basis for comparison.

5.4 Operational security

In terms of addressing the concerns described in section 2.3.1.1 (risk of errors in the control centre when manually procuring countertrade energy in the balancing time frame), the intraday methodology addresses and remedies the current situation already as the procurement of countertrade energy is made well in advance of the operational hour.

That being said, Energinet has considered, prior to deciding on the detailed design of the methodology, a number of ways to organize the practical set-up of the procurement of countertrade energy in the intraday market. In this respect, the chosen solution comprises and balances more considerations than merely the situation in the control centre, at set out in the following sections.

5.5 Market-based, non-discriminatory, and transparent solution

The Electricity Market Regulation and the Danish Electricity Supply Act both states, as a fundamental requirement for the procurement of countertrade energy, that it must be market-based and non-discriminatory.

The procurement of countertrade energy with the intraday methodology will take place on the already existing cross European intraday market, and thus complies with the requirement of being market-based. The market is well established and accessible to all market participants on non-discriminatory terms.

The Danish Electricity Supply Act further requires transparency. The requirement for transparency seems to have two implications.

Firstly, it refers to the functioning of the market in which countertrade energy is procured. In this sense, it is seen as supplementary to the other two conditions and underlines that it is not sufficient in itself to for the methodology to be a market-based and non-discriminatory solution; it is further required that the rules pertaining to market access and the way the market functions are transparent, to ensure, in effect, equal access and possibilities, not only for participants already involved in the market, but also for those who would consider entering. The intraday market complies with this legal requirement.

The second implication of the transparency requirement pertains to Energinet's trade. As established in section 4.3, the intraday methodology provides full transparency on the countertrade volumes requested.

ENERGINET
Myndighedsenheden

5.6 Socio-economic efficiency

The Electricity Market Regulation explicitly requires that network congestion problems be addressed with solutions that give efficient economic signals to market participants and transmission system operators. This implies, in Energinet's assessment, that the intraday methodology should result in the lowest possible socio-economic costs based on competitive pricing, and that this should be reflected in the price of the countertrade energy to be paid by the requesting TSO.

The Danish Act on Energinet also requires Energinet to include socio-economic efficiency considerations in its task performance.

On this basis, Energinet has made a qualitative assessment of the efficiency of the intraday methodology and Danish countertrade practice in general and a quantitative assessment of the impact of countertrade on DK1-DE/LU in 2019 and 2020.

5.6.1 Qualitative assessment

From a qualitative perspective, two parameters are central to the socio-economic effects associated with the choice of countertrade methodology[52]:

1. Market coupling (more market coupling increases efficiency)
2. Prequalification requirements (prequalification reduces efficiency).

The Danish countertrade practice and the intraday methodology score differently on these drivers as shown below in Table 1.

	Intraday model	Danish special regulation
Market coupling	High[53]	Low
Prequalification requirements	No	Yes

Table 5: Efficiency drivers with respect to the two different countertrade methods.

All else being equal, prequalification requirements for systematic countertrade known well in advance of the operational hour will have a negative efficiency effect. Based on this, the intraday methodology must be assumed to be more efficient than the current Danish countertrade practice since it shows the highest degree of market coupling.

Market coupling is characterized by decreasing marginal utility, i.e. the benefits of market coupling are relatively large, when the degree of market coupling is small, and vice versa. As such, the Danish countertrade practice with a low degree of market coupling is expected to be significantly less efficient than the intraday methodology.

[52] Energinet has disregarded the availability of reserve bids since these bids generally have the lowest opportunity costs of providing reserves, implying that it is unlikely that these bids would be activated for countertrade purposes. Therefore, reserve bids have a very low socio-economic effect in relation to countertrade. Also, the effects of the applied pricing principle in different markets are ignored, where, in particular, the open order book in the continuous intraday market implies that the risk of inefficiency due to the pay-as-bid principle is significantly reduced. Also, the expected pay-as-cleared principle in intraday auctions implies that efficiency concerns in relation to the methodology due to pay-as-bid settlement would be greatly reduced by the introduction of intraday auctions.

[53] If countertrade energy is traded in the first slot according to the proposed methodology, not all borders will be open which implies a reduced level of market coupling at that time. However, since these borders will open at a later stage, market participants can send countertrade energy to "any" bidding at a later stage, ensuring optimal efficiency.

In summary, Energinet finds that there is a significant efficiency difference between the intraday methodology and the Danish countertrade practice. The intraday methodology with a high degree of market coupling and no prequalification requirements is expected to be significantly more efficient than the current Danish countertrade practice.

5.6.2 Quantification of countertrade efficiency on DK1-DE/LU in 2019 and 2020

In the following, the efficiency of the Danish countertrade practice and the intraday methodology is compared.

Countertrade energy received from TenneT must be sold by Energinet in order to maintain the DK1 balance between load and generation (including imports and exports). The sale of energy will result in either an increase in load, which will increase consumer utility, or a decrease in generation, which will decrease generation costs, both of which are positive socio-economic effects. The comparison between the two models thus seeks to reveal which model has the highest positive socio-economic effect as the sum of these two parameters.

The value of countertrade can be estimated by calculating generation cost savings from reduced generation (generator revenue minus producer surplus, i.e. the area under the supply curve) and the extra value from increased generation (total consumer payments plus consumer surplus, i.e. the area under the demand curve). In the figure below, these effects are illustrated for the special regulation model (left-hand side) and the intraday model (right-hand side). The figures are explained in more detail in Annex 1.

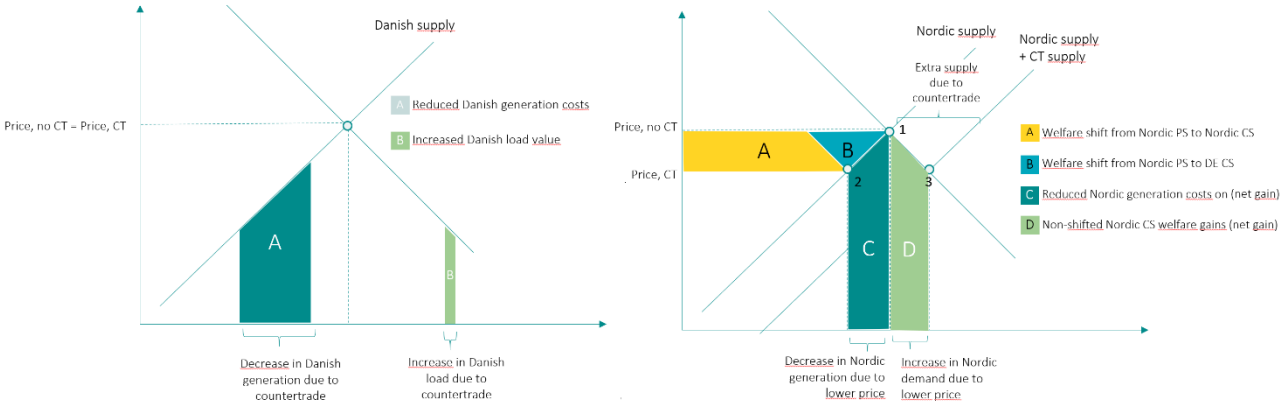

Figure 14: Illustration of the effect of countertrade in the current and the intraday methodology

It is impossible to quantify the future efficiency of the current Danish countertrade practice and intraday methodology as both future countertrade volumes, relevant borders, and the direction of the countertrade (upward or downward regulation) are unknown. The qualitative assessment in the previous section is made to the extent possible on that account.

However, countertrade on DK1-DE/LU presents an actual case of countertrade where recorded data exists, which makes a quantification of the effects more credible. The quantification is associated with significant uncertainty for several reasons:

- The quantification of the effects of the Danish countertrade practice can only be based on assumptions made by Energinet and the availability of information necessary for Energinet to make these assumptions is limited

- The considered countertrade methods cannot be compared within one analytical framework since each method requires a specific analytical approach to allow Energinet to estimate the socioeconomic effects.

Therefore, Energinet emphasizes that the theoretical arguments presented in the previous section suggest that the intraday methodology is socio-economically superior to the current Danish countertrade practice. Thus, the uncertainty in the calculations presented below is rather a result of the use of the assumptions made to enable the application of a day-ahead model in the calculations than a stylized fact that the current Danish countertrade practice could be considered equally or more efficient than the intraday countertrade methodology.

5.6.2.1 The Danish countertrade practice

In the Danish countertrade practice, countertrade on DK1-DE/LU in 2019 and 2020 resulted in downward regulation in Denmark and in netting with system imbalances in DK1 and the Nordic synchronous area as presented in the below table.

Type	GWh (2019)	GWh (2020)
Wind	420	1,461
Electric boilers	289	517
Thermal generation	603	1,065
Netting	602	853
Total	1,914	3,896

Table 6: Downward regulation in Denmark because of countertrade requests on DK1-DE/LU border in 2019 and 2020.

The value of countertrade in the Danish countertrade practice depends on the derived socio-economic consequences based on the type of special regulation (netting is technically not special regulation). Table 7 and Table 8 below show the calculated socio-economic effects resulting from countertrade in the Danish countertrade practice in 2019 and 2020. The ranges for electric boilers and thermal generation represent an attempt to quantify the uncertainty described above.

Type	GWh	Unit price, EUR/MWh	Total value, mEUR
Wind	420	3	1
Electric boilers	289	25-35	7-10
Thermal generation	603	0-38	0-23

Netting	602	27-35	16-21
	1,914		**25-55**

Table 7: Socio-economic cost savings resulting from countertrade in the Danish countertrade practice in 2019.

Type	GWh	Unit price, EUR/MWh	Total value, mEUR
Wind	1,461	3	4
Electric boilers	517	11-27	6-14
Thermal generation	1,065	0-18	0-19
Netting	853	11-13	10-11
	3,896		**20-47**

Table 8: Socio-economic cost savings resulting from countertrade in the Danish countertrade practice in 2020.

Energinet estimates that countertrade in the Danish countertrade practice has resulted in cost savings of 25-55 million euros in 2019 and 20-47 million euros in 2020. The figures for 2019 are higher due to the generally much higher power prices in 2019, which dominate effect of the larger volume of countertrade in 2020. The lower and upper values of these ranges represent worst-case and best-case considerations, neither of which are likely to be correct but the lack of information on the costs associated with the accepted bids makes it difficult for Energinet to be more precise. The details on the estimation of unit cost savings can be found in Annex 1.

The average price of special regulation was -12 and -23 EUR/MWh for 2019 and 2020, respectively.

5.6.2.2 The intraday methodology

Naturally, no actual data is available to assess the proposed intraday methodology so the assessment of the effects of the intraday methodology are purely counterfactual. Energinet has used the Simulation Facility model to estimate these counterfactual effects. This model allows Energinet to use realized bids in the day-ahead market to approximate the effects of countertrade in the intraday time frame. The modelling allows Energinet to calculate socio-economic impact on a global level from a cost and load value perspective, but it does not allow the calculation of the distribution of socio-economic benefits between market participants (and by extension between members states). The reason for this is that the calculated day-ahead price which is key in determining these distributive effects does not reflect what the actual day-ahead price is likely to be. The cost and load value estimations, however, do not depend on the day-ahead price, but on the actual dispatch following the intraday market.

Countertrade on the DK1-DE/LU border results in an increase in supply in the DK1 bidding zone. This supply will, due to market coupling, be used to reduce generation and increase load in the markets connected to DK1 where the marginal (most costly) generation would otherwise happen. The bidding zones where these changes in generation and load can happen depend on the availability of cross-zonal capacity. The Simulation Facility model allows the full optimization of these changes across the entire power system market modelled in the Euphemia algorithm.

In principle, it is thus possible to sum the increased load value and decreased generation costs across all bidding zones which shows increased load value and decreased generation costs. Such an approach, however, seems to overestimate the effect. To avoid such overestimation, the utility effects are only calculated for the Nordic bidding zones which

intuitively are the central bidding zones in which the countertrade energy on the Danish side of the DK1-DE border ultimately impacts load and generation.

The estimated Nordic socio-economic effect of the intraday model is 25-55 million euros for 2019 and 20-47 million euros for 2020. Roughly 15 % of this is realized in Denmark (13 % in 2019, 18 % in 2020). The details on the estimation of the socio-economic effects of the intraday methodology are presented in Annex 1.

The calculated average day-ahead prices for the hours with countertrade (a proxy for the expected intraday price) for 2019 and 2020 are shown in the below table. The estimated price for the intraday model reflects the estimate of the average price of countertrade energy (non-weighted).

		Reference	Intraday model	Difference
DK1	2019	37.7	34.7	-3.0
	2020	17.9	14.5	-3.4
DK2	2019	39.3	38.4	-0.9
	2020	22.1	21.3	-0.8

Table 9: Estimated prices of intraday model compared to reference prices.

The estimated impact on day-ahead prices was thus estimated at roughly 3 EUR/MWh for DK1 for both 2019 and 2020. The relative impact was, however, much higher for 2020, which had much lower day-ahead prices than 2019. These estimates do not take into account that perfect price alignment between the day-ahead and intraday time frames is unlikely. The actual price impact must therefore be expected to be lower.

Energinet stresses that the calculated prices do not reflect the full impact of the intraday model since it was technically not possible to implement the full countertrade volume, which impacts the hours with the largest volumes of countertrade. See further details in Annex 1.

5.6.2.3 Conclusion

The below table sums up the calculated effects of the two models for procuring countertrade.

	2019	2020
Special regulation model	25-55	20-47
Intraday model	40-66	36-49

Table 10: Summary of the estimated socio-economic effects, million euros.

Given the calculated range, no clear conclusion can be reached. The lower value of the special regulation model is, however, considerably below the lower value calculated for the intraday model, while the upper value is higher for the intraday model than for the special regulation model, although not considerably so. The width of the bands highlights the uncertainty involved in the calculations.

Even though the socio-economic calculations do not provide a clear conclusion as to which model is socio-economically superior, the price signals that the TSOs get from the models must still be considered. If TSOs are faced with artificially high costs of countertrade, they could be incentivised to take remedial actions that are too costly or ultimately overinvest in grid development based on such excessive costs.

The average price of special regulation of -23 EUR/MWh in 2020 (-12 EUR/MWh for 2019) is extreme compared to the calculated average price of countertrade in the intraday methodology of 14.5 EUR/MWh (34.7 EUR/MWh for 2019). It is thus clear that the Danish countertrade practice provides a highly inefficient price signal to TenneT as requesting TSO.

In conclusion, an intraday-based countertrade methodology will provide more efficient price signals to market participants and TSOs. Further, even though higher socio-economic efficiency in the intraday model could not be clearly concluded, the qualitative assessment still suggests that the intraday methodology is socio-economically superior to the current Danish countertrade practice.

5.7 Sufficient liquidity for the procurement of countertrade energy

The fundamental treaty obligation under article 4, 3. to (i) take any appropriate measure, general or particular, to ensure the fulfilment of the acts of the institution of the Union, and (ii) to refrain from any measure which could jeopardize the attainment of the Union's objectives, implies that Energinet, in situations such as this, shall be committed to searching for alternatives to ensure that the risk of having to reject requests for countertrade is reduced, if an alternative way to procure the energy is available.

To that end, the intraday methodology seems to offer a more appropriate solution. In practice, it gives Energinet access to the procurement of countertrade energy in the European cross-border intraday market. This means that more market participants have access to the procurement of countertrade energy. Moreover, the intraday methodology allows Energinet to handle structural countertrade needs earlier, leaving more time to procure the necessary volumes.

5.8 Consumer prices

As per recital (2) of the Electricity Market Regulation, the Energy Union aims to provide the end customers, households and businesses, with competitive and affordable energy prices. Danish law defines consumer access to inexpensive power as one of the most vital aims.

The benefits of a competitive market for TSO energy must, thus, be reflected in consumer's prices.

As established in section 5.10.2.1, if the current volumes of downward-regulated countertrade energy were purchased in the intraday market instead of using the Danish special regulation countertrade practice, then the day-ahead price would have decreased by approximately 3 EUR/MWh in DK1 in 2019 and 2020 and 1 EUR/MWh in DK2, as Danish consumers can buy countertrade energy in the intraday market, and thus shift their demand from the day-ahead market to the intraday market (see further explanation in section 5.10.2.1.).

ENERGINET
Myndighedsenheden

5.9 Environment and climate

The recent re-wording of the objects clause in the Danish Act on Energinet commits Energinet to consider climate in its task performance.

On the basis established in section 2.4, Energinet has examined if an intraday-based methodology to purchase energy would reduce European CO-emissions.

The analysis is presented in Annex 3.

As 10% of hydro power is run of river (where water cannot be saved for later use), European CO_2 emissions could have been reduced by 0.9 million tonnes CO_2 in 2020.

5.10 Market impact of countertrade in intraday

As stated in section 3.1.3, Energinet shall support well-functioning markets. This section addresses the potential impact that Energinet's procurement of countertrade energy in the intraday market may have on the electricity markets as well as the legal framework for Energinet's trade in the intraday market (see section 5.10.1).

Current hourly volumes countertraded as special regulation vary from 0 to 3,000 MWh on the DK1-DE/LU border. Moving countertrade volumes to any other market will have a big impact on that market, regardless of model design.

Since participation in the intraday-market imposes fewer requirements on participants than participation in the regulating power market, it is technically possible for all market participants in the regulating power market to also participate in the intraday-market, unless a market participant has already sold his capacity as reserve capacity. In relation to bid volumes the volume of Danish bids in the intraday methodology is thus expected to be at least of similar size as the current practice for procurement of countertrade energy, without considering the procured reserve volume. Further, bids from the Nordic countries can be traded in Denmark after 15:00 p.m. in the intraday market, if the necessary capacity is available on the Nordic borders. Furthermore, all European traders can trade in Denmark at 18:00 p.m., once the necessary capacity is available on the interconnectors to the continent.

This broad market access without any prequalification requirements provides the best possible basis for competition, increased liquidity, and efficient prices.

5.10.1 Energinet as market participant in the intraday market

It is, as stated in section 3.3, a fundamental requirement that Energinet uses market-based solutions to procure energy needed to fulfil its obligations as certified TSO.

Regulation no 1227/2011 of 25 October 2011 on wholesale energy market integrity and transparency has as its declared goal to ensure that

"[…] *consumers and other market participants can have confidence in the integrity of electricity* […] *markets, that prices set on wholesale energy markets reflect a fair and competitive interplay between supply and demand, and that no profits can be drawn from market abuse"* (recital (1)),

and further that

"the goal of increased integrity and transparency of wholesale energy markets should be to foster open and fair competition in wholesale energy markets for the benefit of final consumers of energy" (recital (2)).

REMIT includes TSOs in its definition of market participants, cf. article 2 (7). When procuring energy in the intraday market, TSOs shall comply with REMIT.

REMIT article 3 prohibits insider trading. It reads in excerpt:

"1. Persons who possess inside information in relation to wholesale energy product shall be prohibited from:

(a) using that information by acquiring or disposing of, or by trying to acquire or dispose of, for their own account or for the account of a third party, either directly or indirectly, wholesale energy products to which that information relates;
(b) disclosing that information to any other person unless such disclosure is made in the normal course of the exercise of their employment, profession or duties;
(c) recommending or inducing another person, on the basis of inside information, to acquire or dispose of wholesale energy products to which that information relates

[…]

3. Points (a) and (c) of paragraph 1 of this Article shall not apply to transmission system operators when purchasing electricity or natural gas in order to ensure the safe and secure operation of the system in accordance with their obligations under points (d) and (e) of Article 12 of Directive 2009/72 […]"[54]

REMIT article 2 (2) defines inside information as follows:

(1) "inside information" means information of a precise nature which has not been made public, which relates, directly or indirectly, to one or more wholesale energy products and which, if they were made public, would be likely to significantly affect the prices of those wholesale energy products.

For the purposes of this definition, "information" means:

(a) Information which is required to be made public in accordance with Regulations (EU) no. 714/2009 and (EC) no. 715/2009, including guidelines and network codes adopted pursuant to those Regulations;
(b) Information relating to the capacity and use of facilities for production, storage, consumption or transmission of electricity or natural gas related to the capacity and use of LNG facilities, including planned or unplanned unavailability of these facilities;
(c) Information which is required to be disclosed in accordance with legal or regulatory provisions at Union or national level, market rules, and contracts or customs on the relevant wholesale energy market, in so far that this information is likely to have a significant effect on the prices of wholesale energy products; and

54 Directive 2009/72 has been repealed by the Electricity Market Directive where art 40 is the relevant article.

ENERGINET
Myndighedsenheden

(d) *Other information that a reasonable market participant would be likely to use as part of the basis of its decision to enter into a transaction relating to, or to issue an order to trade in, a wholesale energy product.*

Information shall be deemed to be of a precise nature if it indicates a set of circumstances which exists or may reasonably be expected to come into existence, or an event which has occurred or may reasonably be expected to do so, and if it is specific enough to enable a conclusion to be drawn as to the possible effect of that set of circumstances or event on the prices of wholesale energy products".

It thus follows from REMIT that TSOs may trade energy needed to ensure secure operation of the transmission system in the intraday market, even though they possess inside information.

Being a market participant under REMIT, Energinet is subject to the obligation in article 4 to publish inside information.

REMIT article 4 (1) reads

"Market participants shall publicly disclose in an effective and timely manner inside information which they possess in respect of business or facilities which the market participant concerned, or its parent undertaking or related undertaking, owns or controls or for whose operational matters that market participant or undertaking is responsible, either in whole or in part. Such disclosure shall include information relevant to the capacity and use of facilities for production, storage, consumption or transmission of electricity [...] *including planned or unplanned unavailability of these facilities".*

The large volumes of countertrade energy that Energinet will bid into the intraday market will have a significant impact on the market in the same way as the "relevant" information that REMIT requires market participants to publish. For this reason, the intraday methodology has been designed with publication of the countertrade volume before the volumes are bid into the market, cf. section 4.3.2.4.

5.10.2 Impact of prices in day-ahead, intraday, and balancing markets

5.10.2.1 Day-ahead price impact

The simulations described in Annex 1 show a day-ahead price decrease of approximately 3 EUR/MWh in 2019 and 2020 in DK1, when simulating the procurement of countertrade energy in the intraday market. The price impact in the simulations is a result of a shift in demand from the day-ahead market to the intraday market. Energy consumers will purchase their energy in the market with the lowest prices, meaning that some demand will shift from the day-ahead market to the intraday market, resulting in lower day-ahead prices.

Energinet emphasizes that in the simulations, price convergence between intraday and day-ahead is the underlying assumption when modelling effects of countertrade using a day-ahead market model. However, Energinet assumes that market participants cannot optimize their purchase of energy perfectly as they only have knowledge about the volumes of countertrade energy after the day-ahead market has closed. This means that it is riskier to cover their demand in the intraday market. Consequently, Energinet expects a day-ahead price decrease which is lower or less than the simulated 3 EUR/MWh. If the demand in the day-ahead market decreases by e.g. 30-60% of the countertrade volume which will be offered in intraday, the impact on the day-ahead price would probably decrease equivalently.

The electricity price in the day-ahead market generally varies greatly. Table 2 shows that the average day-ahead price was 25 EUR/MWh in 2019, whereas it was 44 EUR/MWh in 2018.

The day-ahead price effect reflects that the increased competition, enabled by European market participation in the intraday methodology, will reduce electricity prices for consumers in Denmark, which is a sign of more well-functioning markets.

5.10.2.2 Intraday price impact

The current intraday trade volumes range from 0 to 1,000 MWh in DK1, while the current volumes countertraded as special regulation vary from 0 to 3,000 MWh. This means that it is necessary to increase liquidity in the intraday to market accommodate the countertrade volumes and ensure efficient prices. Energinet expects that the broad market access and publication of countertrade volumes will allow liquidity to match the increase in supply.

The intraday and day-ahead prices are expected to converge to some degree. It is not possible to predict the actual level of price convergence. However, an assessment commissioned by TenneT and performed by Consentec showed that the larger and more predictable volumes of countertrade are, the closer the correlation between day-ahead and intraday prices is, as market participants can predict the countertrade volumes which will be offered in the intraday market.

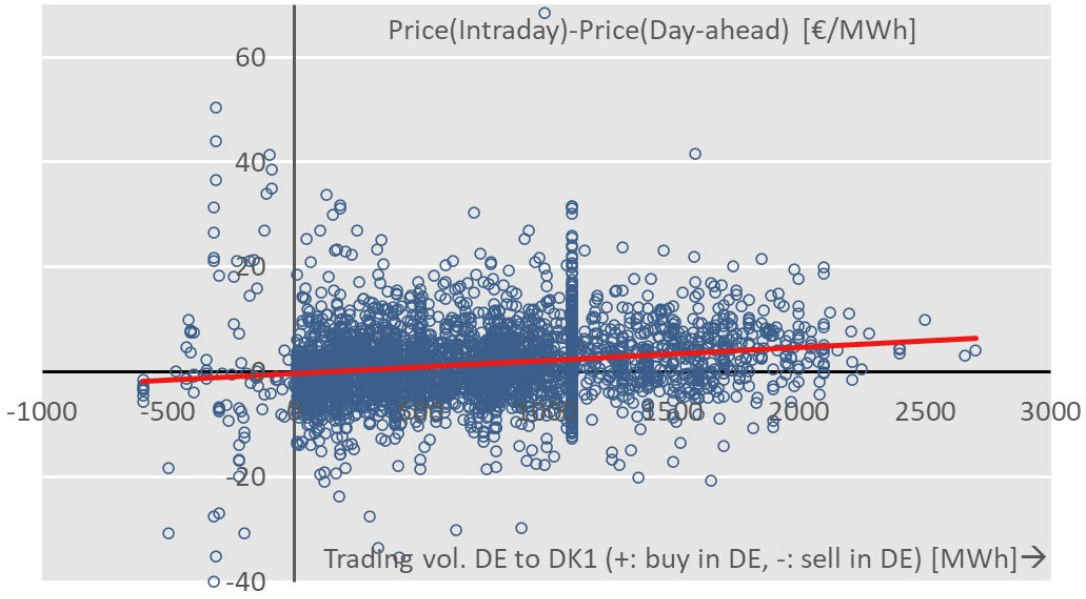

Figure 15: Correlation between price difference (intraday vs. day-ahead) in Germany and total trades for safeguarding cross-border transmission capacity. Positive volume denotes procurement in DE and sales in DK1. Source: Assessment by Consentec commissioned by TenneT

ENERGINET
Myndighedsenheden

	2018 (JD)	2019 (JD)	2020 (JD)	2020 (JD+other)
Frequency of countertrade for safeguarding transmission capacity [% of hours]	17.5%	35%	38%	43%
Average share of countertrade in continuous intraday trading volume [% during hours with countertrading]	6.5%	8.4%	11.1%	12.8%
Correlation coefficient between countertrade volume and day-ahead and intraday price difference	0.25	0.12	0.10	0.15[55]

Table 11: Comparison of frequency and volume of countertrade between 2018, 2019 and 2020 in Germany. Source: Assessment by Consentec commissioned by TenneT

Structural countertrade volumes purchased in the intraday market increase competition as market participants must determine whether they will get the best price for their energy in the day-ahead market or the intraday market, which will lead to a price convergence between the intraday and day-ahead markets when large volumes of countertrade are traded. This is also a sign of well-functioning markets.

5.10.2.3 Balancing markets price impact

On 10 March 2019, Energinet submitted a confidential report on special regulation (2018) to the Danish Utility Regulator. The report has not been published due to the inclusion of special regulation prices, which are currently deemed confidential due to concerns of reduced competition and price coordination. The report concludes that:

- Danish bids for downward regulation are aimed at activation as special regulation, as the offer price of downward regulation is significantly lower (more negative) than the average balancing price. Therefore, balancing bids are primarily delivered from Norway and Sweden. The impact on the balancing price may, however, be insignificant, as bids from Norway and Sweden are generally more competitive.
- An increase in the balancing price of upward regulation relative to the day-ahead price is expected when procuring countertrade energy in the intraday market, due to the fact that, in the methodology, netting with balancing needs will not happen, as structural countertrade energy will be procured almost a day before the balancing time frame. This should, however, be seen in the light of generally lower day-ahead price such that the net effect is expected to be minimal.

Once the procurement of countertrade energy has been moved to the intraday market, Energinet expects that Danish mFRR bids submitted to the NPRM for downward regulation will be closer correlated to the other Nordic mFRR bids sent to the NPRM, as these bids/ can no longer expect to be activated at their bid price if the bid is above the marginal price for balancing. This will, generally speaking, improve competition in the NPRM as Danish bids lead to increased competition.

5.10.3 Imbalance risks

When procurement of countertrade energy is done in intraday, it also becomes possible for consumers and power traders to trade countertrade energy, and the equilibrium between supply and demand will be reached in a different way

[55] When only considering the JD volumes the correlation coefficient between countertrading volume and day-ahead-intraday price difference is 0.1

than in the Danish countertrade practice. Today, consumers typically procure their energy day-ahead while countertrade energy results in downward regulation in the regulating power market. With the methodology, countertrade energy is sold in the intraday market instead where Energinet expects Danish consumers, power traders, and Nordic producers to procure the energy (just like Danish producers buy countertrade energy as Danish special regulation). This means that Danish consumers will reduce their demand day-ahead, while power traders will increase their day-ahead supply, expecting to cover their position in the intraday market. All else being equal, this means that the day-ahead market result, if realized, would not be balanced (consumers and/or traders have an unbalanced position after the day-ahead market). However, the intraday market is integral part of the power market so this cannot be considered wrong in any way.

Market participants with unbalanced positions after the day-ahead market are incentivized to balance themselves in the intraday market if they expect costs to be lower in the intraday market than the cost of imbalance settlement. If the cost is expected to be high in both markets, market participants will assume a more balanced position in the day-ahead market. As such, market participants will continuously optimize their position to obtain the best price for their energy.

The intraday methodology creates a new dynamic where the intraday market becomes more important, but it does not fundamentally impact the incentive to be imbalanced after the intraday market. A consumer that, in the absence of the methodology, would balance himself in the day-ahead market, would balance himself in the intraday market instead, if he wants to (attempts to) buy countertrade, regardless of whether he actually buys countertrade energy or not. Similarly, a trader would have no reason to speculate more in being unbalanced, just because he also speculates in trading countertrade energy. In both cases, there would be plenty of time in the intraday market to balance unbalanced positions from the day-ahead market that were not balanced with countertrade energy. As such, Energinet expects the overall imbalance risk to be the same.

Based on the above, Energinet sees no reason to suspect that the intraday methodology will increase the imbalance risk, and thus sees no increased risk for system security.

5.10.4 Market conduct in the intraday methodology

Energinet interprets the REMIT regulation to imply that structural countertrade volumes, which are to be traded in any given market, must be publicly disclosed before trading the volumes. In the review of the legal basis, Energinet does not find any obligation to publish time and bid price prior to trading.

REMIT article 4: "*Market participants shall publicly disclose in an effective and timely manner inside information which they possess (…)*", when reading the definition of 'inside information' (REMIT Article 2(1)) it means "*information of a precise nature which has not been made public, which relates, directly or indirectly, to one or more wholesale energy products and which, if it were made public, would be likely to significantly affect the prices of those wholesale energy products*".

Market manipulation, as defined in article 2(2) in REMIT, is prohibited.

As such, the normal competitive behaviour of market participants seeking the best price for their energy, as described in Annex 2, cannot be considered market manipulation since, contrary to market manipulation, this behaviour ensures competitive prices for the consumers.

The risk of market manipulation is considered potentially relevant in an intraday-based methodology where the intraday methodology will provide market participants with ex ante knowledge of upcoming trade volumes and trading timing.

The market manipulation concern is primarily related to two types of market manipulation:

1. Energy hoarding, referring to a market participant acquiring all or a large part of the bids in order to control the pricing of these, for example in relation to the TSO need to manage congestion in the power system.

2. Capacity hoarding, referring to a market participant acquiring all or part of the available transmission capacity (ATC) without using it or without using it effectively. This is done by one or more market participants (but a limited number) taking a position on each side of a biding zone.

With respect to energy hoarding, Energinet considers the risk of market manipulation theoretical. Energinet expects the competitive pressure to make such behaviour unprofitable.

With respect to capacity hoarding, Energinet finds that there is a risk associated with an intraday-based methodology as described in Annex 2. However, Energinet considers it too risky for market participants to engage in such activity, making it unlikely that it would indeed happen, as this would constitute a breach of the rules in the REMIT regulation.

Consequently, Energinet does not find that the risk of market manipulation makes the intraday methodology less attractive. Further, several choices have been made in respect of its detailed design to minimize the risk of capacity hording, eg. timing of the slots.

5.10.5 Capacity adjustment

The current approach, described in section 4.3.2.6.1, of adjusting capacities when countertrading on DK1-DE/LU prior to the submission to SIDC results in a negative ATC which is not visible to the market. Moreover, there is a risk of overallocation in the opposite direction of the market flow, and the current approach also prevents new capacity from being released to the intraday market if trades against the market flow direction have been done in the market after the countertrade has been finalised, meaning that the current capacity adjustment solution limits the market more than necessary.

The new solution suggested in section 4.3.2.6.2 solves the above-mentioned issues.

5.11 Conclusion of the assessment

Energinet finds that the intraday methodology addresses the needs for a new countertrade model listed in section 2.3 and is in line with the current European and national law described in section 3.

The intraday methodology not only ensures that a countertrade model is in place by November 2022, but it is also a far better alternative than the current countertrade practice when it comes to the central legal requirements: system security, market-based, non-discriminatory, efficient, and transparent. Furthermore, the larger market in the intraday methodology ensures competitive and efficient consumer prices and ensures that the production units with the highest marginal cost of producing energy are the production types that are stopped if downward regulation is needed. This further leads to the positive environmental effect, i.e. that the intraday methodology will lead to less wind curtailment.

Energinet has assessed some potential concerns related to the intraday methodology such as the risk of imbalances, cf. section 5.10.3, and market manipulation, cf. section 5.10.4. These concerns are alleviated by the introduction of a transitional period with a gradual increase in volumes traded in the intraday market or have been accommodated in the detailed design of the intraday methodology.

6. Process

This section provides an overview of the process that has taken place to ensure involvement of relevant stakeholders and transparency.

6.1 Internal process in Energinet

An evaluation of the current countertrade practice, and thus the internal work on a new countertrade methodology, was initiated in the beginning of 2020 in accordance with the impact assessment. The Danish Utility Regulator was informed of this work at a meeting on 20 February 2020.

The work was initiated due to an increased demand for countertrade on DK1-DE/LU and a possible demand for countertrade on all borders, stemming from the 70% rule. Furthermore, at that point, it was not certain whether TSOs would be allowed to use MARI for structural countertrade.

Initially, all countertrade models assessed in the "DK1-DE countertrade models impact assessment"[56] from 2018 were listed as alternative countertrade models by the internal working group. However, since the methodology has to be applicable on all Danish borders, models such as the CoCa model (using transmissions rights) was disregarded as there are no transmission rights on the Nordic borders. Due to the intermediate changes to the regulatory framework, it was deemed impossible to continue to use the existing practice. The alternatives considered (presented at the first workshop[57] in August 2020), were:

1) Countertrade using intraday auctions
2) Countertrade in the continuous intraday market
3) A Nordic TSO-TSO countertrade model (countertrade in a separate Nordic market).

The work faced challenges right from the beginning because the deadline for the implementation of a new countertrade methodology/actual date when the Danish countertrade practice could no longer be used was not fixed. This was due to a mix of legal and practical issues. At first, MARI, and the rules pertaining to it, was found to set the deadline, so to speak (in 2023/2024). However, soon after the first workshop, it became apparent that the Nordic Balancing Model (NBM) programme was planning AOF implementation (parallel operation) in Q2 2022.

The implementation of the AOF implied a new, even tighter deadline for the implementation of a new countertrade methodology. Thus, by the date of the AOF implementation, it would no longer be possible to countertrade using the current practice. The implementation date of the Nordic AOF was later moved to November 2022.

An assessment was made of whether an IT solution could potentially solve the problem caused by the AOF (i.e. a solution which could activate mFRR bids pay-as-bid after the AOF). For several reasons, the idea was, however, rejected.

56 https://en.energinet.dk/-/media/608B834CB9214E4994A1BAD56D4371C0.PDF?la=en&hash=CC3EE12BEB61895A9AC19DB79CA63DFDF3B7BF43

57 Workshop 1 on alternative countertrade models | Energinet

Among other, it became apparent rather quickly that it would be a complex task to solve, and since the Danish countertrade practice could not efficiently handle the large countertrade volumes, the IT solution was not investigated further.

However, a determining factor was the outcome of the analysis conducted in the meantime to assess the pros and cons of implementing an intraday-based methodology for countertrade needs (as opposed to continuing a practice based on mFRR). Firstly, an intraday-based model would – unambiguously – accommodate the critical practical issues identified in the Danish countertrade practice (control centre aspects, including operational security). Secondly, an intraday-based methodology was found to be the solution most compliant with the requirements and considerations in EU and Danish law, and, in this respect, it was also found to be the superior socio-economic/most efficient solution.

In the process, it was also clarified that a Nordic TSO-TSO countertrade model was simply not possible, as the idea of creating a separate Nordic market was not supported by the other Nordic TSOs.

On this basis, Energinet continued to work on an intraday-based methodology.

6.2 Involvement of market participants

To ensure transparency and involvement to the greatest possible extent, Energinet has involved market participants and other interested parties in and informed these of the process on an ongoing basis.

Workshops were announced on Energinet's website and at a stakeholder meeting for Danish market participants. Furthermore, an invitation was sent to neighbouring TSOs, and energy organisations representing the Danish, Norwegian and Swedish market participants were encouraged to inform their members about the workshops. In general, a personal invitation to the subsequent workshop was sent to participants who participated in one of the first workshops. Memos and presentations were distributed in advance to facilitate discussions, and summaries were circulated after the workshops. All information on countertrade has been published here: Modhandel | Energinet on Energinet.dk.

At the first workshop in August 2020, Energinet explained the reasoning behind the review of the countertrade practice and the aspects supporting the introduction of a new countertrade methodology (as they were at the time).

At the workshop, Energinet experienced general discontent with the fact that clear, unambiguous answers to legal and practical issues, including the deadline for the implementation of a new countertrade methodology, could not be provided. Consequently, many requests for clarification were made, which, in turn, complicated the intended solution-focused dialogue.

To ensure the best possible framework for discussions, including a solid basis, Energinet pushed back the second workshop to 12 January 2021. At this workshop, intermediate developments pertaining to the legal and practical framework were explained, as was the rationale for pursuing, and preferring, an intraday-based methodology.

In the meantime, one market participant had approached Energinet to question whether the effect on day-ahead prices of an intraday-based methodology had been sufficiently examined and considered. The issue was addressed and explained at the workshop.

Moreover, three speakers were invited to provide input for discussions:

ENERGINET
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- Statnett who presented their thoughts on implementing an intraday countertrade methodology
- Ørsted who presented arguments that the Danish countertrade practice is well-functioning and their interpretation of the 70% rule
- Energi Danmark who presented arguments that an intraday-based methodology would be market-based whereas the Danish countertrade practice was not.

A third workshop was held on 2 February 2021 to provide market participants with further details on analyses and the rationale underpinning Energinet's preference for an intraday- based methodology. The question of relevant time frame(s) for the 70% rule was handled by the Danish Utility Regulator, which presented its interpretation and possible interpretation bases. TenneT gave a short presentation on their planning process and scheduled grid expansion projects.

At this workshop, participants also voiced several reflections on the design details of an intraday-based countertrade methodology.

This input was processed and a fourth workshop, an intraday design meeting, was held on 20 April 2021. Input from this workshop was taken into account in the submitted intraday methodology.

Energinet conducted a public consultation on the proposed methodology between 2 July and 30 August 2021. The consultation prompted a good response. Following the consultation and a dialogue meeting held on 17 August 2021, Energinet implemented several changes to the methodology. These changes are listed in the below section 6.3.

6.3 Changes to the methodology following the public consultation

The consultation responses have triggered a number of changes in the methodology apart from general editorial changes.

- The trading strategy has been changed from an auction-like strategy to an active trading strategy based on the inputs from several consultation responses. This has triggered a rewrite of section 4 since an active trading strategy implies that countertrade energy is procured over an extended period of time. In line with an active trading strategy, neither bid prices nor timing of trading will be published ahead of time.
- Netting of countertrade needs requested for upward regulation on one border and downward regulation on another border in the same bidding zone, prior to the procurement of countertrade energy in the intraday market, has been added.
- A number of consultation responses pointed to the fact that Energinet had not demonstrated a positive socio-economic effect of the intraday methodology. On this background, Energinet has continued its analysis, which has revealed errors in the calculations behind the results included in the consultation, which have now been corrected. This has resulted in changes in the reported results, but the overall quantitative conclusion remains unchanged, i.e. the quantitative analyses does not conclusively show a higher socioeconomic effect of the intraday model as suggested by the theoretical analysis.
- Energinet has re-evaluated the obligation under REMIT to publish the Energinet bid volumes and bid prices in the intraday market. Prior publication of countertrade volumes is maintained as in the consulted methodology but Energinet will not publish information about the bid prices of Energinet.
- The reference to insufficient bids has been removed from the description of security of supply and moved to a section regarding the obligation for Energinet to assist neighbouring TSOs.

By agreement with TenneT Germany, the new capacity adjustment solution for the DK1-DE/LU bidding zone border (also described in the consulted methodology) are now a part of the proposed methodology.

The methodology and annex 5 have been translated into Danish.