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Report on methodologies and projects that shall provide a long-term solution to the operational security risks which the derogation granted to TenneT TSO B.V. seeks to address

in accordance with Article 16(9) of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity

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1. Introduction

Article 16(8) of the Regulation (EU) 2019/943, prescribes that TSOs 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. TSOs are considered compliant with this requirement if a minimum level of 70% of available capacity for cross-zonal trade is reached. For borders using a flow-based approach, this level is set to 70% of the capacity respecting operational security limits of internal and cross-zonal critical network elements taking into account contingencies (hereinafter referred to as "CNECs"). Transitory measures, such as action plans pursuant to Article 15 of the Regulation 2019/943 or derogations pursuant to Article 16(9) of the same regulation, allow a step-wise approach for reaching this minimum capacity, ultimately by 31 December 2025.

In December 2019, the Ministry of Economic Affairs and Climate Policy of the Netherlands has established an action plan¹ pursuant to Article 15 of Regulation 2019/943. In accordance with Article 15(2) of Regulation 2019/943, the action plan has established a linear trajectory for the minimum capacity available for cross-zonal trade to be compliant with Article 16(8) of Regulation 2019/943 (hereinafter referred to as "linear trajectory").

Article 16(9) of Regulation 2019/943 prescribes that upon request of transmission system operators in a capacity calculation region (hereinafter "CCR"), the relevant regulatory authorities may grant a derogation from Article 16(8) of Regulation 2019/943 on foreseeable grounds where necessary for maintaining operational security. The derogation shall be granted for no more than one year at a time, or, provided that the extent of the derogation decreases significantly after the first year, up to a maximum of two years. The extent of such a derogation shall be strictly limited to what is necessary to maintain operational security and shall avoid discrimination between internal and cross-zonal exchanges.

In October 2019, TenneT TSO B.V. (hereinafter referred to as "TenneT") applied for two derogations in accordance with article 16(9) of Regulation 2019/943. In anticipation of a decision of the Ministry of Economic Affairs and Climate Policy of the Netherlands to establish an action plan pursuant to Article 15 of Regulation 2019/943, TenneT retracted one of the two applications for derogation on 18 December 2020. The other application for a derogation was approved by the Dutch national regulatory Authority for Consumers and Markets (hereinafter "the ACM") on 20 December 2020, for the duration of 1 year from 1 January 2020 until 31 December 2020. In July 2020, TenneT applied for another derogation in accordance with article 16(9) of Regulation 2019/943, this time for the period from 1 January 2021 until 31 December 2021. Apart from the removal of the request for performing a parallel run for the purpose of developing, testing and executing new processes and tools, this derogation for the year 2021 was largely similar to the derogation for the year 2020.

In July 2021, TenneT applied for another derogation in accordance with article 16(9) of Regulation 2019/943,

¹Action plan of the Netherlands published by the Ministry of Economic Affairs and Climate Policy: <https://www.rijksoverheid.nl/ministeries/ministerie-van-economische-zaken-en-klimaat/documenten/publicaties/2019/12/20/actieplan-verhoging-beschikbaarheid-zone-overschrijdende-transportcapaciteit-elektriciteitshandel>

this time for the period from 1 January 2022 until 31 December 2022 (hereinafter referred to as “the derogation”). This derogation for the year 2022 was largely similar to the derogation for the year 2021 and 2020. This request for a derogation was granted by the ACM on 1 December 2021.²

As a condition for its approval, the ACM requires that TenneT reports at the latest on June 30th 2021 on the methodologies and projects that shall provide a long-term solution to the issues that the derogation seeks to address and that TenneT needs to develop pursuant to article 16(9). By means of submitting this report to the ACM, TenneT complies with this requirement.

In the following sections the grounds for the derogation are shortly discussed, the methodologies and projects and their current status are discussed and finally a conclusion is given on how these methodologies and projects will help to provide a long-term solution for the grounds of the derogation.

2. Grounds for the derogation

TenneT has submitted a request for a derogation from the requirement of article 16(8) of Regulation 2019/943 on the basis of the following two foreseeable grounds:

1. Loop flows on Dutch CNECs cannot be contained to an acceptable level, as they are not under the control of TenneT
2. There is a foreseeable lack of redispatching potential when the grid is in an outage situation

Both foreseeable grounds are further explained below.

2.1 Loop flows above an acceptable level

The first foreseeable ground for the requested derogation is that loop flows on Dutch CNECs cannot be contained to an acceptable level, as they are not under the control of TenneT. This contributes to creating an operational security risk if the minimum capacity provided for in Article 16(8) of Regulation (EU) 2019/943 or the action plan of The Netherlands would be applied. Loop flows created in neighbouring bidding zones are a consequence of the grid topology in that bidding zone in combination with a sub-optimal generation and load distribution. Phase Shifting Transformers located at the North Eastern border of the Netherlands can help to reduce loop flows, yet an optimised utilisation of these transformers is not expected to be sufficient to constrain the level of loop flows to acceptable levels. Given the fact that several Member States implemented an action plan in accordance with Article 15 of Regulation (EU) 2019/943, including Germany, TenneT expects that structural congestion in neighbouring bidding zones will remain on the short term and loop flows will remain above an acceptable level.

² ACM/21/053041

Observations from 2021

For TenneT's report on margins available for cross-zonal trade in 2021,³ TenneT already gathered and performed analyses on the level of loop flows that have been determined for each CNE. A breakdown of the average loop flow per CNE per MTU can be found in figure 12 of section 5.2.4., which is also included below for convenience below. This figure shows that for several CNEs, significant amounts of loop flows are observed.

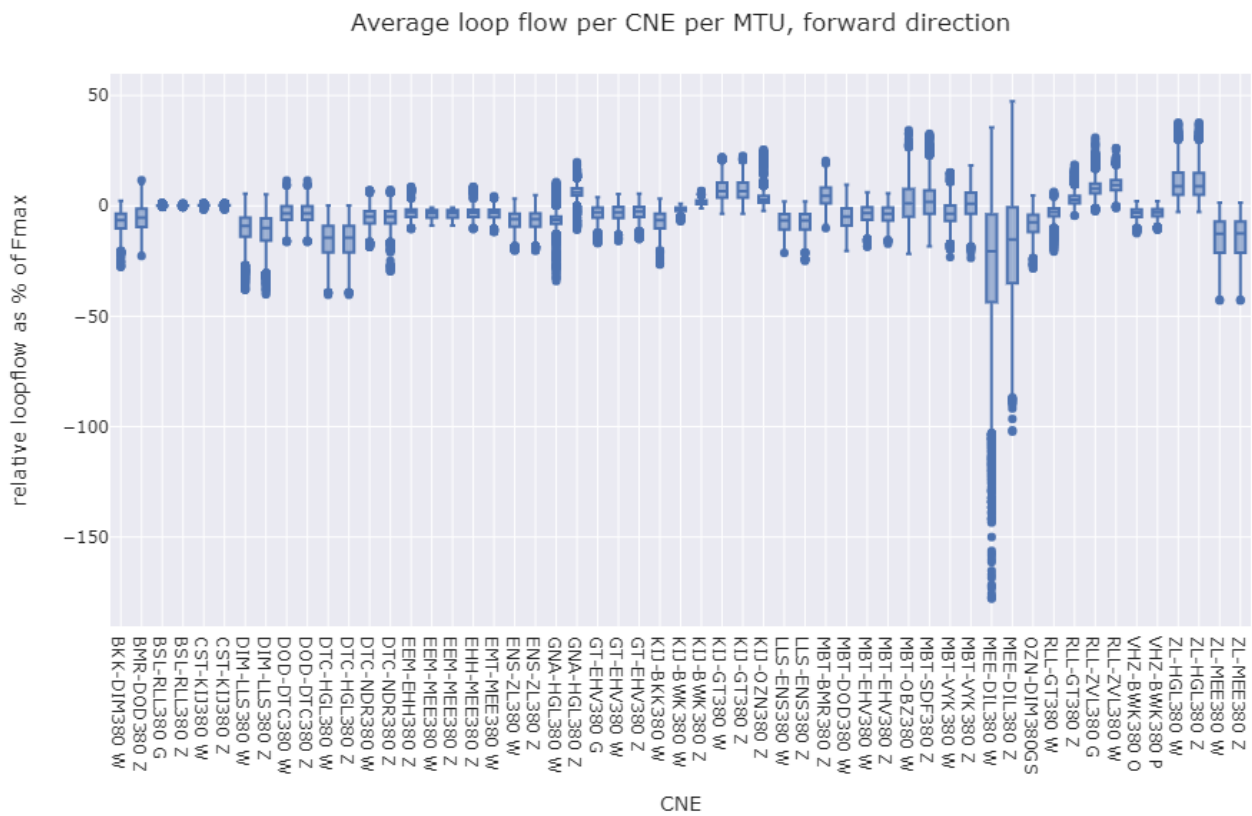


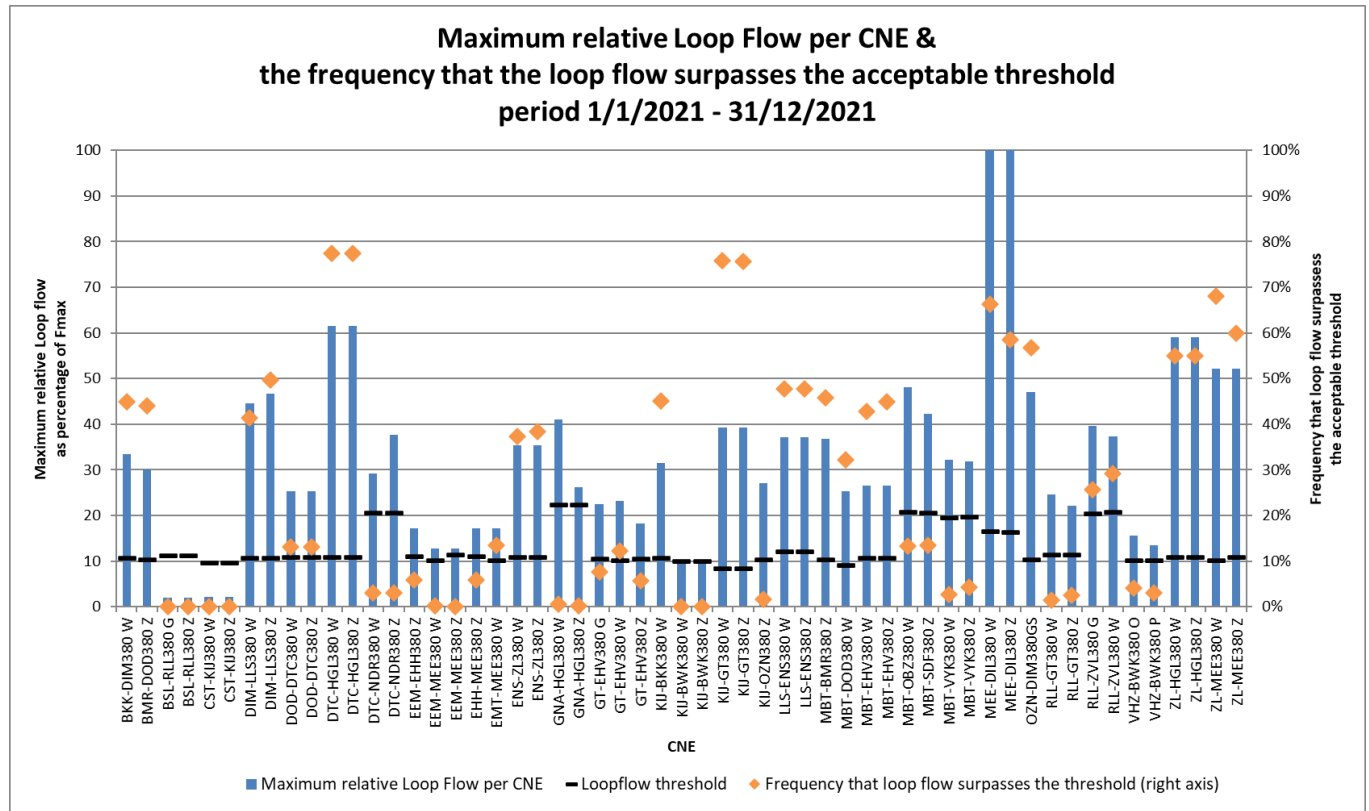
Figure 1: Average relative loop flow per Dutch CNE per MTU. Positive values indicate loop flows in the forward direction, negative values indicate loop flows in the opposite direction. CWE CCA, considering third countries. Period Jan-December 2021

In order to allow for an easier comparison with the threshold value of 'acceptable' loop flows, the data on loop flows has been processed in a way similar as done for the previous report on methodologies and projects that shall provide a long-term solution to the operational security risks which the derogation granted to TenneT TSO B.V. for the period 1 January 2021 to 31 December 2021 seeks to address.⁴

³ 2021 Assessment of available cross-zonal capacity for the Netherlands, published by the ACM on 14-04-2022: <https://www.acm.nl/sites/default/files/documents/verzoek-tennet-goedkeuring-beoordelingsverslag-actieplan.pdf>

⁴ ACM/21/053041

In the next figure, the maximum absolute loop flow that has been observed per CNE in the period 1/1/2021 – 31/12/2021 is shown, as well as the threshold value of 'acceptable' loop flows on each CNE. Also, the frequency that the loop flow surpasses the acceptable threshold is depicted.



From this figure it becomes clear that there is a need for a derogation to deal with loop flows, because:

- For the majority of CNEs, maximum levels of loop flows are observed which significantly surpass the threshold level of acceptable loop flows.
- For 26 CNEs loop flows surpass the threshold at least 20% of the time, which is comparable to the amount of CNEs found in the report on the derogation for 2021⁵

Generally, the level of maximum loop flows and frequency that loop flows surpass the threshold as observed in 2021 is rather comparable to the levels observed in 2020, except for a significant increase in both maximum loop flows as frequency for Zwolle – Hengelo (ZL-HGL380 W and ZL-HGL380 Z). Therefore, from the operational data there is no indication that the need for a derogation for loop flows will decrease in the near future.

⁵ In the report on the 2021 derogation it was included that loop flows surpass the threshold at least 20% of the time for 14 CNEs. However, the figure for the report for the 2021 derogation combined parallel CNEs into a single CNE (e.g. MEE-DIL W and MEE-DIL Z were depicted by a single element CNE NMEE381 XDI_ME1). Thus, the current report considers a higher granularity. Considering that typically most high voltage connections consist of 2 circuits, the total number of CNEs (26 in this report, versus 14 in the previous report) that surpass the threshold for the year 2021 is comparable to the amount reported in the report for the 2021 derogation.

2.2 Foreseeable lack of redispatching potential when the grid is in an outage situation

The second ground for the requested derogation is the foreseeable possible lack of redispatching potential to allow TenneT to comply with the minimum capacity provided for in Article 16(8) of Regulation (EU) 2019/943 or the action plan, without endangering operational security when the grid is in an outage situation. As indicated in the action plan of the Netherlands and the TenneT investment plan⁶, TenneT is and will be upgrading the capacity of several corridors of the extra high voltage grid in the Netherlands. Upgrades are performed to keep the grid fit for purpose considering the future energy mix and the ability to comply with the various obligations on the minimum capacity to be made available for cross-zonal trade.

For construction of these projects, situations of long duration outages are expected to occur. For the duration of such an outage, the grid capacity is temporarily reduced and internal flows on the remaining critical network elements increase compared to the grid situation where the outage is not present. Therefore it can occur that the available internal redispatching potential is insufficient to meet the 70% requirement.

Especially in situations with (locally) limited domestic redispatching potential, cross-border remedial actions can provide efficient measures to maintain operational security while complying to the required minimum margins available for cross-zonal trade. However, existing bilateral redispatching contracts do not enable a structural use due to the manual procedures involved and the limited visibility on the future availability of redispatching potential. The implementation of methodologies for coordinated redispatch is required to efficiently make use of cross-border remedial actions for this purpose.

Observations from 2021

As indicated in the TenneT's report on margins available for cross-zonal trade in 2021,³ TenneT had to reduce the capacity on the interconnector cables on the borders DK1->NL and NO2->NL in order to guarantee operational security, yet contrary to the situation in 2020, TenneT was able to meet the target levels of 70% when applying these reduction. The reason that reductions had to be applied is related to several planned outages throughout 2021 to perform grid investments. In order to maintain sufficient redispatch potential in the area, part of the discrepancy between installed generation capacity and available transport capacity had to be solved by applying a reduction on the interconnectors to ensure operational security. Application of a reduction has always been done in combination with restriction contracts and redispatch. In 2021 an amount of EUR 299 million was spent on redispatch and restriction contract related to critical branches⁷, compared to approximately EUR 60 million in 2020⁸.

⁶ Investeringsplan Net op land 2020-2029, available at: <https://www.tennet.eu/nl/bedrijf/publicaties/investeringsplannen/>

⁷ ACM/21/168250

⁸ ACM/20/049441

3. Methodologies and projects

TenneT is working on several methodologies and projects that should alleviate the foreseeable grounds for the derogation. The methodologies and projects are explained below, after which an overview of the status of the methodologies and projects can be found.

3.1 Methodologies

Article 16(4) of Regulation (EU) 2019/943 prescribes that TSOs should use countertrading and redispatch, including cross-border redispatch, to maximise available capacities to reach the minimum capacity provided for in paragraph 8 of the same article, or the minimum capacities as provided for by the action plan. To do this in a coordinated way, in accordance with Regulation (EU) 2015/1222 (hereafter: CACM Regulation) and Regulation (EU) 2017/1485 (Hereafter: SOGL Regulation), TSOs are required to deliver several aligned methodologies that are key to manage the flows in the grid via a coordinated capacity calculation and coordinated application of remedial actions.

With respect to the previous reporting in 2021 regarding the methodologies and projects to address the foreseeable grounds of the derogations, a major first step has been made with the go-live of the Day-Ahead Capacity Calculation Methodology for the Core Capacity Calculation Region as referred to in Article 21 of the CACM Regulation ("**Core DA CCM**"). This methodology, among other things, will improve the estimation of loop flows and optimize the effective use of capacities on internal and cross-zonal CNECs by implementing a harmonised approach across the Core region: TSOs will be able to individually define the initial setting of its own non-costly and costly remedial actions, based on the best forecast of their application and with the aim to reduce the loop flows on its cross-zonal CNECs below a loop flow threshold that avoids undue discrimination.

However the go-live of this first version of the Core DA CCM is not yet sufficient to respect operational security limits in cases of high loop flows. Article 20 of the Core DA CCM requires that in a next version of the Core DA CCM, the Core TSOs also implement a "coordinated validation" process, implying there will be a process that consolidates the prediction and usage of available remedial action on Core level. This process creates the necessary visibility on the ability to maintain operational security in a coordinated way when applying the minimum 70% requirement. This is important in the Dutch context because the local remedial action potential may be insufficient to alleviate the impact of loop flows, but there may be effective remedial actions available elsewhere to alleviate the impact of loop flows. Since the go-live of the Core DA CCM, TenneT already applies a voluntary coordinated validation together with the German and Austrian TSOs. Although this is effective and a significant improvement compared to individual validation by just one TSO, the future coordinated validation process on Core level will also provide insight in the availability of remedial actions in the Core countries other than Austria, Germany and the Netherlands. Therefore, TenneT considers this coordinated validation process as part of the Core DA CCM also as a remaining key methodology to be developed to alleviate the foreseeable grounds of this derogation.

The remaining key methodologies to be developed are:

- a) The coordinated validation, as part of the Core DA CCM
- b) The operational security coordination methodology as referred to in Article 76 of the SOGL Regulation ("**SOGL 76 methodology**"). This methodology will improve amongst others the coordination between TSOs based on the coordinated security analysis as well as outage coordination by the regional coordination centres (RCCs). The methodology considers and where necessary complements the CACM 35 methodology.
- c) The coordinated redispatching and countertrading methodology as referred to in Article 35 of the CACM Regulation ("**CACM 35 methodology**"). By improving coordination of remedial actions and redispatching measures across the Core region, cross-border redispatching possibilities will be created which can help to reduce loop flows and make it easier to increase available capacities for cross-zonal exchange without endangering security of supply.
- d) The redispatching and countertrading cost sharing methodology as referred to in Article 74 of the CACM Regulation ("**CACM 74 methodology**"). This cost sharing methodology will ensure that financial settlement between TSOs after providing redispatch and countertrading using the above mentioned methodology will be dealt with accordingly.

3.2 Projects

Next to methodologies, TenneT is also working on a number of projects to alleviate the grounds for the derogation.

Grid investments are the major driver for increasing capacity available for cross-zonal trade. Relevant grid investments are detailed in the aforementioned investment plan and, particularly relevant in this context, in the action plan of the Netherlands. Investments in the Dutch grid as such do not constrain the amount of loop flows, but do reduce the relative share of capacity that is used by loop flows.

TenneT is also actively participating in the ongoing **Bidding Zone Review process** that is taking place in accordance with Article 14 of (EU) Regulation 2019/943. As a basic principle, bidding zones shall not contain long-term, structural congestions and bidding zone borders shall be based on structural congestions rather than national borders. The purpose of the Bidding Zone Review is to investigate whether alternative bidding zone configurations would increase the economic efficiency and cross-border trade opportunities, while maintaining the operational security of the electricity grid. Alternative bidding zone configurations could significantly reduce the level of loop flows, in particular if bidding zones that are causing loop flows are split in smaller zones. In such a situation, the flows could still remain in the system but the flows would become cross-zonal flows instead of loop flows. However, such a bidding zone reconfiguration potentially also has a huge impact on the market (e.g. less liquidity in the market/ higher prizes) and electricity prices for generators and consumers, and therefore needs to be thoroughly investigated before decided upon by the relevant Member States.

TSOs have delivered the results of Locational Marginal Pricing (LMP) calculations to ACER in March 2022. ACER will use these LMP results to determine what alternative bidding zone configurations should be studied. TSOs are expecting a decision by ACER on which alternative configurations are to be studied in the Bidding Zone Review process by July 2022, after which they will start the full evaluation of the alternative configurations. Results, including a recommendation to maintain or amend the current bidding zone recommendation, should then follow per July 2023, after which Member States have six months to take a unanimous decision on this recommendation. If eventually the Bidding Zone Review process will lead to a decision of Member States to adjust the bidding zone configuration, these reconfigurations are not expected to happen before 2027 as also at minimum 3 years lead time is deemed required to implement a bidding zone reconfiguration.

Next to TenneT's effort in order to enable coordinated cross-zonal remedial action optimization via the previously mentioned methodologies, TenneT also actively contributes to a well-functioning redispatch market on a national level. A local project for this purpose is the "*Grid Operators Platform for Congestion Solutions*" (**GOPACS**), a platform in which the TSO and DSOs cooperate to both increase the redispatching potential by unlocking more market participants and to better coordinate the use of congestion alleviation measures in the TSO and DSO grid. These efforts contribute to having enough redispatching potential available in the future. A major step in the continuous development of this platform is an agreement of cooperation between GOPACS and EPEX SPOT, the power exchange with the largest volume of trades in the Netherlands. With this agreement, the bids on the Intraday market will be available on the GOPACS platform as well, including a locational component of each bid. This significantly increases the potential of the platform, and thereby the effectiveness of the redispatch market in the Netherlands.

3.3 Status overview

The table below summarises the latest available information regarding the implementation of the methodologies and projects.

	Status	Currently foreseen implementation date
Methodology		
Core DA CCM	Operational since 8 June 2022	-
Core DA CCM – coordinated validation	Methodology still to be developed	A proposal for implementation is due 18 months after Core DA CCM go-live, thus by Dec 2023. Implementation is at the earliest in 2024
SOGL 76	Implementation ongoing	April 2024
CACM 35	Implementation ongoing	April 2024
CACM 74	Implementation ongoing	April 2024
Project		
Grid investments	Grid reinforcements are performed according to the action plan	The relevant grid reinforcements are included in the investment plan ⁶ and also listed in the action plan ¹
Bidding Zone Review	The methodology for the review has been approved by ACER and the modelling chain is being prepared accordingly. Configurations to be studied are expected to be decided upon by ACER in July 2022	Results are expected in 2023, after which Member States will have to take a decision on the future Bidding Zone configuration. Potential BZ reconfigurations are not expected to happen before 2027
GOPACS	GOPACS has been introduced as a portal for electricity producers and users to offer flexibility for resolving congestions to TenneT and Dutch DSOs.	The efforts to increase the redispatch potential in the Netherlands is an ongoing process

4. Conclusions

For the purpose of this derogation, TenneT is developing in cooperation with others TSOs several methodologies and in addition is working on several projects. As the required methodologies are not yet in place, this prevents TenneT to structurally rely on cross-border remedial actions.

For the year 2023 TenneT believes that a derogation remains necessary, in particular for loop flows which exceed their acceptable level.