FNI REPORT 3|2021

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Reform of the EU Electricity Regulation

Background, early implementation, consequences for cross-border trade in the internal electricity market

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Abstract
Grid congestion has been a major problem constraining trade in the EU's internal electricity market (IEM). The recently reformed EU Electricity Regulation (EU) 2019/943 aims at improving conditions for cross-zonal trade. This report analyses the making and early implementation of reformed rules, focusing on a new provision requiring European transmission system operators to make at least 70% of capacity on interconnectors available for cross-border trade. We then assess the opportunities and challenges for the Norwegian trade-based power policy strategy emerging from how this new rule is implemented in Norway's grid-connected neighbouring countries. An important objective of this strategy is to maximize the value of Norwegian power resources through cross-border trade in the EU IEM.

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ISBN 978-82-7613-731-6
ISSN 1893-5486

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Executive summary

Grid congestion has been a major problem in the EU's internal electricity market (IEM). The recently reformed EU Electricity Regulation (EU) 2019/943 aims at improving conditions for cross-zonal trade. It has introduced changes in how congested grids should be managed to promote cross-border trade, by altering the capacity allocation and congestion management provisions. Importantly, a new provision requires that minimum 70% of the capacity margin on grid elements that critically affect trade across bidding zones, the critical network elements (CNEs), are to be allocated for such trade.[1] As the previous Electricity Regulation, from 2009, stated the principle that interconnector capacity should be used at its maximum to support efficient cross-zonal trade, the new minimum 70% entails a clear shift in EU regulation.

The deadline for implementing the new minimum level of capacity to be made available for trade (MACZT – minimum available capacity for cross-zonal trade) was set at 1 January 2020. However, an extended deadline to 31 December 2025 can be granted to member states that document structural congestion in their grids, if they present an action plan for achieving the 70% MACZT at this later point. To ensure early action by the member states, the action plan must specify start-values for MACZT already in 2020, and a timetable showing a linear annual increase in MACZT towards 70% by the end of 2025. Further, the plan must list the measures planned for reducing national grid congestion – the problem cited by transmission grid operators (TSOs) to justify not making cross-zonal interconnector capacity available for trade. An additional derogation opportunity of maximum two years can be offered for TSOs if strictly necessary to maintain security of system operation.

If structural congestion remains a problem and the TSOs do not manage to attain the annual linear increase in MACZT and minimum 70% by 2025, the TSOs must apply costly redispatch and countertrade measures and/or re-configure bidding zone borders, to ensure that congestion is no longer moved to the zonal borders and thus constrains cross-border trade.

The Commission's proposal

The Commission's reform proposal was launched in 2016 as part of the Clean Energy Package. Importantly, market monitoring reports from ACER (the European Union Agency for the Cooperation of *Energy Regulators)* had shown that the TSOs were systematically constraining allocation of capacity on cross-border interconnectors for trade, instead reserving capacity on congested national grids for exchanges within the national bidding zones (ACER, 2020) – despite the principle in EU legislation that interconnector capacity should be used at its maximum to enable efficient cross-border trade in the internal energy market.

The Commission proposal did not include the 70% MACZT, but retained the *maximum* principle. The proposal also followed previous legislation as regards the principle that international countertrading and redispatch should be used as remedial actions, with the costs to be borne by the national TSO that limits interconnector capacity. That was intended to incentivize TSOs not to curtail interconnector capacity, even if national grids were congested. However, TSOs could derogate from that requirement if they could demonstrate that such international redispatch/countertrading would not be economically efficient at the EU level or would put operational security at risk.

[1] Network elements critical in cross-border trade (CNEs) include cross-border interconnectors as well as the national grid elements that affect power flow on these interconnectors.

The Commission additionally proposed new enforcement provisions to ensure maximum use of interconnector capacity. These included mandatory review of bidding zones if cross-zonal interconnector capacity continued to be curtailed. According to the proposal, bidding-zone borders should be located where structural congestions existed, be reviewed to maximize economic efficiency and adjusted to facilitate cross-border trade. Moreover, the Commission should have the final say in defining the borders.

Additional enforcement measures proposed included a series of new provisions aimed at increasing the transparency and efficiency of TSO capacity calculation. In essence, these would imply further institutionalization at regional and EU levels of tasks and decision-making powers for calculating grid capacities and security margins and for co-ordinated allocation of such capacities. At regional level, new Regional Operational Centres (ROCs) would get mandatory tasks and decision-making powers. At the EU level, ACER's roles would be strengthened with new powers to monitor the ROCs, and powers to decide on the delineation of new capacity calculation regions, to be drafted and proposed by ENTSO-E (European Network of Transmission System Operators for Electricity).

To improve ACER's decision-making effectiveness (which had been curtailed by frequent blocking minorities), new voting rules were proposed for ACER's Board of Regulators: the member-state regulators sitting on this board would take decisions by simple rather than two-thirds majority.

The compromise after negotiations in the Council and European Parliament

The proposed provisions on grid capacity allocation and congestion management proved to be among the most contested of the entire Clean Energy Package. The final compromise after negotiations between the EU member states (the Energy Council) and the European Parliament entailed considerable adjustments.

One such compromise, proposed by the Energy Council and agreed by the Parliament, was the 70% MACZT and extended deadline opportunity to reach this level. On the one hand, this meant a hollowing-out of the existing maximum principle, indicating no strong political commitment to ensure non-discrimination of cross-border trade in the internal energy market. On the other hand, as the background was a situation of interconnector capacity used at far lower levels than 70%, the new MACZT could also be interpreted as a signal of stronger political commitment to improve conditions for cross-border trade. Indeed, the Energy Council was instrumental in proposing early action enforcement provisions: the action plan for achieving the 70% MACZT would contain start-values and linear annual increases in MACZT towards 2025.

The Energy Council further accepted the Commission proposal that international countertrading and re-dispatch should be mandatory if the TSOs did not comply with the MACZT. This could make non-compliance costly for the member states. The Energy Council also accepted the Commission-proposed principle that bidding zone borders should be based on long-term structural congestion, that these zones should not contain such congestions, and that the Commission should have the final say in deciding new bidding zone borders. This meant that the member states could no longer excuse curtailment of cross-border interconnectors by structural congestions in the national grid. However, the Energy Council watered down the text somewhat, so that bidding zones could still contain structural congestions if the member states complied with the new minimum 70% benchmark level for interconnectors, and the bidding zones did not affect adjacent countries significantly. The member states further adjusted the text on who would decide on bidding zone borders: according to the final text, the Commission will make decisions on bidding zones only if the member states are unable to agree.

Concerning the proposed provisions on stronger institutionalization of decision-making at EU and regional levels, these were significantly altered. Both the Energy Council and the European Parliament agreed on weakening some of the proposals that would give Regional Operation Centres (ROCs) new tasks and decision-making

powers. Transferring such tasks to the regional level was not considered compatible with the principle that member states should have final responsibility over security of supply. The Council and Parliament agreed to keep important system operation tasks with the national TSOs; the new regional entities were renamed Regional Co-ordination Centres (RCCs).

However, the Council and Parliament still accepted some new tasks for the RCCs – to ensure regionally co-ordinated capacity calculation and congestion management. The RCCs will be responsible for, *inter alia,* calculating relevant capacity requirements, assessing their feasibility, and coordinating a reduction in MACZT where the 70% is not feasible; they are to report to ACER every three months on any failures to meet this target. The Council and Parliament also agreed on weakening some of the proposed provisions that would have meant stronger institutionalization of decision-making powers at EU level, notably through new tasks proposed for ACER. Thus, national regulators (instead of ACER, as originally proposed), would have responsibility for monitoring the RCCs. Further, the provision for new voting rules for the ACER Board of Regulators was scrapped: two-thirds majority was retained as voting rule. This entailed that frequent blocking minorities would probably continue for ACER decisions.

Implementation of the 70% MACZT

Given the high level of political contestation of new rules on capacity calculation and congestion management, and the fact that important member states, such as Germany, could face substantial costs from complying with the new 70% MACZT, expedient implementation could not be expected – not least regarding the northern European countries.

In February 2019, ACER included the new 70% MACZT and new bidding zone provisions in a decision related to implementation of the 2015 CACM Regulation. Germany responded by contesting the legality of the decision and ACER's competences, bringing a case for annulling the decision to the European Court of Justice. Also indicative of implementation challenges is the fact that several countries (Germany, the Netherlands, and Poland) have sought to buy time by requesting the extended deadline to 2025. Austria and Romania have also expressed their intention to apply for action plans as of 2021 (ACER, 2020: 12). Additionally, most TSOs in the EU, including in north and central European member states, have requested the more time-limited derogation opportunities for 2020. Those not requesting derogations in 2020 were TSOs of the Baltic and Nordic countries (with Sweden as an exception), Germany, Ireland and Slovenia (ACER, 2020:12). However, also the Danish TSO and one of the German TSOs have asked for derogation for a specific hybrid interconnector, linking the two countries via offshore windpower plants in the Baltic Sea.

The action plans submitted by Germany, Poland and the Netherlands show that start-values for MACZT are generally set at a low level, lower for recently inaugurated interconnectors where historical capacity utilization values do not exist. Otherwise, the plans vary – in displaying the details of critical network elements relevant for cross-zonal trade, in the comprehensiveness of measures planned for achieving 70% MACZT in 2025, and in transparency concerning capacity calculations on different interconnectors.

Of the many applications for derogations, one stands out. The Danish TSO and one German counterpart have jointly applied for derogation concerning the Krieger's Flak offshore windpower plant interconnection to have more permanent duration. The derogation aims to ensure priority access to the grid for windpower generated at these plants, which was a precondition for the TSOs when making their initial investments. The application presents the interconnector as a unique case that should not create precedents for other offshore hybrid-grid projects. However, if the Krieger's Flak interconnector is granted permanent derogation, similar claims might perhaps be expected from other future offshore hybrid-grid projects, thereby hollowing out the 70% MACZT.

We conclude that the widespread application for exemptions/derogations indicates that, at least in

the short-term, compliance with the 70% MACZT level is not to be expected. Supporting this expectation is the December 2020 ACER report, showing far lower capacities allocated on many interconnectors in the EU in given time-periods of 2020 (ACER, 2020). The approach and methodologies applied by ACER for this report have been heavily criticized by the TSOs in ENTSO-E (ENTSO-E, 2020).

However, in a longer-term perspective, the EU Commission, as guardian of EU Treaty free-market rules, may well decide to apply harder enforcement measures on member states and TSOs that fail to meet the 70% MACZT. The European Commission's DG Competition had on two previous occasions instigated legal proceedings against TSOs for capacity allocation practices on their interconnectors, against the Swedish Svenska Kraftnät and German TenneT, investigating these practices for breach of EU competition rules. In both cases, the TSOs changed their practices to avoid further proceedings and fines.

Consequences for Norway

The new 70% MACZT affects Norway, which is connected to several EU member states with overhead powerlines and seabed cables. Directly, the new provision does not require the Norwegian TSO to follow the new MACZT, as Norway has not yet decided whether to implement the new EU Electricity Regulation. Indirectly, the 70% MACZT affects opportunities for Norway to attain its long-term energy policy goal of maximizing the value of Norwegian power resources through efficient trade. It has been decided to construct new interconnectors to and from Norway, on the assumption that non-discriminatory access will be provided to power markets and grids: i.e. that the utilization of interconnectors will be at maximum capacity and will reflect price signals, such that zones with lower prices will export to zones with higher prices.

For Norway, the 70% MACZT offers challenges and opportunities, depending on how existing and new interconnectors are used in support of cross-border trade. For interconnectors that have seen a declining trend and curtailed below the 70% level, the new MACZT may improve conditions for cross-border trade to and from Norway. For interconnectors not previously curtailed below this level, conditions for trade may not change – unless the new benchmark level is applied more like a maximum than a minimum level by adjacent TSOs. For new interconnectors, where investments were decided on the condition that these would be used at their maximum in order to support trade, Norwegian actors may experience losses from capacity levels set low in the short term and if the 70% MACZT is institutionalized as a new practice when adjacent TSOs allocate capacity in their grids.

In a partial analysis of how Germany has decided to implement new capacity allocation rules for the new NordLink interconnector, we estimate economic consequences for Norway. The German action plan guarantees minimum capacity for the Norway–Germany interconnector NordLink from 2021, with this minimum availability increasing until 2025. We identify a most-likely scenario for the use of this interconnection, depending on continued congestion in the German grid in hours of high windpower input. The analysis shows that the congestion rent on NordLink is expected to be reduced by EUR 5 million between 2021 and 2025: thus, a loss in congestion rent when the current full interconnector availability strategy is replaced with wind-constrained availability. The total social surplus is estimated to be reduced by EUR 26 million for Norway over these years, as compared to a scenario where the interconnector is used at its maximum capacity. The reduction in social surplus is due mainly to a decrease in trade volumes.

Preface

This report is written as part of the project 'Reform of EU Internal Energy Market Policies: Implications for the Norwegian Energy Policy Strategy (REMAP)', funded by the Research Council of Norway, grant # 280960, with co-funding from Agder Energy, Energy Norway, NorthConnect, Statnett, Norwegian Oil and Gas, and the Norwegian Water Resources and Energy Directorate. (NVE) The project is a collaborative venture with the Fridtjof Nansen Institute and Thema Consulting as main national partners. Under the project, political scientists and economists have analysed the 2019 EU internal energy market (IEM) policy reform under the Clean Energy Package, member-state implementation and the consequences for Norway's trade-based power policy strategy. Although not an EU member state, Norway is a signatory to the European Economic Agreement and thus part of the IEM.

This report addresses changes to the Electricity Regulation (Regulation (EU) 2019/943) focused on grid capacity calculation and congestion management rules. These rules aim at ensuring that the European electricity grid is utilized efficiently to facilitate cross-border trade. We analyse the making and early implementation of reformed rules, focusing on a new provision in the 2019 Electricity Regulation requiring European transmission system operators to make at least 70% of capacity on interconnectors available for cross-border trade. We then assess the opportunities and challenges for the Norwegian trade-based power policy strategy emerging from how this new rule is implemented in Norway's grid-connected neighbouring countries. An important objective of this strategy is to maximize the value of Norwegian power resources through cross-border trade in the EU IEM.

The report is based on data collected from desk study (information available online) and interviews conducted in 2019 with stakeholders and decision-makers (the Commission, members of the European Parliament, and member-state permanent representatives to the EU) who were involved in the reform of EU IEM legislation.

Contents

1. Introduction

In 2019, the EU reformed its internal energy market (IEM) legislation. Part of this reform involved changes to the EU Electricity Regulation (EU) 2019/943 and its provisions for managing capacity on congested grids: capacity allocation and congestion management provisions. Importantly, a new provision requires that a minimum of 70% of the capacity of critical network elements (CNEs) be released for cross-border electricity trading. Setting such a minimum level (MACZT – minimum available capacity for cross-zonal trade) marked a shift from the existing energy market acquis principle that interconnectors should be used at their maximum to facilitate efficient trade in the EU internal market. The deadline for attaining the new 70% MACZT was 1 January 2020, but implementation time could be extended to 31 December 2025, if the member state(s) in question documented structural congestions in the grid, presented an action plan with measures to reduce these congestions, and a timetable indicating annual increases in the MACZT. Additionally, a time-limited maximum two-year derogation opportunity was offered for TSOs if essential for maintaining system operation security. If structural congestions remain a problem and the 70% MACZT cannot be attained, the TSOs must use costly redispatch and countertrade measures, or re-configure bidding zones to ensure that congestions are not shifted to the borders and thus continue to constrain cross-border trade.

In this report we first ask: why was the reform of capacity allocation and congestion management rules proposed by the European Commission in the first place? Next, we analyse how and why negotiations among EU decision-makers brought adjustments to these rules, including the new 70% MACZT. Thirdly, we thirdly examine how selected member states have chosen to implement the reformed EU regulation: to what extent have member states decided to comply with the 2020 deadline for attaining the 70% MACZT, or chosen to apply for postponement/derogation? In the latter case, how have they justified postponing MACZT attainment and what national strategies/measures have been proposed to reach the 70% by 2026? Drawing on this information, we briefly discuss opportunities and challenges for certain EU member states in complying with the new rules. Here we focus on northern and central European countries, particularly relevant for trade between Nordic and continental markets. The background for this selection is the main goal of the project underlying this report – to investigate how new EU market design regulations may affect opportunities for Norway to realize its trade-based energy-policy strategy.

Taking a Norwegian perspective, we then provide a preliminary analysis of the opportunities and challenges stemming from how the MACZT is implemented in neighbouring interconnected countries. A long-term strategy in Norwegian energy policy has been to maximize the value of Norway's power resources through efficient trade. New interconnectors have been decided on the assumption that non-discriminatory access will be provided to power markets and interconnectors: that the utilization of interconnectors will reflect price signals, such that zones with lower prices will export to zones with higher prices. We conclude this report by assessing how the new EU 70% MACZT provision and the mode of implementation may affect trade, and thereby opportunities for value creation from Norway's long-term trade-based energy strategy.

2. Commission proposal for reform of grid capacity allocation and congestion management

2.1 Why reform?

The EU 2019 reform of capacity allocation and congestion management rules is rooted in decisions in the 1990s to establish a free-trade internal electricity market. EU legislation to this end has been adopted in a stepwise manner. First, the main legal principles and regulations were adopted with the 1996 Electricity Directive. Regulatory reform in 2003 (second package) and 2009 (third package) gave new impetus to improving conditions for cross-border trade, which had been too limited to level out major electricity price differences among the EU member states.

In 2003, a new legal document, the Electricity Regulation, was adopted for this purpose. It included the principle that the cross-border transmission connections should be used at maximum to serve suppliers seeking entry to foreign markets (Regulation (EC) 714/2009). The 2009 reform of this regulation instructed European exchanges, transmission grid operators (TSOs) and national regulatory agencies (NRAs) to co-operate and harmonize rules, to achieve efficient use and non-discriminatory access to commercial trading platforms and interconnectors ('network codes'). New EU-level arenas were established to accelerate such co-ordination: ENTSO-E to facilitate co-operation between national TSOs, and ACER to monitor the market and facilitate co-operation and agreement between NRAs on network code proposals from ENTSO-E.

Follow-up co-ordination between European exchanges brought progress in market-coupling initiatives: joint trading platforms with joint algorithms were established to clear the market, combined with implicit auctioning of grid capacity, meaning automatic allocation of grid capacity for successful bidders in the market. The TSOs and regulators intensified their collective efforts within ENTSO-E and ACER to establish methods for, *inter alia,* determining actual volumes of capacity available for trading between the bidding zones. These efforts became codified in EU law with the adoption of the 2015 CACM Regulation (Regulation (EU) 2015/1222), which provided detailed guidelines on how the TSOs and national regulators should proceed in developing and adopting regional network codes on capacity calculation and congestion management.

Although such co-ordination efforts provided a foundation for more efficient cross-border trade, ACER's successive market monitoring reports showed that non-optimal trade remained a problem, stemming from constricted use of interconnectors, within and between regions, greater at some borders than others. In its 2014 report, ACER concluded that the main reasons for this problem were congested internal grids and national modes of managing congestion: grid operators tended to give priority access to national suppliers over supplies via interconnectors whenever national grids were congested. Further, grid congestion was increasing in many countries, whereas the utilization of interconnectors was declining (ACER/CEER, 2014).

Increasing congestion stemmed in large part from rising investments in new renewable energy capacity located far from major load centres and with priority access to the grid, and failure to follow up with accelerated grid investments. Considerable attention was given to one hotspot for declining use of interconnectors: the interregional borders between Germany and the Nordic area (Denmark and Sweden). Here, TSOs on the German side had increasingly limited their exports to Sweden and imports from Denmark because of the increasing internal grid congestion stemming from the rapid

development of wind power in northern Germany, combined with lengthy national and regional planning and decisionmaking processes for upgrading national networks between the German north and south. Congestion was a problem also on the Swedish side, specifically related to limited capacity in the 'West Coast Corridor'. As capacity use on the interconnector between western Denmark and Germany had experienced a particularly steep decline over the years, ACER sent a follow-up letter to the Danish and German NRAs requesting measures to mitigate this trend. The joint response from the Danish and German NRAs stated that the relevant TSOs – Energinet.dk and TenneT – would intensify their co-operation in order to implement remedial measures (ACER/CEER, 2014:116).

However, ACER's next 2015 report showed little change in the trend of declining allocation of capacity on interconnectors for the market. Again, the border between Germany and the Nordic countries was highlighted as a hotspot for the more general problem. ACER concluded that technical grid congestion was not the sole culprit, however. It also noted inefficiencies in how TSOs and NRAs had progressed in developing regional methods for calculating cross-zonal capacities, with non-coordinated practices in allocating such capacities and in defining bidding zone borders that could contribute to more efficient capacity allocation (ACER/CEER, 2015: 147). This meant, according to ACER, that the TSOs had not effectively complied with the Electricity Regulation (EC) No 714/2009, or with the specific 2015 CACM Regulation, which required such regional co-ordination.[2]

Lack of regional co-ordination had been allowed to persist even though action on the part of one TSO could severely affect physical flows and the operational security of other TSO areas as well (ACER/CEER, 2015:157). This was evident in the increasing volumes of unscheduled flows and loop-flows on interconnectors reinforcing congestion problems also in neighbouring grids, impinging on their opportunities for cross-border trading. ACER highlighted the situation in Germany and its neighbouring countries as example. Unscheduled flows originating in north Germany would pass through Poland, the Czech Republic, the Netherlands, Belgium and France, to re-enter Germany or Austria in the south – the two latter countries joined in a common bidding zone.[3]

In response to ACER-documented problems, the European Commission in 2016 proposed changes to capacity allocation and congestion management provisions in the EU Electricity Regulation as part of the major Clean Energy Package reform. An accompanying assessment report summed up the Commission's diagnosis of the problem*:*

> One key barrier to cross-border-trade remains the uncoordinated use of interconnectors, leading to a limitation of available cross-border capacity. Even where interconnection capacity between countries is physically available, TSOs do often not make this capacity available to the market. According to recent ACER analyses, up to 75% of the physically available interconnector capacity cannot be used because of such practices. At some borders, cross-border capacities offered by TSOs have even been reduced to 0 or close to zero, although a large physical interconnection is in place (e.g. at the German/Polish or German/ Danish border). The main motivation for TSOs to reduce existing cross-border capacities and not to make all capacities available to the market is to avoid problems in the internal grid of the TSOs. (European Commission, 2016:30)

The Commission thus concluded that the TSOs had tended to maximize opportunities for exchanges within their own grid area, disregarding trade on cross-border interconnectors and negative security of supply effects on other, adjacent grid areas. It

[2] Some progress, albeit limited and varying, was noted from the TSOs establishing Electricity Regional Initiatives (ERI) (ACER/CEER, 2015: 158).

[3] Reference to a recently adopted ACER opinion (Opinion 261/2015) backed up how such unscheduled flows impacted cross-border tradeable capacities in the Central East European region (CEE) (ACER/CEER, 2015: 165).
Also cited as example were loop-flows from France, via Germany and Switzerland, and back into France.

further concluded, as ACER had done, that inefficient regional co-operation on network code development was largely to blame. The EU institutionalization of co-operation between TSOs and between national regulators (through the establishment of ENTSO-E and ACER in 2009) had been insufficient to create optimal results for the all-European internal market (European Commission, 2016: 32). Recent voluntary TSO cooperation initiatives for Regional Security Cooperation Initiatives (RCIs) were assessed as a step in the right direction but unlikely to be sufficient to ensure progress without clearer rules on cooperation between the TSOs (European Commission, 2016:33). The decision-making powers of national regulators within ACER (the Board of Regulators) were seen as impeding the development of new regulatory proposals, aided by majority voting rules – decisions could be vetoed by a coalition of 1/3 of the regulators (European Commission, 2016: 35).

2.2 Reform proposal

The proposed reform built on the existing 2009 Electricity Regulation and the 2015 CACM Regulation. From the existing *aquis* it retained the principle that internal grid congestion should be addressed with non-discriminatory market-based solutions, including that *maximum capacity* of network elements/interconnections affecting cross-border flows should be made available to market participants. It also retained some opportunities for derogating from this principle, and specified criteria for how such derogation could be justified and achieved.

Derogation should be strictly limited to what would be necessary for operational security or beneficial to economic efficiency *at the EU level.* Such qualification of the level for assessing economic efficiency was new. No longer could priority dispatch for renewable energy be used to justify reducing cross-border capacities, an opportunity provided by the 2009 Renewable Energy Directive. Derogation should avoid discriminating between internal and cross-zonal exchanges; interconnection capacity should not be curtailed to solve congestion in internal national grids.

The TSOs could no longer justify limiting capacity on interconnectors *ex-post:* now they would have to apply for derogating the maximum capacity principle, and substantiate in advance that the criteria for temporary limitation would be met. The aim was to increase transparency and thus raise the threshold for TSOs to curtail interconnectors. The burden of proof would shift from NRAs to TSOs. NRAs and stakeholders would be entitled to submit comments before the NRA made its decision as to derogation. NRAs would have to consult the NRAs of other member states that formed part of an affected capacity calculation region before granting a derogation. If the national NRAs could not agree, the decision on the derogation would be left to ACER.

Also proposed was mandatory use of counter-trading and redispatch, including cross-border redispatch, as remedial action to maximize cross-border trade, unless this can be shown to be detrimental to economic efficiency at the EU level. This would impose costs on the TSOs (to be re-allocated to TSO consumers) for curbing trade by underutilizing the interconnectors.

Next, the Commission proposed new provisions on revision of bidding zones as remedial action aimed at increasing capacity on interconnectors available for cross-border trade. Bidding zone borders were to be based on long-term structural congestions in the grid; no congestion should exist within bidding zones. Also proposed were new procedures for determining bidding zone borders, with sole competence for final decision left to the European Commission. This marked a significant change from the existing EU *acquis*: the 2015 CACM Regulation had vested the authority to review and propose bidding-zone configurations with TSOs, and final decision-making with the participating member states or regulatory authorities. Further, it was proposed to give ACER new tasks: to approve and request amendments to the methodology and assumptions used in bidding-zone reviews. In the existing energy *acquis*, ACER had more limited tasks: it could request the TSOs to launch a review of bidding zone borders if technical or market reports revealed inefficiencies in the current configuration.

To solve the problem of poor regional co-ordination among the TSOs, the Commission proposed new Regional Operation Centres (ROCs) mandated to adopt binding decisions for TSOs within the region. Various mandatory tasks were proposed for the ROCs: *inter alia*, the co-ordination of capacity calculation, regional procurement of balancing capacity, security assessments and frequency restoration tasks, adequacy forecasting and risk preparedness planning. Oversight tasks and binding powers over the ROCs were to be allocated to the NRAs, mandated to co-operate with other NRAs within ACER. Further, ACER was to have responsibility for monitoring and analysing the performance of the ROCs and the capacity adequacy assessments developed at national, regional and EU levels. New regional sub-structures of the ACER Board of Regulators would match the ROC structure, empowered to decide which issues would be decided at regional or EU level, to request information from ROCs, and to issue opinions and recommendations to the ROCs. ENTSO-E would be tasked with proposing the geographical scope of the ROCs, while ACER would have powers to decide on this. To improve the decision-making effectiveness of ACER, the Commission proposed new voting rules for ACER's Board of Regulators – from two-thirds majority to simple majority.

Most of the proposed changes represented a move towards more formal supranational institutional structures for monitoring, analysis and decision-making, with more tasks and decision-making powers given to regional and EU-level institutions.

To sum up, in 2016 the Commission proposed:

- stronger enforcement of the principle of *maximum use* of capacity on interconnectors in support of trade.
- abolishing priority access for national renewables which had contributed to internal congestion and curtailment of interconnectors.
- obligatory redispatch and countertrading across borders, to increase the costs of curtailing interconnectors.
- splitting up national bidding zones if internal structural grid congestion continued to affect the use of interconnectors.
- new measures to speed up co-ordinated network code development: the regional TSO unit would take over tasks and powers from national TSOs; new powers would be accorded to ACER.

3. Negotiating and deciding on the reform proposal

The provisions regarding capacity allocation and congestion management were heavily contested when the member states in the Energy Council and the European Parliament negotiated the Clean Energy Package in 2017 and 2018. Substantial changes were introduced after these negotiations.

3.1 Energy Council: position and negotiations

On 18 December 2017, the Energy Council presented a joint provisional position (Council of the European Union, 2017). This introduced the new provision on MACZT, first proposed at 75% of total capacity. However, the maximum capacity principle was not deleted from the text – merely complemented with the new minimum-level target. In further negotiations during 2018, the proposed MACZT was adjusted down to 70%, generally to be achieved by 1 January 2020.

The Energy Council also proposed new derogation rules: the member states could opt for a stepwise approach to achieving the MACZT, if they documented structural congestion in internal grids and presented an action plan for meeting the target by a final deadline of 31 December 2025. To ensure early improvement in the use of interconnector capacity for the market, this action plan should present start-values for capacity in 2020 and a linear trajectory towards full target attainment in 2025, alongside measures to reduce structural congestions.

The Energy Council retained the Commission-proposed option for a more time-limited derogation, relating also this to the 70% MACZT. Criteria and requirements for the derogation-granting process were kept mainly in line with what the Commission had proposed, but further specified. According to the final text, a derogation may be granted by relevant regulatory authorities at the request of the TSO only if necessary to maintain operational security – for one year at a time, up to a maximum of two years, conditional on documentation of reduced structural congestion in the first year. The derogation should avoid discrimination between internal and cross-zonal exchanges. Before granting a derogation, the regulatory authority must consult with the regulatory authorities of other member states within the affected capacity-calculation regions. If these formally disagree, ACER shall decide on whether or not to grant a derogation. If a derogation is granted, the relevant TSO shall develop and publish methodology and projects for solving the problem addressed by the derogation (European Commission, 2019).

The Energy Council further watered down the text on several of the proposed provisions for bidding-zone review. The Commission had proposed that structural congestions would automatically trigger a review of bidding-zone borders. However, according to the final text, should structural congestion remain a problem at the end of the implementation period for the 70% MACZT, the member states may either opt for refiguring the bidding zone(s), or address remaining congestion through remedial actions (redispatch and countertrade), for which they would bear the costs. In the latter case, a bidding zone should not be reconfigured against the will of the member state, provided that the 70% MACZT is achieved (European Commission, 2019).

Moreover, several proposed provisions entailing stronger institutionalization of decision-making on rules for capacity allocation and congestion management at EU and regional levels were significantly altered. This included tasks and powers proposed for new Regional Operation Centres (ROCs) and ACER. The Council here lent ear to the European association of national TSOs, ENTSO-E, which had warned that granting extended powers to ROCs would split liability and insert legal and political gaps

that could negatively affect the secure operation of the power system. Moreover, according to ENTSO-E, binding powers to ROCs would be incompatible with the principle whereby member states had primary responsibility for security of supply (ENTSO-E, 2016; 2017). The final legal text kept lead responsibility over system operation with the national TSOs. The more limited powers of the regional entities were reflected in renaming these from ROCs to RCCs (Regional Co-ordination Centres), a proposal that emerged from the European Parliament. Through new tasks, these entities would get a stronger role in ensuring more transparent and regionally co-ordinated capacity allocation and congestion management.

The final decision on capacity allocation and congestion management provisions reflected a compromise between member states with highly diverging views. The Nordic countries formed a bloc which supported the principle that maximum capacity of interconnections should be made available for the market, accompanied by provisions aimed at enforcing this principle, such as mandatory use of countertrade and redispatch measures. Several member states with borders to Germany supported this principle as well – countries whose internal grids had been constrained by loop-flows originating from German grid congestions.[4] Germany, which faced high countertrade and redispatch costs stemming from its many interconnectors and internal grid congestion problems, was instrumental in proposing the lower 70% MACZT and the extended deadline for achieving the MACZT.

Germany gave high priority to altering Commission-proposed provisions that would give ACER a stronger regulatory role and powers in adopting EU capacity allocation and congestion management regulations, including the provision to change the voting rules for the ACER Board of Regulators. Many other member states were sceptical to ceding powers to ACER; large states such as Spain, France and Italy formed a blocking coalition, together with Germany.[5] However, several smaller member states opted for a stronger legal mandate and effectiveness for ACER in adopting and enforcing EU congestion-management rules. Again, this included several states with borders and interconnectors to Germany.[6]

Germany also favoured altering bidding-zone provisions, notably that the Commission should have final authority to determine bidding-zone borders – a proposal that encountered strong opposition in domestic political circles. The Bundestag held that the Commission's proposal for new decision-making powers in the configuration of bidding zones within a country contravened the principle of subsidiarity according to the EU Treaty (European Parliament, 2017b). The German government took this same position with a close ally in the Austrian government, who held the Council Presidency autumn 2018 under the final negotiations.

Due to its position on various issues, Germany was portrayed by some other member states as anti-market – whereas Germany countered that it merely wanted to find reasonable solutions to the specific problem of internal grid congestion having spill-over effects on cross-border trade.[7]

Member states were more united in their opposition to the Commission-proposed transfer of considerable operating control over electricity systems from national TSOs to new Regional Operation Centres. However, that did not mean that they opposed regional co-ordination of capacity allocation and congestion management tasks as such, which had long been realized as important for ensuring fair and competitive trade.

3.2 The European Parliament

Negotiations with the European Parliament did not result in much change to the capacity allocation and

[4] Information on the conflict dimensions and positions taken in the negotiations on market design provisions was gathered in interviews conducted between 25 February and 1 March 2019 with representatives of several member-state permanent representations in Brussels who attended the negotiations. This included representatives of Germany, Sweden, France, the UK, Sweden, Poland and several other countries which held the EU presidency while the negotiations were taking place.

[5] See footnote 5.

[6] See footnote 5.

[7] See footnote 5.

congestion management provisions. The Industry, Research and Energy Committee (ITRE) prepared the Parliament's position. In June 2017, the ITRE rapporteur presented his draft report. This report proposed, as did the Energy Council position paper, that bidding zones should be as large as possible, while taking structural congestion into account. The Parliament also sided with the Council regarding a 'carrot and stick' approach to restructuring the bidding zones, whereby relevant member states would first be requested to agree unanimously, before the Commission might step in to resolve disagreements.

Concerning regional co-operation, the ITRE report regarded this as important to system security, but also stated that ultimate responsibility for system security should remain with the national transmission system operators (European Parliament, 2017a). The full ITRE report, adopted on 21 February 2018, included the amendment proposed by the Energy Council in December 2017 that at least 75% of cross-border lines must be opened for European electricity trading by the end of 2025, and that, in the future, the Commission would have the final say in the reconfiguration of bidding zones (European Parliament, 2018). A minority opinion warned that the target could lead to significant internal grid congestion in Germany and a massive increase in redispatch costs. If Germany failed to achieve the target and the Commission split up Germany into separate bidding zones, that would dramatically affect electricity prices and create a clear north–south divide in the country.[8]

Further negotiations in the European Parliament brought no change to the main direction staked out by the rapporteur. Initially, the Parliament supported retaining the principle that interconnectors should be made available for trade at maximum capacity, but this principle was not made absolute in the negotiations with the Council. Other issues concerning renewable energy and capacity remuneration mechanisms appeared to be far more important priorities for the European Parliament (European Parliament, 2018).

3.3 Spillover from other EU policy processes

There was spillover from the process of implementing the 2015 CACM Regulation, connected to the proposal for 70% MACZT. In July 2017, German and Danish energy ministries and regulators issued a joint declaration on how to secure higher capacity on the West Denmark–Germany interconnector, which ACER had repeatedly highlighted as a hotspot for the problem of interconnectors limited for trade. The declaration outlined a stepwise approach to increase the use of interconnectors up to 2020, when a minimum level of total capacity should be released for hourly exports and imports – specifying that countertrade should be used if this level were not achieved (energinet.dk, 2017). This structure of measures matches what the Energy Council later that year proposed as its common position for solving the interconnector curtailment problem. The German–Danish declaration set the minimum capacity level for 2020 at 1100 MW, amounting to some 70% of total thermal capacity in the southbound direction (European Commission, 2018).

However, the Commission's Directorate-General for Competition was not convinced that the Danish–German declaration would solve the problem: the 1100 MW target was considered too limited; it would be achieved too late (only in 2020 after a stepwise increase from 400 MW in 2017), be conditional on non-acceptable factors (e.g. subject to a cost-cap for countertrade and redispatch) and be non-binding as well (European Commission, 2018). This assessment was notified to the German TSO TenneT on 19 March 2018. TenneT then came up with new commitments for further increase of interconnector capacity for trade (European Commission, 2018).

The Commission nonetheless notified TenneT that it would initiate formal proceedings to investigate whether capacity limitations on the DE-DK1 interconnector had resulted in a partitioned internal market and discrimination between network users based on their place of residence, thus representing

[8] The minority opinion came from the German member of the EPP group, Angelika Niebler, who voted against these amendments (see European Parliament website www.europarl.europa.eu/doceo/document/A-8-2018-0042_EN.html?redirect#title5).

a breach of EU Treaty rules banning abuse of a dominant position (European Commission, 2018a).[9] Faced with further legal action, TenneT on 12 November 2018 submitted an amended commitment: 75% of interconnector capacity would be released for the market by 1 January 2026 if internal congestion in the German grid had been reduced.[10] This was identical with the 75% MACZT already outlined in the Energy Council's joint position from December 2017, and the deadline date set for attaining this level.

However, in the final agreement on the MACZT, the Energy Council adjusted the figure down to 70% – in line with the figure agreed between German and Danish ministries and regulators in July 2017.

3.4 The main agreement: summing up

The 2018 political compromise that was finally reached on the capacity allocation and congestion management provisions after deliberations within and between the Council and European Parliament included agreement on:

- the Commission proposal to remove priority grid access for renewables (except small-scale).
- the 70% MACZT to apply from 1.1.2020, with extended deadline possible to 31.12.2025, as well as more time-limited opportunities for derogation.
- new provisions on the review of bidding zones, including that the Commission should have the final say in defining bidding-zone borders.
- powers and tasks for new regional TSO units (RCCs) and for ACER, revised compared to the Commission proposals, to retain national control over system operations – however, with an extended list of tasks to be co-ordinated at regional level and made binding for all TSOs.

The compromise represented only a shallow agreement: some member states, notably Germany, felt that they had lost out in the negotiations and would now face very high political and economic costs'.[11] Firstly, due to its many interconnectors to be bound by the 70% benchmark level, Germany would face potentially very heavy countertrade and redispatch costs if it could not solve the major congestion problems in its internal grids rapidly – which was unlikely, given the massive popular opposition to grid developments in the past. Secondly, the new threat of bidding zones being imposed on the country from the European Commission was a serious political headache, given the opposition to such market splitting among commercial and political actors in Germany. If energy policy developments were increasingly dictated from Brussels, that could reinforce Germany's growing Euroscepticism, as shown by the success of the new party *Alternative für Deutschland* in regional elections.

In fact, the economic and political costs entailed in implementing the new provisions would affect not only Germany but also the many other countries that faced growing grid congestion problems due to increasing volumes of renewable energy and resistance to grid development. Germany was not alone in preferring to keep its national market with only one bidding zone: most EU member states (besides the Nordic countries and Italy) had chosen this solution. Moreover, growing Euroscepticism was certainly not an exclusively German problem. Thus, swift, and straightforward implementation of the new capacity allocation and congestion manage-

[9] As a first step, the Commission asked third parties to comment on the commitments through its notification in the *Official Journal* on 4 April. 16 May, the Commission informed TenneT about responses allegedly supporting the Commission view, from 23 respondents, who represented electricity producers, associations of energy traders, generators, retailers and distributers, TSOs and public authorities of various member states.

[10] After further internal consultations, the Commission's DG Comp published its decision on 7 December 2018, establishing the commitments as binding on TenneT TSO for a period of nine years (European Commission, 2018b). The decision included planned measures to reduce internal bottlenecks by commissioning the East and West Coast Lines in northern Germany by 1 January 2025. Also included were commitments not to deflect countertrading, to not shift the problem to interconnectors with other borders, and a clarification that no reservation had been planned concerning capacity for the exchange of balancing capacity.

[11] See footnote 5.

ment provisions in many member states could hardly be expected – as we investigate for a selection of northern and central European countries in next section.

4. Implementing the 70% MACZT

Attaining the 70% MACZT target appears to be a tall order for the member states: many TSOs have applied for extended deadlines for target achievement.

Germany, the Netherlands and Poland have applied for the full five-year extended deadline and presented action plans for reducing structural congestions to attain the 70% MACZT in 2025. Also Austria and Romania have expressed their intention to apply for action plans as of 2021 (ACER, 2020: 12). Additionally, most TSOs in the EU, also in north- and central European member states, have requested the more time-limited derogation opportunity for 2020.[12] Those *not* asking for derogations in 2020 are TSOs of the Baltic and Nordic countries (except Sweden), Germany, Ireland and Slovenia (ACER, 2020:12). However, the Danish TSO (energinet.dk) and one German TSO have applied for derogation for their joint hybrid interconnector, linking the two countries via offshore windpower plants in the Baltic Sea.

Sections 4.1 to 4.4 present implementation data for Germany, the Netherlands, Poland, Sweden and Denmark, chosen due to their importance for cross-border trade within the Nordic market and between this market and continental Europe. Section 4.5 summarizes the findings and discusses how early implementation indicates prospects for attaining the 70% target and reversing the trend of curtailing interconnectors for trade.

4. 1 Germany

4.1.1 The German Action Plan

In 2019, Germany submitted its action plan for implementing the MACZT and attaining the 70% level by end-2025 (for details, see Annex 1). In this plan, the German federal authorities acknowledged their country's critical role in enabling cross-border trade, a result of its central geographical position in Europe with interconnectors linking markets to the north, south, east and west (Federal Ministry for Economic Affairs and Energy, 2020a). All in all, Germany's four TSOs operate around 50 interconnectors to neighbouring countries: Denmark, the Netherlands, Belgium, Luxembourg, France, Austria, Switzerland, the Czech Republic, Poland and Sweden. Several interconnectors are under construction, like NordLink to Norway, or are in the planning stage (Federal Ministry for Economic Affairs and Energy, 2020b).

The Plan justifies Germany's application for an extended deadline by citing the challenges of congested national grids, in turn a result of combined impacts from the national renewable energy transition and increasing interest in cross-border

[12] Ten out of 16 TSOs in the new CORE Capacity Calculation Region have applied to use the more time-limited derogation opportunity, citing the need to achieve security of grid operation: the TSOs of Austria, Belgium, the Czech Republic, Croatia, France, Hungary, Romania and Slovakia, as well as of the Netherlands and Poland, which have also requested a five-year extension.
SEPS (Slovakia): submitted nationally on 10/10/2019 • MAVIR (Hungary): submitted nationally on 15/10/2019 • Elia (Belgium): submitted nationally on 15/10/2019 • RTE (France): submitted nationally on 15/10/2019 • HOPS (Croatia): submitted nationally on 29/10/2019 • PSE S.A. (Poland): submitted nationally on 30/10/2019 • APG (Austria): submitted nationally on 30/10/2019 • TenneT BV (Netherlands): submitted nationally on 31/10/2019 • CEPS (the Czech Republic) : submitted nationally on 05/11/2019 • TRANSLECTRICA (Romania): submitted nationally on 11/11/2019 (Derogation proposal of Core TSOs in accordance with Art. 16.9 Regulation 2019/943: Core common document, 15 October 2019, https://eepublicdownloads.blob.core.windows.net/public-cdn-container/clean-documents/Network%20codes%20documents/Implementation/ccr/methodologies/core/cep/20191111_Core_derogations_common_V14.pdf)

trade via a growing number of interconnectors. Despite considerable pressure for upgrading the national grid to remove congestion, specifically between the north and south of the country,[13] finalizing such upgrading projects has encountered great problems and significant delays, caused by poor public acceptance and delays in public planning (Federal Ministry for Economic Affairs and Energy, 2020b). Immediate implementation of the 70% MACZT would have exacerbated structural congestion in the German grid.[14]

The German authorities indicate that attaining the MACZT may prove very expensive unless planned major HVDC lines through Germany are commissioned. The 70% MACZT is expected to increase interest in cross-border trade, thereby also increasing grid congestions and the need for higher volumes of costly congestion management measures (redispatch and countertrading) – to be borne by German electricity consumers (Federal Ministry for Economic Affairs and Energy, 2020b).

Setting level of capacities released for trade on the interconnectors

The German plan, in line with EU requirement, outlines the calculation of MACZT start-values for its interconnectors based in historical data. Various methods were used to calculate capacities for the three capacity-calculation regions of which Germany is part:

- Hansa: with Denmark and Sweden
- Central Western Europe (CWE): with Belgium, France, Luxembourg, the Netherlands and Austria
- Eastern Neighbours: with Poland and the Czech Republic (to be assimilated with CWE into the CORE region in 2021).

A flow-based calculation method was used for the CWE and Eastern Neighbours regions. In principle, this method gives each critical network element (CNE) its own start capacity to be considered when calculating start capacity for the interconnectors. However, Germany allocated each CNE a value based on the average across all CNEs, to facilitate monitoring the linear trajectories for the large number of German CNEs. For the CWE Region, the German authorities promised to set the start-value at 20% or above, reflecting agreement between the TSOs in the region in 2018. However, in its 2020 report, ACER records the start-value set for these interconnectors as being around 12%, irrespective of this agreement. For interconnectors to Poland and the Czech Republic, start-values were also set at around 12%.[15]

For the Hansa region, capacity calculation followed a Net Transfer Capacity (NTC) approach, which accounted for capacity calculations made also by the adjacent TSOs. Start-values were set at 41% for the Baltic interconnector to Sweden and 70% for one of the DC interconnectors to Denmark (DE-DK2).[16] The latter reflected the fact that this value had already been settled in the 2017 agreement between German and Danish ministries and national regulators (see Section 3). However, for the DE-DK1 AC interconnector, the start-value was set at 24% (ACER, 2020).

In addition to these capacity-calculation regions, Germany has interconnectors to non-EU countries like Switzerland and Norway and trades large quantities of power with other non-EU countries as well. For interconnectors starting operation in 2026, start-values will be set at a minimum for their first year of service, in the absence of historical capacity figures. The new NordLink interconnector to Norway was given a start-value of 11.7% for 2021, to increase linearly to 70% in 2026.[17]

[13] Conditions for electricity generation based on new renewable energy are best in the north of Germany, but major load centres are in the south and west of the country.
[14] The report, prepared jointly by the four German TSOs 50 Hertz, Amprion, TenneT GmbH and TRANSNETBW,. concluded that many powerlines would suffer congestion for more than 400 hours per year – i.e. more than 5% of all the hours in a year if the target were implemented immediately.
[15] The TSOs has published calculated start-values and trajectories for individual interconnectors at www.netztransparenz.de and www.jao.eu.
[16] See www.bnetza.de/marketcoupling.
[17] The EU-set deadline for attaining the 70% MACZT is 31 December 2025.

All in all, there is significant variation in how Germany allocates capacity at interconnectors for different regions. Germany has chosen to set very low start-values for newer interconnectors, where historical values are non-existent – an easy solution for avoiding some of the expected increases in redispatch and countertrade costs.

Measures for attaining the 70% MACZT

Measures listed in the German action plan for attaining MACZT are grouped as: 1. national measures to increase power transmission capacity; 2. national measures to enable more cross-border trading; and 3. cross-border measures requiring regional cooperation. (See table 3 in Annex 1 for the full list of measures.)

Concerning the first group, Germany aims at finalizing its many long-in-the-pipeline grid expansion projects: more than 160 projects on 88 grid stretches at various stages of planning – 41 already commissioned and a few completed before the action plan was published. Most projects are planned to be commissioned in the period 2020–2026, with a few also after this point. Altogether, these projects involve approximately 10,600 km of powerlines at a cost of around EUR 40bn. Further measures target optimal operation of the transmission grids by phase shifters (8 in operation by 2023) as well as extending distribution grids. The German authorities expect approval to be completed for 85% of planned onshore and all previously planned offshore-connecting powerlines by 2023. By that date, long-planned critical HVDC transmission lines north–south in Germany should be under construction, and altogether 3,200 km of new onshore lines and 2,500 km of offshore lines should be operating (Federal Ministry for Economic Affairs and Energy, 2020b).

Concerning the second group, measures to facilitate cross-border trade more directly, the action plan lists various congestion management measures, including implementation of a unified dispatch regime for renewable and non-renewable electricity (no longer priority access for renewables in the market and grid). This marks a clear turnaround in German energy policy.

Further, Germany will retain its network reserve system as main back-up for national redispatch. Market-based redispatch will not be implemented, because it has been assessed as increasing the risk of market distortion by incentivizing strategic congestion-boosting behaviour among the producers. Co-operation between TSOs and DSOs on developing new concepts for reducing the need for redispatch is also on the list. However, the absence of market-based dispatch is likely to reduce the opportunities for demand-side redispatch measures. International redispatch opportunities will be sought through bilateral agreements between German TSO and those of and other countries. More extensive cross-border optimization of redispatch will not take place before TSOs and NRAs agree on regional methods and rules of cost allocation, to be implemented under the 2015 CACM Regulation.

Also on the list is greater co-ordination between national network expansion and expansion in generation. The pace of target achievement of renewable energy, including for offshore wind, and the ordering of coal-power plants to be phased out will be more closely aligned to progress in the development of national transmission and distribution grids.

With the third group of measures in need of cross-border co-operation, the plan states that new bilateral agreements will be concluded in anticipation of greater regional efforts producing more results. Also listed is co-ordination between national and bordering countries' TSOs on new phase-shifting transformers.

As regards splitting the German market into several bidding zones as a measure to reduce structural congestion shifted to interconnectors, the German plan does not consider this as a solution. On the contrary, the German action plan focuses on keeping the single German–Luxembourg bidding-zone intact, regardless of the network situation and increases in dispatch costs. The plan refers to TSO assessments showing that congestion problems are geographically diffused, volatile over time and heavily dependent on weather conditions, impeding a clear-cut splitting of the German market – unlike Sweden and Italy, with clearer-cut network topologies. The authorities here found that the

macroeconomic advantages of a single bidding zone would outweigh its disadvantages (Federal Ministry for Economic Affairs and Energy, 2020b).

Transparency

The German action plan outlines quite comprehensively how the plan was developed and adopted through collaboration involving the Ministry, BNetzA, and the TSO, as well as stakeholders in neighbouring countries and the European Commission. Start-values and trajectories were calculated for various CNEs (interconnectors, sensitive domestic powerlines and other network elements (transformers). However, no transparent information is provided to identify the CNEs; the plan merely states that Germany has many CNEs because of the large number of interconnections to neighbouring countries (Federal Ministry for Economic Affairs and Energy, 2020b). The start-values for individual interconnectors are not listed in the plan, but information on where these can be found is provided.

Concerning broader consultations required by EU regulation, the plan refers to a first workshop on 30 September 2019 on methodology and calculation of start-values and linear trajectories for the CNEs. Further consultations with international stakeholders on draft versions of the plan are noted: 'two well-attended workshops in Brussels on 10 December 2019 (the first with member states and the European Commission, the second with stakeholders)', with opportunities for written comments.

Further outlined are main concerns voiced by stakeholders: many apparently welcomed the plan's main goal of retaining one bidding zone, but also stressed the need for member states, NRAs and TSOs to improve cooperation on cross-border redispatch (Federal Ministry for Economic Affairs and Energy, 2020b). The German authorities were allegedly praised for transparency, but stakeholders also requested additional information: on network expansion projects and phase shifters, their location, impact on transmission capacity and time schedule for implementation. Some stakeholders called for TSO-developed start-values to be made public. Also requested was information on the role of flexible load in optimizing redispatch. Several participants allegedly welcomed that BMWi set the linear trajectory as only a minimum requirement for trading capacity, and that the minimum 20% capacity would be maintained from the start in the central western Europe (CWE) region – indicating that already-signed agreements would be respected (Federal Ministry for Economic Affairs and Energy, 2020b).

The plan further outlines monitoring measures to ensure transparent progress towards attaining the 70% benchmark level: BNetzA will use a two-stage monitoring process – at short notice, TSOs will inform of suspensions of the minimum trading capacity, as well as preparing annual reports on developments.

4.1.2 The German/Danish joint application for permanent derogation of the 70% MACZT

The action plan concerns all interconnectors. On 30 June 2020, the German government, jointly with the Danish authorities, applied for a more permanent derogation of 70% MACZT for one specific interconnector operated jointly by the TSOs Energinet.dk and 50 Herz, linking the countries via the offshore windpower plant Krieger's Flak in the Baltic Sea.[18] The European Commission decided partly in favour of the applicants, granting a 10-year derogation that may be prolonged by another 15 years by the Commission (European Commission, 2020).

The derogation aims at allowing the two TSOs to apply the new rules in such a way that the offshore windpower plants would be given priority access,

[18] The two countries based their application on Article 64, which provides opportunities for more permanent derogation for small connected systems. The applicants requested the derogation to start when commissioning the new connected grid system and to apply for the whole lifetime of the German offshore windpower farms Baltic 1 and Baltic 2 and the Danish offshore windfarm Kriegers Flak. That would mean a long period, as the German plants started operation in 2011 and 2015, with the Danish plants due to start operation in 2021. A shorter time period would entail substantial problems for operating the connected grid system.

whereas remaining capacity on the grid should be used to attain the 70% MACZT for actors with successful bids on the German and Danish market platforms. The application was justified by an assessment that curtailment of offshore windfarms to increase capacity available to the market would lead to a reduction of renewable energy in the system and could lead to an increase in CO_2 emissions. The applicants added that increasing capacity on the interconnector or countertrading would not be socio-economically optimal for securing compliance with the 70% MACZT.[19]

A further justification was that the Krieger's Flak is a unique case, a first-of-a-kind project supported by the EU (under the EERP Programme) to test out new offshore hybrid grid systems,[20] decided under different EU regulatory rules, as the 2009 Renewable Energy Directive promoted priority access for renewables. The project could not have been realized without such support and regulatory conditions. Further, the applicants held, given the uniqueness of the project, a derogation should not create a precedent for other offshore hybrid systems. On the other hand, the applicants referred to recital 66 in the Electricity Regulation, according to which investments in major new infrastructure should be strongly promoted by possible adjustments of capacity allocation and congestion management rules, including for offshore electricity infrastructure operating as hybrid-assets. Should this recital be invoked more broadly in future hybrid interconnector projects, the Krieger's Flak interconnection case might create more legal precedents than expected, hollowing-out the new 70% MACZT rule.

4.1.3 German authorities: challenging EU capacity calculation and congestion management rules

In addition to applying for derogations, German authorities and TSOs have taken steps to challenge the legality of EU enforcement of the 70% MACZT and new bidding-zone rules.

The background was a decision by ACER on 21 February 2019 (ACER Decision 2/2019) on common capacity calculation methodologies (CCMs) for the CORE Region, which were required to be developed under the 2015 CACM Guideline Regulation (ACER, 2019). National regulators had not agreed on the TSO proposals within the deadline, and requested ACER for settlement.[21] The main contested issues concerned 1) application of the requirement 'to avoid undue discrimination between internal and cross-zonal exchanges' in capacity calculation; 2) the technical solution for remedying such undue discrimination, *inter alia*, what internal network elements and contingencies (CNECs) should be counted as critical for cross-border trade, how should minimum level of available margin (min RAM) for cross-border trade on these CNECs be calculated; and 3) what methodology should be applied in determining the reliability margin needed for these CNECs (ACER, 2019a: 9-10).

One contested part of the ACER Decision was the link that had been made to the recently agreed 70% MACZT: the minRAM level to be settled for all CNECs should be set at 70% (ACER, 2019b: 29, annex 1 of the decision).

German TSOs (Amprion GmbH and Transnet BW GmbH) as well as the German regulator BNetzA filed separate appeals on 23 April 2019. The two TSO appeals were later merged by ACER into one case.

[19] The applicants requested that the minimum level of available capacity be interpreted so as to apply to the capacity of the connection lines to shore remaining after the forecasted wind production had been deducted, not to the full transmission capacity of the system. This interpretation would affect several interrelated articles in the EU Regulation for which derogation was requested: Article 12(7), 14(1), 14(2), 15(2), 15(4), 15(5), 15(6), 15(7), 16(3), 16(4), 16(8) and 16(9).
[20] A hybrid grid system links offshore generation into the national grid and serves as interconnector between countries.
[21] The TSOs submitted two proposals (on capacity calculation methods in the day-ahead and intraday markets respectively) to the national regulators on 15 September 2017. N 9 March 2018, the regulators requested amendments, to which the TSOs responded on 4 June 2018. On 21 August 2018, the regulators informed that they had not reached a unanimous agreement and requested ACER to either extend the deadline for a decision or adopt a decision based on the proposed amendments. Between 11 September 2018 and 6 February 2019, ACER consulted extensively with the TSOs and regulators and held a public consultation, before announcing its decision on 21 February 2019.

The German TSOs requested annulment of the decision on several grounds, one being that ACER had erroneously set the minRAM level at 70%.[22] They claimed that this 70% minRAM level would have to be annulled as it had not been included in the CACM Regulation on which ACER had based its decision, but was linked to the EU Electricity Regulation agreed on late 2018. However, in its response, ACER held that the 70% figure was not linked to this agreement but had emerged from consultations with Nordic and CORE TSOs on historical capacities (ACER, 2019c: decision on appeal).

The German NRA BNetzA's appeal for annulment had a broader legal basis.[23] In parallel, BNetzA on 2 May 2019 requested the European Court of Justice to get specific elements of the ACER decision annulled (Case T-283/19), with another case filed on 21 September 2019 on annulling also ACER's Board of Appeal decision (Case T-631/19).[24] The latter included an extended list of paragraphs sought annulled or as an alternative, an annulment of the entire ACER Decision and related decision of the ACER Board of Appeal. No decision has yet been announced by the ECJ in these case proceedings.

In essence, BNetzA called for annulment of provisions requiring TSOs to list all network elements critical for cross-border trade (CNECs) and to subject these to joint regional minRAM capacity calculation, setting the minRAM level at 70%. Annulment was also called for the corresponding maximum 30% capacity limit set for loop-flows, and

[22] The decision was contested on these grounds: (i) it included issues that had already been agreed on by the NRAs and thus should not fall under the Agency's competency, (ii) substantive errors had been made by ACER on CCMs, by further amending already lawful amendments by the NRA, (iii) ACER had erroneously determined the minimum level of remaining available margin ('minRAM') for cross-zonal exchanges to be set at 70%, and had incorrectly considered the impact of capacity on the non-core bidding zone borders in the calculation of this margin, (iv) ACER had breached requirements of the CACM Regulation in the determination of CNEs (v) and had unlawfully emplaced limits on loop-flows.

[23] BNetzA first contested the ACER decision for infringing important principles of EU law, including the (i) principle of conferred powers (lack of a legal basis), (ii) principle of institutional balance, (iii) principle of sincere cooperation, (iv) principle of legal certainty, and (v) principle of proportionality. Further\, it claimed the decision to be: (i) in violation of the rights of the European Parliament and of the Council, (ii) in violation of the rights of the Member States under the new Electricity Regulation to be adopted as a part of the 'Clean Energy Package', (iii) discriminating on the ground of nationality, (iv) an infringement of Regulation (EU) 2015/1222 and Regulation (EC) 714/2009, (v) in violation of Articles 34 and 35 TFEU. Finally, BNetzA claimed infringement of its procedural rights by virtue of (i) amendment of the TSOs' proposal beyond the TSOs' and NRAs' request, (ii) imposition of additional amendment proposal obligations on Core TSOs, (iii) infringement of duty to issue the Contested Decision in the Appellant's and in the official language(s) of the addressees.

[24] The 2 May 2019 claim for annulment included Articles 5(8) and (9) of Annexes I and II (on capacity calculation in day-ahead and intraday markets, respectively); the second clause of Articles 10(4) and 10(5); the second sentence of Article 16(2); Article 16 (3) (d)(vii) of Annex I; and Article 17(3) (d)(vii) of Annex II. In addition, BNetzA in its 21 September quest additionally claimed annulment of paragraphs 5–9 of Article 5 in Annex I; and otherwise all provisions of Annexes I and II which referred to any of the other points which it held should be annulled. Article 5 deals with the definition of critical network elements and contingencies (CNEC) in capacity calculation. Paragraphs 5-5 states that within 18 months, all TSOs in the CORE CCR shall jointly develop a list of CNECs and immediately submit the list to NRAs. After approval, these should form an annex to future adopted regulation. Paragraph 5-6 states that this list shall be updated every two years with the same procedure as in paragraph 5-5. Paragraph 5-7 states that the CNEC list shall not include elements with maximum PTDF (power transfer distribution factor) below 5%; paragraph 5-8 states that impact assessment should be performed also including CNECs with PTDF below 7–10% on the list, as well as a requirement for broader analysis of how including individual CNECs in capacity calculation would be the economically optimal solution for dealing with congestion, considering also other alternative solutions: remedial actions, reconfiguration of bidding zones, investments in infrastructure, or a combination. All the Core TSOs should jointly co-ordinate and consult the NRAs on methodology, assumptions, and criteria applied when performing this analysis. Further, para. 5-9 states that, in preparing the list of CNECs (paragraphs 6-7) TSOs should take into account paragraph 8. Article 10 concerns methodology for remedial action in capacity calculation. The second clause of paragraph 10-4 states that in order to achieve optimal use of non-costly remedial action, all Core TSOs shall provide for a common capacity calculator all expected costly and non-costly remedial action alternatives. The second clause of 10-5 deals with the minRAM factor of 70% to be allocated to trade via the interconnectors and the corresponding 30% which would be a max factor allocated for loop-flows. Article 16 in annex I and Article 17 in annex II concern optimization of remedial actions in respectively day-ahead and intraday markets. Annulation of the second sentence of the paragraph 16 (2) cross-referenced to Articles 10-4 and 10-5, was also demanded. Article 16 (3) (d) vii and Article 17 (3) (d) (vii) concerned the maximum 30% level of loop-flow allowed, with reference to Article 10-5.

the requirement for joint regional analysis of economical optimization of measures toward achieving the 70% target – whether in the form of remedial action, bidding zone reconfiguration or investments in infrastructure, or a combination. An important element in the BNetzA litigation strategy was the de facto legal challenging of the 70% MACZT agreed under the reformed EU Electricity Regulation.

4.2 The Netherlands

The Dutch government belonged to the alliance of EU member states that supported the principle of maximum use of interconnector capacity for trade in the negotiations on reforming the Electricity Regulation. Nevertheless, the Netherlands used the opportunity to apply for the five-year extension period for attaining the 70% MACZT. Additionally, the national TSO, TenneT BV, applied for shorter-time derogation from the new EU regulation grounded in concerns for operational security.

4.2.1 The Dutch Action Plan

The Dutch Ministry for Economic Affairs and Climate Policy of the Netherlands presented its action plan in late 2019, after the national regulator, ACM, had approved the report from the national TSO, TenneT BV, which documented structural congestions in the transmission grid. This report, based on data from the ENTSO-E Technical Report 2018 and additional analysis based on the CORE day-head capacity calculation method (DA CCM),[25] concluded that multiple Critical Network Elements with a Contingency (CNECs) would experience violations of thermal capacity, precluding adherence to 70% MACZT.

In the action plan, the Dutch authorities emphasized their long-time support of European market integration and commitment to solving internal congestions and increasing cross-border trade on their interconnectors. The Netherlands has altogether nine interconnectors: to the UK (Brit–Ned), Norway (Nord–Ned), Belgium (2), Germany (4) and most recently Denmark (Cobra), making the country a major exporter and importer of electricity (19 TWh export, 27 TWh imports in 2018). Such cross-border exchanges are expected to increase towards 2030 (30 TWh imports/44 TWh exports), a result of Dutch decarbonization policy/increases in the share of renewables. Underlined as fundamental for attaining the MACZT was strengthening not only the Dutch transmission grids, but also those of surrounding countries; that would require good co-operation among the various TSOs, market actors, ministries, regulators and the European Commission (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

Setting level of capacities released for trade on the interconnectors

The action plan outlines how start-values and linear trajectory per individual critical network element (CNE) were calculated and set by TenneT BV, on two basic principles: the same value for both directions of power flow; and aggregation of values for parallel circuits (on all CNEs between the same two substations). The start-value and linear trajectories of individual CNEs were then calculated for every CNE-contingency (CNEC) based on historical flow data.[26] This procedure included a total of 31 CNEs (9 interconnectors and 24 internal CNEs).

For interconnectors in the Central West Europe (CWE) region, data were collected from the full Continental European Network Model for the 2-Days ahead Congestion Forecast ('D2CF') and constraints resulting from application of the CWE Flow-Based Day-Ahead Capacity Calculation, for the period 2016–2018. Start-values for CNEs in this region were set at a minimum 20%, already agreed among the adjacent TSOs in 2018 (Ministry for

[25] Publication of (approval of) structural congestion report: www.acm.nl/nl/publicaties/goedkeuring-structurelecongestierapport-tennet-tso 3

[26] A CNEC is a combination of a CNE and a Contingency (C). This is the basis of (n-1) network security analysis, where the flow over the CNE is evaluated, taking into account the contingency. In the FlowBased capacity calculation, a selection of market-sensitive CNECs is used as the set of constraints for cross-zonal trade. The present study examines only the limiting Dutch CNECs, while considering a domain consisting solely of Dutch CNECs, the 'presolved Dutch CNECs'. These would be the Dutch constraints to the market, if no other limits existed. For every time-stamp, the relevant flow-based parameters are extracted for every presolved Dutch CNEC.

Economic Affairs and Climate Policy of the Netherlands, 2019). Start-values thus vary between 20% and 70% for all CNEs. For the cross-border interconnectors, the start-values were set in the range 20%–58% (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019). For some CNEs, where no historical data are available, TenneT BV determined start-values based on expert opinion. However, the Dutch action plan does not mention how start-values and trajectories were calculated with start-values set for interconnectors beyond the CWE region, like those bound for Denmark and Norway.

Measures for attaining the minimum 70% MACZT

The action plan presents a timetable for measures to reduce structural congestions and increase the availability of cross-zonal capacities, to be carried out by the TSO TenneT BV. Most important are planned investments for reinforcing critical parts of the transmission system. Additional measures include improvement of cross-border redispatch processes. Moreover, the Ministry has stated that it will request TenneT BV to investigate also other measures for increasing cross-zonal trade capacities.

The list of TenneT BV's planned grid investments is announced as preliminary – to be completed in the company's investment plan and updated bi-annually with progress reports. All listed projects, comprising 11 projects linked to 12 CNEs in 8 locations, are expected to be realized by 2026. Six of these projects involve exchange of conductors, thus upgrading the thermal capacity of network elements. Five projects require the construction of new infrastructure (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019). No financial cost estimates have been included. The Dutch action plan focuses specifically on strengthening powerlines from the Eemshaven region, a hotspot for current congestion. This region is home to many of the country's conventional power plants, whereas major load centres are located elsewhere. Despite the planned grid reinforcement projects, the further expected growth of renewable energy sources (solar PV and wind) and the new COBRA interconnection (NL–DK) into Eemshaven means that the Dutch authorities expect congestion also in the future (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

Other measures include the use of remedial actions, where cross-border redispatch is emphasized as a crucial measure for alleviating network constraints, in particular congestions in interconnectors and grids close to the border. Without the inclusion of across-the-border plants in dispatch, electricity trading capacity at the borders would have to be reduced, to maintain operational security of the electricity grid. The Dutch TSO has already signed several individual, bilateral and multilateral cooperation agreements for redispatch. Until relevant dispatch methodologies are implemented under the 2015 CACM Regulation and the SOGL Regulation[27], the Ministry will request TenneT BV to respect these agreements where possible and appropriate (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

Also mentioned is improved coordination of redispatch between the TSO and the DSOs. Here the plan refers to joint working groups established to find new innovative concepts and joint projects (such as the GOPACS platform), where different system operators bring their needs for redispatch together and market parties can offer possibilities for redispatch and for avoiding dispatch (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

A final measure mentioned concerns the continuation of specific winter thermal limits on critical network elements. The Ministry will request TenneT BV to investigate if existing winter limits can be increased and extended to a larger number of critical network elements (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

[27] The EU CACM and SOGL network code regulations require the TSOs to deliver methodologies needed to manage flows in the electricity grid, on coordinated capacity calculation and coordinated application of remedial actions, such as redispatching and countertrading, and methodologies for sharing the costs of such remedial actions (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

Transparency

The Dutch action plan was developed by the Ministry in collaboration with the regulator, ACM and the TSO, TenneT BV. Concerning transparency in methods for calculating capacities, the plan only outlines one such for the CORE region. As to the calculation of start-values and trajectories for capacity at CNEs, these are included in the plan for the CORE region but not for interconnectors to other regions, like the Nordic area. The plan mentions only 34 CNEs as particularly relevant for cross-border trade; these are openly listed with start-values and trajectories (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

Very little information is provided concerning broader consultations. Reference is made to a meeting between member states in the Pentalateral Energy Forum on 28 November 2019 where a draft of the action plan was presented and discussed. and a meeting with a variety of national stakeholders and market participants on 17 December 2019 (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019). Also, little information is provided on concerns voiced by stakeholders, except concerning strong support for annual meetings with stakeholders to discuss measures for securing progress in implementation. Beyond this, no results from the few consultations are reported in the action plan (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

As to monitoring implementation of the plan, TenneT BV, ACM and the Ministry have provisionally agreed that TenneT BV shall submit its annual assessment of progress for cross-zonal capacity to ACM for approval before the 1st of April each year, following the year for which the assessment is performed. The assessments will be made public. Outcomes from this monitoring process may result in changes to the action plan. The Ministry will arrange annual stakeholder meetings to discuss the results of these assessments.

Should the annual assessment by TenneT BV or the assessment by ENTSO-E on structural congestions show non-compliance with the linear trajectory, the Ministry will initiate contact with other member states within the capacity-calculation region, to assess possibilities for maintaining or adjusting the bidding-zone configuration, as per the EU Regulation. This process may also involve evaluation of possible, additional measures to bring the available cross-zonal capacities for trade (back) on target (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

In its application for a more time-limited derogation (see below) TenneT BV states that it will justify deviation from the trajectory in monthly reporting. The above-mentioned additional request for derogation was taken up by the ACM with other regulatory authorities and finally granted on 19 December 2019.

4.2.2 The application for short-time derogation

TenneT BV has also applied for a more time-limited derogation, regarding the new 30% capacity limit to be reserved for loop-flows, in order to deal with outage situations and to maintain reliability margins for internal flows. This is justified by historical data showing the average levels of loop-flows on the relevant Dutch CNEs above 30% of the total power flow, amounting to almost full capacity usage in some hours. Loop-flows are expected to remain above this level due to market arrangements and grid congestion in neighbouring counties, Germany in particular. As the Dutch stakeholders have little direct control over loop-flows, the derogation would be necessary.

As loop-flows result in congestion in the Dutch grid, this de facto implies derogation from the 70% MACZT. TenneT BV will still strive to provide higher capacity for cross-zonal trade than offered historically (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019). Concerning derogation linked to planned outage situations, TenneT BV aims in principle to offer the same MACZT as it has normally done, conditioned by operational security limits.

Concerning the duration of derogations, TenneT BV has requested a three-month postponement for implementing the action plan as such, to secure its quality and stability – the linear trajectory thus starting on 1 April and not 1 January 2020. The

derogation justified in loop-flows and outage situations has a duration of one year (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019). The Dutch government has indicated the possibility that new derogations for loop-flows and outages will be requested for the entire year 2021, depending on progress and developments in the Netherlands and surrounding member states (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019).

4.3 Poland

Poland has chosen to apply for an extension of the implementation period for the 70% MACZT to end-2025 and has also applied for a more time-limited derogation. The Polish transmission system is interconnected synchronously with the German, Czech and Slovak systems, as well as asynchronously with Sweden and Lithuania, and with additional links to Belarus and Ukraine (CMS Law, undated).

4.3.1 The Polish Action Plan[28]

After the dissolution of the Ministry of Energy in 2019, Poland's Ministry of State Assets (MAP) submitted its request for action plan in late 2019. The plan was prepared by MAP in coordination with the national regulator, the Energy Regulatory Office (ERO), and in cooperation with the Polish TSO – Polskie Sieci Elektroenergetyczne S.A. (PSE S.A.). The plan concerns interconnectors in the synchronous area (to Germany, the Czech Republic and Slovakia) and those between asynchronous areas (to Sweden and Lithuania) (Ministry of State Assets, 2019a).

The action plan is based on the PSE S.A. Report on Structural Congestions in the Polish Bidding Zone, approved by the President of ERO on 7 August 2019 and submitted on 12 August to the Ministry of Energy, which later transferred its tasks to the new Ministry of State Assets, which received the plan on 17 December 2019 and delivered it for approval by the European Commission and ACER (Ministry of State Assets, 2019a).

Setting level of capacities released for trade on the interconnectors

The plan states an important basis for calculating start-values, both average capacity allocated on interconnectors in 2018 and average for the period 2016–2018. Different calculation methods are used for interconnectors within synchronous and between asynchronous areas. For interconnectors in the synchronous area in the CORE region, the Net Transfer Capacity (NTC) approach has been applied as the main method, with some adaptation to the Flow-Based Allocation method that will apply for the CORE region. Start-values and linear trajectories have been calculated for each CNE and CNEC for synchronous connections based on historical energy market data. The calculation period was divided into seven timeframes. In each timeframe, a relevant ENTSO-E reference grid model was used (Ministry of State Assets, 2019b).[29] For the Sweden–Poland and Lithuania–Poland interconnectors, the starting values were calculated on the basis of historical capacity allocated on these interconnectors for 2016–2018.

Four types of CNEs and CNECs have been identified, based on their mode of operation at specific time-points:

a) Invariable CNE/CNEC elements, in operation throughout the 2016–2018 period and planned operated identically for 2020. Starting value for these will be the average of allocated capacity in 2018 or the average of allocated capacity for the years 2015–2018, whichever is greater;

b) CNE/CNEC commissioned in 2016–2018 and planned for identical operation in 2020. For such CNEs/CNECs, the starting point is taken to be the greater of: (i) the average of the allocated capacity in 2018 or (ii) the average of the allocated capacity for the years 2016–2018, limited to the period for which the CNE/CNEC concerned was included in the grid model;

[28] The English version of the Action Plan, with appendices, is available at www.gov.pl/web/aktywa-panstwowe/plan-dzialania-przyjety-przez-kse

[29] See 'Methodology for the Calculation of Linear Trajectories', Appendix 1, at www.gov.pl/web/aktywa-panstwowe/plan-dzialania-przyjety-przez-kse

c) New CNE/CNEC commissioned after 2018, non-existent in the grid models. The starting value is set at 0% (minimum value) but the TSO will offer the maximum capacity calculated according to the results of the cross-zonal capacity-calculation process;

d) Network element commissioned by the end of 2018, added to the list after the decision to adopt the Action Plan. Again, 0% has been set as starting value.

For one of the two interconnectors to adjacent asynchronous areas, the Sweden–Poland interconnector, different starting points have been set for the consistent and opposite directions, reflecting variation in historical capacity utilization.

Average allocated capacities for the Sweden–Poland and Lithuania–Poland interconnectors in a consistent direction are calculated as respectively 84% and 70% of maximum capacity. The starting values are thus set at 70% at maximum capacity for both of these in the consistent direction. Average allocated capacity for the Sweden–Poland and Lithuania–Poland interconnectors in the opposite direction are calculated as respectively 40% and 53% of their maximum capacity. The start-value on the former is set at 40% for the opposite direction. Due to international commitments concerning the Lithuania–Poland interconnector, the starting point has been set at 70% for the opposite direction for this interconnector (Ministry of State Assets, 2019c).

For the 811 identified CNEs/CNECs within the synchronous area (interconnectors to Germany, the Czech Republic and Slovakia), the methodology for calculating starting values is presented in Appendix 1 (Ministry of State Assets, 2019b). Appendix 2 presents a summary of calculation results, i.e. start-values and trajectories towards 70% in 2025 (Ministry of State Assets, 2019c). Start-values for most CNEs in the synchronous area are set below 10%, for many at 1–5% (Ministry of State Assets, 2019c). However, concerning cross-border interconnectors, start-values were set at 0 (ACER, 2020).

Measures to attain the minimum 70% MACZT

The action plan highlights investments to be made in nine transmission grid projects in the 2019–2023 period. Four projects to receive investments in 2019–2020, will increase the capability of electricity export to Sweden in line with the linear trajectory. One project, with planned investments in 2023, aims at achieving the cross-border exchange of electricity on the Lithuania–Poland interconnector. Investments in four reinforcements of grid lines are planned for 2021–2022, to increase the capability of electricity exchange on the synchronous interconnectors in line with specific linear trajectories. No specific mention is made of other measures, except that re-dispatching will be used as a supplementary tool (Ministry of State Assets, 2019a). Neither is there any mention of whether bidding-zone borders could be adjusted if the plan fails to result in compliance with the 70% MACZT.

Transparency

The Polish action plan was developed by the Ministry in collaboration with the regulator, ERO and the TSO, PSE S.A. The plan is quite transparent concerning the methods used for calculating capacities. Information on the calculation of start-values and trajectories for capacity at CNEs is included; moreover, the plan mentions a very large number of CNEs in the national grid of relevance for cross-border trade, all in all 813 as particularly relevant for cross-border trade, but these are not openly listed with start-values and trajectories.

Very little information is provided in the plan concerning broader consultations, only that a draft of the action plan was submitted for public consultation 14–29 November 2019. No mention is made of the input provided in these consultations or of any international consultations. Further, the plan merely states that progress in achieving the 70% target will be monitored by ERO.

This report is based on the English version of the Polish Action Plan. In this version, the government emphasizes that the final Action Plan will be available only in Polish – the English translation was prepared solely for working and consultation

purposes and should not be treated as a binding document (Ministry of State Assets, 2019a). This certainly indicates reluctance to deal with transparency issues related to implementing the EU Regulation.

4.3.2 The application for short-time derogation

PSE S.A. has also applied for more time-limited derogation, specifically regarding implementation of the 70% MACZT, justified by three factors.[30] First, the need to develop new capacity-calculation processes and tools as Poland enters the CORE capacity-calculation region, stemming from implementation of the 2015 CACM Regulation's requirement for flow-based calculation and new provisions in the reformed EU Electricity Regulation. For this reason, PSE S.A. requested a derogation for a period of six months. Secondly, the derogation was based on capacities needed to tackle loop-flows, internal flow and transmission reliability margins, expected above the 30% level specified in the regulation. For this reason, PSE S.A. requested a time-limited derogation for a period of one year. However, those concerns are reoccurring issues, so the Polish ministry stated that the request may be resubmitted to apply for the maximal duration allowed by Regulation 2019/943. Thirdly, derogation was requested because of uncertainties of non-coordinated transit flows, to apply for one year to the Polish bidding zone borders belonging to the Core CCR. Also this concern is viewed as a re-occurring issue, and this request may thus be resubmitted at the end of the one-year period for the next period of maximal duration allowed by Regulation 2019/943 or until the Core CCM is in operation.

The application states that the 70% MACZT will be respected to the maximum possible extent as long as operational security is guaranteed. Deviations will be reported to the Polish NRA along with a justification for why the deviation was required to guarantee operational security.

4.4 Sweden

Of the Nordic countries, both Sweden and Denmark applied for derogation from achieving the 70% MACZT for specific interconnectors by the 2020 deadline. The Danish case concerned the government's joint application with the government of Germany for the Krieger's Flak hybrid interconnector in the Baltic Sea. The applicants requested a more *permanent* derogation to ensure priority access for offshore windpower linked to this interconnector. As such, the application may challenge the generality of the 70% MACZT. (This joint German–Danish derogation is presented in section 4.1.2, under Germany.) The Swedish case concerns applications by the national TSO, Svenska Kraftnät (SvK), for a time-limited derogation for interconnectors affected by one specific hotspot congestion area of the Swedish grid. This case is presented below.

4.4.1 The Swedish application for short-term derogation

A first application by SvK to the national regulator was sent on 27 November 2019 for a one-year derogation (until 31 December 2020) for interconnectors affected by congestions in the West Coast Corridor (Energimarknadsinspektionen, 2019). Sweden has a total of seventeen interconnectors (five to Norway, five to Finland, four to Denmark, and one each to Germany, Poland, and Lithuania) (Svenska Kraftnät, 2020a). The request for derogation concerned six of these: two to Denmark (Sv3-DK1 and Sv4-DK2), one to Norway Sv3-N1) and the ones to Germany, Poland and Lithuania (Svenska Kraftnät, 2020b).

The Swedish regulator decided that since Norway was not member of the EU (and thus had not yet implemented the reformed EU Electricity Regulation), the application could not apply for this interconnector (Energimarknadsinspektionen, 2019). On 7 July 2020, SvK delivered a new application for extending the derogration period to 31 December 2021 (Svenska Kraftnät, 2020b).

[30] https://eepublicdownloads.blob.core.windows.net/public-cdn-container/clean-documents/Network%20codes%20documents/Implementation/ccr/methodologies/core/cep/20191111_Core_derogations_common_V14.pdf

The background was the structural congestion identified for the West Coast Corridor, an area of the Swedish transmission network located within bidding zone SE3 that cuts through two 400 kV north–south transmission lines. The congestion problem occurs in hours with high northbound flow, as opposed to the normal situation with southbound flow. Northbound flow is typical in hours with high in-feed of windpower in Denmark, Germany and southern Sweden. The direction of flow affects producers also in Norway. There are, according to SvK, few opportunities for down-regulation and countertrade in the West Coast Corridor area – due to the non-flexible Ringhals nuclear power plant located there. SvK must thus restrict import capacity on southbound interconnectors and reduce transit capacity on the interconnector bound for Norway (Svenska Kraftnät, 2020b). Extending the deadline for achieving the 70% MACZT would be required in order not to endanger operational security in a N-1 situation.

The West Coast Corridor area has long been a hotspot for grid congestions. It was in the spotlight also when Sweden split the market into four bidding zones in 2011. Establishing a separate bidding zone for the area was considered but rejected, justified also then by lack of opportunities for flexibly regulating production assets in the area, and thus limited opportunities for countertrade. In 2011, however, the Swedish TSO promised that grid capacity in the area would be strengthened with a new 400 kV powerline, which came into operation in 2012 (Energimarknadsinspektionen, 2015). However, the West Coast Corridor has remained a hotspot for congestion in Sweden, with repercussions for trade on Swedish interconnections.

Capacities reserved for trade on the interconnectors

To document structural congestion, SvK in its application outlined developments in historical capacity utilization of relevant interconnectors, calculated based on data collected from NordPool and use of the NTC method. This method will be applied until replaced by a flow-based approach for the Nordic Capacity Calculation Region, as required by the 2015 EU CACM Regulation, with final implementation planned for late 2021/early 2022. In its application, SvK states that until the new co-ordinated method is implemented, the regulatory authorities and ACER should recognize that high uncertainties related to forecasting cross-zonal exchanges outside coordination areas may affect its ability to attain the 70% MACZT (Svenska Kraftnät, 2020b).

The historical capacity calculations for relevant interconnectors in the application show that for the entire period 2016–2019, the average capacity made available for the market was 67% or higher. However, this relatively high percentage masks the fact that capacity was set at zero in some hours. It also masks a general trend of reduced utilization of the interconnectors in the period 2016–2019 (see Table 1 below (Svenska Kraftnät, 2020b). The Table also shows how this declining trend was caused by congestions within the West Coast Corridor.

Measures for achieving the 70% MACZT

The EU regulation states that where a derogation is granted, the relevant TSO shall develop and publish a methodology and plans for solving the problem addressed by the derogation. However, SvK concludes that a separate bidding zone for the West Coast Corridor is not feasible, due to low loads and no flexible production resources. Further alleviating measures will involve a new transmission line planned through the area, to be in operation from 2023 (Svenska Kraftnät, 2020b).

Transparency

The Swedish regulator informed all national regulators in the EU about the SvK application. None formally objected to the derogation, so ACER involvement was not required. However, the Danish regulator, *Forsyningstilsynet (DUR)*, later stated that Danish actors were negative, adding that the constraints for capacity at interconnections should be as few as possible and justified to the Swedish regulator, which in turn should inform DUR (Energimarknadsinspektionen, 2019). Consultations on the second application for prolonging the derogation were open until 25 September 2020 (Energimarknadsinspektionen, 2020). As of this writing, the conclusions from this consultation were not yet transparently accounted for by the national regulator.

Share of total hours with capacity <70% of max (2016–2019), in %						
	NO1-SE3	DK1-SE3	DK2-SE4	DE-SE4	PL-SE4	LT-SE4
2016	9	20	12	9	11	33
2017	55	42	36	40	36	47
2018	34	40	48	42	36	50
2019	51	56	50	39	51	42
Average 2016 –2019	33%	34%	42%	30%	28%	43%
Share of total hours with capacity <70% of max (2016-2019) due to restrictions in West Coast Corridor (WCC) (in %)						
2016	37	56	38	51	54	85
2017	69	76	71	78	79	78
2018	64	75	70	76	77	76
2019	73	81	76	81	82	80
Average 2016–2019	57%	69%	60%	68%	70%	80%

Table 1: Share of total hours where the capacity on selected Swedish interconnectors has been <70% of max net transfer capacity (2016–2019). (Source: the table builds on Svenska Kraftnät (2020b).)

4.5 Summing up and assessing national implementation

The northern European countries have clearly differed as regards early responses to the new EU capacity allocation and congestion management regulations. German TSOs and the national regulator have sought to halt ACER enforcement of the new 70% MACZT and bidding-zone provisions, connected to an ACER decision of 21 February 2019 on capacity calculation methods in the Core region. After failing in its appeals to the ACER Board of Regulators for annulling this decision which incurporated references to the new provisions, the German national regulator proceeded to challenge the decision in the European Court of Justice; the case is still pending. To buy time, Germany has made use of the opportunity for gradual implementation of the 70% MACZT towards the end of 2025.

Germany is not alone in this. Also the Netherlands and Poland applied in 2020 for the similar extended deadline, justified by national grid congestion caused partly by loop-flows emerging in neighbouring countries, notably Germany.

The TSOs of a further 16 EU member states have sought more time-limited derogations, including most TSOs in the Core area, as well as the Swedish TSO in the Nordic area. None of the applications have been formally challenged by other member states (ACER, 2020). The Danish TSO has, together with its German co-operator, requested a more permanent derogation for a hybrid interconnector linking windpower plants in the Baltic Sea. The European Commission has decided to grant this interconnector a 10-year derogation for attaining the 70 % MACZT, with the possibility of a further 15-year extension.

For Germany, we see a clear connection between reluctant implementation and positions held when the new capacity calculation and congestion management provisions were negotiated at EU level in 2017–18 (see section 3). Germany opposed the Commission's proposal of various legal provisions aimed at enforcing the principle that maximum capacity on interconnectors should be made available for trade instead, it opted for a continued bottom–up voluntary and gradual approach, aligned with progress in national efforts to remove structural grid congestions. Germany was instrumental in supporting the compromise 70% MACZT and opportunities for gradual implementation towards the end of 2025. The German reluctance to new capacity allocation and congestion management rules has continued into the implementation stage.

However, also member states that were more supportive of the European Commission proposals aimed at speeding up the removal of restrictions on the use of interconnectors for trade have been rather hesitant in their efforts to implement the 70% MACZT. They include the Netherlands and Poland, both of which have also applied to get target attainment extended to 2025.

4.5.1 The Action Plans

The high diverse German, Dutch and Polish action plans are not considered by ACER as being fully in line with their recommendations for implementing the 70% MACZT (ACER, 2019). The countries differ in methods applied by national TSOs to calculate capacities on various interconnectors, the start-values set and the expected trajectories. [31]

For Germany, ACER has noted that margins set as start-values were derived from non-coordinated capacity calculation methodology (margin from non-coordinated calculation – MNCC), an approach not considered in line with methods recommended in 2019 (ACER, 2019, 2020). Germany has opted to take into account the maximum possible exchanges, also beyond the coordination area, rather than the actual forecasted exchanges, with the risk of leading to an overestimated reliability margin, according to ACER. Germany has also opted to incorporate part of this margin into the MACZT, rather than into the remaining 30% share of the transmission, as envisaged by the Electricity Regulation (ACER, 2020). For the Netherlands, the start-values set for the CWE CCR reflect only the margin derived from the co-ordinated capacity calculation, thus disregarding the contribution of MNCC (ACER, 2020).

Greater transparency and standardization of methods might be expected in the future in connection with the pending implementation of the 2015 CACM Regulation. This may also lead to changes in how the countries allocate capacities on their interconnectors. In their action plans or applications for derogation, all three countries – Germany, the Netherlands and Poland – refer to the importance of planned work on joint regional methods for capacity calculation (co-ordinated capacity calculation). Pending finalization of this work, existing bilateral and multilateral agreements on methods and capacity margins, already signed between various national TSOs, have been applied in the calculations.

The start-values and trajectories set in the three action plans vary greatly. Here it should be borne in mind that these start-values are minimum values, and do not preclude that the TSOs may allocate higher capacities. For German interconnectors within the synchronous CWE region, start-values are set at minimum 12% capacity, irrespective of the agreement between the TSOs in the region of minimum 20% capacity released for trade. For the specific *synchronous* interconnector DE-DK1 to Denmark, the start-value is set at 24%, irrespective of the 2017 agreement between Germany and Denmark that envisioned 70% MACZT (see section 3) (ACER, 2020: 46). For interconnectors eastwards from Germany – to Poland and the Czech Republic – integrated with CWE in the larger Core synchronous region by 2021, average German start-values are set at around 12%. Start-values for Dutch interconnectors are set at 20%, in line with the CWE regional agreement. For interconnectors out of Poland, start-values within the forthcoming synchronous Core region are not specified, but the plan presents start-values for capacity on internal grid elements which are critical for ensuring trade via the interconnectors (as noted, 811 critical network elements have been identified). Start-values for most of these

[31] As an example, all countries have identified network elements that are critical for trade, 'CNEs'. However, definitions of a CNE, and the number of relevant CNEs, differ greatly. The German plan defines CNEs thus: '…interconnectors between two countries on the one hand and sensitive powerlines in terms of international electricity trading on the other.' The Dutch plan provides no specific definition, but its listing of relevant CNEs indicates a similar definition as Germany. Although the Polish plan provides no explicit definition, the number of CNEs identified there point to a much broader definition – altogether 813 CNEs are identified as relevant. By comparison, the Dutch plan lists 34 CNEs of relevance for international trade. The German plan mentions no specific number, but states: 'Germany has a particularly large number of neighbouring countries and thus, a correspondingly large number of critical network elements.' The most relevant would be related to the long list of grid investment measures to be implemented in order to achieve the 70% target for 2025.

Country	Capacity calc	Bidding-zone	2020 (%)	2021 (%)	2022 (%)	2023 (%)	2024 (%)	2025 (%)	2026 (%)
DE	CWE	DE CWE CNE	12	21	31	41	51	60	70
	DE-CZ_PL	DE-CZ, DE-PL	12	21	31	41	51	60	70
	DE-DK1	DE-DK1	24	32	39	47	55	62	70
	DE-SE4	DE-SE4	41	46	51	56	61	65	70
NL	CWE	NL CWE CNE	20	28	37	45	53	62	70
PL	LT-PL	LT->PL	70	70	70	70	70	70	70
		PL->LT	70	70	70	70	70	70	70
	PL-SE4	PL->SE4	40	45	50	55	60	65	70
		SE4->PL	70	70	70	70	70	70	70
	PL-CZ_DE_SK	PL-CZ, PL-DE	0	12	23	35	47	58	70

Table 2: Start-values and trajectory for MACZT on German, Dutch and Polish interconnectors. (Source: ACER (2020))

CNEs are reported as set below 10%, for many at 1–5% (Ministry of State Assets, 2019c). For the Polish synchronous interconnections, ACER reports start-values set at 0 (ACER, 2020: 46).

On *non-synchronous* DC interconnectors, Germany set the start-value for its interconnector to Sweden at 41%, whereas the start-value for the interconnector DE-DK2 was set at 70%, in line with the 2017 agreement between Germany and Denmark. For the recently opened interconnector between Germany and Norway, the start-value is set at 11,7%. The Dutch Action Plan fails to report on start-values for its DC interconnectors to Norway and Denmark. Poland has set start-values for the two interconnectors to adjacent asynchronous areas, Sweden and Lithuania, far higher than for those in the synchronous area. On the former, different starting points are set for imports and exports, 70% and 40% respectively. On the latter, the start-value is set at 70% for both directions, reflecting the agreement already made between the national TSOs.

For new or soon-to-operate interconnectors, start-values in all three countries have been set at zero or very low levels, justified by the lack of historical data. For Dutch powerlines without historical data, TenneT has relied on expert assessments when setting start-values. Poland and Germany have decided to set their start-values at zero – while giving the relevant TSOs leeway to adopt more detailed agreements with adjacent TSOs, in order to optimize interconnector use. The start-value for the new interconnector from Germany to Norway was set at 11.7%. For the Netherlands–Norway interconnector, no start-value was transparently set in the Dutch action plan, despite the existence of historical values. This may reflect the fact that Norway as a non-EU member is not automatically part of the new EU capacity allocation and congestion management regime – the country lags behind in implementing EU internal energy market regulations, still struggling to fully implement the 2009 version of the EU Electricity Regulation.

4.5.2 Applications for shorter-time derogation

The shorter-time derogations have been justified by structural congestions and security considerations for the national grid emerging variously from many new renewable electricity generation plants far from main load-centres, lengthy grid-planning procedures, loop-flows emerging from neighbouring countries, limited potential for remedial actions, and lagged processes of co-ordinated capacity calculation at regional level (see also ACER, 2020). In the Nordic area, the Swedish TSO's application for derogation is time-limited to two years for interconnectors affected by congestion in one area of Sweden, the West Coast Corridor.

ACER assessments show that many of the applications for derogations in 2020 failed to include a MACZT target; however, a significant improvement is observed in applications for derogations in 2021, except the Swedish and Italian. Many applications were viewed by ACER as minimally aligned with the guidelines on the content of derogations, jointly provided by ACER and the regulatory authorities. The is variation in the methodology used to identify the conditions that give rise to operational security concerns and how much capacity must be reduced

because of this (ACER, 2020). Many applications for derogations set an average MACZT for the whole year, which means that compliance cannot be assessed until the following year. According to ACER, this approach obstructs individual assessment of instances when cross-zonal capacity is reduced below the minimum target; specifically, it becomes harder to identify whether the reductions relate to the operational security issues for which the derogation was granted (ACER, 2020: 53).

ACER's assessment report encountered immediate criticism from ENTSO-E, displeased that data provided by the TSOs in the monitoring and feedback delivered on a draft report were not fully reflected in the final report (ENTSO-E, 2020).[32] According to ENTSO-E, the report first failed to recognize the fact that wholesale prices do converge in an increasing number of hours and that more cross-border capacity during such instances would not have benefited consumers – the market actually functions better than shown in ACER's report. Next, the report was criticized for applying different principles and standards for different member states; data presentations were seen as non-harmonized in terms of the period covered,[33] the definition of coordination areas, consideration of allocation constraints and the inclusion of exchanges with third countries.[34] Moreover, presentations of derogations and action plans were deemed non-transparent.

[32] According to ENTSO-E, the results obtained by ACER and presented in the report often differed from the data provided and the results obtained separately by the TSOs. It appears that the TSO data were recalculated to fit a one-size-fits-all framework, yielding results different from the practices applied by TSOs in day-to-day operations. ENTSO-E holds that the monitoring principles for the capacity calculations applied by TSOs under today's conditions must be consistent with those applied in day-to-day operations (ENTSO-E, 2020).

[33] According to ENTSO-E, ACER's report fails to recognize capacity allocated beyond day-ahead timeframes. In particular, capacity made available for balancing as well as capacity made available for the intraday and long-term timeframes are not considered in the ACER report (ENTSO-E, 2020).

[34] According to ENSTO-E, exchanges of electricity with third countries are today's reality: TSOs must include them in day-to-day operations with repercussions for overall trading margins. ACER's presentations, which exclude such exchanges with third countries, will disproportionally affect the countries that are located in geographical proximity to third countries (ENTSO-E, 2020).

5. Prospects for cross-border trade via interconnectors

The aim of the EU reform of capacity allocation and congestion management regulations has been to increase cross-border trade in the internal market. To achieve this aim, the TSO practices of allocating low capacities for trade on cross-border interconnectors had to end. To what extent can the new EU regulatory regime be expected to trigger change in TSO practices?

In the very short term, major improvements seem unlikely, as indicated by the many applications for derogations concerning the new 70% MACZT. Also, the most recent ACER monitoring report shows little improvement in the utilization rate of interconnectors in 2019 (Acer, 2020).

Towards 2025, the new MACZT, combined with the new mandatory requirement for remedial actions (redispatch and countertrade) which impose costs for deviating the trajectory towards the 2025, may incentivize greater use of interconnectors for trade, certainly on interconnectors that have experienced capacity usage below this level. If the 70% MACZT is properly implemented in the member states by the end of 2025, we may expect a subsequent increase in cross-border trade, as compared to the status quo situation. On the other hand, should this new MACZT be institutionalized as a new normal practice for capacity allocation, capacity utilization might decline on interconnectors which historically have been used at higher capacity levels than 70%.

Future utilization of capacities on interconnectors will depend on the removal of structural congestions in internal grids. Here, many have their eyes on Germany, where structural congestions have been increasing over the years. The German action plan includes a comprehensive list of measures for removing structural congestions. Should Germany succeed in implementing this plan, brighter prospects may emerge for more non-restricted trade on its interconnectors. However, the plan also reveals underlying realization problems. The numerous grid extension projects listed in the plan include many which have been long delayed because of massive public opposition and planning problems.[35]

The plan further reveals a dilemma in German energy and climate policy: whether to continue the ongoing energy transition at unabated speed (in line with national and EU climate targets), even if this leads to more grid congestion problems and repercussions for trade via interconnectors – or to slow down the pace of the transition and await progress in grid investments, thus solving congestion problems and improving conditions for trade via the interconnectors. The latter scenario entails an additional dilemma: removal of structural congestions to improve prospects for cross-border trade may, if it leads to greater interest in cross-border trade, cause more congestion of the grid.

In the plan, the German government signals that it intends to continue its ongoing national energy transition (deployment of additional renewables-based electricity capacity combined with the phase-out of coal and nuclear power) – but also that the pace of the transition may be adapted to the time needed to realize the grid investment plan.

The action plans of the Netherlands and Poland signal that solving their internal grid congestion problems is conditional on Germany taking the lead in solving its internal problems.[36] However, also

[35] The German action plan includes a very high number of transmission grid projects for many national locations (more than 160, most of them towards 2026). Many of these will involve the construction of new grids. The timeline set for projects shows that many of these have still not been commissioned and that some will be commissioned only after 2025.

[36] The Netherlands has identified eleven planned projects linked to twelve critical network elements in eight different locations by 2026. Six of these involve only the exchange of conductors. Poland has identified nine grid investment

these countries face other drivers of the congestion problem – increasing volumes of renewable energy driven by climate policy goals, acceptance problems for grids, as well as greater interest in cross-border trade.

Thus, it would be a very tall order for Germany to accelerate removal of congestions towards 2025 at a pace implying that these will cease being moved to the border – continued curtailment of interconnectors for the market may be expected. Congestion in Germany is also likely to continue to affect grids in neighbouring countries via loop-flows, with curtailment of interconnectors continuing also here.

Should congestion continue, the EU member states must then apply remedial actions, international redispatch and countertrade and/or market-splitting in new bidding zones. The costs of remedial action will be spread among grid users who have already seen their bills increasing from subsidizing transition to renewables, with possible political repercussions. Splitting a country into different bidding zones and price areas is also politically sensitive, certainly in Germany, where higher prices will emerge in the south of the country and affect the many energy-dependent businesses located there. Thus far, market splitting has been a no-go in German politics, and the German action plan was drafted with the chief goal of maintaining the current unified bidding zone. However, the Dutch action plan is more open to new bidding-zone delimitations, while the Polish plan does not even mention such a possibility.

Various scenarios may be envisaged for how EU member states will comply with the new 70% MACZT. One such scenario involves swift implementation of the new EU regulation and compliance with the MACZT. Such a scenario may, for instance, involve strict EU enforcement of the new rules. The EU has used its powers under EU Treaty rules twice in the past to enforce changes in TSO practices concerning allocation of capacity on interconnectors. In 2009, the EU Commission (DG Competition) decided to back the Danish TSO, energinet.dk, in its claims that the Swedish TSO, Svenska Kraftnät, had breached EU competition rules by limiting capacity on interconnectors to deal with congestions in the Swedish grid (West Coast Corridor).[37] EU pressure instigated the introduction of bidding zones in the Swedish TSO control area, leading to a split of the Swedish market into four such zones in 2011. Through a binding agreement with the EU Commission, the Swedish TSO thus avoided further legal procedures. Then, as outlined above, DG Competition again used its powers to clamp down on capacity-calculation practices in 2018, by backing energinet.dk in its claim that the German TSO TenneT had misused its dominant position by curtailing capacity on one of the cross-border interconnectors. The outcome then was an agreement with TenneT on a gradual increase in allocation of capacity up to around 75% by 2020. As the EU has successfully applied such enforcement in the past, this might also happen in the future – with prospects for swift compliance with the 70% MACZT and more cross-border trade via the interconnectors.

However, the high economic and political costs for EU member states that could result from such enforcement, on top of the costs associated with the ongoing energy transition, may indicate a different scenario of dwindling political support for the energy transition and/or for the internal energy market project, or EU co-operation more generally. In turn, dwindling political support could increase demand for new reform of EU energy market regulations – or, at least, that the EU should exercise caution in enforcing the new regulations, including the new minimum 70% MACZT for interconnectors. Under such a scenario, the member states could be expected to implement measures for developing and balancing their energy systems more in isolation from other member states, with bleaker prospects for cross-border trade via interconnectors, including less interest ibn investing in new interconnectors.

A third in-between scenario may also be contemplated where the EU member states revert to a slow

projects needed to reach the 70% target by the 31 December 2021 deadline.

[37] This allegedly reduced export capacity on interconnectors to Denmark with the result that Swedish customers were given priority over Danish customers (Energimarknadsinspektionen, 2015).

and gradual development in capacity allocation and congestion management practices, similar to the situation before 2019. In such a scenario, the member-states' TSOs and NRAs seek, on a voluntary basis, to find common solutions for capacity calculation and congestion management – in line with realities on the ground, differing economic impacts and political risks associated with hasty acceleration of trade and interconnector capacity expansion. We may then expect only a very gradual development over a long period before restrictions on such trade have been removed. However, such a scenario also reduces the risk that the EU internal energy market and EU integration efforts will lose further political support.

How the situation for cross-border trade on interconnectors will develop is still veiled in uncertainty. Various factors might define the direction and should be heeded. These include the capability and willingness of EU institutions to enforce the new rules. Here, a joker is the outcome of proceedings in the European Court of Justice concerning legal powers of ACER to decide on capacity-allocation and congestion-management arrangements. Also uncertain is whether the EU Commission will continue to invoke EU competition rules to enforce more trade on interconnectors. A final poser is whether the TSOs and national regulators will manage to progress collectively in working out less trade-restricting capacity-allocation and congestion-management practices without strong EU enforcement – work incentivized by the EU 2015 CACM Regulation and the reformed EU Electricity Regulation.

6. Implications for Norway

In this section, we take a closer look at the implications of the 70% rule for Norway as a trade partner with the EU. Norwegian energy policy is linked to the EU internal energy market policies by the EEA Agreement. In past decades, Norwegian governments have generally been supportive of establishing international markets to increase trade opportunities. Norway was a forerunner in the establishment of the Nordic Electricity Market in 1996 and has supported the development of the internal EU electricity market since its inception.[38]

An important strategic power-policy objective of successive Norwegian governments and the Parliament has been to *maximize the value of Norwegian power resources through trade via interconnectors*. Norway has co-invested in interconnectors with Sweden, Denmark, Finland, Russia, the Netherlands, Germany and the UK (the latter expected to start operation during 2021) to attain this objective.

Here we explore the implications of the new 70% MACZT for the value of Norwegian power resources, using curtailment on the NordLink interconnector between Norway and Germany as an example.

6.1 The Norwegian trade-based strategy

Opportunities for realizing the value of Norwegian power resources from international trade stem in large part from the dominance of hydropower, with ample storage capacity, in the generation mix.[39] Hydropower plants can easily be ramped up and down at insignificant cost – generation can be increased when market prices are high; water can be stored in reservoirs when prices are low. Power exports and imports can be adapted to price differences in various interconnected markets. The EU's incremental strategy for transforming a power system based on non-flexible wind and solar generation has increased the potential market value of flexible Norwegian hydropower to balance European power markets.

However, opportunities for Norway to realize its trade-based strategy objective of maximizing the value of Norwegian resources within the EU IEM are now affected by how EU member states, where Norway seeks to realize trade via its interconnectors, will implement the new 70% MACZT rule and deal with their national grid congestion problems.

Achieving this objective presupposes interconnectors and grids used at maximum capacity to ensure efficient trade – i.e. that zones with higher prices export to zones with lower prices. Investment decisions for interconnectors are normally based on the assumption that these will be used at their maximum to support efficient cross-border trade.

However, as documented in this report, some of the interconnectors affecting electricity trade to and from Norway have experienced capacities limited below 70%. This is the case with the Norway–Sweden and Sweden–Denmark interconnectors through the contested West Coast Corridor in Sweden, affecting particularly the opportunities for trade between Norway and Denmark. As also documented in this report, the very low start-value of 11.7% has been set for the new interconnector between Norway and Germany. On the other hand, interconnectors between Norway and Denmark, and Norway and the Netherlands have normally

[38] Interconnectors from Norway date back to long before the establishment of the Nordic electricity market, built to reap security of supply benefits and to optimize cross-border dispatch from different power generation plants.

[39] For decades, hydropower has provided nearly 100% of Norway's total onshore supply. The massive growth in windpower in the past decade brought this figure down to 92% in 2020 (SSB, 2021)

operated at high capacity, except in periods of technical problems and maintenance.

As further documented, the prospects for significant short-term improvement in capacity allocated to trade on some of these interconnectors are not all good. Several of Norway's interconnectors enter areas that are likely to remain structural congestion hotspots for a considerable time. The NordNed interconnector enters the Netherlands in Eems-haven, which is also the entry point for the new Cobra interconnector from Denmark. Additionally, this area is the location of many of the country's conventional power plants and new renewable power plants. Despite planned grid reinforcement projects to shift congestion to load centres further south, the Dutch Ministry for Economic Affairs and Climate Policy expects congestions also in the future (Ministry for Economic Affairs and Climate Policy of the Netherlands, 2019). Similarly, the new NordLink interconnector to Germany enters the Netherlands in the north, as do interconnectors from Denmark and Sweden. The north also hosts many conventional power plants and is the main area for national investments in wind power. However, given the continuing delays in strengthening the grids out of the area, the entry point of the interconnector seems set to remain a hotspot area for German congestion problems, unlikely to be solved in the short term.

The Swedish TSO plans to start operation of a new interconnector through the congested West Coast Corridor in 2023, intended to improve the prospects for Norway–Sweden–Denmark interconnections to achieve higher capacities for cross-border trade in the Nordic area. However, for trade to and from the Nordic countries and continental Europe (the Core area), congestion problems continue to constrain interconnectors between Sweden and Poland, Sweden and Germany, and Denmark and Germany.

To sum up, the new minimum 70% MACZT for the use of interconnectors may be expected to increase opportunities for efficient trade from and to Norway on interconnectors previously used at lower capacity, as with the interconnectors to Sweden and further to Denmark. For interconnectors used at high capacity, such as those to Denmark and the Netherlands, the prospects are less certain. Should the 70% capacity be adopted by neighbouring TSOs as a new normal practice, the volumes of efficient trade may decline. Certainly, for all interconnectors that were decided under the assumption of full capacity utilization, the 70% target may reduce the value of these interconnectors.

In the following we offer an illustration of how the values of Norwegian interconnectors may be affected by the new 70% MACZT. The case in point is the new Norwegian interconnector NordLink to Germany, where the German TSO set very low start-values in 2021 (11.7%), gradually increasing to 70% by 2026.[40]

6.2 Case study: Implications of curtailment of the NordLink interconnector

The 1.4 GW NordLink interconnector between Germany and Norway was commissioned in March 2021. The decision to invest in NordLink was based on the assumption that the full capacity would be available for trade, which is also a central assumption for the Norwegian power market strategy. With the implementation of the 70% rule and the 5-year derogation, this assumption has now been falsified. What losses do these provisions imply? And how are the restrictions likely to affect the welfare-economic value of NordLink from a Norwegian perspective?

6.2.1 Three cases for capacity restrictions

Exactly what the capacity limitation means for NordLink has been unclear. In an earlier proposal, the start-value was to be set to zero for the first year of operation. Talks about zero start-value were then misunderstood as referring to a *constant* start-value, rather than a minimum capacity. Accordingly, the Norwegian media presented the constraints as meaning that there would be no Norwegian export at all during the first year *(Teknisk Ukeblad,* 2020). However, the rationale for restricting transmission

[40] The EU-set deadline for attaining the 70% is 31 December 2025.

capacity is internal grid congestion in Germany. Therefore, imports to Germany exceeding the minimum capacity may still be allowed when the German grid situation so allows. Similarly, it is unreasonable to assume that the 70% minimum provision in 2025 will be implemented as a constant.

To investigate what the 70% rule could imply for trade volumes and the value of trade on NordLink, and how restrictions would affect trade on other interconnectors, we have simulated some simplified cases for capacity utilization on the interconnector. We have assumed that, to adhere to the EU regulations, a minimum of 70% of the interconnector capacity will be available to the market by 2025. Moreover, we have assumed that the minimum applies for each hour.

We have used the The-MA power market model to provide a quantitative assessment of the impacts. The impacts have been investigated by simulating three cases:

1. **Unconstrained.** The investment decision for the NordLink interconnector was based on the assumption that the full capacity of the interconnector would be available to the power market: i.e. that capacity would be constrained only due to technical issues or maintenance.
2. **Wind-constrained.** The second case is likely to correspond to the realistic constraints on NordLink within the 70% rule and the derogation period. Here, the rule is applied as a minimum provision when the internal German grid is congested. North–south congestions in Germany are highly correlated with wind generation in the north, since this generation requires high flows from north to south in Germany. Thus, this case limits the availability of NordLink only in hours with high wind output in Germany – there are no constraints on NordLink when wind output is low. It should also be noted that NordLink capacity is likely to be constrained only for imports *to* Germany. Exports *from* Germany will be unconstrained and flow according to price differences. Further, we have set the minimum provision at 0% in 2021, with a linear increase to 70% in 2025, and assumed that the same minimum value applies throughout the year.
3. **Worst-case.** As noted, there have been several misconceptions about the constraints on NordLink. The worst-case conception is that the minimum provision is also the maximum: i.e. that import capacity on NordLink will always be constrained to 70% in 2025.

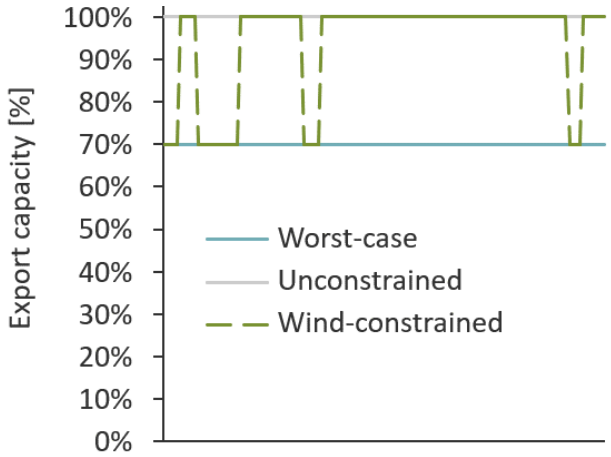

Figure 1: NordLink export capacity for one week in 2025, for the three cases. Exact restrictions vary from week to week.

Available market capacity for Norwegian export on NordLink is presented in Figure 1, exemplified by one week in 2025. The worst-case profile is constant at 70% availability; the unconstrained profile is constant at 100% availability, whereas the wind-constrained profile is a hybrid of the two other profiles. As Figure 1 shows, Norwegian exports are constrained to 70% capacity in certain hours – those with high German wind output. Historical wind output in Germany was used in setting up this profile, so the exact profile will vary from week to week. With this profile, roughly one-sixth of hours throughout the year are constrained. Further, German prices are lower than Norwegian prices in two-thirds of the constrained hours. That means that, in most of the constrained hours, NordLink is used for exports *from* Germany, and the flow is not affected by import constraints.

6.2.2 Impact on NordLink trade flows

The welfare economic benefits of NordLink and other interconnectors consist of congestion revenues and the impact on consumers' and producers' surplus, i.e. the impact on trade flows and prices.

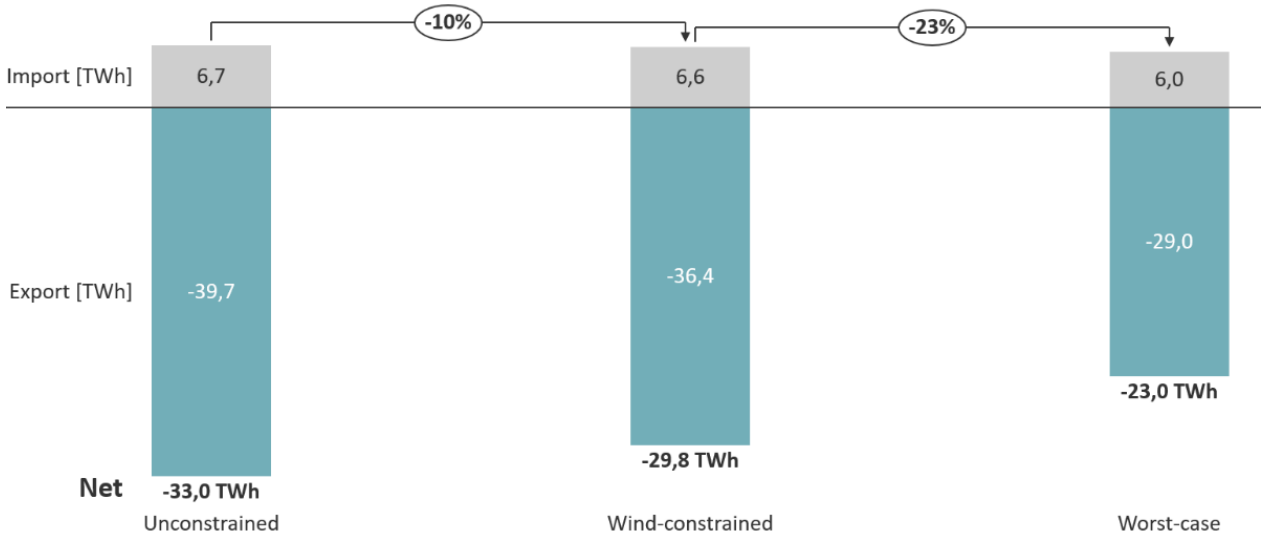

Figure 2: Import and export volumes NordLink 2021–2025, and percentage reduction in total trade volumes

Figure 2 shows the total change in NordLink trade volumes from 2021 to 2025. Compared to the unconstrained case, trade volumes decrease by 10% in the wind-constrained case, amounting to 3.2 TWh. In the worst-case scenario, trade volumes decrease further by 23% – i.e., by 30% compared to the unconstrained case, corresponding to a 10 TWh reduction. The reduction in export volumes is naturally greatest, but import volumes are slightly reduced as well, because reduced capacity affects prices, as will be shown below.

Another element that reduces the negative volume impact of constraining the capacity on NordLink is that, in many of the constrained hours, the capacity is used for Norwegian imports because the German price is lower than the price in the connected bidding zone of Norway (NO2).

6.2.3 Price effects

While net exports decrease on NordLink, total export volumes from Norway depend on the Norwegian power balance; reduced (net) export volumes via NordLink will generally be exported via other interconnectors.[41] Thus, the price effect depends on the availability of capacity on other interconnectors, and price patterns in other markets. At present, Norway has direct interconnector capacity to Sweden, Denmark and the Netherlands. After 2021, the North Sea Link interconnector to Great Britain will bring additional capacity, and hence flexibility in terms of power trade despite the constraints on NordLink. On the other hand, the changes in trade flows will affect market prices and water values. In this section, we investigate how reduction in net export capacity on NordLink affects power prices in NO2, the price area where NordLink is connected.

The power prices in NO2 in 2021 and 2025 are shown in Figure 3. Two trends should be kept in mind while examining the impact on power prices: the increase in total transmission capacity, and the reduction in the Norwegian power surplus. From 2022, the North Sea Link adds another 1400 MW of transmission capacity, and increasing electricity demand reduces the Norwegian power surplus substantially from 24 TWh in 2021 to less than 2 TWh in 2025. Figure 3 shows that the power-price level in NO2 is approximately 7 EUR/MWh higher in 2025 than in 2021, for all cases. This is due both to closer interconnection to neighbouring countries with higher prices (Germany and Great Britain), and to the substantially weaker power balance in Norway in 2025.

[41] Electricity demand is highly inelastic in the short term, and power consumption levels are fixed in the simulations.

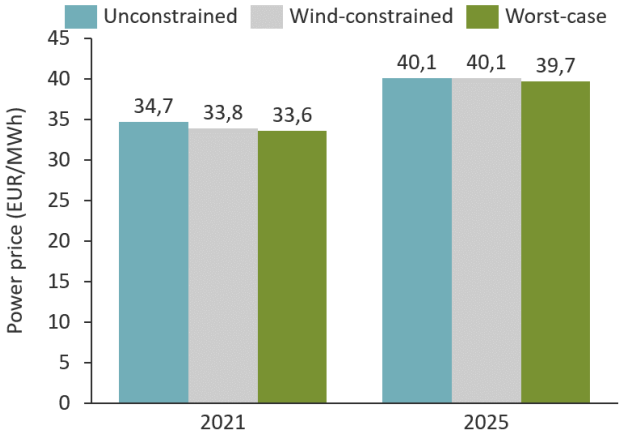

Figure 3: Power prices in NO2 for the three cases in 2021 and 2025

Second, Figure 3 shows that the price spread between the cases decreases from 2021 to 2025. The price spread is also reduced due to the combination of additional interconnector capacity and the reduced Norwegian power surplus. Thus, in 2025, the price level is unchanged when we go from the unconstrained to the wind-constrained case. However, the Norwegian power surplus is expected to increase beyond 2025. Correspondingly, the price impact in the 2021 results is explained by the higher total net exports from Norway, the larger constraints on NordLink export capacity, and the fact that the North Sea Link has not yet been commissioned.

To recap, the impacts on power prices due to NordLink constraints are mitigated because there are other interconnectors as well. Thus, the market impact depends on the availability of additional interconnectors and the power balance: the volume of net exports that must be shifted to other interconnectors. The more capacity to export the power surplus is available on other interconnectors, the lower is the impact of constraints on NordLink. But the higher the power surplus, the more must Norway rely on additional export capacity.

From the market effects, we can calculate the welfare economic consequences.

6.2.4 Reduced congestion rent on NordLink …

First, we investigate to what extent the 70% rule affects the profitability of the NordLink interconnector. The impact on export volumes naturally weighs heavily on the result.

Figure 4 shows the Norwegian share of the congestion rent on NordLink in the three cases With unconstrained capacity, the Norwegian share of the congestion rent is EUR 158 million over the five years 2021–2025. In the worst-case scenario, where capacity is always constrained, the congestion rent is reduced by 15% compared to the unconstrained solution: a total revenue loss of EUR 23 million in the implementation period. The revenue loss in 2025, when minimum capacity is set to 70%, is EUR 5 million.

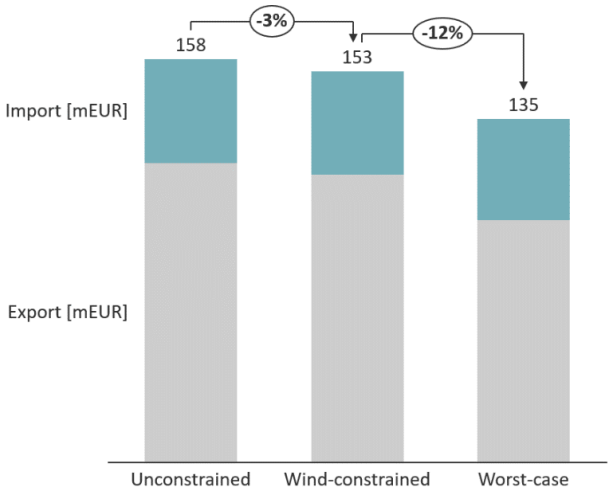

Figure 4 Norwegian congestion rent from NordLink 2021–2025 [million Euros]

In the more likely wind-constrained case, where capacity is constrained only in hours of (expected) high wind in northern Germany, the total reduction in the Norwegian congestion rent is only 3%, corresponding to a reduction of EUR 5 million in the five-year implementation period. Thus, the entire loss for the five-year implementation period corresponds to the 2025 loss in the worst-case scenario. In the wind-constrained case, the revenue loss in 2025 is a mere EUR 0.2 million.

After the five-year derogation period, we expect the minimum value to remain at 70%. Thus, the results indicate that the reduction in congestion rent on the

NordLink interconnector is not likely to be substantial. However, it should also be taken into account that the power surplus is expected to increase after 2025, which would tend to increase the loss.

On the other hand, the reduction in congestion revenues on NordLink is partly compensated by an increase in congestion revenues on other interconnectors, such as the North Sea Link, where the utilization rate increases, as shown in the analysis of the total impact, in the next section.

6.2.5 … and reduced overall social benefits

Welfare analysis is the key element in the decision to invest in new interconnectors. Thus, a central question is to what extent constraints on NordLink will affect the overall social benefit, thereby illustrating how the 70% rule could impact investments in interconnectors in the future.

The simulations show that the Norwegian social surplus of the NordLink project during the derogation phase is likely to be decreased by EUR 29 million (wind-constrained case). The effects across the three cases are summarized in Figure 5. In the worst-case scenario, where export capacity is constantly reduced, the socio-economic impact amounts to a reduction of EUR 51 million.

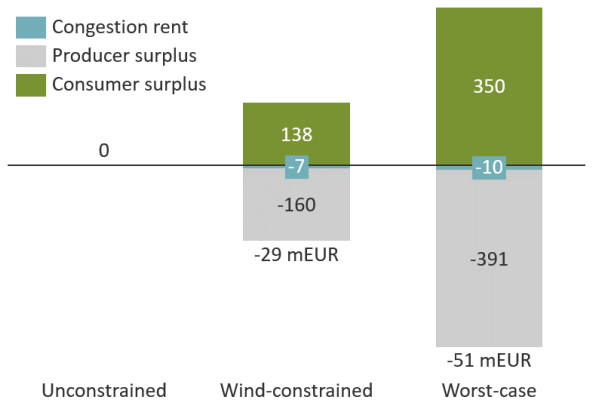

Figure 5 Change in socio-economic surplus between cases (million Euros)

As the constraints result in lower power prices in Norway, the producers are worse off when NordLink is constrained, but the consumers are better off. However, the reduction in total congestion revenues is borne by the consumers, as it increases the grid tariff.[42]

The modelling results also show that the price reduction affects the value of flexible hydropower in line with the average price reduction. Although hydropower producers can leverage higher capture prices than the overall average market, they cannot additionally mitigate the price effect of reduced trade opportunities.

6.2.6 Conclusion: The 70% rule reduces the value of power trade for Norway – exactly how much depends on how it will be practised

Until now, the Norwegian power-market strategy has been based on the assumption that interconnector capacity will be fully available for trade based on hourly price differences. As pointed out above, however, under the German implementation plan, only a small share of the NordLink capacity will be guaranteed in 2021, gradually increasing to the 70% minimum provision from the end of 2025 and onwards.

Albeit simplified, our analysis shows that if capacity is curtailed to the minimum only in hours of high wind, the impact on the NordLink congestion rent is not necessarily substantial. The main reason is that in hours with high wind generation, the German price is more likely to be lower or more similar to the Norwegian. Moreover, the impact on the total Norwegian social surplus is mitigated by increased trade through other interconnections.

It should be noted, however, that the impact may be greater and trade patterns additionally distorted if:

- The 70% minimum is implemented as an annual average, not as an hourly rule. In that case, capacity is likely to be curtailed more significantly in the relevant hours –

[42] For comparison, the investment case (see Statnett 2013) shows an expected annual total benefit of around EUR 140 million from NordLink. The figures are not directly comparable, as the calculations are based on different scenarios and assumptions.

and the result may approach (possibly exceed) the worst-case result.

- Other interconnectors curtail capacity as well (according to the 70% rule): that means that trade options are reduced and the negative price impact is greater.
- Germany has opted to take into account the maximum possible exchanges with other bidding zones in its capacity calculations. According to ACER this may lead to overestimating the reliability margin, with more frequent curtailment of the NordLink import capacity.

Germany wants to restrict the capacity of NordLink and other interconnectors because of the alternative costs incurred in managing internal grid congestions. These congestions occur when there is high windpower generation in the north, resulting in high demand for flows from north to south. In these hours, prices in the all-Germany bidding zone are also likely to be low, and the value of exports from Norway to Germany low as well. In hours when German prices are lower than the Norwegian ones, Norway will import power from Germany – and import capacity is not restricted, as such exports of German wind alleviate pressures on the internal grid.

Our analysis does not show significant changes in the economic case for the NordLink interconnector in the most likely case. However, if export capacity on other interconnectors from Norway is restricted simultaneously, the impact can be much greater. We do not consider the worst-case scenario to be particularly plausible, but it does show that, if import capacity to other markets is more restricted, the negative effects are accentuated, and may affect the value of Norwegian power trade substantially.

Our modelling results show the impacts of the 70% rule during the implementation (derogation) period, and it could be argued that they are not representative of the period *after* the derogation period. Similarly, it might be argued that the results for 2025 are more representative of the general effects of the 70% rule – however, that is not necessarily the case. Concerning to the degree of curtailment, the situation in 2025 is presumably more representative of long-term implementation of the 70% rule. However, the 2025 results are also affected by the low Norwegian power surplus in that year. As the power surplus is expected to increase beyond 2025, the impacts are likely to increase, even if the rule is applied as in the most-likely scenario. In addition, the results are likely to be significantly affected by access to alternative trade capacities.

However, we have not compared the results with the alternative scenario in which internal congestion in Germany is managed by splitting the country into bidding zones. We have not analysed whether this scenario represents a better or worse economic outcome for the NordLink interconnector than with application of the 70% rule. If structural internal congestions in Germany prevail, keeping Germany as one price area will also distort price formation and, thereby, congestion rents and trade flows.

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Annex 1: Action plan of Germany

Table 3 Measures planned for achieving the 70% MACZT[43]

1	National measures to increase power transmission capacities	
1.1 Expand and strengthen electricity networks		
1	Network expansion planning to 2030	On the basis of the NDP, amendments to BBPIG[44]aim at legalizing the network expansion requirement in 2020. BNetzA[45] publishes info on NDPat www.netzausbau.de
1.2 Speed up network expansion		
2	Simplify approval procedures	NABEG[46] 2.0 simplifies procedures for administration.
3	Control	Under system established in 2019, the Ministry[47] will implement control of grid expansion together with BNetzA, federal states and TSOs. Time schedules agreed at meeting with energy ministers of Länder, May 2010, published at www.netzausbau.de
4	Increase acceptance	Ministry pursues the Public Electricity Network Dialogue with the public, to be expanded from 2020, including possibilities for underground cable pilot projects, should projects fail to progress
1.3 Optimize the existing network		
5	Digitization of networks, monitoring and implentation of assistance systems	Systematic implementation of online assistance systems for evaluation of network status by 'TSOs.
6	Weather-dependent overhead powerline operation	Systematic implementation by TSOs.
7	Control load-flows with phase shifters	Will be implemented by TSOs 2023–2025
8	Test reactive operations management	Realize NDP2019 pilot plants
9	Increase incentives for investment in network expansion	In 2019, certain measures to promote refinancing of major expansion and restructuring investments taken. In 2020, stakeholder dialogue on further development of incentive regulation (legal adjustments) and dealing with the costs of congestion management.
2. National measures to enable greater cross-border trading		
2.1 Optimize congestion management		
10	Make redispatch more efficient	Implementation of uniform redispatch regime to eliminate congestion, including renewable energy and CHP plans by 1 Oct 2021
11	Continue the transitional network reserve	Until co-ordinated regional cross-border redispatch is implemented, the network reserve will serve as back-up for national redispatch potential

[43] Table 3 is a summary of the table in section 7 of the German action plan (Federal Ministry for Economic Affairs and Energy, 2020b).
[44] Federal Requirement Plan Act
[45] The Federal Network Agency
[46] The Energy Transmission Network Expansion Acceleration Act
[47] The Federal Ministry for Economic Affairs and Energy

12	Make cross-border redispatch possible	Germany will continue to expand bilateral agreements until European TSOs develop methods for cross-border optimization of redispatch and rules on cost allocation, based on CACM[48]
13	Retain cost-based redispatch	Ministry expert commission concludes that market-based redispatch would distort the market and massively increase grid congestion: strategic congestion-boosting behaviour is to be expected without sufficient competition for a market, providing Germany with room for exception under EU regulation
14	Strengthen co-operation between TSOs and DSOs	Joint working groups work on concept development aimed at reducing the redispatch requirement
15	Organize network-supporting load management with flexible consumers	Ministry presented key points summer 2019, with subsequent discussion with stakeholders. Draft of legal framework planned by mid-2020
2.2 Coordinate network expansion and production structure		
16	Link expansion targets for offshore wind to network expansion progress	Three acts (Coal Phase-out Act, Umbrella Act relating to the Renewable Energy Sources Act and the Wind Sea Act) condition expansion of offshore wind energy target (from 15' to 25' MW by 2030) on network capacities for call-off, transmission and distribution being prepared in good time
17	Synchronize expansion of renewable energies with network expansion	Assessment of opportunitiesy' for redefining by BNetzA
18	Gradually reduce and phase out coal-fired power generation	Full phase-out by 2038 at the latest. In implementing the Coal Commission's[49] recommendation of January 2019, special attention will be paid to network aspects
3 Cooperate across borders in regional initiatives		
19	Carry out redispatch and countertrading across borders	Bilateral and multilateral agreement on redispatch and countertrading already exists. Two further agreements currently negotiated
20	Control cross-border network flows with phase-shifting transformers	Such transformers already installed and operating in a co-ordinated manner at borders between Germany, Poland and Czech Republic. Two of these to be replaced with new ones at Uckermark powerline; the transformer at Röhrsdorf will be better integrated into the southern area of the 50Hertz control zone.
3. Calculation of start-values and trajectory		
21	Monitoring compliance with minimum trading capacities	BNetzA will apply a two-stage monitoring process to ensure that TSOs can provide information at short notice about suspensions of minimum trading capacity, and will prepare annual reports on capacity development. Capacity start-values and capacities in accordance with the linear phase-in are announced by the TSOs at www.netztransparenz.de and www.jao.eu. Fort the principles of start-value calculation, see www.bnetza.de/marketcoupling.

[48] Capacity Allocation and Congestion Management (CACM) network code
[49] The Growth, Structural Change and Employment Commission

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