Danish Energy Agency

Consultation note – Establishment of DK3

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Consultation on amended bidding zone configuration in Denmark

On the 26th of October 2023 the Danish Energy Agency opened a consultation on the decision to amend the bidding zone configuration in Denmark in accordance with article 14, sec. 9 of the Electricity Regulation. The consultation ended on the 16th of November.

Nine interested parties have submitted their views in the consultation:

- Bornholms Energi og Forsyning (BEOF)
- Bornholms Regionskommune
- CIP
- RWE
- Scottish Power Renewables
- Siemens Gamesa
- Svenska Kraftnät
- Total Energies
- Ørsted

The views have touched upon the following topics:

Danish Energy Agency

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Price formation

1. Market access and price formation for existing production facilities

BEOF expresses a concern regarding the future income opportunities of existing electricity production facilities on the island of Bornholm due to lower electricity prices, and BEOF emphasizes that the investments in these facilities have been carried out before Bornholm Energy Island and a new bidding zone (DK3) were announced. BEOF and Ørsted suggest that it should be considered to compensate existing electricity producers on the island of Bornholm based on the price risk of being placed in an offshore bidding zone (OBZ) and the potential value reduction of the existing production.

Remarks from the Danish Energy Agency:

The Danish Energy Agency acknowledges the importance of investments in electricity production facilities that both contribute to the green transition and security of supply. The Danish Energy Agency also acknowledges that a certain price impact could occur from the establishment of Bornholm Energy Island that may affect existing producers and consumers on Bornholm. It is, however, a general precondition for electricity production facilities in Denmark and throughout the internal electricity market in the EU that they participate in a market with a continuously increasing share of renewable energy and continuous changes in the composition of supply and demand. Therefore, changes in market prices have to be anticipated. Moreover, electricity production facilities are generally subject to changes in the market design and market interconnection during the lifetime of the electricity production facility affecting all market participants.

With regard to Bornholm, the main driver for a change in the electricity price on the island of Bornholm is not the inclusion of the distribution grid of Bornholm in DK3. Energinet states in the note – "Establishing the new Bidding Zone"[1] (from here "the note") *that the difference in price from this is less than 2% in 2040.*[2] *The main driver for the price effect is the establishment of offshore wind generation and transmission capacity of the Energy Island. To comply with EU-regulation, as a main rule, the market design of Bornholm Energy Island and that of Bornholm main Island must reflect structural congestions in the grid. To this end, Bornholm Energy Island should constitute its own bidding zone. In addition, Energinet is analysing the technical possibilities for connecting Bornholm Energy Island to the distribution grid on Bornholm main island. This analysis is expected to be finalized in 2024. The Danish Energy Agency will review Energinet's analysis when it is finalized.*

[1] Energinet, Establishing the new Bidding Zone, 25th of April 2023
[2] Reference is made to the table from Energinets report that is also shown as part of the answer to comment no. 10 in this consultation note.

2. Compensation in case of deterioration of value

Bornholms Regionskommune points out that compensation of neighbours and the regional community should be enabled in the regulation. They approve the current work on an analysis looking into the opportunities of compensating the neighbours to transmission facilities. However, Bornholms Regionskommune believes that this should also include neighbours to offshore wind and local production facilities.

Remarks from the Danish Energy Agency:

In connection with Bornholm Energy Island, Energinet is establishing a large electricity transmission facility onshore on the island Bornholm. This is apparent from the Supplementary Agreement on tender frameworks for 6 GW offshore wind and Bornholm Energy Island[3]. The political parties in the agreement "take note (...) of any compensation related to land facilities on Bornholm". Furthermore, compensation "will be discussed as part of follow-up on Climate agreement on green electricity and heat 2022 regarding possible measures for local and municipal support".

Furthermore, the Danish government has published a proposal titled "Climate Action, Together for more green energy from the sun and wind on land"[4] In this proposal, the government proposes to carry out an analysis of possible profit and compensation schemes for neighbours of particularly large electricity transmission facilities. The analysis is meant to uncover conditions for the compensation scheme's targeting neighbouring groups. This includes criteria for the size of transmission facilities covered by the scheme, scope of expenditure and financing etc. The proposal of an analysis is included in current political discussions.

3. Data basis

Total Energies requests that the assumptions and data basis behind the analysis of price formation in the note is shared.

Remarks from the Danish Energy Agency:

The price formation analysis in the note is based on the data in the Analytical Assumptions for 2023[5] which are included in Energinets existing grid model.

The Analytical Assumptions are developed for the Danish electricity and gas sector by the Danish Energy Agency, and indicate a likely course of development for the Danish electricity and gas system up to 2050. The Analytical Assumptions are made by the Danish Energy Agency for use in Energinet's task of planning the development of the transmission network and concentrate on the development in

[3] Tillægsaftale om udbudsrammer for 6 GW havvind og Energiø Bornholm of 30th May 2023
[4] Klimahandling – Sammen om mere grøn energi fra sol og vind på land.
[5] In Danish, "Analyseforudsætningerne – 2023"

electricity and gas consumption as well as in electricity and district heating production capacities.

In the Analytical Assumptions, the Danish Energy Agency takes into account the general technological development and assumes the achievement of political objectives, if concrete measures have not been adopted to achieve this. In contrast to Denmark's Climate Status and Outlook[6], the Analytical Assumptions developed for the Danish electricity and gas sector are thus not based on a Frozen Policy scenario.

These assumptions are combined with Energinet's grid model, the BID3 model[7], which is programmed to run day-ahead market simulations.

In addition, Energinet has taken the consumption and generation in DK2 from the Analytical Assumptions and divided them according to how much should be located on Bornholm main Island and how much should be part of DK2 without Bornholm. Power plants, onshore wind, solar cells and consumption have been assigned on the basis of the division in the Network Planning decomposition of consumption and generation. Energinet is hereby able to include the distribution grid of Bornholm main island in DK3 in the simulations.

4. Price differences and the detection of a structural congestion

RWE notes that the established price differences between the bidding zones DK2 and DK3, in accordance with the note, are not significant in size and asks for the data that lay the foundation for proving a structural congestion between these two zones.

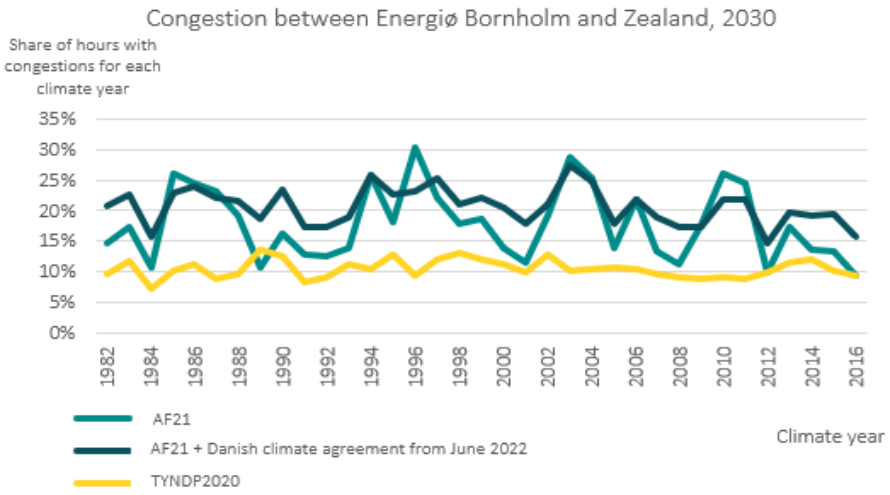
Remarks from the Danish Energy Agency:
The note presents average electricity prices. This implies that significant price differences could occur during a year even though the average prices are very similar. A congestion is dependent on the requests for trades that cannot be served by the available grid. This causes price differences. The scale of the price difference generated may vary, but this is not in itself important when determining if there is a congestion. If the congestion is structural, thus predictable and frequently occurring, then it is a candidate to be addressed in the market, i.e. by splitting the bidding zone.

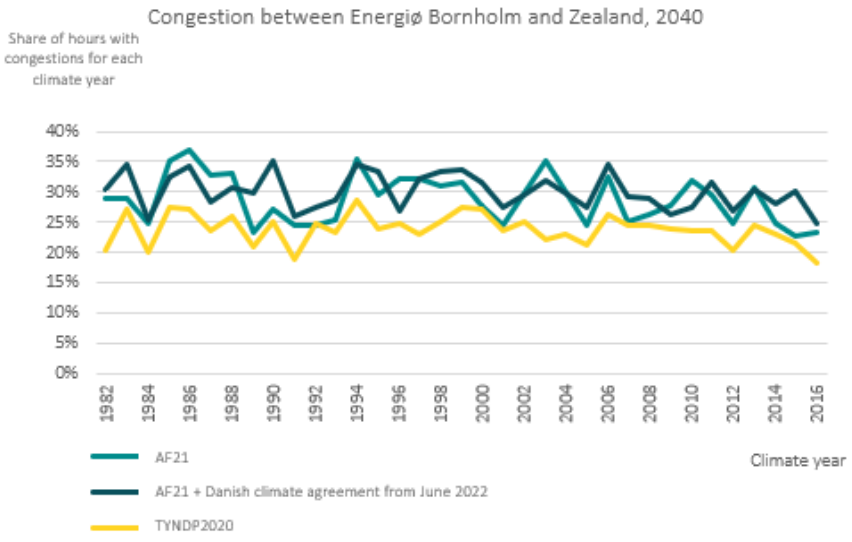
Simulations show that a structural internal congestion occurs in each of the 35 climate years in 2030 and in all 3 RES (Renewable Energy Sources) deployment scenarios if DK3 is not established.

[6] In Danish, "Klimafremskrivningen"
[7] https://bid3.afry.com/

Furthermore, the simulations suggest congestions to increase in 2040.

[8]





[9]

[8] Energinet, Rapport vedrørende strukturelle kapacitetsbegrænsninger ved energiø Bornholm, 27th of June 2022

[9] Energinet, Rapport vedrørende strukturelle kapacitetsbegrænsninger ved energiø Bornholm, 27th of June 2022

5. Unknown price formation may alter the choice of market coupling

Ørsted notes that if advanced hybrid coupling is introduced in the new offshore bidding zone, the price on Bornholm Energy Island will be created based on the flows in all surrounding bidding zones. This can lead to significant price impacts.

Remarks from the Danish Energy Agency:

The network code CACM[10] prescribes that flow based market coupling is the default model for capacity calculation in the European market. This is therefore generally being implemented. Flow-based market coupling includes the use of Advanced Hybrid Coupling, which enables the optimisation in Euphemia (Single Day-ahead Coupling algorithm). This ensures full competition between all cross-border flows in Europe and thus increases the overall efficiency of the market as a whole. The market design of Bornholm Energy Island and Bornholm must comply with the rules set out in the Electricity Regulation. Changes in market coupling methodology, the establishment of new production facilities, changes in the interconnection between bidding zones, and the delineation of bidding zones are all factors that producers in general are subject to, and changes in these factors do not imply compensation or exceptions from the regulation.

Ancillary Services

6. Demand for ancillary services and access to ancillary services markets

BEOF asks, whether there in the future will be a need for the balancing services currently supplied by BEOF as well as other ancillary services. Furthermore, BEOF asks, if and how the societal contribution from these services has been included in the analysis.

Remarks from the Danish Energy Agency:

Energinet, the TSO, has informed that it is the intention to procure balancing reserves, i.e., aFRR (Automatic Frequency Restoration Reserve) and mFRR (Manual Frequency Restoration Reserve) jointly between DK2 and DK3, provided cross-zonal capacity is available to share balancing resources. Regardless of the procurement of reserves, market participants in DK3 will also be able to offer voluntary mFRR bids. The services will be procured via market based solutions, where all BSPs (Balancing Service Provider) can participate. The final ancillary services market design is subject to approval by the Danish Utility Regulator.

See also Energinet's memo on Balancing of Danish energy islands published 27 October 2023[11].

[10] Commission regulation no. 1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

[11] *https://energinet.dk/media/l13atswn/dimensioning-of-reserves-and-balancing-of-danish-energy islands.pdf*

Additional renewable energy

7. Possibilities of putting up additional renewable energy

BEOF and Bornholms Regionskommune are requesting more clarity on whether it in the future will be possible to establish additional renewable energy production on Bornholm, and how the clearing price of the potential additional renewable energy will be affected by the new bidding zone.

Remarks from the Danish Energy Agency:

Developers, who establish electricity producing facilities are subject to the rights and obligations set out in the electricity supply regulation and electricity supply directive. Among these is the right to be connected to the collective grid and an authorisation procedure set out in national law, which is objective, transparent and non-discriminatory. This is unaffected by the establishment of a new bidding zone. The clearing prices in the new bidding zone will be affected to some extent, as described in the note. However the price differences are not expected to be of a significant size.

PtX

8. Possibilities of putting up PtX-facilities

BEOF and Bornholms Regionskommune request clarity on the future possibilities of establishing PtX facilities on Bornholm.

Remarks from the Danish Energy Agency:

Today, the Island of Bornholm has a distribution grid for electricity. The possibilities to connect large consumption assets to this existing grid on Bornholm are limited. There are project developers, however, who have voiced ideas of connecting large new electrolysis/PtX assets once the transmission infrastructure of Bornholm Energy Island is built. From a grid perspective, developers of new consumption assets may wish to pursue different scenarios of connection. They can pursue not to be connected to the transmission grid at all (hence not be part of the day ahead market), or be partly or fully connected to the new transmission grid. Regardless, options for establishing and connecting PtX facilities on Bornholm are not affected by the establishment of DK3 or the delineation of bidding zones in general

9. The potential price effects brought along by putting up additional consumption capacity

RWE would like to know if any calculations of the possible price effects of establishing considerable amounts of consumption in the bidding new zone have been done.

Remarks from the Danish Energy Agency:

Energinet has modelled the future electricity pricing dependent on the delineation of DK3. Energinet has in this regard conducted simulations for 35 climate years. The average wholesale prices are shown in the table below. In the table "Large DK3" means Bornholm Energy Island and Bornholm local grid are included in DK3 (moving consumption and generation on Bornholm from DK2 to DK3 in the simulations) and "Small DK3" includes only the Energy Island.

The results indicate a very limited price impact on the wholesale price as a result of changing the scope of the new bidding zone DK3.

Wholesale price (€/MWh)	Germany		DK3	
	Large DK3	Small DK3	Large DK3	Small DK3
2030	68.55	68.52	58.03	57.84
2040	42.08	41.79	39.33	38.99

Energinet has not simulated how new large consumption in DK3 will impact electricity prices, but the price impact is generally expected to be limited.

10. Expectations regarding PtX-facilities on Bornholm

Scottish Power Renewables requests an insight into the assumptions made by Energinet regarding the development of electricity demand on Bornholm. Furthermore, Scottish Power Renewables asks if there are any formal plans for electrolysers or other high demand generating facilities on Bornholm within the next 15 years.

Remarks from the Danish Energy Agency:

Currently, the Danish Energy Agency is not aware of any formal plans about establishing high demand generating facilities, like electrolysers, on Bornholm. However, the Danish Energy Agency is aware of a consortium consisting of private industry parties that has begun the development of a project called "Bornholm Bunker Hub". The project has a long term plan of locally produced PtX-fuels with electricity from the Bornholm Energy Island.

The Danish Energy Agency may, however, not have a complete overview of all current plans for establishing PtX-facilities, since PtX-facilities are private and commercial parties that themselves are responsible for obtaining the right permissions and enter agreements with the local authorities.

Conditions for energy suppliers and traders on Bornholm

11. Future opportunities and potential consequences for energy suppliers and traders on Bornholm

BEOF asks how the establishment of the new bidding zone will affect the energy suppliers and traders on Bornholm, the conditions under which these work, and their opportunities to offer fixed-price-contracts.

Remarks from the Danish Energy Agency:

The conditions of suppliers and traders do not depend on the delineation of bidding zones. The conditions are the same whether a supplier or trader is active in DK1, DK2 or DK3. The establishment of DK3 will therefore not affect their possibility to offer fixed-price-contracts. The price determination for Bornholm will continuously change and reflect the new dynamics of the DK3 bidding zone. In any case, the change in market design brought by the establishment of DK3 will not be effectuated before the physical establishment of Bornholm Energy Island in 2030. This should provide market participants with ample time to prepare for the changes in the market design in Denmark.

Socioeconomic impact

12. Inadequate analysis of the socioeconomic impact

BEOF considers the note to be insufficient with regards to the socioeconomic impacts, because the analysis does not take into consideration local jobs and ancillary services. Furthermore Bornholms Regionskommune urges the Danish Energy Agency to have the local community and citizens in mind, and considers it important that no citizens are left worse off being included in DK3 scenario than they were being included in DK2.

Remarks from the Danish Energy Agency:

It is an important priority to consider the impact on the community of Bornholm of the establishment of Bornholm Energy Island and the establishment of the new bidding zone DK3. To this end, the Danish Energy Agency is including the community of Bornholm in the overall plans of establishing the Bornholm Energy Island. The market design of Bornholm Energy Island must reflect the framework in EU regulation. According to this, DK3 is established under the procedural framework in the Electricity Regulation. The rules in the Electricity Regulation on structural congestions, and Energinets report on these at Bornholm Energy Island

entail the establishment of DK3. The Danish Energy Agency is following the technical recommendation herein and notes that the Danish Utility Regulator ("Forsyningstilsynet") has approved the report. The question of whether the existing distribution grid on Bornholm is going to be included in DK3 is subject to a separate technical analysis by Energinet. This is expected to be finalized in 2024. The Danish Energy Agency will review Energinets analysis when it is finalized.

The SE4-Bornholm connection

13. Security of supply

BEOF and Total Energies consider the description in the note of security of supply on Bornholm in case the cable between SE4 and Bornholm is discontinued, to be insufficient. Furthermore, the note does not include a description of the security of supply for the consumers on Bornholm, in case of the demand on Bornholm and the interconnectors exceeds the supply from the production on the energy island.

Remarks from the Danish Energy Agency:
Security of supply on Bornholm is of high priority. Energinet emphasizes that regardless of the technical solution chosen, the security of supply will not be compromised as compared to the level in the other Danish bidding zones.

The interconnectors from Bornholm Energy Island to Germany and DK2 will be a part of the market coupling (SDAC[12] - Single Day-ahead Coupling, and SIDC[13] - Single Intraday Coupling). Thus, the consumption on Bornholm and of the interconnectors cannot exceed the generation from the energy island during market coupling. In actual operation, if the demand is higher than expected or generation is lower, then the imbalance will be mitigated by Energinet in the balancing timeframe through the pan-European balancing platforms.

14. Future plans for SE4 connection and consequences for the price formation

BEOF, RWE and Total Energies request a more adequate description of the future plans for the SE4-Bornholm interconnector and the resulting consequences for the price formation and in relation to the supply of balancing and other ancillary services.

Svenska Kraftnät states that they do not support the idea of a subsea cable in operation between Bornholm and SE4 that is not part of the capacity allocation.

[12] https://www.entsoe.eu/network_codes/cacm/mplementation/sdac/

[13] https://www.entsoe.eu/network_codes/cacm/implementation/sdac/

Remarks from the Danish Energy Agency:
Like in the current market setup, the SE4-Bornholm cable is not expected to be part of the day ahead market. The future of the connection between SE4 and Bornholm is subject to a separate analysis by Energinet. This is expected to be finalized in 2024. The Danish Energy Agency will review Energinet's analysis when it is finalized.

The view of Svenska Kraftnät is noted. The primary scenario in Energinet's analysis complies with this view.

15. Potential consequences of not including Bornholm in the new bidding zone.

RWE asks what the current plans are, in case Bornholm is not included in the new offshore bidding zone, and whether market coupling between DK3 and Bornholm will be established.

Remarks from the Danish Energy Agency:
The question of whether the existing distribution grid on Bornholm is going to be included in DK3 is subject to a separate technical analysis by Energinet. This is expected to be finalized in 2024. The Danish Energy Agency will review Energinets analysis when it is finalized. The consequences in the event that no such connection is built are not currently decided upon.

Tender and support scheme

16. Risks associated with capacity constraints on interconnectors

CIP would like to bring to the attention of the Danish Energy Agency that it is important that the interconnector availability is specified in the procurement material, and that a clear compensation mechanism/scheme reflecting deviations from the baseline should also be defined as part of the procurement material.

Remarks from the Danish Energy Agency:
The interconnector availability is regulated on EU-level. The availability will therefore not be determined in the procurement material but will follow the applicable EU market regulation. The procurement material, however, will refer to applicable EU regulation. In the current market regulation, this means at least 70 pct. availability. However, a revised EU regulation i.a. on availability on interconnectors in relation to offshore bidding zones is negotiated as part of the EU electricity market reform. Potentially, this includes a new transmission access guarantee for producers in an offshore bidding zone. The Danish Energy Agency expects this rule to apply to a concessionaire on offshore wind connected to Bornholm Energy Island.

17. The interaction between TAG and the compensation payments

CIP and Total Energies is asking how a lack of availability on the cables, if caused by the 70% rule, would be compensated in practice, and where in the contract or procurement material this would be described. Furthermore, Total Energies asks how compensation payments in the expected TAG will be determined in practice.

Remarks from the Danish Energy Agency:
Interconnector availability is regulated in by The European Electricity Regulation, and any potential compensation will therefore have to follow this regulation. In the ongoing negotiations of the European electricity market reform, a potential Transmission Access Guarantee is currently being negotiated. This will potentially outline possible compensations mechanisms. However, it is too early to say, whether such mechanisms will be applicable for Bornholm Energy Island.

18. Applicability of TAG on BEI

RWE, Scottish Power Renewables and Total Energies ask if the proposed bidding zone DK3 in both cases (including or excluding the existing distribution grid on Bornholm) will be regarded and officially defined as “Offshore Bidding Zone” (OBZ).

Scottish Power Renewables wants to know if TAG will be apply to the OWF in the new bidding zone DK3.

Remarks from the Danish Energy Agency:
It is important whether DK3 is an offshore bidding zone or not, because the Transmission Access Guarantee may apply only in offshore bidding zones. There is no formal definition of an offshore bidding zone at the moment, since the term is not used in any finalized and binding regulation. Based on the current progress in the electricity market reform, it is the expectation that the proposed delineation of DK3 will constitute an offshore bidding zone, including in the scenario where the existing distribution grid on Bornholm is included. The Danish Energy agency expects that the question will be further clarified when the Electricity Regulation is amended as a part of the electricity market reform.

Questions regarding capacity constraints and the TAG

19. Expansion of the grid as an alternative to establishing a bidding zone

Scottish Power Renewables would like to know why Energinet does not address the structural congestion by means of additional connection lines or increased capacity on the planned interconnector?

Remarks from the *Danish Energy Agency*:
It is not estimated to be financially feasible to address the structural congestion by means of additional transmission infrastructure. In addition, it is a political choice not to be able to transmit all power from the Energy Island to DK2.

20. The interaction between TAG and support schemes

Total Energies is asking how the fixed price supplement would work alongside a compensation mechanism resting on TAG, based on the current electricity market reform?

Remarks from the *Danish Energy Agency*:

The support scheme is determined in a political agreement.[14] It will be a fixed price supplement for each produced kilowatt-hour or the highest payment to the state through a concession payment. Any potential compensation mechanism from Transmission Access Guarantee (TAG) will not affect the support scheme. The Danish Energy Agency notes that TAG is a part of the ongoing electricity market reform negotiations in EU and the final outcome is not known at this point in time.

21. Uncertainty due to TAG and timing of the establishment of DK3

Ørsted expresses a concern in relation to the potential insecurities of depositing competitive electricity production due to potential capacity constraints and uncertainty regarding the TAG.

Ørsted recommends that the establishment of a new offshore bidding zone is postponed until after the TAG is fully implemented. The reason is that different versions of the TAG in the negotiations have had different scope, and some have discontinued the right for developers to be compensated through the TAG, if consumption is placed in the bidding zone. Such technical details should be clarified before the bidding zone boarders are agreed on.

Remarks from the *Danish Energy Agency*:

The Danish Energy Agency recognizes the importance of the TAG with regard to the tender on offshore wind connected to BEI, Currently, the Danish Energy Agency is awaiting the results of the ongoing electricity market reform where the TAG is negotiated. The Danish Energy Agency expects that the negotiations, including an overall agreement on TAG, to be finalized before the tender on offshore wind connected to BEI is made public.

The decision on the establishment of DK3 is planned to take place prior to the tender on offshore wind related to Bornholm Energy Island. The intention is to provide clarity for developers on market design.

[14] Tillægsaftale om udbudsrammer for 6 GW havvind og Energiø Bornholm" of 30th May 2023

Basis for the analysis

22. Limitations on the interconnectors and assumptions

RWE requests further information about the assumptions laying the foundation for the modelling of limitations on the interconnectors?

Scottish power Renewables wants to know what assumptions are made regarding possible curtailments of the interconnector-lines in both directions (towards DK2 and Germany), asks what influences those congestions have had on the price within DK3, and finally asks, how the spread between DK2 and DK3 develops in this scenario?

Remarks from the *Danish Energy Agency*:
In the modelling of the congestions carried out by Energinet, an availability of 100% of the interconnectors is assumed, thus the presented congestions is a best case scenario. In practice, planned outages and unplanned outages will add to the congestion picture.

Since no assumptions on reduction of capacity is assumed, it is not possible to determine the price elasticity subject to reduced interconnector availability. In general, this will significantly depend on the timing of the actual congestions. Since this is embedded with a too high degree of uncertainty, the reduction of interconnector availability is not included in the analysis.

23. Inclusion of the grid code in the data basis and change of grid code

Siemens Gamesa requests that the grid code impact should be evaluated as part of the establishment of such zone. Siemens Gamesa also requests to include the impact, if the new bidding zone were to be disconnected from the Nordic Grid and solely be HVDC connected, in the analysis.

Remarks from the *Danish Energy Agency*:
First, there will be no impacts of the grid code on the delimitation of the bidding zone. Second, a bidding zone is a tool of the electricity market and thus does not directly relate to connection requirements. There is, however, a potential link between the grid code requirements that can be applied depending on whether there is an operational AC cable from Bornholm Energy Island to Sweden.

24. Insufficient level of detail in the analysis and inadequate involvement of actors

Svenska Kraftnät expresses a concern that the decision on how to handle the expected structural congestion between the Energy Island and Zealand should have been based on a more detailed study. As Bornholm is connected to the AC

grid in the Swedish bidding zone SE4, Svenska Kraftnät believes that they should have been involved while investigating possible alternative configurations.

Remarks from the *Danish Energy Agency*:
The Electricity Regulation stipulates a process for amending bidding zone configurations based on an approved report that shows a structural congestion in the grid. Regarding Bornholm Energy Island, Energinet has been recommended to follow this process by the Danish Utility Regulator, Forsyningstilsynet. It is the understanding of the Danish Energy Agency that the necessary consultations prior to the approval of the report has been conducted by Forsyningstilsynet. Based on the approved report from the Danish Utility Regulator, the Danish Energy Agency has subsequently facilitated the involvement of relevant member states in the decision and conducted a public hearing.

Availability of liquidity and hedging opportunities

25. Insecurity of availability of liquidity in smaller bidding zones

Ørsted has voiced a concern about the uncertainty in relation to available liquidity in the market in smaller bidding zones, and thereby also the risks associated with the opportunities of hedging the market risks for producers.

Remarks from the *Danish Energy Agency*:
Energinet expects to offer long term transmissions rights (baseload) to the neighbouring bidding zones in line with the Forward Capacity Allocation regulation.