



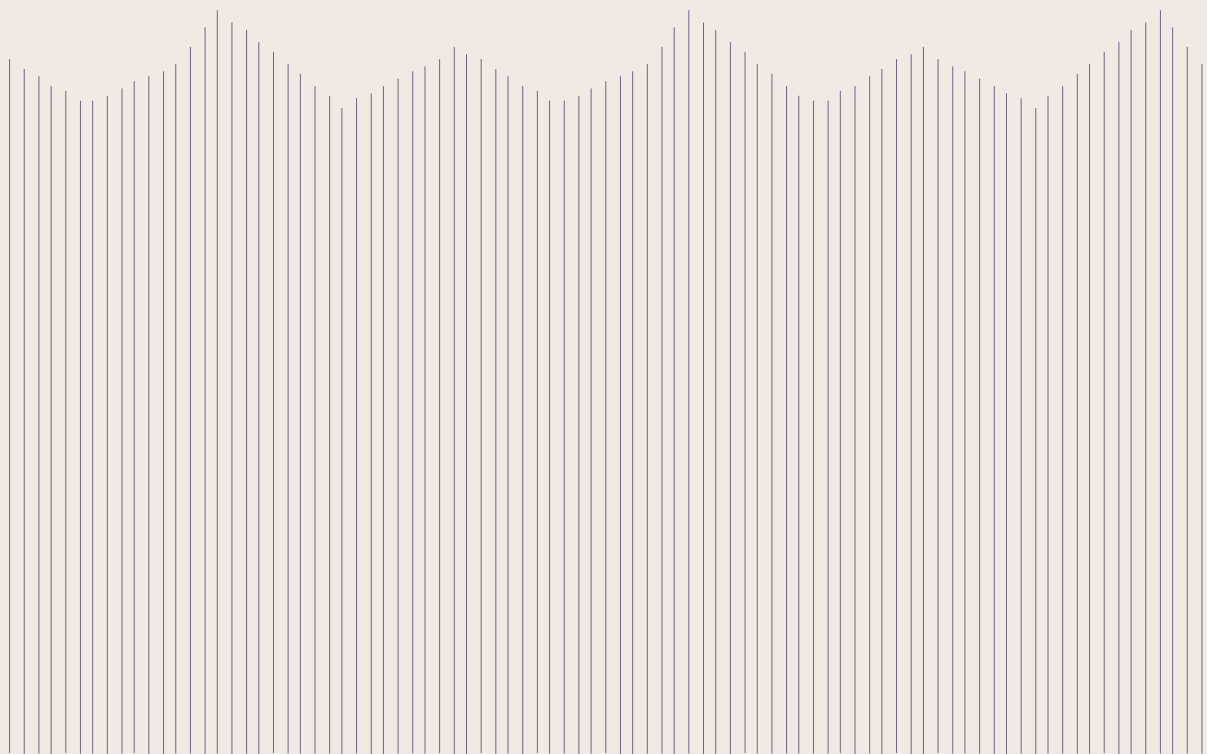
**ENERGITILSYNET**

Danish Energy Regulatory Authority



**Energimarknadsinspektionen**

Swedish Energy Markets Inspectorate



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SELF-EVALUATION REPORT, JUNE 2017

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# EUROPEAN GAS TARGET MODEL SELF-EVALUATION BY DERA AND EI

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## 1. INTRODUCTION AND CONCLUSIONS

### INTRODUCTION

The Agency for the Cooperation of Energy Regulators (ACER) has developed a vision for the European gas market: The Gas Target Model.<sup>1</sup> The Gas Target Model focuses on gas wholesale market functioning, security of supply and the future role of gas. The focus of this self-evaluation is on wholesale market functioning.

The starting point of the discussion of wholesale market functioning is the European gas Regulation<sup>2</sup> which, inter alia, “aims at facilitating ... a well-functioning and transparent wholesale market with a high level of security of supply in gas” (Article 1).

Well-functioning gas markets with liquid gas hubs or gas exchanges are attractive for market participants because it makes it easier to trade gas and manage market risks and the gas price is closer to the market price. In addition it gives new participants a better opportunity to enter the market and more reliable gas prices (high volumes and number of trades). In order to attract more participants and volumes to the gas market it may be necessary to manage potential barriers that can affect spot and forward market liquidity. Especially liquid forward markets are a focus point of the Gas Target Model because they “enable cost effective wholesale market risk management.”

The Gas Target Model is a non-mandatory initiative initiated by ACER which proposes that the national regulatory authorities carry out self-evaluations of their national markets. The self-evaluation consists of two phases.

Phase 1 is the national regulatory authorities’ assessment of the current state of gas wholesale market functioning and expected state of wholesale market functioning of their national markets in the short term.

The Gas Target Model recommends that Member States take steps to evaluate possible national market reforms to connect the national market to neighbouring markets in order to become more well-functioning if the conclusion of phase 1 is that the gas market will not be well-functioning in the short term. This is phase 2 of the self-evaluation.

The assessment of the current state of the wholesale market functioning is based on a number of metrics. The metrics are divided between “market participants’ needs” (liquid markets) and “market health” (low market concentration):

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<sup>1</sup> “European Gas Target Model – Review and Update” by ACER (January 2015) .

<sup>2</sup> REGULATION (EC) No 715/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005.

- *Market participants' needs* are met if “products and liquidity are available such that effective management of wholesale market risk is possible.” The metrics are order book volume, bid-offer spread, order book price sensitivity and number of daily trades.
- A market has *market health* if “the wholesale market area is demonstrably competitive, resilient and has a high degree of security of supply.” The metrics which measures market concentration are Herfindahl-Hirschman Index, number of supply sources, Residual Supply Index, market concentration for bid/offer activities and market concentration for sales/purchase activities.

The Gas Target Model sets a threshold level for each metric which must be met for the market to be considered well-functioning. The threshold levels are based on the two most well-functioning gas hubs in Europe: The TTF in the Netherlands and the NBP in Great Britain. The threshold levels are therefore very ambitious.

The Danish and Swedish national regulatory authorities have decided to make one joint self-evaluation. The reason for this is that the Danish and Swedish natural gas markets are closely linked since the Swedish gas market is supplied with gas from Denmark only. The balancing operators in the Swedish natural gas system are active on the Danish gas market, including the gas exchange Gaspoint Nordic. Consequently, competition, pricing and transparency in Sweden are largely dependent on developments in Denmark. Furthermore, TSO's in Denmark and Sweden are currently working on creating one joint balancing zone.

This report contains an assessment of the current state of wholesale market functioning based on latest available data and a description of expected future projects in Denmark and Sweden which may improve wholesale market functioning. The report constitutes phase 1 and 2 of the joint self-evaluation by the Danish Energy Regulatory Authority (DERA) and the Swedish Energy Markets Inspectorate (Ei).

Self-evaluations are supposed to be carried out at regular intervals – every three years as a starting point. As there are already several projects in the pipeline for the “Danish-Swedish gas market”<sup>3</sup> which could substantially improve the market functioning, phase 2 of the self-evaluation therefore focuses on the planned market projects in the short term, until the next self-evaluation will be carried out in 2020. The next self-evaluation will draw conclusions from the planned and realised projects and will look ahead to assess whether further structural reforms could benefit the Danish-Swedish market.

Chapter one gives an overview of the Danish-Swedish gas market. Chapter two is a description of the Gas Target Model metrics and results of the analysis of the Danish-Swedish gas market. Chapter three is a description of expected future projects on the Danish-Swedish gas market. Chapter four gives a summary of the comments from the public consultation.

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<sup>3</sup> In the self-evaluation the Danish and Swedish gas market area will be referred to as the Danish-Swedish gas market.

The report includes an annex which describes in detail how the metrics for the Danish-Swedish gas market have been calculated.

## **SUMMARY AND CONCLUSIONS**

The Danish gas market has undergone substantial change in recent years. Two important developments are 1) a substantial expansion of the Danish transmission system, which among other things have made it possible to import a high volume of gas from Germany and linked the Danish gas market to the Northwest European gas market and 2) the development of a Danish gas exchange that has now grown to a size where traders can sell and buy the volumes of gas they need in the short term market at prices which are today closely correlated with the more developed markets in Northwest Europe.

The development of Gaspoint Nordic has also benefited the Swedish gas market where the trade of Swedish participants on the exchange has increased compared to Swedish gas consumption.

The results of the self-evaluation for the Danish-Swedish gas market are summarized in Table 1 below. Two of the metrics have not been calculated for Gaspoint Nordic (Order book price sensitivity and Market concentration for bid and offer activities). These metrics as proposed by ACER are based on REMIT data which are not readily available for the publication of this evaluation.

The results show that the Danish-Swedish gas market does not meet all the criteria for a well-functioning market as set out by the Gas Target Model. Especially, the results suggest that the market could be improved by focusing on participants' need.

It should be mentioned that the Danish-Swedish gas market is well connected to the Northwest European gas market, which means that traders are able to manage their risks by trading forward contracts on e.g. the German and Dutch gas markets. Also, traders have access to a fairly well-functioning short term market at Gaspoint Nordic where prices are today highly correlated with gas prices at the more liquid German and Dutch gas hubs.

TABLE 1 | GAS TARGET MODEL RESULTS FOR DENMARK AND SWEDEN

Market participants' need metrics	Day Ahead	Month Ahead	Forward
Order book volume (bid-side)	450-750 MW	0-150 MW	NA
Order book volume (offer-side)	450-750MW	0-150 MW	NA
Bid-offer spread	1-1.25 pct.	2-2.5 pct.	NA
Order book price sensitivity (bid-side)	-	-	NA
Order book price sensitivity (offer-side)	-	-	NA
Number of trades	0-50	0-50	NA
<b>Market health metrics</b>			<b>Denmark-Sweden</b>
Herfindahl-Hirschmann Index			1,720
Number of supply sources			3
Residual Supply Index			179 pct.
Market concentration for bid activities			-
Market concentration for offer activities			-
Market concentration for sales activities			< 40 pct.
Market concentration for purchase activities			> 40 pct.

Source: ACER and DERA based on data from Gaspoint Nordic, Danish Energy Agency and Swedegas.

Notes: Forward products are not available (NA) on Gaspoint Nordic. Order book price sensitivity and market concentration for bid/offer activities are not calculated. Results are described in detail in chapter two.

In the coming years there are a number of expected projects in the pipeline which may support the positive development of the Danish-Swedish gas market:

One of the largest producing gas fields in Denmark, **Tyra**, will close down temporarily from December 2019 until March 2022 in order to be rebuilt to continue its production at full scale. It is expected that the gas production from Tyra will increase after the maintenance period due to improved production facilities and postponed production.

A new gas route from Norway to Poland (the **Baltic Pipe Project**) through Denmark may be established and start transporting gas from 2022. The project will make it possible to flow large amounts of Norwegian gas to/through Denmark and onwards to Poland. The pipeline to Poland will be bidirectional which makes gas import from Poland possible as well. The Baltic Pipe Project will increase the amount of gas that flows to/through the Danish-Swedish gas market and also the number of market participants.

In relation to the Baltic Pipe project, the Danish TSO, Energinet, is expected to create a **common market zone** which means that shippers<sup>4</sup> who buy Norwegian only have to book entry/exit capacity to the Danish system once (instead of upstream and transmission entry/exit capacity separately). Furthermore, Energinet is to acquire the existing Danish upstream pipelines in the Danish North Sea. In the longer run these pipelines could be included in a common market zone.

Denmark and Sweden are expected to create a **joint balancing zone** in 2019 which will expand the balancing zone to include both Denmark and Sweden. The market expansion may improve wholesale liquidity since some market barriers to Sweden will be removed which could increase the traded volume of gas.

EEX took over full ownership of **Gaspoint Nordic** in 2016.<sup>5</sup> Later that year Gaspoint Nordic's gas products became available at the European trading platform PEGAS. Since a larger number of traders are active at PEGAS it is expected that trade in Gaspoint Nordic's products could increase and thus increase product liquidity.

Sweden is in the process of building a **LNG terminal in Gothenburg** which is expected to be completed in 2018/2019. The LNG will primarily be used by shipping, industry and heavy transport but can in the longer run also feed into the natural gas transmission system. If this happens the LNG can create an extra supply source, which will increase the flexibility in the system.

The described projects could in the coming years affect the Danish-Swedish gas market positively since they will create extra supply sources and increase the number of participants and gas volumes. The projects could improve existing gas products and liquidity (participants' need) on the Danish-Swedish gas market. But forward products are still not expected to be available at the Danish gas exchange, Gaspoint Nordic.

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<sup>4</sup> A shipper is a market participant who arranges for transport of gas between entry and exit-points, e.g. entry to the transmission system and exit to the customers or a delivery point for resale of the gas.

<sup>5</sup> Gaspoint Nordic is today fully owned by Powenext – an EEX subsidiary company.

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## MARKET REFORMS - RECOMMENDATIONS

The Danish-Swedish gas market has been through a very positive development. It can be mentioned that capacity at Ellund has been expanded and made physical import of large amounts of gas possible and prices at the Danish gas exchange has become correlated with prices in Germany and the Netherlands.

However, the Danish-Swedish gas market will be challenged in the short run when the Danish gas production will decrease significantly in a period running from December 2019 to March 2022. It is therefore important that there is enough flexibility in the system to ensure gas supply in this period.

- DERA and Ei recommend that Energinet looks at possible ways to ensure that there is enough gas in the market during the renovation of Tyra through enhanced TSO cross-border co-operation and by optimizing the use of capacity at Ellund, e.g. through effective use of CMP tools and other tools for allocation of capacity like secondary auctions and implicit allocations.

One way to reduce market concentration is to increase the market area in order to increase the number of market participants and traded gas volumes.

- DERA and Ei support the Danish and Swedish TSOs work of analysing the costs and benefits of creating a joint balancing zone.
- DERA recommends that it should be analysed if a common market zone could also include the existing Danish upstream system.

Given that the outcomes of the expected gas projects in Denmark and Sweden are not yet known and that Germany is in the process of analysing possible market reforms there are many unknowns which can affect a phase 2 analysis.

- DERA and Ei suggest that a more extensive analysis of possible market reforms or adjustments for the Danish-Swedish market should await the next self-evaluation which is expected to be performed in 2020 due to the many expected projects in the short term.
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## **PUBLIC CONSULTATION**

DERA and Ei received five responses from the public consultation. The responses came from Danish, Swedish and Polish market participants.

All of the responses generally agreed with the main conclusions of the self-evaluation, but there were different views regarding the benefits of the identified future projects and the need for more substantial reforms before 2020.

Key elements from the consultation are summarized below.

- The Danish-Swedish gas market meets the Gas Target Model metrics relating to market concentration, but the market is still characterized by a relatively high market concentration and low liquidity.
- There is also after the expansion of Ellund a risk of contractual bottlenecks, when large volumes has to be imported to cover consumption in Denmark and Sweden, e.g. during the Tyra renovation.
- The market will be challenged in the short term during the renovation of Tyra. It may therefore be necessary to introduce market reforms or in other ways ensure the efficient use of the infrastructure.
- The pricing on Gas Point Nordic is suggested not entirely to reflect supply and demand in the market. DERA continuously follows flow and price signals between Denmark and Germany.
- One of the main barriers to a well-functioning gas market in Denmark and Sweden is the market size and expectations about falling demand. If gas demand is falling there is a risk of decreasing liquidity and increasing tariffs.

## 2. THE DANISH-SWEDISH GAS MARKET

The Danish-Swedish gas market is geographically located as an appendix to the European gas market. For a long time the market has been supplied only with Danish gas from the North Sea but expectations about decreasing production has led to investments in import capacity at the Danish-German border. Today, the Danish-Swedish gas market is better connected to the Northwest European gas market.

The Danish gas system consists of upstream infrastructure, a transmission and distribution system, gas storages and a compressor station. The Danish transmission system stretches across the whole country.

The Swedish gas system consists of a transmission and distribution system and one minor gas storage. The Swedish transmission system runs from Malmö to Gothenburg (the Southwest part of Sweden). The Danish and Swedish gas systems are linked together via a submarine pipeline below Öresund. At present a shipper needs to book capacity at Dragør in order to transport natural gas to Sweden. The consumption in Sweden is relatively low compared to the system's transmission capacity hence there is no risk of congestion. Figure 1 shows the Danish and Swedish gas systems.

The Danish-Swedish gas market is mainly supplied with natural gas from the Danish part of the North Sea and some import from Germany. Sweden does not produce any natural gas on its own. Furthermore, the market is supplied with biogas from Denmark and Sweden.

Natural gas is produced from 19 Danish gas fields in the North Sea. A single Norwegian gas field, Trym, is directly linked to the Danish upstream system, which makes it possible to import gas directly from Norway. The Danish upstream system is also linked to the Dutch upstream system via the pipeline NOGAT, which makes it possible to export gas directly to the Netherlands.

Total Danish production of natural gas was around 4.3 bcm in 2016. Some of the gas is used directly for the gas production and is therefore excluded to determine the volume of “sales gas”. Danish production of sales gas was around 3.7 bcm in 2016.<sup>6</sup>

Gas from the North Sea was historically the only source of gas in Denmark, but physical import of gas at the Danish-German border has been possible since 2010 and the cross-border capacity has been increased at different steps since 2010. Furthermore, Denmark also imports gas from Norway via Trym. Denmark imported around 0.5 bcm gas from Norway and 0.2 bcm from Germany in 2016.<sup>7</sup>

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<sup>6</sup> Danish Energy Agency. Monthly Energy Statistics – Natural gas.

<sup>7</sup> See footnote 5.

FIGUR 1 | THE DANISH AND SWEDISH GAS SYSTEMS



Kilde: Danish Energy Regulatory Authority based on ENTSO-G Transmission Capacity Map 2014 and Energinet.

Note: The figure shows some of the Danish gas fields and the Norwegian gas field Trym in the North Sea, the pipelines which transport gas to Denmark (Tyra-Nybro and Syd Arne/Harald-Nybro) and the Netherlands (NOGAT), and the transmission pipelines which transport gas in Denmark. The figure also shows two Danish gas storages (Lille Thorup and Stenlille), the border points (Ellund and Dragor), a final coastal landing terminal (Nybro) and the compressor station (Egtved). The Danish gas system consists of three entry/exit points (Nybro, Ellund and Dragor). Nybro Exit has not yet been used for either physical or virtual flow. The Danish gas system furthermore consist of the Exitzone (Danish distribution area), two virtual delivery points (GTF and ETF) for gas traded bilaterally or on the Danish gas Exchange (Gaspoin Nordic) and the virtual delivery point for biogas (BNG Entry), where gas is delivered virtually into the transmission system. The figure also shows the Swedish gas transmission system and gas storage (UGS Skallen).

Besides natural gas, Denmark and Sweden also have a second source of gas: biogas. The production of biogas is increasing, and if the expected future potential is realised biogas could become a significant source of gas in Denmark and Sweden. Denmark produced around 0.3 bcm of biogas in 2015.<sup>8</sup> It is expected that the Danish biogas production will have more than doubled by 2020.<sup>9</sup> [There is a large potential for biogas production in the long run, and it is estimated that the production of biogas in Denmark will be around 1 bcm in 2050 which is around 30 per

<sup>8</sup> Danish Energy Agency, Energy Statistics.

<sup>9</sup> Danish Energy Agency.

cent of the current total Danish and Swedish consumption<sup>10</sup>.] Sweden produced around 0.04 bcm in 2016.<sup>11</sup>

Total Danish and Swedish consumption was around 3.4 bcm in 2016 (consumption was around 2.5 bcm in Denmark and 0.9 bcm in Sweden).<sup>12</sup> Denmark produces more gas than is consumed in both Denmark and Sweden, and Denmark is therefore still a net exporter of natural gas.

In Denmark, natural gas is primarily used as a fuel in the production of power and power and heat combined, but industry and households respectively also constitutes a large share of the Danish natural gas consumption. In Sweden, natural gas is primarily used by industry and combined heat and power plants while only a few per cent is used by households. There is therefore a strong connection between the weather, especially during the winter months, and natural gas consumption in both Denmark and Sweden.

Import from Germany is constrained by the technical capacity on the German side. The northbound capacity on the German side of the border is around 4.4 bcm.<sup>13</sup> This means that the capacity is sufficient to supply the Danish and Swedish markets with natural gas when total consumption is around 3.4 bcm as it was the case in 2016.<sup>14</sup>

Denmark exports gas to Sweden, the Netherlands and Germany. Total Danish gas export was around 2.0 bcm in 2016. Around 0.9 bcm was exported to Sweden, 0.6 bcm to the Netherlands and 0.6 bcm to Germany.<sup>15</sup>

Denmark has two natural gas storages which are owned by Energinet. The storages have a total technical capacity of around 1.0 bcm, which is almost 30 pct. of the Danish and Swedish annual consumption.<sup>16</sup> Sweden has one natural gas storage with a capacity of 0.01 bcm which is owned by the Swedish TSO, Swedegas.

## TRADE AND COMPETITION IN THE DANISH-SWEDISH GAS MARKET

Trade in the Danish gas market has since the liberalization of the gas market moved more towards OTC and exchange contracts which in general are shorter than the historical long-term ToP contracts.<sup>17</sup> A lot of gas in the Danish market is

<sup>10</sup> Danish biogas production potential in 2050 is 40 mill. GJ. "Energiscenarier frem mod 2020, 2035 og 2050", Danish Energy Agency (2014).

<sup>11</sup> Denmark produced 6,347,790 GJ from biogas in 2015. This is about 276 mill. m3 when conversion factor 0.023 is applied. Sweden produced 517 GWh from biogas in 2016. This is about 42.4 mill. m3 when conversion factor 12,2 is applied.

<sup>12</sup> Danish Energy Agency. Monthly Energy Statistics – Natural gas. Swedish consumption is defined as Danish export to Sweden. Denmark is the only source of supply to Sweden.

<sup>13</sup> ENTSOG Capacity Platform. Data is computed in kWh/h. Applied conversion factor: m3 = 11.2 kWh.

<sup>14</sup> Assuming that the utilization of the capacity is around 85 per cent.

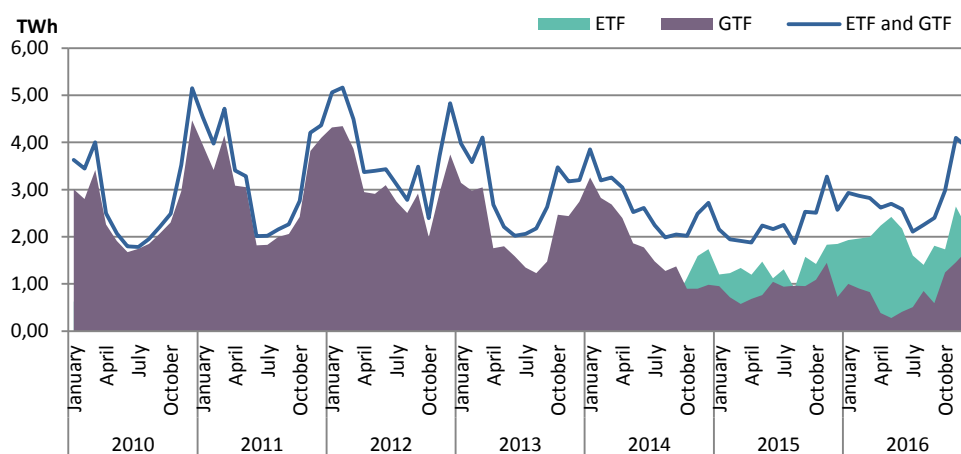
<sup>15</sup> Danish Energy Agency. Monthly Energy Statistics – Natural gas.

<sup>16</sup> Gas Storage Denmark – public website ([www.gaslager.dk/GSMSPUB\\_WEB/](http://www.gaslager.dk/GSMSPUB_WEB/)).

<sup>17</sup> OTC: Over the Counter; ToP: Take or Pay.

still traded on long-term contracts, which e.g. were agreed on in the course of establishing the Danish gas system and they are still effective today. Gas traded on OTC and exchange contracts has increased and in 2016 the gas volumes delivered on the virtual delivery points GTF (OTC, Energinet) and ETF (exchange, Gaspoint Nordic) was 0.8 bcm and 1.8 bcm respectively, cf. figure 2.<sup>18</sup> This is a large share compared to the Danish and Swedish consumption which was 3.4 bcm in 2016. Furthermore there has been a shift from OTC to exchange contracts in the last couple of years. This is a very positive development since it supports the gas price at the transparent trading platform.

FIGURE 2 | VOLUMES AT DANISH EXCHANGE (ETF) AND OTC (GTF) 2010-2016



Source: Danish Energy Regulatory Authority based on data from Gaspoint Nordic and Energinet.

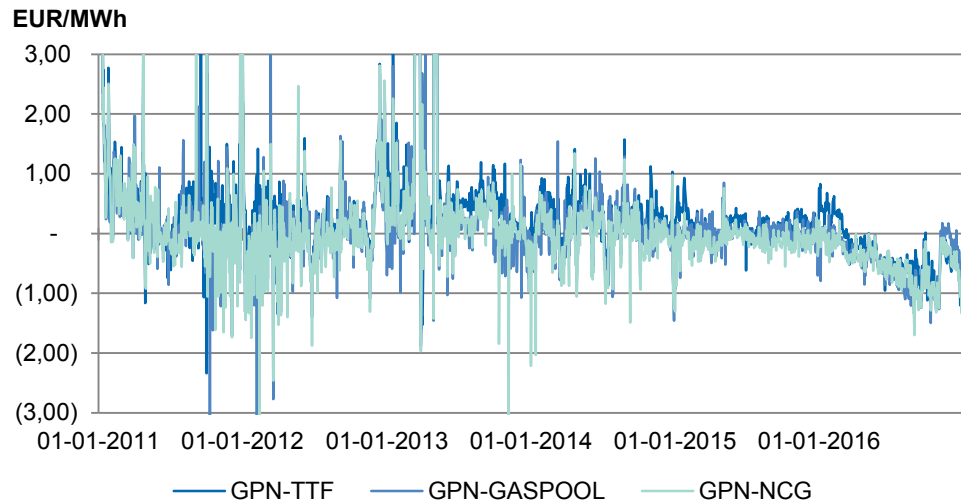
Note: ETF (Exchange Transfer Facility) is the delivery point for gas exchange (Gaspoint Nordic) contracts and GTF (Gas Transfer Facility) is the delivery point for OTC contracts on the Danish gas market.

In Sweden, trade in natural gas from Denmark mainly takes place at Gaspoint Nordic. All trading at Gaspoint Nordic is conducted with physical delivery and shippers must have an agreement with the Danish TSO.

The above mentioned investments in Ellund have made physical import of significant volumes possible. It is now possible to import and export gas from/to Germany with a low risk of congestion. Trade at Gaspoint Nordic has also improved over the last couple of years. The effect of this is that the price spread between prices at Gaspoint Nordic and gas hubs in Germany (Gaspool and NCG) and the Netherlands (TTF) has decreased significantly and been relatively constant for a long time. The price-spreads are shown in figure 3.

<sup>18</sup> Energinet Online. Data is computed in kWh/h. Applied conversion factor: m<sup>3</sup> = 12.157 kWh.

FIGURE 3 | PRICE-SPREADS ON DANISH AND GERMAN GAS MARKETS (2011-2016)



Source: Gaspoint Nordic and EEX.

Note: GPN is Gaspoint Nordic, TTF is the Dutch gas hub and Gaspool and NCH are the German gas hubs.

Even though trade on GTF and ETF has increased and the price spread between Gaspoint Nordic and German gas hubs has decreased there is still a problem with competition in Denmark. In an analysis<sup>19</sup> of the competition on the Danish wholesale gas market, DERA found that there are still only a few companies bringing gas onto the gas market and in general there are only a few active players and limited amounts of gas available in the market. The Danish wholesale gas market is therefore characterised by high market concentration. Furthermore DERA found that the Danish incumbent, DONG Energy, has access to at least two thirds of the Danish gas in the North Sea.

Some of the relevant conclusions from DERA's analysis are presented in Box 1 below.

<sup>19</sup> "Analysis of Competition on the Danish Wholesale Market for Natural Gas" – English summary, Danish Energy Regulatory Authority (January 2016).

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**BOX 1 | DERA'S ASSESSMENT (DECEMBER 2015)**

**Access to transport gas to the Danish gas wholesale market:** DERA considers that, up to 2023, contractual bottlenecks could arise at the German side of Ellund, if import needs increase. In dialogue with Bundesnetzagentur, DERA will monitor contractual bottlenecks at Ellund, and DERA will monitor how the common European rules for managing bottlenecks (congestion management procedures, CMP) are being applied.

**Transmission tariffs and competition:** DERA considers that too high tariff differences between Entry/Exit points in the Danish system could restrict competition in the Danish gas market. There is a limit to how much tariff differentiation can be tolerated and how much higher the tariff at Ellund (entry) can be compared to other points before it will reduce continental gas imports via Germany. However, it is difficult to state exactly when the legal requirement that tariffs shall facilitate efficient gas trade and competition will become more important than the legal requirement that tariffs shall avoid cross-subsidies between network users - meaning that the individual network users shall in principle pay for the costs they generate; DERA urges market players to provide input in due time for the work by Energinet to develop a tariffs structure which meets the common rules on harmonisation of tariff structures in the EU.

**Analysis of gas prices and gas flows at Ellund:** DERA has observed gas flows contrary to price signals for most of the period 1 January 2014 to 30 June 2015; DERA considers that, for a period, it will be necessary to focus on prices in the Danish, German and Dutch markets. If necessary, DERA will ask market players to account for their commercial considerations on flow direction.

**Competition on the Danish gas storage market:** DERA considers, like the Danish Competition and Consumer Authority that the Danish gas storage market (with two physical storages gathered in one storage company with one common storage point) will not inhibit competition in Danish wholesale market; Because of the risk of cross-subsidisation, in its supervision of storage and transmission, DERA will especially focus on purchases by the TSO of storage services; If the Danish storage market develops in an unforeseen way, DERA will approach the legislator to discuss a possible shift from "negotiated access" to "regulated access" which is also possible under EU law.

**Transparency in the North Sea:** DERA considers that market transparency in the Danish part of the North Sea could be significantly improved if market players publish the time an incident occurs, e.g. a shut down, and how much capacity of total available capacity is affected; DERA will enter into dialogue with relevant stakeholders to examine possibilities to publish data on gas flows to the Netherlands, i.e. via Tyra Vest-F3. Such flow data will provide market players with a better understanding of amounts being transported to the Netherlands and the Danish gas market.

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"Analysis of Competition on the Danish Wholesale Market for Natural Gas" – English summary, Danish Energy Regulatory Authority (January 2016).

### 3. ASSESSMENT OF THE CURRENT STATE OF WHOLESALE MARKET FUNCTIONING

The current state of wholesale market functioning is analysed based on the Gas Target Model metrics. The metrics are applied to analyse market participants' needs and market health, cf. the introduction to this self-evaluation.

This chapter contains a short description of each of the GTM metrics and the results for the Danish gas exchange, Gaspoint Nordic, and the Danish-Swedish gas market. A more detailed description of the calculations can be found in Annex 1.<sup>20</sup> Metric results are either calculated by DERA or ACER.<sup>21</sup>

According to the Gas Target Model the analysis should be done with data from transparent markets. Where relevant the analysis use data from Gaspoint Nordic. Some of the metrics are analysed for day-ahead, month-ahead and forward products individually. Forward products are not available at Gaspoint Nordic.

#### 3.1 MARKET PARTICIPANTS' NEEDS: ABSOLUTE METRIC VALUES FOR FORWARD, PROMPT AND SPOT MARKETS

##### METRIC 1: ORDER BOOK VOLUME

The order book volume measures the availability of bid and offer volumes. The results are found by taking the median of daily order book volumes over the defined period. Sufficient bid and offer volumes are necessary for market participants to be able to buy and sell the gas needed. This will reduce market participants' risk. Higher volumes mean better market functioning.

The order book volumes for Gaspoint Nordic and the GTM order book volume metric threshold are shown in Table 2 below.

Order book volumes for day-ahead on the bid and offer side were 450-750 MW per day in the period November 2015-April 2016 and order book volumes for month-ahead on the bid and offer side were 0-150 MW per day in the same period. Neither of the products on the bid and offer side was above the threshold level which indicates a lower than recommended order book volume.

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<sup>20</sup> The calculations are based on the "Calculation specification per metric" in Annex 3 to the Gas Target Model.

<sup>21</sup> "Annual Report on the Results of Monitoring the Internal Natural Gas Markets in 2015" ACER/CEER (September 2016) or calculated for DERA.



**TABLE 2 | ORDER BOOK VOLUME AT GASPOINT NORDIC, NOVEMBER 2015-APRIL 2016**

Metric		Day Ahead	Month Ahead	Forward
Threshold		≥ 2,000 MW	≥ 470 MW	≥ 120 MW
Order book volume	Bid-side	450-750	0-150	NA
	Offer-side	450-750	0-150	NA

Source: European Gas Target Model – Review and Update” by ACER (January 2015) and “Annual Report on the Results of Monitoring the Internal Natural Gas Markets in 2015” ACER/CEER (September 2016).

Note: Forward products are not available (NA). Median of daily order book volumes over analysed period.

#### METRIC 2: BID/OFFER SPREAD

The bid/offer spread metric measures the difference between the highest bid price and the lowest offer price for each trading day, which means the difference between the highest price a buyer is willing to pay and the lowest price at which a seller is willing to sell gas. The bid/offer spread is calculated as a percentage of the bid price. Low bid/offer spreads mean better market functioning.

The bid/offer spread for Gaspoint Nordic and the GTM bid/offer spread metric threshold is shown in Table 3 below.

**TABLE 3 | BID/OFFER-SPREAD AT GASPOINT NORDIC (PCT. OF BID PRICE), NOVEMBER 2015-APRIL 2016**

Metric	Day Ahead	Month Ahead	Forward
Threshold	≤ 0.4 pct.	≤ 0.2 pct.	≤ 0.7 pct.
Bid/offer-spread	1-1.25 pct.	2-2.5 pct.	NA

Source: European Gas Target Model – Review and Update” by ACER (January 2015) and “Annual Report on the Results of Monitoring the Internal Natural Gas Markets in 2015” ACER/CEER (September 2016).

Note: Forward products are not available (NA). The bid/offer spread is calculated as percent of bid price.

The bid/offer spread was 1-1.25 pct. for day-ahead in November 2015-April 2016 and 2-2.5 pct. for month-ahead. Both were significantly above the threshold level, which indicates a high bid/offer spread.

#### METRIC 4: NUMBER OF TRADES

Number of trades is determined as the median of the daily number of trades in the analysed period. A high number of trades implies a better market functioning.

The number of trades for Gaspoint Nordic and the GTM number of trades metric threshold are shown in Table 5 below.

TABLE 4 | NUMBER OF TRADES PER DAY AT GASPOINT NORDIC, 2016

Metric	Day-ahead	Month-ahead	Forward <sup>1</sup>
Threshold	≥ 420	≥ 160	≥ 8
Number of trades (median)	0-50	0-50	NA

Source: European Gas Target Model – Review and Update” by ACER (January 2015) and Danish Energy Regulatory Authority based on data from Gaspoint Nordic.

Note: 1) Number of trades per day for forward products is measured as the number of months with at least 8 trades per day. Median of daily number of trades over analysed period.

The number of trades at Gaspoint Nordic in 2016 is 0-50 for day-ahead and 0-50 for month-ahead. This is below the GTM threshold level and indicates a low number of daily trades.

### 3.2 MARKET HEALTH: ABSOLUTE METRIC VALUES

#### METRIC 5: HERFINDAHL-HIRSCHMANN INDEX

The Herfindahl-Hirschmann Index (HHI) is a measure of the level of concentration in a market based on market shares. The HHI is calculated as the sum of squared market shares. A low HHI implies a better market functioning.<sup>22</sup>

The GTM HHI metric is calculated for upstream producers from the supply sources determined in GTM metric 6 (Number of supply sources) below.

Upstream gas supply sources to the Danish-Swedish gas market area are Denmark, Norway and Germany. All upstream producers’ market shares and the total gas production in Denmark, Norway and Germany should be included in the calculation of HHI for the Danish-Swedish gas market as described in the GTM.<sup>23</sup>

The Danish gas system is not directly linked to the Norwegian upstream system. Danish import from Norway is therefore restricted to a single gas field, Trym. The HHI for Denmark therefore includes only market shares and gas production from Trym instead of all Norwegian upstream producers’ market shares and total Norwegian production.

The HHI for the Danish-Swedish gas market and the GTM HHI metric threshold is shown in Table 6 below.

<sup>22</sup> HHI can vary between [0; 10.000] where 0 implies perfect competition and 10.000 represents a market with only one supplying company (monopoly).

<sup>23</sup> “Calculation specification per metric” – Annex 3 to the Gas Target Model.

TABLE 5 | HERFINDAHL-HIRSCHMANN INDEX FOR DENMARK AND SWEDEN, 2015

<b>Metric</b>	
Threshold	≤ 2,000
Herfindahl-Hirschmann Index	1,720

Source: European Gas Target Model – Review and Update” by ACER (January 2015) and Danish Energy Regulatory Authority based on data from Frontier data 2011, Norsk Petroleum and Eurostat.  
Note: Only Trym (not total Norwegian) producers and production are included in the HHI.

The HHI calculated for the Danish-Swedish gas market area in 2015 is 1,720.<sup>24</sup> This is below the threshold and indicates a low market concentration.

The Danish-Swedish HHI is relatively dependent on the choice of which producers to include in the calculation. If all Norwegian upstream suppliers and total Norwegian gas production were included, HHI would be around 4,000 which is higher than the GTM threshold level.

The calculation of HHI could also be based on flows or capacity bookings in entry points instead of upstream producers and production from supply countries. Denmark imports gas from Germany, but this gas could come from any country (with gas production or LNG import) in Europe and not only German upstream producers.

Flow data says something about which suppliers have “access” to gas in a market. If capacity is scarce the same calculation could be done with capacity reservations. HHI for Denmark using flow data is around 4,900 which is higher than the GTM threshold level. The method for calculating HHI defined in the Gas Target Model thus gives a better result for Denmark.<sup>25</sup>

#### METRIC 6: NUMBER OF SUPPLY SOURCES

The Danish-Swedish gas market area is supplied with gas directly from Danish and Norwegian gas fields in the North Sea with entry in Nybro and from Continental Europe with entry at the Danish-German border Ellund. The market area has three supply sources but gas is transported to the market only through two entry points (with physical import).<sup>26</sup>

<sup>24</sup> If HHI was calculated for Sweden alone it would be 2,290, where Denmark is the only supply source to Sweden.

<sup>25</sup> HHI for Sweden is 2,674 when flow data from Denmark to Sweden are used in the calculation.

<sup>26</sup> The Danish-Swedish gas market also has a third entry/exit point at the Danish-Swedish border, Dragor. Sweden is supplied with gas only at Dragor and there is no physical flow from Sweden to Denmark.

Aside from the natural gas entry points Denmark also has an entry point for up-graded biogas (bio-natural gas, BNG), which can be fed into the transmission system.

The metric is defined as the number of supplying countries and says something about supply diversity. Supply diversity alone cannot be used as a measure for concentration and should only be interpreted with other measures for concentration such as the Herfindahl-Hirschmann Index (metric 5) or residual supply index (metric 7).

The number of supply sources in Denmark and Sweden and the GTM number of supply sources metric threshold is shown in Table 7 below.

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**TABLE 6 | NUMBER OF SUPPLY SOURCES IN DENMARK AND SWEDEN**

<b>Metric</b>	
Threshold	≥ 3
Number of supply sources	3

Source: European Gas Target Model – Review and Update” by ACER (January 2015) and Danish Energy Regulatory Authority based on data from Danish Energy Agency “Energy Statistics”, Swedegas statistics.

Note: Natural gas import (Germany and Norway) and Danish natural gas production.

The number of supply sources in the Danish-Swedish gas market is three which is equal to the threshold.<sup>27</sup>

#### METRIC 7: RESIDUAL SUPPLY INDEX

The residual supply index (RSI) is a measure which illustrates whether if the largest supplier is necessary to bring enough gas to the market to meet total gas demand. According to the Gas Target Model the RSI should be equal to or above 110 per cent, which means that the supply of all suppliers except the largest supplier is equal to or 10 pct. above demand. A high RSI indicates that the market is less dependent on the largest supplier and therefore implies a better market functioning.

The calculation of RSI is based on the total ability to transport gas to the market and not supply sources, which is the case for HHI. The ability to transport gas can be measured by both import capacity and gas production.

Gas is transported to the Danish-Swedish gas market area at the Danish-German border Ellund and from the Danish gas production including the Norwegian gas

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<sup>27</sup> The number of supply sources in Sweden is one.

field Trym. The ability to transport gas to the market is calculated as the sum of import capacity at Ellund and gas production including Trym. The import capacity at Ellund is smaller on the German side of the border. German Ellund Exit capacity is therefore included in the calculation instead of Danish Ellund Entry capacity.

The largest supplier is the company that has the largest market share of import capacity and gas production combined. The available capacity to the rest of the market is found by subtracting the largest supplier's import capacity from total import capacity and the largest supplier's production from total production. This number is then divided by total gas demand.

The RSI for the Danish-Swedish gas market and the GTM RSI metric threshold is shown in Table 8 below.

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**TABLE 7 | RESIDUAL SUPPLY INDEX FOR DENMARK AND SWEDEN, 2015**

<b>Metric</b>	
Threshold	≥ 110 pct.
Residual Supply Index	179 pct.

Source: European Gas Target Model – Review and Update” by ACER (January 2015) and Danish Energy Regulatory Authority based on data from Energinet and Danish Energy Agency “Energy Statistics”.

Note: Available supply capacity for other than largest supplier divided by demand.

The RSI for the Danish-Swedish gas market in 2015 is 179 per cent. This is above the threshold and indicates that there is enough capacity to supply domestic demand from other suppliers than the largest supplier.<sup>28</sup>

The RSI is above the threshold level for Denmark and Sweden. Consequently the Danish gas production and the import capacity at Ellund each are well above the total Danish and Swedish demand.

DERA analysed the Danish gas market concentration in 2015.<sup>29</sup> The analysis showed that most producers sold their gas at the platform to the Danish incumbent. This means that the Danish incumbent transports a large amount of gas to the market. An alternative calculation of the RSI could therefore include entry capacity only instead of import capacity and production:

Gas is transported to the Danish-Swedish gas market area via two entry points, Ellund and Nybro. The company with the largest share of entry capacity in Ellund and Nybro is excluded. The largest supplier in this alternative calculation is different from the largest supplier in the calculation above where producers are includ-

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<sup>28</sup> The ability to transport gas to the Swedish gas market is the total import capacity in Dragor. The Swedish RSI is 306 per cent which is also above the threshold level.

<sup>29</sup> “Analysis of Competition on the Danish Wholesale Market for natural gas”, DERA (December 2015).

ed. Furthermore German exit capacity should be included instead of Danish entry capacity. Information about the companies' capacity bookings are not publicly available data. Furthermore the Danish and Swedish national regulatory authorities do not have access to capacity bookings on the German side of the border.

#### METRIC 9: MARKET CONCENTRATION FOR TRADING ACTIVITIES

Market concentration for trading activities is calculated for sale and purchase of gas at the Danish gas exchange, Gaspoint Nordic. The metric analyses each company's market share of total sale and purchase of gas. The analysis does not distinguish between products. Low concentration implies better market functioning.

The market concentration for trading activities calculated for Gaspoint Nordic in 2016 and the GTM market concentration for trading activities metric threshold is shown in Table 10 below.

**TABLE 8 | MARKET CONCENTRATION FOR TRADING ACTIVITIES AT GASPOINT NORDIC, 2016**

<b>Metric</b>	
Threshold (market share)	≤ 40 pct.
Market concentration for sales activities	< 40 pct.
Market concentration for purchase activities	> 40 pct.

Source: European Gas Target Model – Review and Update" by ACER (January 2015) and Danish Energy Regulatory Authority based on data from Gaspoint Nordic.

Note: Average of companies daily market shares for sales and purchases respectively.

The largest market share for companies selling gas on Gaspoint Nordic in 2016 was below the 40 pct. threshold but the largest market share for companies purchasing gas was above 40 pct. This indicates that there is some concentration on the purchase side.

#### CONCLUDING REMARKS TO CURRENTS STATE OF MARKET FUNCTIONING

The analysis of the current state of market functioning for the Danish and Swedish gas market shows that the Danish gas market meets the criteria relating to overall market concentration and supply diversity.

The analysis also shows that the Danish gas market does not meet the criteria relating to the individual trading needs of market participants.

It should be mentioned in this context that some of Danish gas trade is also carried out at the OTC market (longer termed contracts), cf. figure 2.

The analysis may therefore look different if this market was also taken into account. But the Danish-Swedish gas market is in general expected to be constrained by its geographical location and market size (demand). To improve this it may be necessary to consider some form of market reform to increase the market.

#### 4. IDENTIFICATION AND DESCRIPTION OF THE STEPS THAT MAY BE IMPLEMENTED TO IMPROVE WHOLESALE MARKET FUNCTIONING

This section contains a description of the short and medium-term projects that may positively affect the Danish-Swedish wholesale gas market.

<b>Project</b>	<b>Year</b>
Developments at Gaspoint Nordic	2016
LNG terminal in Sweden	2018/2019
Tyra renovation	2019-2022
Joint Balancing Zone Denmark-Sweden	2019
Baltic Pipe Project	2022
Common Market Zone	-

#### DEVELOPMENTS AT GASPOINT NORDIC (DANISH GAS EXCHANGE)

In November 2016, the Danish gas exchange, Gaspoint Nordic, joined the trading platform PEGAS<sup>30</sup>. Participants already active at PEGAS have since then also been able to include the Danish ETF, which is the virtual delivery point for gas traded at Gaspoint Nordic. If more participants demand gas with delivery at ETF this could increase liquidity for Gaspoint Nordic's current products and therefore have a positive effect on the Danish wholesale market functioning. At this point PEGAS trading only affects liquidity on existing products. If Gaspoint Nordic begins to offer longer contracts than month ahead it could improve the participants' need metrics.

Gaspoint Nordic does not expect to introduce financial gas contracts during 2017 but will consult the market to clarify whether there is any market interest for futures trading at a later stage – supported by one or more market makers

#### LNG TERMINAL IN SWEDEN

An important issue for EU member states is to increase continuity of supply and the security of supply of electricity and gas within the EU. In order to accomplish this, projects can be given the status of "Projects of Common Interest" (PCI). PCI projects have a specific regulatory framework that aims to simplify permit granting processes and coordinate approval processes between the relevant countries, but also rules that provide project owners with the opportunity to apply for specific EU funds to facilitate financing. PCI projects must contribute to the integration of markets and increase competition, lead to better security of supplies and reduce carbon dioxide emissions.

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<sup>30</sup> PEGAS is a European gas trading platform which give access to a range of products in several gas markets in Europe..



The LNG terminal in the Port of Gothenburg is currently the only PCI project for gas in Sweden. The terminal is expected to be completed and in operation in 2018/2019 and will primarily facilitate shipping, industry and heavy transport on land by providing easier access to natural gas. When fully developed, the total capacity will be about 30,000 m<sup>3</sup>. In the long term, the terminal can also be used to feed gas into the natural gas network in Southwest Sweden.

The capacity is relatively small compared to Swedish consumption. If LNG will be fed into the gas transmission system it could create an extra flexibility tool for the market. At this stage it is still uncertain whether the LNG terminal will create an extra supply source and what will be the impact on the wholesale gas market in that case.

## **TYRA RENOVATION**

Gas production from the gas field Tyra, one of the largest gas producing fields in the Danish part of the North Sea, will close temporarily from December 2019 until March 2022 due to necessary renovation. The owners (DUC partners A.P. Møll-Mærsk, Shell, Chevron and Nordsøfonden) and the Danish state came to an agreement in March 2017 that Tyra should be fully rebuild. After the renovation Tyra will start producing again at full scale. The Danish gas market is thus expected to lose a major gas source during the maintenance period. In this period Denmark relies on gas from continental Europe imported via the Danish-German border at Ellund.

Mærsk Oil has announced in a REMIT message that the effect of the renovation is a reduction in flow capacity of 95,000 MWh/day (approximately 2.9 bcm a year).<sup>31</sup> By comparison the total gas production in the Danish part of the North Sea was around 4.3 bcm in 2016.<sup>32</sup>

The Danish Energy Agency assumes that production after the maintenance period will increase because of both postponed production and improved production facilities.

In the short run gas volumes will decrease which may have a negative effect on liquidity and market concentration, and the Danish-Swedish gas market will have to rely on gas import from Germany. In the long run the gas market could return to the same state as before the renovation but with increased volumes. If the renovation leads to a lower demand because of uncertainties about deliveries in the renovation period this could also lead to a lower demand in the longer run if some customers decide to substitute gas with other energy sources.

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<sup>31</sup> Gas Market Message ID: 1728 (22 March 2017).

<sup>32</sup> Not including gas from the Norwegian gas field Trym.

In July 2017 the Danish government published a strategy report for the future of the Danish North Sea oil and gas fields/production<sup>33</sup> where it is concluded that there is potential for continued development of existing and new oil and gas fields and that work will be pursued in the future to secure an efficient and attractive exploration environment with the development of new drilling technologies. The report also focuses on the need to secure highly educated staff for the future Danish offshore industry.

## **JOINT BALANCING ZONE DENMARK-SWEDEN**

The Danish and Swedish TSOs are analysing the possibility of creating one joint balancing zone. This will remove transmission tariffs at the Danish-Swedish border point, Dragør, as Dragør will cease to be an entry/exit point as part of the envisaged balancing model.

The project can be compared to one of the market integration tools (market merger) described in the Gas Target Model. But according to the Gas Target Model two conditions must apply: The markets are directly connected and both gas markets have at least one entry from another market. Sweden is only supplied with gas from Denmark and Sweden does not have its own trading facility.

A joint balancing zone for Denmark and Sweden will create a larger market area. The Swedish traders are already present at the Danish gas market but removing the barrier of having to book and pay for transmission capacity (in two steps) could create more activity and thus liquidity on the Danish-Swedish gas market.

## **BALTIC PIPE PROJECT**

A new infrastructure project involving the Danish gas market could create a new gas transport route from Norway to Poland through Denmark from 2022. The Baltic Pipe Project, which is also a PCI project, creates new gas infrastructure from the Norwegian upstream system to the Danish upstream system (Norwegian tie-in), through Denmark by expanding the existing transmission system and from Denmark to Poland (Baltic Pipe). The capacity from Norway to Denmark and from Denmark to Poland is offered on long-term Open Season<sup>34</sup> contracts (90 per cent of the envisaged capacity) and a smaller share is reserved for short-term contracts (10 per cent of the envisaged capacity). The project offers 12.8 GWh/h (approximately 9.2 bcm per year<sup>35</sup>) from Norway to Denmark and 12.1 GWh/h (approximately 8.7 bcm per year) from Denmark to Poland on long-term Open Season contracts.<sup>36</sup>

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<sup>33</sup> FREMTIDENS OLIE- OG GASSEKTOR I DANMARK (juli 2017).

<sup>34</sup> The Open Season was launched on 6 June 2017.

<sup>35</sup> Applied conversion factor: m<sup>3</sup> = 12.157 kWh.

<sup>36</sup> The Baltic Pipe Project Open Season 2017 Model Paper (December 2016).

Baltic Pipe could create new import capacity since the project also offers 3.4 GWh/h (approximately 2.5 bcm per year) from Poland to Denmark on long-term Open Season contracts.

To secure the necessary amount of gas to the Polish gas market the Norwegian and Danish upstream systems will have to be connected (tie-in). The Norwegian tie-in will not add an extra source to the total number of supply sources to the Danish market since Norway is already included but it will add more producers since only Norwegian gas field Trym and Trym producers are included in the current assessment of the market functioning. As demonstrated by the HHI analysis including all Norwegian producers will actually worsen the result since the Norwegian production and producers' market shares are larger than Danish and German production and producers' market shares.

The Baltic Pipe, on the other hand, could add an extra source to the number of supply sources because the Baltic Pipe also gives access to gas from Poland.

The effects of the project on the Danish-Swedish gas market are not conclusive since market concentration may worsen, but at the same time it may give an extra supply source and bring larger amounts of gas on to the market. This may improve liquidity at Gaspoint Nordic significantly. Most of the gas is expected to flow through Denmark as transit gas. Huge transit amounts will decrease transmissions tariffs in the Danish system which could also be beneficial for market development, e.g. by ensuring the competitiveness of flowing gas from the Danish part of the North Sea to Germany through Denmark and the Danish-Swedish Market. Lower transmission tariffs in the Danish system could also make the transport route through Denmark to Poland more competitive than e.g. a route where gas is transported to Poland through the Netherlands and Germany.

## **COMMON MARKET ZONE (UPSTREAM AND TRANSMISSION)**

Energinet proposes to create a common market zone for the Danish transmission and upstream system, where the entry point to the Danish transmission system is moved offshore. The shippers would then only have to make one entry booking into the Danish gas system. The common market zone should be seen in relation to the Baltic Pipe project.

Energinet is to buy the existing upstream pipelines and the common market zone could thus be extended to include the existing Danish upstream system. One of the main reasons for creating a common market zone is to attract more gas volumes from the Danish part of the North Sea since you only have to pay entry/exit tariffs once (the gas volumes can be transported directly to Denmark or the Netherlands).<sup>37</sup>

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<sup>37</sup> “For Public Consultation: Tariff principles and market design in a Baltic Pipe1 Open Season”, Energinet (November 2016).

Potential benefits of a common market zone could include: “Reduced risk of capacity mismatch; Removal of the need for multiple capacity contracts entered with independent system operators in a coherent transportation chain; Minimized costs (and hence lower tariffs) through synergies in IT systems for capacity booking and billing, joint operation of the balancing system and administrative tasks.”<sup>38</sup>

## **DONG ENERGY**

DONG Energy has decided to sell DONG E&P A/S to INEOS.<sup>39</sup> INEOS do not have other activities in the Danish part of the North Sea and will thus be a new player on the Danish market. Furthermore since DONG Energy is present at different parts of the Danish gas market the sale of DONG E&P A/S could improve competition. DERA has estimated that DONG E&P A/S produced around 0.3 bcm or 7 per cent of total production including Trym in 2014.<sup>40</sup>

DONG Energy has decided to sell its upstream pipelines in Denmark. Critical infrastructure such as the upstream pipelines must be owned by a publicly owned company. DONG Energy is to sell its upstream pipelines to Energinet. If Energinet buys the pipelines this could have a positive effect on the market since it will increase the transparency in the market and decrease the problem of asymmetric information. Furthermore, Energinet may develop products demanded by the shippers.

## **CONCLUDING REMARKS - STEPS TO IMPROVE MARKET FUNCTIONING**

Most of the described projects relates to investments in infrastructure or reforms that will increase the market area. The investments in infrastructure could increase the number of market participants and the gas volumes. If multiple capacity bookings are viewed as a barrier of trade then an increased market area (where participants only have to pay an entry/exit tariff once) could have a positive effect on liquidity in the market if a “simpler” system will attract more gas volumes and potentially more participants. The expected projects could therefore reduce the market concentration (market health). The Danish-Swedish gas market does not meet the market participants’ need metrics. The expected projects could have a positive effect on existing contracts (day-ahead and month-ahead) at Gaspoint Nordic if more participants are active and if larger gas volumes are traded. At this stage it is uncertain if Gaspoint Nordic will offer forward contracts with delivery at ETF.

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<sup>38</sup> “For Public Consultation: Tariff principles and market design in a Baltic Pipe Open Season”, Energinet.dk (November 2016).

<sup>39</sup> Press release (24 May 2017): “DONG Energy enters an agreement to divest its upstream oil and gas business to INEOS”, DONG Energy

<sup>40</sup> “Analysis of Competition on the Danish Wholesale Market for natural gas”, DERA (December 2015).

In light of the above projects, DERA and EI suggest not to push for a substantial market reform at this stage but to await the market effect of the planned projects and then evaluate on possible long-term market developments at the next self-evaluation which is expected to be performed in 2020.

## MARKET REFORMS

In the short term, the gas field Tyra will close down for a temporary period (December 2019 to March 2022) due to maintenance. During the maintenance period the Danish-Swedish gas market will rely almost exclusively on import from Germany and stored gas. Northbound capacity at the Danish-German border (Ellund) is sufficient to supply the Danish and Swedish market. Energinet has analysed the supply situation during the maintenance period and finds that the market can cope with an extreme cold winter if all cross-border capacity at Ellund is fully used to supply the Danish-Swedish gas market and if full storage injection takes place in due time for the winter period.<sup>41</sup> However, all capacity on the German side of Ellund is booked on long-term contracts and during the maintenance period there could therefore be a mismatch between shippers who own the capacity and shippers who have a need for the capacity. It is therefore important that unused capacity is made available to the market.

There are different ways to ensure that unused capacity is made available to the market. Shippers who own capacity may sell their unused capacity on the secondary market (secondary capacity) or unused capacity may be returned to the market via mandatory use-it-or-lose-it procedures (CMP instrument). DERA recalls that DERA has approved a Danish model for implementation of the European rules on congestion management.<sup>42</sup> DERA expects that the market and the TSO will observe the CMP rules and other relevant legislation not least during the coming maintenance period – and DERA will liaise with the German regulator, Bundesnetzagentur, to the extent necessary to make sure that the cross-border capacity is used according to the rules in place

The Gas Target Model also proposes another way of ensuring the optimal allocation of capacity could be to hand capacity which is not booked and booked but unused over to a market operator who allocates the available capacity to the shippers based on cross-border traded gas volumes (implicit allocation of capacity). According to the Gas Target Model, the price of this capacity should be a fixed regulated price. Shippers who own capacity and use this capacity do not hand their capacity over to the market operator.

There are also other ways to ensure that gas can be delivered to consumers during an extreme cold winter. Denmark and Sweden have already developed tools which activate the demand side if there is not enough gas in the system such as the com-

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<sup>41</sup> “Supply and demand 2018-2021 without Tyra”, Energinet.dk (August 2016).

<sup>42</sup> DERA decision of 29 September 2015 implementing “Commission decision of 24 August 2012 on amending Annex I to Regulation (EC) No 715/2009...” the so-called Congestion Management Procedures (CMP).

mercial interruptibility regime in place. It may be useful to look at further developing or refining this regime during the maintenance period. The use of this tool and other tools could make it more attractive for shippers to ensure gas in the market. If possible, the system should also be optimized during this period, especially to ensure enough firm capacity at the German side of the border.

- DERA and Ei recommend that Energinet looks at possible ways to ensure that there is enough gas in the market during the renovation of Tyra through enhanced TSO cross-border co-operation and by optimizing the use of capacity at Ellund, e.g. through effective use of CMP tools and other tools for allocation of capacity like secondary auctions and implicit allocations.

In the medium-term, the Danish and Swedish TSOs are working together on creating a joint balancing zone. If the TSOs come to an agreement the project will geographically increase the market zone and thus the number of participants and demanded volume in the market zone. A larger market zone could reduce market concentration.

- DERA and Ei support the Danish and Swedish TSOs work of analysing the costs and benefits of creating a joint balancing zone.
- DERA recommends that it should be analysed if a common market zone could also include the existing Danish upstream system.

Later this year it will be known whether the two projects “Joint Balancing Zone” and “Baltic Pipe Project” will move forward. Both projects are expected to have positive effects on the Danish-Swedish gas market since they will increase the market area, increase the number of participants in the market, increase the gas demand and increase the gas volume in the system significantly.

The Danish-Swedish gas market is connected only to the German gas market and it therefore makes sense to analyse possible ways to further integrate the Danish gas market with the German market. However, Germany is currently in the process of determining how to develop its own gas market. An analysis of such market integration for the Danish-Swedish gas market will therefore not be initiated before there is more clarity about the German market development, i.e. in 2020.

- DERA and Ei suggest that a more extensive analysis of possible market reforms or adjustments for the Danish-Swedish market should await the next self-evaluation which is expected to be performed in 2020 due to the many expected projects in the short term.

## 5. PUBLIC CONSULTATION

The self-evaluation was published for public consultation on 7 June 2017. The deadline for the consultation was 30 June 2017.

Ei informed the market about the public consultation at the Swedish gas market council on 15 June 2017 and DERA presented the self-evaluation and the public consultation at a Shippers Forum on 21 June 2017, which was organised by the Danish TSO.

The market participants were asked to comment on the evaluation and especially consider the following questions:

- Do you share the NRA's analysis regarding the expected state of wholesale market functioning?
- What do you think should be done to improve wholesale market functioning?
- What do you think are the main barriers to a well-functioning wholesale market?

DERA and Ei received five responses to the public consultation: One from a Danish market participant, three from Swedish market participants and one from a Polish market participant.

DERA and Ei have where relevant incorporated points from the responses from the public consultation into the self-evaluation.

### SUMMARY OF RESPONSES

In general, all responses to the public consultation agree with the main conclusions of the self-evaluation of DERA and Ei and the identification of future projects. There are however different views on the benefits of the identified projects on the Danish-Swedish gas wholesale market and the need for more substantial market reforms before 2020.

The key messages from the responses to the public consultation are grouped under three headings, which correspond to the three basic questions asked in the consultation.

#### DO YOU SHARE THE NRA'S ANALYSIS REGARDING THE EXPECTED STATE OF WHOLESAL MARKET FUNCTIONING?

- The Danish-Swedish gas market is relatively small with a limited number of players and there is a problem with low liquidity and high market concentration, which DERA has also concluded in previous reports. The low liquidity is captured by the Gas Target Model metrics, but the problem of high market concentration is not.

- The spot market is well-functioning with close price correlation to the more liquid gas hubs. Shippers rely on liquid forward markets to manage risks.
- The pricing on Gas Point Nordic is suggested not entirely to reflect supply and demand in the market. The price at Gaspoint Nordic can be viewed as a shadow price to facilitate wholesale players having upstream volumes priced at German or Dutch exchanges with an interest in high correlation to mitigate pricing risk from their sold portfolios linked to prices at Gaspoint Nordic. DERA continuously follows flow and price signals between Denmark and Germany.
- The increased transmission capacity at Ellund has only had a limited, if any, effect on the gas market and there is still a risk of contractual bottlenecks. The shut-down period of Tyra is therefore likely to significantly worsen the Danish-Swedish gas market.
- There is uncertainty about the Baltic Pipe Project.
- There is uncertainty about the impact on the wholesale market of the LNG terminal in Gothenburg.
- Even though a Joint Balancing Zone will increase the market size and reduce market barriers there are uncertainties about the monetary benefits of the project. There will be additional DSO costs and any additional costs will be transferred to the end users. It needs to be demonstrated that the benefits outweigh the costs. All costs will still have to be recovered through tariffs, although the Danish-Swedish entry/exit point is removed.

#### WHAT DO YOU THINK SHOULD BE DONE TO IMPROVE WHOLESale MARKET FUNCTIONING?

- The renovation of Tyra will challenge the Danish-Swedish gas market. It may be necessary to look at market reforms or other ways (e.g. the tariff regime) to support the market in this period to ensure efficient use of the infrastructure.
- The problem of multiple capacity bookings may be solved by introducing a new entry/exit model for the Danish-Swedish market.
- Sufficient third party access to offshore gas should be ensured, cf. the conclusions of DERA's analysis from December 2015 on the competition on the Danish wholesale market for gas. ).
- A common market zone is fundamental for the viability of the Baltic Pipe Project and the Baltic Pipe Project in itself is the most important tool to potentially improve market liquidity and decrease market concentration.
- Focus should remain on continued progress of market integration between the Danish/Swedish market and the liquid hubs of North Western Europe.

#### WHAT DO YOU THINK ARE THE MAIN BARRIERS TO A WELL-FUNCTIONING WHOLESale MARKET?



- The Danish-Swedish gas market is small with a limited number of new entrants. Furthermore, the market is characterized as a market with high market concentration.
- Future demand in the Danish-Swedish gas market is expected to fall. When demand decreases the traded gas volume is expected to decrease as well. A consequence of lower traded volumes could be lower liquidity in the market and increased transportation costs.
- The choice of tariff regime in light of the new NC TAR is important. The wrong tariff regime (in casu CWD) could make the Danish-Swedish gas market less attractive for shippers.

## ANNEX 1: DESCRIPTION OF METRICS CALCULATION

### METRIC 1: ORDER BOOK VOLUME

Calculated by ACER: “Annual Report on the Results of Monitoring the Internal Natural Gas Markets in 2015” ACER/CEER (September 2016).

### METRIC 2: BID/OFFER-SPREAD

Calculated by ACER: “Annual Report on the Results of Monitoring the Internal Natural Gas Markets in 2015” ACER/CEER (September 2016).

### METRIC 3: ORDER BOOK PRICE SENSITIVITY

Not calculated.

### METRIC 4: NUMBER OF TRADES

- Trade data from Gaspoint Nordic.
- Data: number of trades per day for day-ahead and month-ahead products respectively in calendar year 2016.
- Determine median number of trades over calendar year 2016 for day-ahead and month-ahead products respectively.

### METRIC 5: HERFINDAHL-HIRSCHMANN INDEX

- Supply sources: Denmark, Norway and Germany.
- Determine upstream producers and their market share for each supply source.
- Denmark: Production 191,244 TJ; producers 8 (ACER, Frontier data 2011).
- Norway (only data for Trym): production 21,265 TJ; producers 2 (DERA, NPD 2017).
- Germany: Production 296,168 TJ; producers 79 (ACER, Frontier data 2011).
- Calculate each supplier’s market share of total production from Denmark, Germany and Trym.
- Use HHI formula on calculated market shares: Sum of squared market shares.

## METRIC 6: NUMBER OF SUPPLY SOURCES

- Determine supply sources using production and import data.
- Production and import data from Danish Energy Agency: Annual and monthly statistics.
- Import: Germany and Norway.
- Own production (Denmark).
- Number of supply sources: 3

## METRIC 7: RESIDUAL SUPPLY INDEX

- Total ability to transport gas to the Danish gas market is the total import capacity at Danish-German border Ellund and total gas production including Trym.
- Determine total import capacity and production per year.
- Capacity at German Ellund Exit is smaller than capacity at Danish Ellund Entry – include capacity at German Ellund Exit in analysis as total import capacity.
- Assume only 85 pct. usage of capacity at Ellund.
- Determine largest supplier and largest supplier's market share of the sum of total import and production.
- Subtract largest supplier's total share from the sum of total import and production to determine "other suppliers' ability to transport gas".
- Determine yearly "total demand".
- Calculate RSI: Divide "other suppliers' ability to transport gas" by "total demand".

## METRIC 8: MARKET CONCENTRATION FOR BID AND OFFER ACTIVITIES

Not calculated.

## METRIC 9: MARKET CONCENTRATION FOR TRADING ACTIVITIES

- Trades data from Gaspoint Nordic.
- Analysis period: Calendar year 2016.
- Sort data: Each company's sum of daily traded volumes for purchase and sales respectively over the analysis period.
- Determine all companies' daily market share.
- Determine each company's average market share over all days of analysis period.