



MEMO

INTERRUPTIBLE CAPACITY AT ENERGINET

1. Background

As required in TAR NC, Art 29 (b), TSO's must publish the explanation of how the probability of interruption is calculated. This document describes how the rebate levels for interruptible capacity in the Danish transmission system are estimated.

Interruptible capacity was introduced in the Danish gas grid in 2006. Since then, rebates for interruptible capacity have been calculated by Energinet. Rebates are based on the probability of interruption and calculated by comparing the expected interruptible amount with the possible flow.

2. General principles

Energinet determines the rebates for interruptible capacity, based on the following principles:

- The calculation is based on the ex-ante method described in TAR NC
- A separate rebate percentage per relevant points and relevant direction is calculated
- The rebate level is typically calculated in 5 per cent intervals

The demand for interruptible capacity has historically been low, and no actual interruptions have been registered. Therefore, the rebate levels of interruptible capacity are generally based on estimates of the expected level of interruption in cases where interruptible capacity was booked and utilized.

When determining the rebate levels, three factors are taken into consideration:

1. The expected utilization rate of firm contracts
2. Expectations of backhaul flows to support interruptible capacity in the opposite direction
3. Statistical flow scenarios in the transmission system

3. Interruptible capacity prices at current points

Energinet solely offers interruptible capacity on a day-ahead basis.

The formula for calculation of the probability of interruption, and thereby the rebate levels is listed in TAR NC Article 16 as follows:

$$Pro = \frac{N * D_{int}}{D} * \frac{CAP_{av.int}}{CAP}$$

In general, it is estimated that the probability for interruptions on all points is low. To reflect the low probability the rebate level is set to 5 per cent across all entry/exit points in the Danish transmission system. As an illustrative example, the below text box includes an example of how the probability of interruption can be calculated, based on the TAR NC formula.

Example: All capacity is interrupted for one hour (day-ahead capacity):

- N: Number of interruptions = 1
- D_{int} : Duration of interruption = 1 hours
- D: Duration of product = 24 hours
- $CAP_{av.int}$: How large an amount is interrupted of the total capacity = 2,5 GWh/h
- CAP: Total interruptible capacity offered = 2,5 GWh/h

Formula: $\frac{1*1}{24} * \frac{2,5}{2,5} = 0,04 \approx$ rounded up to 5 per cent

The following includes a brief description of each of the entry and exit points where a rebate on interruptible capacity is applied.

Ellund (entry and exit)

Energinet offers interruptible capacity in both directions at the Ellund's entry and exit point. Given the many active shippers in competition for the capacity at Ellund, the probability for interruptions is considered higher than for the remaining points. For this reason, the rebate level at Ellund have in recent years been at 10 per cent. However, since no interruptible capacity has been booked nor interrupted in both directions since 2013, Energinet does not have any relevant empiric or historical data, to back up the calculation of the probability.

For this reason, the rebate level at Ellund in both directions is aligned with the 5 per cent applied in all other entry/exit points.

Joint Exit Zone – reverse flow

The Joint Exit Zone – reverse flow point is part of the market model, supporting the possibility to virtually import gas from Sweden to Denmark in the reverse flow direction.

Physically it is not possible to deliver gas from Sweden to Denmark, but because there is always a physical delivery from Denmark to Sweden, it is possible to offer interruptible capacity virtually in the opposite direction. The price level is set at 5 per cent, to reflect a low probability of interruption if capacity is booked and utilized.

In practice, this capacity has only rarely been booked, and no interruptions have so far been registered.

Faxe (Entry and Exit) and North Sea (Entry)

Faxe Entry and Exit as well as North Sea Entry are relatively new points (Oct. 2022) and was introduced with Baltic Pipe. No interruptions have so far been registered. The price level is set at 5 per cent, indicating a probability of interruptions lower than 5 per cent over a given period of time, typically a gas year.

Faxe Entry (from Poland to Denmark)

There is a significant flow from Denmark to Poland and therefore interruptible capacity in the opposite direction can be supported by this flow. However, there is already a significant firm capacity established in this direction, where almost no bookings have yet been registered (only a few test bookings). On this basis, there is no expectations for demand of interruptible capacity in this point.

Faxe Exit (from Denmark to Poland)

Full technical capacity in direction Faxe Exit is offered as firm capacity. This means that interruptible capacity will mainly be supported by firm capacity holders not utilizing their capacity.

North Sea Entry (from Norway to Denmark)

Full technical capacity at the North Sea Entry point is offered as firm capacity, meaning that interruptible capacity will mainly be supported by firm capacity holders not utilizing their capacity.

4. Overview of rebate levels per point

The following table shows an overview of the current rebate level for existing capacity points:

Point and direction	Rebate level (in percentages)
Ellund Entry	5 per cent
Ellund Exit	5 per cent
Joint Exit Zone – reverse flow	5 per cent
Faxe Exit	5 per cent
Faxe Entry	5 per cent
North Sea Entry	5 per cent

The percentage will be reviewed and possibly adjusted each year, based on any empiric data obtained during the previous period.