

Viking Link Interconnector between Denmark and England
Methodology Statement for Determination of System-to-System Flow

1. Requirement for Methodology Statement

- 1.1 This Methodology Statement is produced for the purposes of paragraph 7.5 of Section R of the Balancing and Settlement Code (BSC).

2. Objective of Methodology

- 2.1 The methodology given in section 3 below describes the basis on which the system-to-system flow will be determined for the purposes of paragraph 7.5.3 of Section R of the BSC. This description is supported by the information on implementation of the methodology set out in section 4.

3. Methodology

- 3.1 The system-to-system flow will be determined from instructions issued by the System Operator (NGESO) or the Externally Interconnected System Operator (Energinet), to respond to events on the Total System or the External System. The acceptance by the Transmission Company of any Bid or Offer submitted by an Interconnector User in respect of an Interconnector BM Unit does not constitute an Interconnector instruction in this Methodology.
- 3.2 The system-to-system flow will be determined in manner consistent with paragraph 7.5 of Section R of the BSC. Accordingly, any system-to-system flow on the Interconnector will not affect, or form part of, the Interconnector Scheduled Transfer (IST). If the difference between the IST and the physical capability of the Interconnector is reduced after an Interconnector instruction has been issued the system-to-system flow may be reduced as necessary.

4. Implementation

- 4.1 The implementation of this methodology is agreed between NGESO and the Interconnector Operator. For information purposes an outline of the processes used to implement this methodology is given in Appendix A. However NGESO recognises that any material changes to the way in which the methodology is implemented (as described in Appendix A) will require a revised Statement to be resubmitted to the Authority for further approval.

5. Definitions

- 5.1 Unless stated otherwise, terms and expressions used in this methodology statement shall have the same meanings given to them in the BSC.

Appendix A

Operational Process for Determining the System-System Flow on an Interconnector

A1 Calculate the Interconnector Scheduled Transfer (IST)

The Interconnector Scheduled Transfer is based on Interconnector specific Nominations submitted by Interconnector Users. Each User's aggregate nomination data will be consistent with Physical Notifications submitted to NGESO by the Interconnector Operator, acting on behalf of Interconnector Users, and must be within the Net Transfer Capacity (NTC) as defined in the Operating Protocol.

A2 Calculate the Scheduled GB Reference Programme (SGBRP)

The Scheduled GB Reference Programme (SGBRP) is based on the same Nomination data that is used to determine the IST. The SGBRP will, as far as possible, give the same energy transfer in each trading period as the Nominations data used to determine the IST, within the agreed dynamic characteristic for the Interconnector.

There will be a day-ahead GB Reference Programme (GBRP) sent to NGESO and it must be within the Net Transfer Capability (NTC) as defined in the Operating Protocol after the outturn of the day ahead auction. The GBRP is the base against which System-System Flows (SSF) will be calculated.

A3 Variations to the Final Scheduled GB Reference Programme (FSGBRP)

After the GBRP has been agreed it may be necessary to vary the GBRP. This will constitute a system-to-system flow (which may for example be recorded as Emergency Assistance) unless for reasons as specified in paragraph 7 of section R of the BSC or as a result of an un-coordinated action.

A4 Volume of System-to-System Changes

Where the instruction to change the GBRP has been given for a reason that will give rise to a system-to system flow then the change to the GBRP will be a system-to-system change. The volume associated with a system-to-system change will be calculated from the previous GBRP as described below:

Consider the simple FSGBRP shown in figure 1.

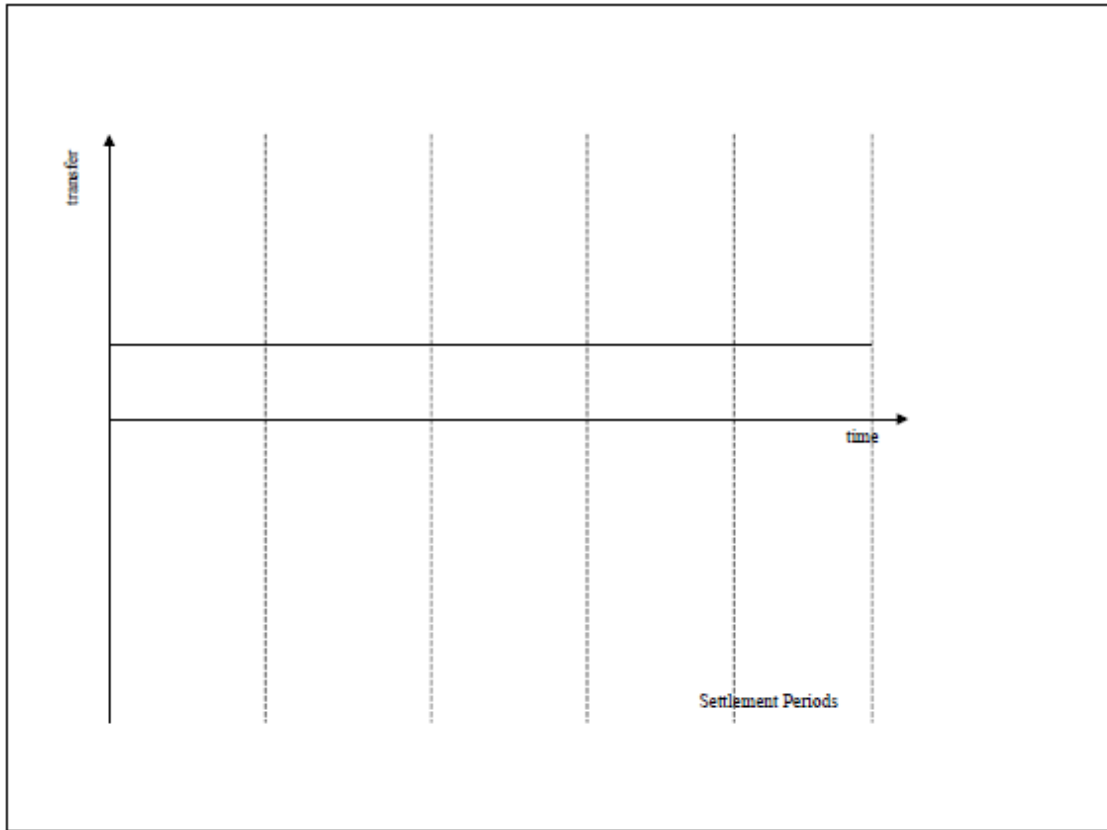


Figure 1 FSGBRP

NGESO makes a request to vary the GBRP (this request being accepted by the other party) or a request is issued automatically by equipment armed by NGESO or the other System Operator to respond to events on the Total System or the External System.

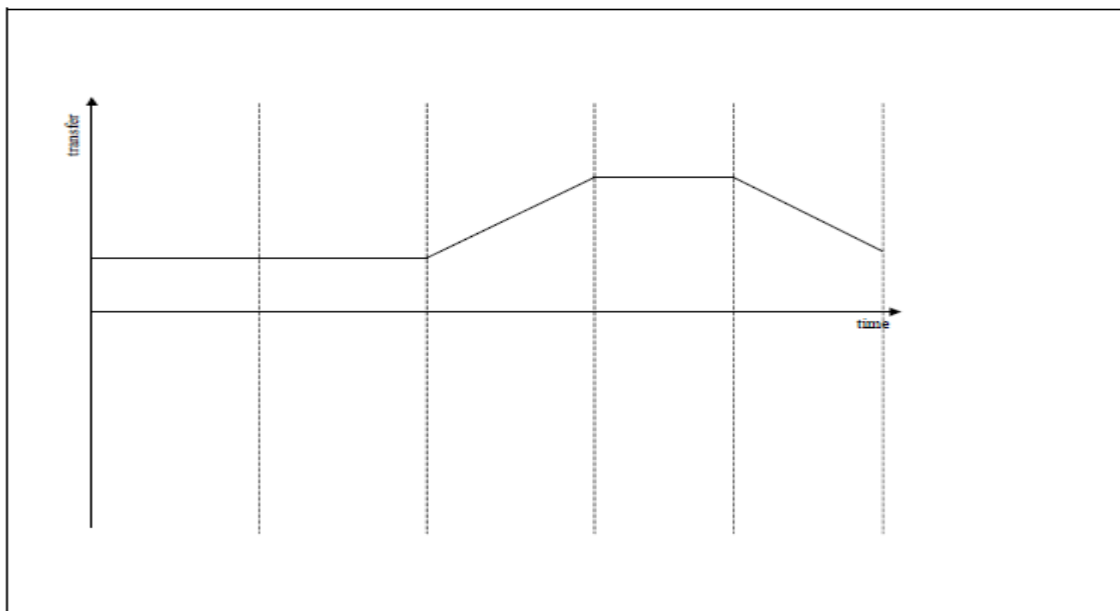


Figure 2 FSGBRP revised for system-to-system flow

The change in the instructed transfer in settlement period j, caused by acceptance of coordinated Interconnector instruction is given by:

$$\Delta T_{n,j} = \sum_s^j \max \left(ICMIN_s, \min \left(ICMAX_s, PT_{n,s} \right) \right) - \max \left(ICMIN_s, \min \left(ICMAX_s, PT_{(n-1),s} \right) \right) \partial t$$

Where

$ICMAX_s$	Is the maximum actual instantaneous Interconnector Capability at second s (MPTC);
$ICMIN_s$	Is the minimum actual instantaneous Interconnector Capability at second s (MPTC);
$PT_{n,s}$	Is the programmed instantaneous transfer as at second s as a result of an agreed trade. A positive value denotes a flow from the remote end network to England. The value is in MW at the English end of the Interconnector. Where a trade is agreed and a new reference programme is not provided NGESO will create this for the purpose of settlement;
$PT_{(n-1),s}$	Is the programmed instantaneous transfer at second s prior to the trade being agreed. A positive value denotes a flow from the remote end network to England. The value is in MW at the English end of the Interconnector. Where a trade is agreed and a reference programme is not provided NGESO will create this for the purpose of settlement;
\sum_s^j	Sum over all seconds in settlement period j;
$\Delta T_{n,j}$	Is the change in transfer volume resulting from acceptance of co-ordinated Interconnector Services in settlement period j;

This is shown graphically below:

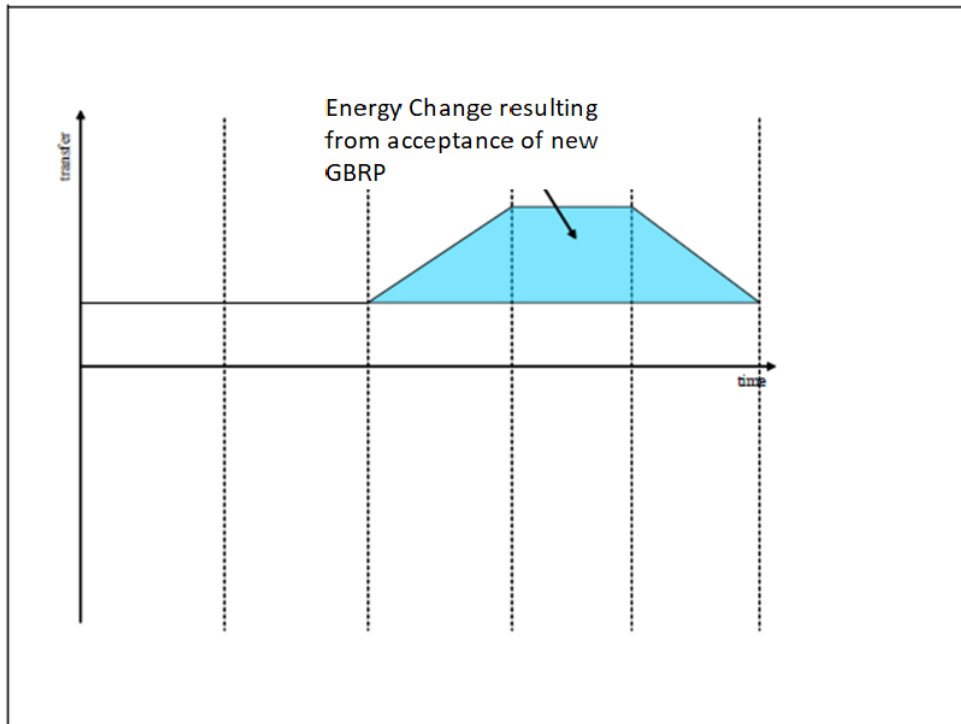


Figure 3: Change in instructed transfer volume arising from change in GBRP

The total volume of system-to-system change (T_j) will be the sum of all changes in instructed transfer volume arising due to system-to-system flows.

A5 Volume of System-to-System Flow (SSF)

The total volume of system-to-system change is calculated at Mid Interconnector. It is then adjusted for Interconnector Losses to determine the System-to-System Flow. This adjustment uses the Mid Point Loss Factor.

A6 Metered Volume for Transmission Company Interconnector BM Units

The system-to-system flow is calculated and the Metered Volume allocated to the Transmission Company Interconnector BM Units (TCIBMU) as shown below:

$$SSF = T_j * (1-x*MCLF)$$

Where $x= 1$ if Net Flow across the Interconnector in the settlement period is Denmark to England, else -1

If direction of SSF is from Denmark to England

$$TCIBMU(Production) = SSF \qquad TCIBMU(Consumption) = 0$$

If direction of SSF is from England to Denmark

$$TCIBMU(Production) = 0 \qquad TCIBMU(Consumption) = SSF$$

A7 Revisions to Appendix A

This appendix is provided for information purposes only. If material changes occur to the planned operational process for determining the system-to-system flow on the Denmark-England Interconnector then this appendix will be revised accordingly.