Note on the Computation of Bilateral Exchanges (BEx) from Net (Export) positions (NEx)

The text in the grey boxes below has been copied integrally from section 12 of the approval document for the CWE FB MC solution, that has been submitted on the 1st of August by the CWE Project Partners to CWE Regulators. The document can be found on the CASC website: http://www.casc.eu/media/CWE%20FB%20Publications/Approval%20Documents/130801%20CWE%20Flow%20Based%20MC%20solution%20Approval%20document.pdf

Additional text has been added after the grey boxes to illustrate:

1. the fact that an infinite number of solutions exists to determine Bilateral Exchanges from Net Positions
2. the practical application of the CWE Bilateral Exchange Computation (i.e. the equations in the grey boxes below)

Bilateral Exchange Computation and Net Position Validation

Bilateral Exchange Computation

As a result of the Market Coupling process one gets several sets of net positions (one net position value for each participating Market Area per hour).

The net positions have to be transformed into bilateral exchange data in order to support the daily nomination process. This transformation is called the 'bilateral exchange computation' (BEC). In the course of the BEC, the routes and time series of all CWE cross-border schedules (reflecting the MC volumes) are determined.

In principle, an infinite number of solutions exists to determine these Bilateral Exchanges, so it was decide to take the same formula as in BEC for ATC, without the major constraint used in this case (respect of NTC on all borders).

This formula reads (with B = NetPosition of one country):

$$\text{BEC\_ma}_{\text{BE}=>FR} = -\frac{1}{4} * (3\text{B}_{\text{FR}} + 2\text{B}_{\text{DE}} + \text{B}_{\text{NL}})$$
$$\text{BEC\_ma}_{\text{FR}=>DE} = -\frac{1}{4} * (3\text{B}_{\text{DE}} + 2\text{B}_{\text{NL}} + \text{B}_{\text{BE}})$$
$$\text{BEC\_ma}_{\text{DE}=>NL} = -\frac{1}{4} * (3\text{B}_{\text{NL}} + 2\text{B}_{\text{BE}} + \text{B}_{\text{FR}})$$
$$\text{BEC\_ma}_{\text{NL}=>BE} = -\frac{1}{4} * (3\text{B}_{\text{BE}} + 2\text{B}_{\text{FR}} + \text{B}_{\text{DE}})$$

The output of the computation has to be provided per directed border, so the missing borders in the previous calculation are determined as follows:

$$\text{BEC\_ma}_{FR=>BE} = -\,\text{BEC\_ma}_{\text{BE}=>FR}$$
$$\text{BEC\_ma}_{DE=>FR} = -\,\text{BEC\_ma}_{\text{FR}=>DE}$$
$$\text{BEC\_ma}_{NL=>DE} = -\,\text{BEC\_ma}_{\text{DE}=>NL}$$
$$\text{BEC\_ma}_{BE=>NL} = -\,\text{BEC\_ma}_{\text{NL}=>BE}$$

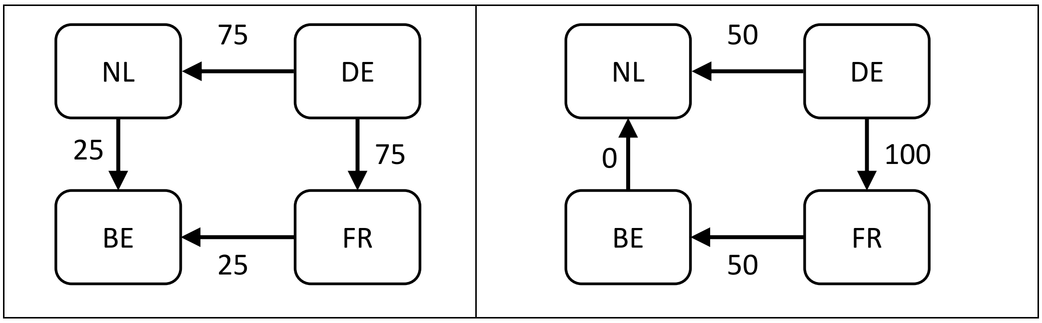
In the following example, we would like to demonstrate the fact that an infinite number of solutions exists when determining Bilateral Exchanges from Net Positions. Only two possible solutions of the infinite set of BEx are given in the graphs below, that both correspond to the following net export positions:

B_{BE} = -50

B_{DE} = 150

B_{FR} = – 50

B_{NL} = – 50

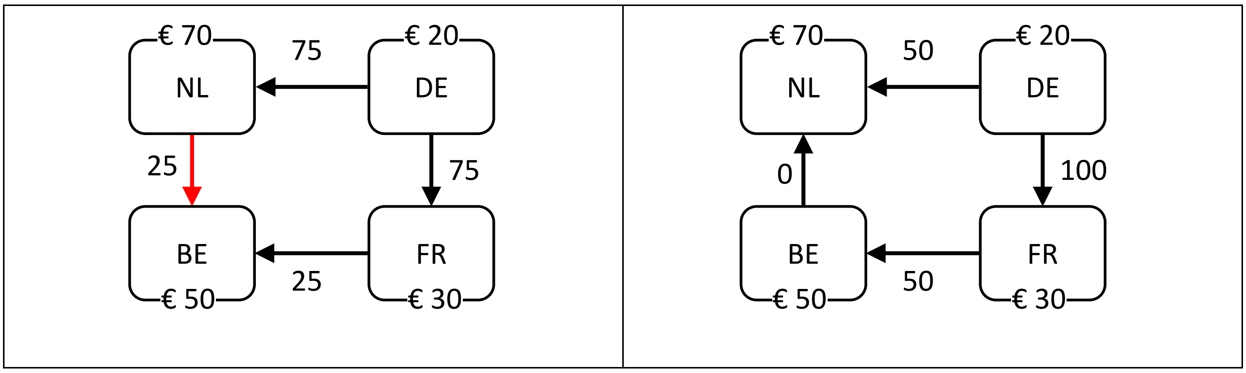


Application of the CWE Bilateral Exchange Computation (i.e. the equations in the grey boxes) leads to the following result:

$$\text{BEC\_ma}_{\text{BE}=>FR} = -\frac{1}{4} * (-150 + 300 - 50) = -25$$
$$\text{BEC\_ma}_{\text{FR}=>DE} = -\frac{1}{4} * (450 - 100 - 50) = -75$$
$$\text{BEC\_ma}_{\text{DE}=>NL} = -\frac{1}{4} * (-150 - 100 - 50) = 75$$
$$\text{BEC\_ma}_{\text{NL}=>BE} = -\frac{1}{4} * (-150 - 100 + 150) = 25$$

I.e. this is the solution illustrated in the left hand side graph.

Mind that CWE FB MC started using the “intuitive” patch, i.e. all results will be “intuitive”: there exists at least one set of bilateral exchanges, where all exchanges go from a low price to a high price. If we use the previous example, but assume some values for the prices, we may get:



I.e. the flows are the same as before, since we assume identical net positions. However when interpreting the 25MW flow between NL and BE this result is non-intuitive if the NL price is above the BE price. For such situations we deviate from the formula, and instead use an “intuitive” set of BEC values (e.g. the one illustrated on the right hand side).