



# LOOP FLOWS CALCULATION

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## 1. Introduction

### 1.1. Loop flow definition

A loop flow is defined as the physical flow on a line where the source and sink are located in the same zone and the line or even part of the tie-line is located in a different zone.

The green arrow in **Figure 1** is an example of such a loop flow.

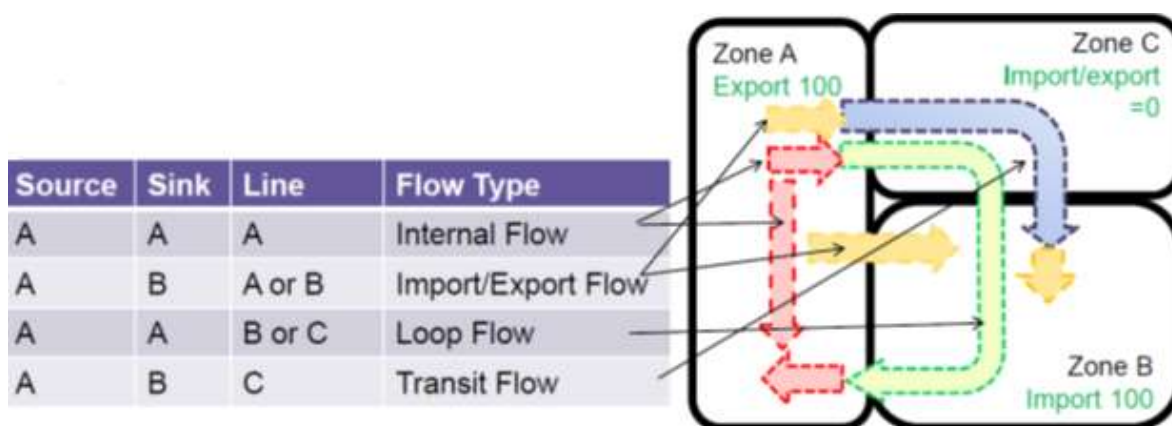


Figure 1: Loop flow illustration

## 2. Calculation methodology

### 2.1. Zero balanced flow per XB line

In order to obtain the loop flows over a specific border, first the zero balanced flows over each of the associated XB lines has to be calculated. This has to be done using the following formula:

$$f_{\text{Zerobalanced}_{\text{XBline}}} = f_{\text{Ref}_{\text{XBline}}} - \sum_{\text{All hubs}} (\text{ptdf}_{\text{XBline,hub}} * \text{np}_{\text{hub}})$$

Where:

- 'fZerobalanced\_XBline' are the flows on one XB line when all countries are in zero net position (expressed in MW)
- 'fRef\_XBline' are the initial flows on one XB line (expressed in MW)
- 'ptdf\_XBline,hub' is the zonal ptdf of one hub for one XB line (dimensionless sensitivity factor)
- 'np\_hub' is the net position of one hub in the reference file (expressed in MW)

The data used for this calculation is the data from the D2CF files (two days ahead congestion forecast).

## 2.2. Zero balanced flow for northern BE border

What interests us are the aggregated loop flows per border. In order to obtain these values, the zero balanced flows of the associated XB lines have to be summed:

$$\mathbf{fZerobalanced}_{\text{border}} = \sum_{\text{All XB lines of border}} \mathbf{fZerobalanced}_{\text{XBline}}$$

Where:

- 'fZerobalanced\_border' are the flows over a specific border when all countries are in zero net position (expressed in MW). These are the loop flows over that border.