

# **Report on the level and causes of congestions on Romanian interconnection lines, in 2015**

2015 NTC allocations on Romanian borders are based on mutual agreements between CNTEE Transelectrica SA and the neighbor TSOs on the interconnection.

Interconnection capacities on all borders were allocated by explicite or implicate auctions, as follows:

- on the border with Hungary there was organized bilateral coordinated allocation for 100% of total capacity: explicite annual and monthly auctions were performed by MAVIR, explicite intra-day were performed by Transelectrica SA. The daily auctions were implicate for 100% of capacity and were organized under the project for coupling of the electricity markets for the next day: 4M MC (Transelectrica, SEPS, SEPS, CEPS); the daily and intra-day allocation applied netting principle for schedules. In case of decoupling, MAVIR will organize the explicite daily auction (shadow auction) for RO-HU border.
- on the border with Bulgaria there was organized a bilateral coordinated allocation for 100% of total capacity: annual and monthly auctions were performed by Transelectrica SA, daily auctions were performed by ESO EAD. The netting principle was considered for the daily auctions for schedules. Starting from 01.01.2015 intra-day auctions are no longer organized on RO-BG border, given the fact that market rules from Bulgaria do not allow intra-day cross-border exchanges, after 15:30 CET on D-1 day for D day no change will be accepted.
- on the border with Serbia there was organized a bilateral coordinated allocation for 100% of total capacity: annual and monthly auctions were performed by EMS, and daily and intra-daily auctions were performed by Transelectrica SA. The netting principle was considered for the daily and intra-daily auctions.

The capacity use obtained by auction on Ukraine and Republic of Moldova borders is conditioned by the written agreements of TSO from these countries, respectively of the local distributor where the consumption island is realized.

**Definition:** The congestion on a border appears when the access cannot be guaranteed on the ATC market for all the market players who have asked for it.

## **The Frequency of Congestion Occurrence (FCO) on the annual and monthly allocations**

For the Frequency of Congestion Occurrence (FCO) on the annual and monthly allocation in 2015, the following formula has been used, by reference to the entire year:

$$FCO (\%) = NdC * 100 / (365 - NdM)$$

where:

- NdC is the number of days with congestion on the annual and monthly allocation of ATC,
- NdM is the number of days with zero ATC value, corresponding to the maintenance days on the borders with a single interconnection line (such as: Serbia, Western Ukraine)

## **The Frequency of Congestion Occurrence (FCOd) on the Daily allocation of ATC:**

For the Frequency of Congestion Occurrence (FCOd) on the daily allocation of ATC, the following formula has been used:

$$FCOd (\%) = NhC * 100 / Nh$$

Where:

- NhC is the number of hours with congestion on the daily allocation of ATC;
- Nh is the total number of hours for which auctions were organized.

### Severity index

According to the value of Frequency of Congestion Occurrence a Severity Index is assigned, as following

Severity Index	0	1	2	3	4	5
Frequency of Congestion Occurrence	0%	1-25%	26-50%	51-75%	76%-99%	100%

### Annual Allocation of ATC

The Frequency of Congestion Occurrence (FCO) on the annual 2015 allocation of ATC on each border and direction was 100% except RO-UA border (for export direction) were The Frequency of Congestion Occurrence was 0%.

Annual Allocation 2015	Hungary		Bulgaria		Serbia		Ukraine	
	RO export	RO import	RO export	RO import	RO export	RO import	RO export	RO import
Number of days with congestion	365	365	365	365	348	348	347	347
Number of maintenance days on borders with a single interconnection line	-	-	-	-	17	17	18	18
Frequency of Congestion Occurrence on annual allocation (%)	100	100	100	100	100	100	0	100
Severity Index	5	5	5	5	5	5	0	5

### Monthly Allocation of ATC

Monthly Allocation 2015	Hungary		Bulgaria		Serbia		Ukraine	
	RO export	RO import	RO export	RO import	RO export	RO import	RO export	RO import
Number of days with congestion	365	0	365	365	346	29	206	267
Number of maintenance days on borders with a single interconnection line	-	-	-	-	17	17	18	18
Frequency of Congestion Occurrence on monthly allocation (%)	100	0.0	100.0	100.0	99.4	8.3	59.3	76.9
Severity Index	5	0	5	5	5	1	3	4

### Daily Allocation of ATC

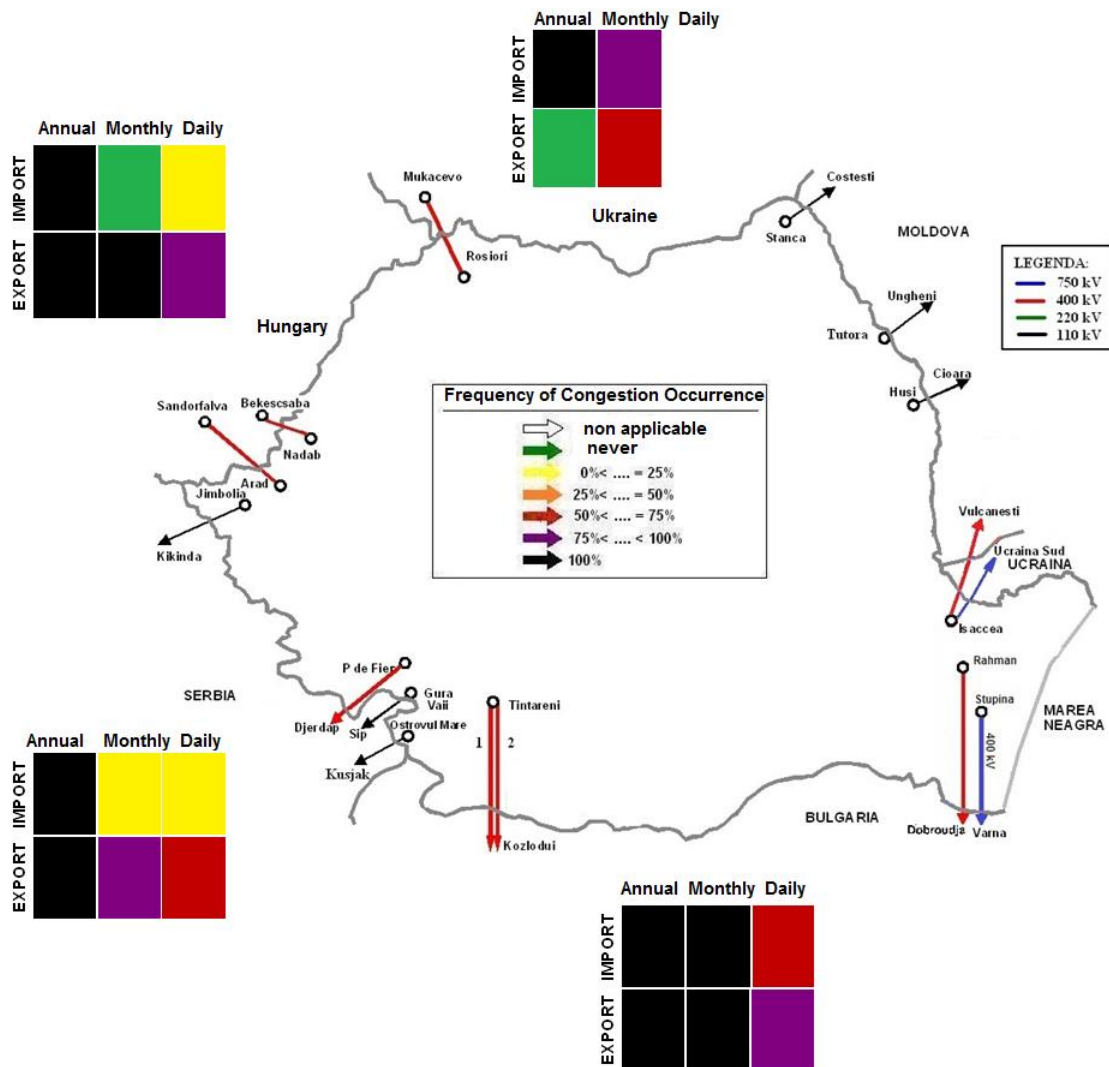
On the Romanian - Ukrainian border there are not daily common allocations organized.

Daily Allocation 2015	Hungary		Bulgaria		Serbia		Ukraine	
	RO export	RO import	RO export	RO import	RO export	RO import	RO export	RO import
Number of hours with congestion	2011	166	6416	5081	3872	1087	-	-
Number of auction hours	2111	6105	7591	8760	5162	8329	-	-
Number of maintenance hours on borders with a single interconnection line	-	-	-	-	408	408	432	432
Frequency of Congestion Occurrence on daily allocation (%)	95.3	2.7	84.5	58.0	75.0	13.1	-	-
Severity Index	4	1	4	3	3	1	-	-

### Intra-daily Allocation of ATC

In 2015, on Romanian - Hungarian and Romanian - Serbian borders on intra-daily allocation, there were no congestion, except 4 hourly intervals on Romanian – Hungarian border for export direction and on 1 hourly interval on Romanian - Serbian border for export direction.

The representation of severity index of congestion for the Annual, Monthly and Daily allocations on each border and direction in 2015 is as follows:



Remarks for export:

- The most congested borders were those with Bulgaria, Serbia and Hungary;
- The less congested border was with Ukraine.

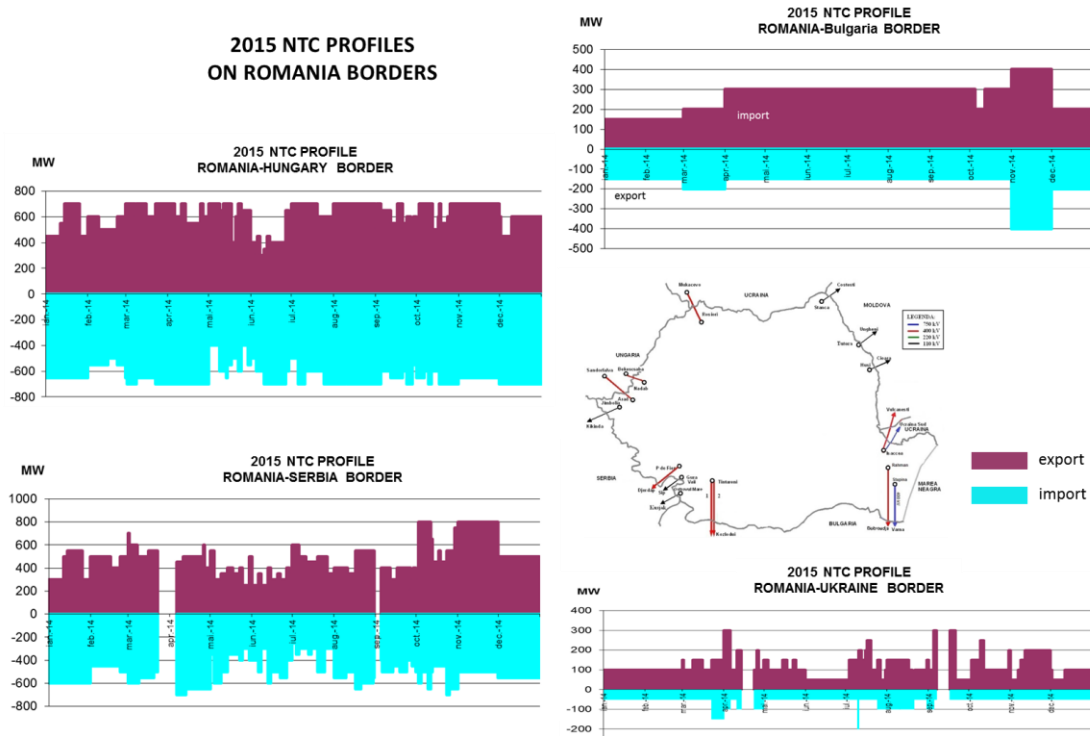
Remarks for import:

- The most congested border was with Bulgaria;
- The less congested border was with Ukraine.

The highest value for the Frequency of Congestion Occurrence in 2015 on the monthly allocation of NTC was reached on the border with Bulgaria and Hungary (100% , similar with 2014) on the export direction (100% beside 97,5% in 2014).

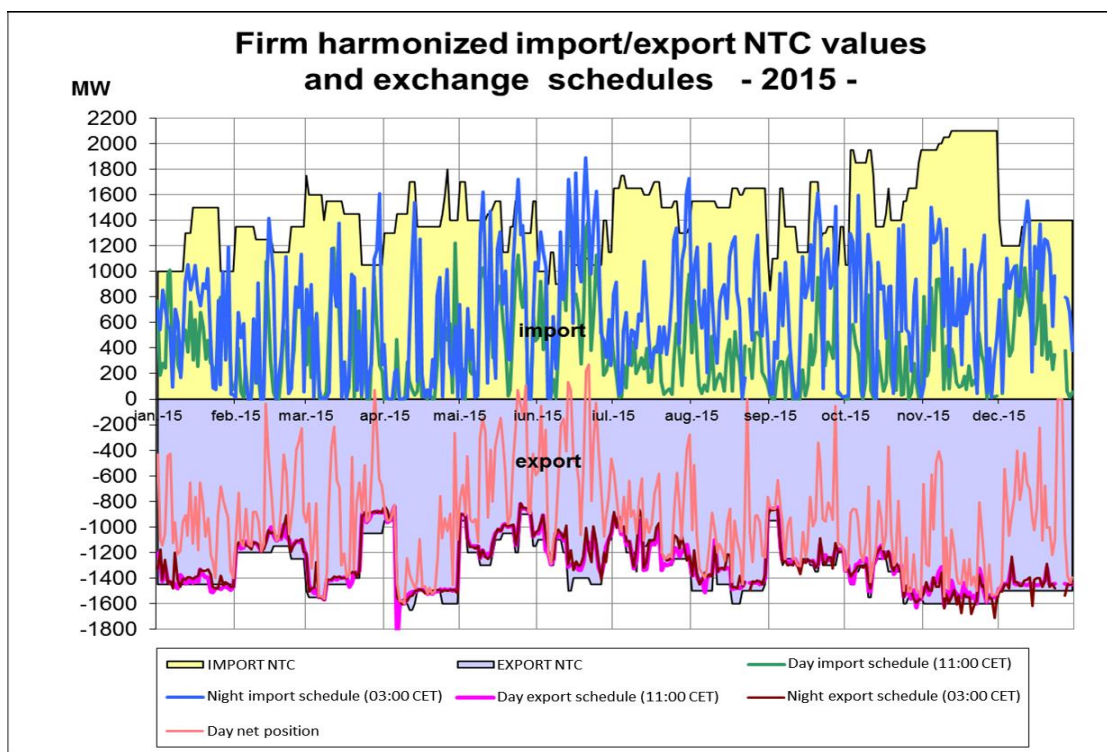
**The profile of 2015 NTC reliable values agreed on monthly basis, with neighbouring TSOs**

The following figure shows the monthly 2015 NTC profile on Romanian borders for both exchange directions:



The reliable NTC values calculated and agreed on each border and direction are aggregable in the Romanian interconnection interface.

The 2015 export and import profiles of the NTC reliable values are shown for all Romanian interface in the figure below, besides the usage level of the NTC values, including the allocation of some more capacity (particularly for import) greater than the respective NTC, in certain situations allowed by the netting procedure for daily and intra-daily auctions.



### The factors that influenced the 2015 NTC values

The 2015 NTC values were influenced by the seasonal and specific factors:

- Switching from winter to summer overloading protection settings in the Power System of Serbia and the reduction of the maximum allowable capacities of the OHLs, especially on interconnection OHL 400kV Portile de Fier-Djerdap, led to a reduced capacity in Romanian interface in May-September period;
- Larger wind generation continues to have a positive effect on the export NTC, due to concentration of this power plants on the S-E part of the country and has determined a redistribution of the power flows and a better usage of the interconnection lines from Dobrogea;
- The reduction of the parallel N-S power flows and the production contracts existence for Iernut power plant had a positive effect on the import NTC due to the power flow reduction within this area and the generation deficit reduction on the northern part of the country, especially in the winter period when import NTC is limited by the overloading of the grid. The deficit reduction in this area on the summer had a positive effect, as well;
- Some disconnections on the interconnection lines and internal lines (on our power system and also in the neighboring power systems) with impact on the interconnection have lead to a reduction of the NTC values;
- The interconnection with the Power System of Bulgaria is the most powerful (there are four overhead lines of 400kV between us) of all countries we are connected with, but NTC values are restricted to very low values due to occurrence of congestions on the Bulgarian internal lines;
- Levels of generation of certain power plants and within certain areas had an important effect on the NTC values, especially when they were correlated with the disconnection programs of OHLs:
  - the generation reduction in Portile de Fier I power plant in August - September period (result of the dry period) has led to a power flow reduction on OHL 400kV Portile de Fier - Djerdap and on the 220kV lines from the Western part and also to an important increase of the export NTC values.
  - a bigger export of the Power System of Serbia in May - July 2015 period has limited export NTC values in Romanian interface, due to overloading of the Western 220 kV axis, with significant effect on export limit in Romanian interface especially toward Hungary.

- an increased import in Hungary in the 2015 summer up to 3260MW has determined on the one hand a redistribution of the power flows generated by the Romanian export exchange, leading to a higher load on Romanian - Hungarian border and on the other hand a redistribution of the import power flows between Northern - Western and Southern Romanian borders, with a positive effect for NTC in some grid topologies and a negative effect on others.

The monthly export and import NTC values for 2015 and the factors that influenced the reduction of the export and import NTC values can be observed in the bellow diagram (summer overloading protection settings, maintenance schedule, changing in the exchange structure):

