THE DACF (DAY-AHEAD CONGESTION FORECAST) PROCEDURE

A few decades ago, the main purpose of the interconnected UCTE-grid was an overall- and border-crossing-optimization of the operation of the grid in a technical as well as in an economical way and the mutual sharing of ancillary services (frequency and voltage control, active and reactive power reserves, network restoration, etc.). The system evolved with the background of integrated electricity companies, where the responsibility for production, trading, transmission and distribution rested with in the same company. In such an environment, it was relatively easy to manage the system and avoid congestion. With the ongoing liberalization, this pre-requisite is no longer given. Especially traders want to have as less restric-tions as possible. This makes it necessary for the TSOs to be able to fore-cast the load-flow situation at least for the following day and to identify possible congestion, based on the results of trading.

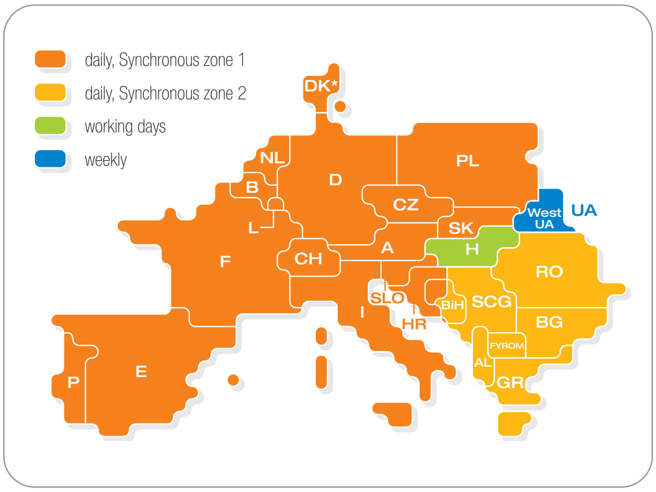

Fig. 1 : Participation in DACF procedure – end of 2003

The DACF method

To carry out load-flow forecasts and to identify possible con-gestion, which can also be located on tie-lines, it is necessary to exchange data with all other TSOs. It is also necessary to take account of the influence of neighboring networks onto the own network, even if the congestions are fully internal, especially for contingency analysis. The main objective is to have a modular method available. That means a method that works in the best possible manner and delivers satis-fying results (e. g.: forecast error per element less than 5 % – 10 % of the maximum capacity of the corresponding element for more than 90 % of all elements).

The main principles of the method are :

– that each »control block« provides to all other »control blocks« a forecasted complete load-flow data set of its grid after closing of the markets,

– that the companies taking part in the forecast have to treat the data sets shipped to them by the other partic-ipants with utmost confidentiality, because they include sensitive production schedules, and

– that the principle of reciprocity is respected by the participants : a »control block« can get the data from other »control blocks« only if it agrees to provide data of the same quality for the same time to all the participating »control blocks«.

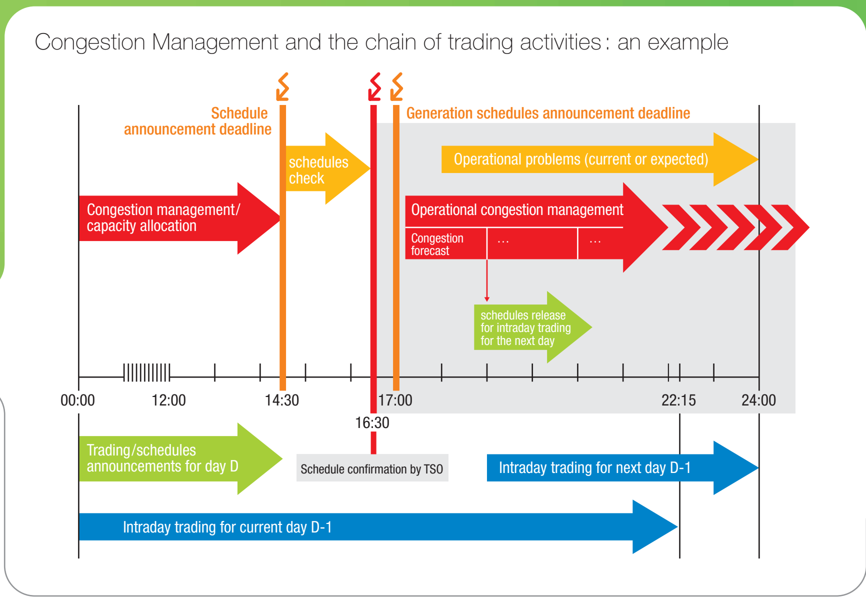

Fig. 2: Congestion Management and chain of trading activities

After all these data sets have been exchanged, each »control block« is able to construct a load-flow model that represents the most probable state of the forecast time. That model should preferably include all UCTE networks, but a »control block« could also disregard the data sets of »control blocks« whose influence on its network is deemed negligible. With this model each »control block« is then able to carry out a load flow-study and security analysis and to identify congestion. The goal of the security analysis is to conclude that there is a possibility that there will be a congestion on any element of the UCTE interconnected power system. Each »control block« has the responsibility to test its network for congestion.

It is important to carry out these calculations with the whole detailed network model in the area of interest.

Description of the Modular Short-Term Load Flow Forecast

The different steps of the modular short-term-load-flow-forecast are the following:

1. On the basis of reference data, each participating »control block« collects the forecast data for the commonly agreed time on a daily basis for several hours of the following day (production schedules from the 380-/220kV-power plant operators, topology, etc.) and adjusts a suitable selected load-flow data set (e.g. snap shot of his system).
2. Each »control block« puts its complete load-flow data set in the UCTE-format on the Electronic Highway (EH) FTP-server where it is accessible to all other participating »control blocks«. Besides the participants' networks, it is intended that the control block programs, provided by the block coordinators *RWE Transportnetz Strom* and *ETRANS*, should also be accessible to all participants. With this information, the control program of the sum of all non-participating countries per control block can be calculated. Conventions are used for naming the exchanged files in order to enable an automatic merging procedure
3. Each participating »control block« takes the last available and convenient load-flow data set of the non-participating »control blocks« (update of known topology changes, etc.) and adjusts this load flow data sets analogously to step 1.
4. After having collected the complete load-flow data sets of all other participating »control blocks« and after adaptation of the load flow data sets of the non-participating »control blocks«, these data sets have to be merged by connecting the »X-nodes« and setting the X-node injections to zero.
5. Carry out a load flow calculation and a contingency analysis with the whole, detailed, and adjusted synchronously interconnected grid corresponding to step 4 and identify congestions.

And, finally, the partners exchange the results (the overloaded elements) with the participants in a defined format.

Conclusion

In such networks, the responsibility for operation of the network is incumbent upon different parties, therefore no one has the complete real time information about the overall network status (status of switch gears, tap positions, injections and loads) and the schedules for production, planned outages and topology changes. Therefore, the DACF method is necessary to predict the load-flow situation in a meshed, synchronously interconnected network. <<<