

**FACULTY OF ELECTRICAL ENGINEERING
AND INFORMATION SCIENCE**



**INFORMATION TECHNOLOGY AND
ELECTRICAL ENGINEERING -
DEVICES AND SYSTEMS,
MATERIALS AND TECHNOLOGIES
FOR THE FUTURE**

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Analyse des zukünftigen Bedarfs an Übertragungskapazität im UCTE-Netz

Introduction of liberalised energy market in Europe in 1996 was a significant step in European power industry development. As a result electrical energy is being traded as usual commodity. It resulted in congestions at many cross border ties in Europe. So the congestion management problem is at the forefront. Generally, trading limitations should not exist or depend on its transportation way, geographical factors and other factors.

In order to understand congestion elimination measure necessity one must know required transfer capacity of the congested cross-section. It can be estimated on the basis of generation and load development scenario, forecast values for load, fuel prices and green generation development and analysis and under consideration of uncertainties affecting cross-border power flows.

The paper presents a method for transfer capacity demand determination based on analysis of load, generation, fuel prices and wind generation development in the UCTE network. The paper also allows uncertainties and their influence on future demand in transfer capacity and results obtained as well as probabilistic properties to be defined. Last but not least, it also permits to make economical estimation of congestion elimination measures like construction of new lines or FACTS installation considering capital costs, working and losses costs, inflation rate and time period.

As a part of the studies the paper presents a method for considered values (load and fuel prices) properties definition based on the financial mathematics and statistics methods (Kolmogorov-Smirnov criterion). Uncertainties like forecast error were analysed as well and its consideration was introduced in results obtained.

A part of UCTE that includes Belgium, Germany and The Netherlands was taken as a studied system (fig.1). The methods developed earlier were applied for transfer capacity demand definition in the future. Two network reinforcement options were considered (new transmission line and transformer installation between Germany and The Netherlands) and both technically and economically estimated. As an optional studies an influence of wind generation development on obtained results

was made and it was shown that more intensive wind generation development brings bigger savings on generation side when dealing and eliminating congestion management problem.

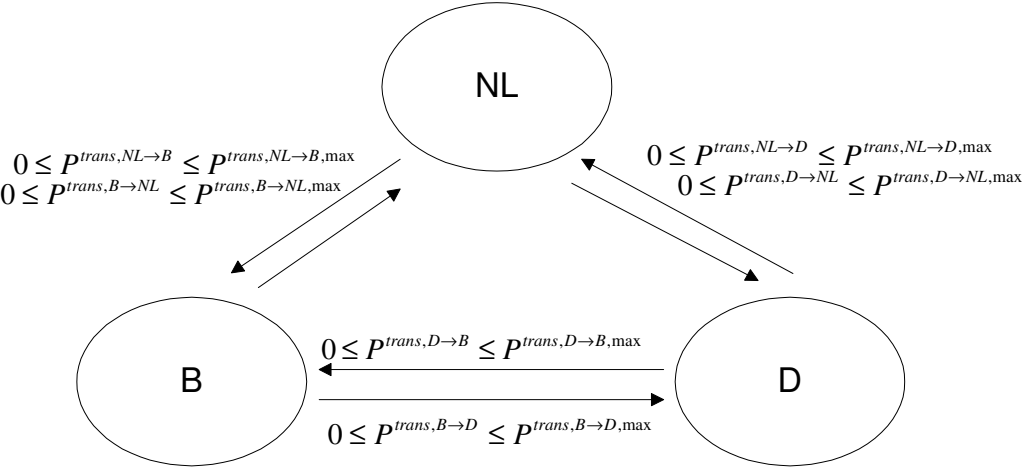


Fig. 1. Studied system

As a result of the studies it can be stated that a method for NTC demand in the future was developed that allows technical and economical estimation of congestion elimination measures. It takes into account previous statistics, forecasts and forecast errors as well as other uncertainties like wind generation development. This can also be used in praxis in network operating and design organisations for system studies. Also it can be used for financial purposes and particularly for evaluation of investments in power systems in liberalised electricity market.