POLICY 4

CO-ORDINATED OPERATIONAL PLANNING

P4 - Policy 4: Coordinated Operational Planning

Chapters

A. Outage Scheduling
B. Capacity Assessment
C. Day Ahead Congestion Forecast
D. N-1 Security Management

Introduction

Policy 4 describes several stages of the operational planning phase. It starts approximately one year before actual operation with an outage scheduling process and continues through capacity assessment, day ahead congestion forecast until real-time n-1 security management.

Modern network operation is characterized by the introduction of competition that has changed the profile of cross-border trade in the meshed UCTE high voltage network, with an increase both in volumes and in volatility from one hour to the other. As a consequence this has rendered to some extent into more operational complexity and increase of congestion risks. As a result, there is a need for increased information exchange and closer coordination among TSOs during the operational planning phase.

Please refer to Appendix 4 (see ⏭A4) for basics and explanation of operational planning processes.
If a control area comprises several TSOs, one of these TSOs may act on behalf of the other for any of the mentioned processes.

History of changes

v.2.0 final policy, approved by the UCTE Steering Committee on 03.05.2006

Current status

This version of the document (version 2.0, level E, dated 03.05.2006) has “final policy” status.

A. Outage Scheduling

Introduction

The process of outage scheduling of the elements of the European interconnected electricity network plays an important role in the operational management of that network.

In order to keep the network in secure operating condition and to guarantee a suitable level of reliability, it is necessary to regularly carry out maintenance work which requires outages of elements. Furthermore, outages are also indispensable to carry out reinforcement work in substations or to install new network elements.

The outages of TIE-LINES directly impact NTC values and possibly reduce the import and export potential between connected areas as well as the potential of mutual support, and consequently have to be prepared carefully in order to prevent lowering the network security in those areas. The outages of TIE-LINES may affect the security of areas that are in close "electrical" vicinity of the outage.

Together, TSOs determine the most suitable dates of outages for the maintenance or the reinforcement of the following network elements: TIE-LINES, substations and other internal system elements influencing the operation of neighbouring systems.

Criteria

C1. **Operation security.** Each TSO has to ensure that despite the planned outages of POWER SYSTEM elements, the interconnected network always meets the SECURITY LIMITS and satisfies the N-1 CRITERION (⏭P3-A).

C2. **UCTE planning deadlines.** Outage scheduling is an iterative process aiming at an operational and economic optimum for each TSO while respecting the SECURITY LIMITS and the N-1 CRITERION. This iterative process starts in the second half of the preceding year and finishes in the week preceding actual operation.

Requirements

R1. **Relevant elements.** The set of power system elements (e.g. TIE-LINES, internal lines, phase shifters, transformers, major power plants) which influence two or more TSOs while being out of operation has to be agreed among involved TSOs.

R2. **Exchange of information.** TSOs collect and share information about planned outages of the relevant elements (see ⏭P4-A-R1) within regional groups.

Standards

S1. **Coordination of planned outages.** TSOs plan the outages in two planning horizons:

S1.1. **Long-term planning.** In the second half of the preceding year, TSOs start outages planning in regional groups for the forthcoming year. At the end of the preceding year, TSOs agree on a joint schedule of outages of all network elements impacting two or more TSOs for the next year. This schedule takes relevant elements into account (see ⏭P4-A-R1). Changes in the long-term planning are communicated as soon as possible.

S1.2. **Short-term planning.** In case of any changes, the agreed schedule has to be reviewed in the course of the year and any amendments will be notified to and agreed with each TSO in the group concerned as soon as possible, but at the latest until Friday before the week concerned.

S2. **Confirmation of planned outages.** Each TSO confirms the outages of relevant elements to involved neighbouring TSOs in the course of the week before the week concerned, and updates that information during this week in case of changes.

Procedures

P1. **Organisation of work.** TSOs meet in groups to reconcile the outage scheduling by regional zones. The groups and their composition can be changed by the TSOs involved.

P2. **Forecast analyses.** TSOs use the best available data in order to perform security analysis to estimate the impact of the outage scheduling.

Bibliography

[Review of UCPTE recommendations on interconnected operation - 31/07/1991]
[Coordination of work on important cross-border lines of UCTE]

B. Capacity Assessment

Introduction

The process of capacity assessment deals with the determination by TSOs of cross-border capacity available to the market. Especially in the parts of the UCTE network where congestion is experienced on a regular basis, this capacity assessment process is crucial. However, due to the changing pattern of trade, congestion is likely to appear suddenly in any part, thus capacity assessment should cover every interconnection and hence the maximum set of possible situations to come. Due to the complexity of transit flows and interactions between areas, the TSOs' capacity assessment process must be coordinated. The accuracy of the capacity assessment depends on the availability of reliable information about each TSO's network system.

This chapter deals with two kinds of NTC calculation: indicative assessment ("ETSO table" half-yearly values) and binding assessment (given by TSOs to the market). Capacity assessment should be designed as a continuous risk assessment process, including all necessary updating loops.

Criteria

C1. **Best forecast.** For the capacity assessment process, TSOs use the best information available.

C2. **Base-Case Exchange (BCE).** The exchanges valid one year before the time stamp of the UCTE reference base-case can be modified upon agreement of all TSOs involved. The finally agreed values constitute the basis of the bilateral base-case exchanges (BCE). The BCE are neither typical values, nor the most probable, they only reflect a possible base situation.

C3. **UCTE reference base-case.** Each half year, TSOs create a joint UCTE reference base-case, which is used as a starting point for the calculation of half-yearly NTC values. The reference base-case includes base-case exchange (⏩C2).

C4. **Composite NTC value.** A composite NTC value is an NTC value calculated for a border between three or more TSOs. The composite NTC value is not necessarily the sum of bilateral NTC values.

Requirements

R1. **Transmission Reliability Margin (TRM).** Each TSO, within its own discretion, has to determine the TRM which is taken into account in the capacity assessment process. Neighbouring TSOs agree on the value of the TRM.

Standards

S1. **Indicative NTC values.** Each TSO calculates half yearly NTC values based on the UCTE reference base-case. Those values are only indicative and non-binding.

S2. **Capacity assessment.** TSOs perform capacity assessment for different time frames in advance with corresponding capacity allocation procedures. Those binding values are assessed on the basis of the TSOs' best forecast. Capacity assessment takes account of special situations (e.g. public holidays).

S3. **Harmonization of NTC values.** Neighbouring TSOs have to harmonize the NTC values on their common borders. In case there is no agreement on a common value, the lower value has to be used, as this ensures secure operation in both systems.

S4. **Calculation of ATC values.** In case there is a joint capacity allocation procedure, TSOs calculate and harmonize the ATC values.

Procedures

P1. **Procedure for the calculation of NTC values.** TSOs use a recommended procedure for the calculation of NTC values given in Appendix A.

P2. **Calculation of composite NTC values.** In case of strong electrical interdependencies between more than two control areas, TSOs can decide to calculate composite NTC values (⏩C4).

P3. **Weekly teleconference call.** TSOs within regional groups organize a weekly teleconference call to share operational information regarding:

- **P3.1.** planned outages of network elements and generation units
- **P3.2.** special events or circumstances
- **P3.3.** week-ahead “trend” of the markets and possible influence on the assumptions to consider
- **P3.4.** influence on the published NTC values.

Guidelines

G1. **Splitting of the composite NTC values.** A composite NTC value can be split by the TSOs involved into bilateral NTC values.

Bibliography

[Indicative values for Net Transfer Capacities (NTC) in Europe, winter and summer, working day, peak hours, ETSO-publication twice a year]

[Definitions of Transfer Capacities in liberalised Electricity Markets, ETSO, April 2001]

[Procedures for Cross-Border Transmission Capacity Assessments, ETSO, October 2001]

C. Day-Ahead Congestion Forecast

Introduction

In order to carry out load-flow forecasts during the operational planning phase and to identify possible congestions, it is necessary to exchange relevant data among TSOs. The influence of the neighbouring networks on the considered network has to be taken into consideration, especially for contingency analysis, even if the identified congestions are not located on tie-lines. Hence, one of the main tasks incumbent on the TSOs is to organize this data exchange, to agree upon the preparation of the data sets and to ensure the confidential treatment of the data exchanged. The procedure for this Day-Ahead Congestion Forecast (DACF) is defined in such a way that each TSO can perform a more reliable load-flow forecast.

Requirements

R1. **Infrastructure.** For exchanging the DACF load-flow data sets and the results of the network security analysis, TSOs use the infrastructure described in Policy 6.

R2. **Data provision.** Each TSO provides to the Electronic Highway (EH)-ftp server a forecasted load-flow data set of its grid, with the whole, detailed network model, i.e. a real model (no equivalents) of all 750kV, 380kV and 220kV elements like busbar couplers, nodes, lines, transformers, nodes' load and injections. Equivalent lines and transformers can be used to represent networks of lower voltages, in case they influence the 750kV, 380 kV or 220 kV level significantly.

R3. **Data collection.** Each TSO collects DACF files from the EH-ftp server and constructs a load-flow model that represents the most probable state of the forecast time. That model can include all UCTE networks, but a TSO can also disregard the data sets of TSOs whose influence on its network is deemed negligible.

Standards

S1. **Quality of the DACF process.** On a regular basis Sub Group Network Models and Forecast Tools checks the quality of the DACF process. The SG presents the results to the Working Group "Operations and Security" with the proposals of improvements.

S2. Data exchange.

S2.1. **Data format.** TSOs use the current UCTE-format published on the UCTE website for the exchange of the DACF load-flow data sets.

S2.2. **X-nodes**. TSOs use fictitious X-nodes located in the middle of TIE-LINES in order to be able to merge the individual DACF load-flow data sets.

S2.3. **Conventions for naming data sets**. TSOs use the conventions for naming the exchanged DACF load-flow data sets.

S2.4. **Merging of data sets**. TSOs follow the rules that are prescribed for merging the DACF data sets.

S2.5. **Exchange of data**. TSOs use the EH-ftp server to exchange the DACF load-flow data sets and the results of the network security analysis. In case the EH cannot be accessed due to a technical problem, the e-mail has to be used.

S2.6. Confidentiality of data. Both the data exchanged and the results have to be kept confidential and meant for TSOs' use only, as they include sensitive production schedules.

S3. Participation of TSOs. All TSOs of the SYNCHRONOUS AREA participate in the DACF method, according to the prescribed daily frequency (⏩S4).

S4. Frequency of DACF. Each TSO shall supply to the EH-ftp server daily data sets of its area for at least the reference times 3:30 a.m. and 10:30 a.m. Additional data sets for other reference times shall be supplied on request of another TSO.

S5. Data processing. Each TSO puts its complete load-flow data set in the UCTE-format and his area exchange (which is automatically included in the sum of all X-node injections) on the EH ftp-server before 6 p.m., where it is accessible to all other participating TSOs. Besides the participants' networks, it is intended that the CONTROL BLOCK programs, provided by the UCTE CO-ORDINATION CENTERS, should be accessible to all TSOs.

S6. Security check. TSOs carry out a load-flow calculation and a network security (the N-1 CRITERION) analysis of their own grid including TIE-LINES and relevant network elements of the neighbouring grids and identify congestions using the DACF or other procedures.

Guidelines

G1. Frequency of DACF. Additional data sets for other time stamps are initiated by the SG Network Models and Forecast Tools and confirmed by the WG Operations and Security.

G2. Results. TSOs should exchange the results of the overloaded elements latest at 9:00 p.m. of the day before.

G3. Consultation. TSOs should compare the DACF results and discuss them with their neighbouring TSOs in case congestion is detected. The TSOs involved then decide whether and what kind of measures should be taken to solve the detected congestion.

G4. Vulcanus system. Besides the DACF information, each TSO checks the cross-border exchange programs for the next day on the Vulcanus system to estimate whether extraordinary transit flows or congestion might be expected.

Bibliography

[UCTE data exchange format for load flow and three phase short circuit studies, version 01 (into force from 2003.09.01, UCTE subgroup Network Models and Forecast Tools)]

[Definition of X-nodes and nominal thermal limits and file naming conventions]

D. N-1 Security Management

Introduction

This chapter deals with the implementation of suitable n-1 security management activities. The goal of these activities is to relieve the foreseen congestions and to remove unforeseen congestion in real time.

Requirements

R1. **Backup strategies.** TSOs have to agree on backup strategies for performing congestion determination (P 1.1) in case the data exchange procedures fails.

Standards

S1. **Congestion detection and solving.** When congestion is detected at any time during the operational planning phase (from one year-ahead up to real-time operation), TSOs have to prepare and, if necessary, activate appropriate measures.

S2. **Joint measures.** Neighbouring TSOs shall agree in advance on joint measures for the identified congestions.

S3. **Measures sequence.** TSO shall take measures in its own system (topology, redispatch) to cope with congestion and if this is not sufficient activate common procedures with neighbouring TSOs.

Procedures

P1. The procedure for n-1 security management comprises the following steps out of which those deemed necessary are performed:

- **P1.1.** Congestion determination (calculations (e.g. month- or week-ahead, DACF) and detection of possible congestions (application of n-1 security rule, reserve margin assessment).
- **P1.2.** Determination of possible consequences of congestions.
- **P1.3.** Information and consultation of the TSOs concerned.
- **P1.4.** Assessment which (coordinated) measures will likely ensure system security.
- **P1.5.** Determination of solutions.
- **P1.6.** Common agreement whether and which measures have to be scheduled and/or activated.
- **P1.7.** Activation of measures by the TSOs.

P2. The workflow above is started by the TSO who identifies possible risks for the security of his system. All contacted TSOs shall participate in the consultation process.

Guidelines

G1. TSOs may use a combination of the following countermeasures:

G1.1. Modification of the outage planning: preventively or curatively.

G1.2. Refusal of a scheduled network element outage.

G1.3. Topology actions such as switching of busbar couplers and lines or adjustment of phase shifter tap positions: these network-related actions modify the distribution of the flows on the grid and hence remove the congestion.

G1.4. Re-dispatching: within a CONTROL AREA, re-dispatching can be used to redistribute power flows on the network elements; it does not change the EXCHANGE PROGRAM between CONTROL AREAS. Re-dispatching including 2 or more CONTROL AREAS may lead to modifications of the EXCHANGE PROGRAMS.

G1.5. Counter trading: TSOs can agree on compensating trades.

G1.6. Capacity reduction (preventive) and curtailment (curative): cross-border capacity can be withdrawn.

G1.7. Preventive load-shedding

Bibliography

[General guidelines for joint cross-border re-dispatch, ETSO, June 2003]

[Counter measures for congestion management, definitions and basic concepts, ETSO, June 2003]