UCTE

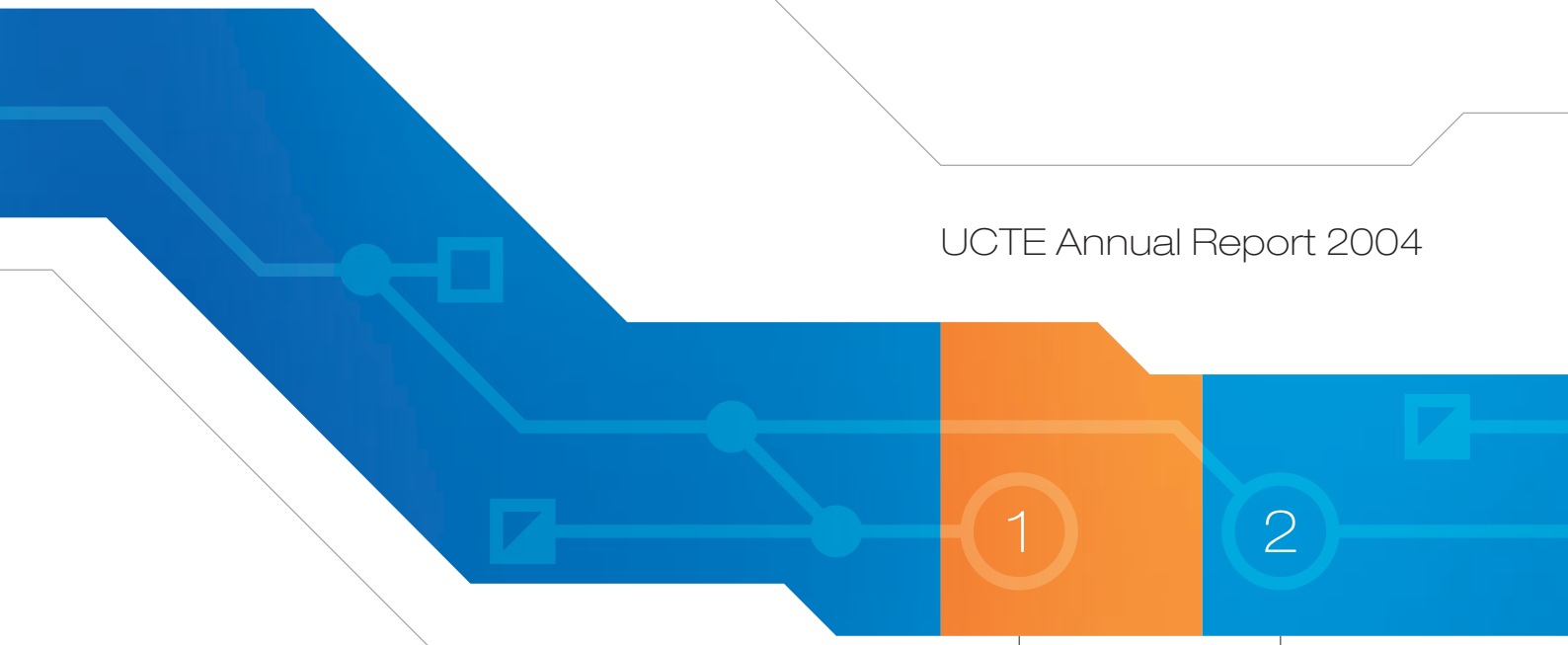
Annual Report 2004

union for the co-ordination of transmission of electricity

A visit to UCTE in 2004

union for the co-ordination of transmission of electricity

UCTE Annual Report 2004



1 PRESIDENT'S FOREWORD

Electricity connects people

On 10 October, 2004, 14 years after the destruction of power links in the war in the former Yugoslavia, the two UCTE synchronous zones were reconnected. The outgoing Energy Commissioner, Loyola de Palacio welcomed this historic event as an »important step towards a fully integrated Internal Electricity Market« which would have a »Europe-wide positive impact on the electricity sector and beyond«. 2004 was also the year of the historic enlargement of the European Union in Central Europe. Nine years before we had synchronized the CENTREL and the UCPTE transmission systems. The two events underline that the European transmission grid does not only connect electrical systems but in fact serves as a pacemaker for political integration in Europe.

UCTE does not only help connecting people. Our main concern is to safeguard the reliability of the transmission system as a whole and to take care for sound system stability. In this regard, last years set-up of a project team which is investigating technical options for a possible interconnection between the UCTE grid and the Eurasian IPS/UPS-System marks another important decision. This investigation is highly significant for Europe's future security of supply. Since the dimension of such a project would be unprecedented and the reliability of such a large system has never been tested before. Therefore, technical stability must be the top priority within the investigation before addressing other aspects related to the regulatory framework and economic evaluations.

Our concern for system stability led to another important activity in 2004 – the UCTE security package: The excellent expertise in security matters of our member companies feeds continuously into the work of our association. Following an intensive consultation process UCTE members agreed on a first compendium of requirements and reliability standards laying down the technical foundation for the safe operation of the interconnected grid in day-to-day practice – the UCTE Operation Handbook. >>>

>>> The Operation Handbook is supplemented by the Multilateral Agreement (MLA) which makes the Handbook legally binding among all UCTE-Members. A Compliance Monitoring and Enforcement Process (CMEP) will complete the package thus creating an important tool for implementation.

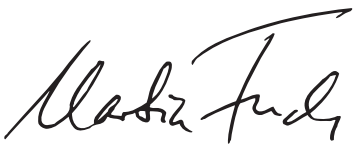
In 2004 UCTE members managed to operate their transmission systems in a highly secure and reliable manner. Compared to 2003 there were only few grid incidents which occurred in Greece, Luxembourg/Germany and Italy. However, the necessary lessons from these incidents were learnt and shared within UCTE. This sharing of experience allows for continuous learning and enhances our joint know-how and expertise.

Security of supply has also become a permanent issue in the political debate. In Brussels the discussion focuses around the draft Directive of the European Parliament and of the Council concerning measures to safeguard security of electrical supply and infrastructure investment. UCTE actively participates in this debate and has recently presented its views in a Public Hearing of the European Parliament. While we strongly support the principal idea we have pointed out that the Directive's approach is not endowed with a clear market orientation and lacks a clear separation of roles and responsibilities.

A practical contribution to the debate on security of supply has been last year's UCTE System Adequacy Forecast which provides a sound analysis of the supply and demand development in the European electricity market.

In the aftermath of the blackouts during the summer of 2003 the question was raised what we were going to do to prevent such large scale incidents in the future. Today, we can state that UCTE has done a lot. I would therefore like to thank all UCTE members as well as the UCTE staff for their tremendous efforts and active participation in our projects and working groups.

Electricity is and will remain the lifeblood in the circular system of our society and economy. UCTE and its members will continue to dedicate their work for the reliability of the transmission system. Our expertise for Europe! <<<



Martin Fuchs

2 RECONNECTION OF TWO UCTE ZONES AS A HISTORIC MILESTONE IN THE EUROPEAN »ELECTRICAL« HISTORY

The successful reconnection of the first and second UCTE synchronous zones was completed on 10 October, 2004 after years of preparation at UCTE level as well as at the level of UCTE member companies and all electricity systems of the countries involved. The size of the two UCTE synchronous zones, the character of their interface extending from the Adriatic to the Carpathian Mountains in Ukraine and the scope of work, made the reconnection process one of the largest and most complex projects and challenges in the history of UCTE.

The UCTE system divided in two synchronous zones in 1991

The UC(P)TE synchronous system was split in autumn 1991 into two zones due to the war in former Yugoslavia that resulted in the destruction of the key 400 kV substations (Ernestinovo and Konjsko) and the associated transmission lines in Croatia and Bosnia & Herzegovina (Mostar).

From 1991 on, major enlargements of the UCTE areas took place.

In the 1st zone, the CENTREL members from the Czech Republic, Hungary, Poland and Slovakia synchronized in 1995, followed in 1997 by the system of Morocco, later on joint also by Algeria and Tunisia and, in 2002, synchronisation of the Western part of Ukraine, the so-called »Burshtyn Island«.

In the 2nd UCTE synchronous zone, the Romanian and Bulgarian systems were synchronized in mid 90s.

Only at the beginning of this decade, after political and security preconditions were met, substantial preparations for the reconnection of UCTE zones could start.

The reconnection process was defined as a three-step procedure:

a) the creation of missing infrastructure (as fundamental pre-requisite, but in itself not sufficient),

b) the re-synchronization program (for the reconnection sequence itself),

c) the measures after the physical reconnection.

<<<

Reinforcements of the transmission grid

After a Memorandum of Understanding was signed in 2001 by UCTE, HEP (Croatia), ZEKC (Bosnia-Herzegovina) and EPS (FR Yugoslavia – at that time) with the aim to facilitate activities necessary for the reconnection, the financing for the reconstruction of the crucial transmission facilities was secured in 2002: in Croatia, through domestic sources, in Bosnia and Herzegovina by International Financial Institutions.

The reconnection process was made possible by the (in fact) new construction of the 400/110 kV Ernestinovo substation with the adjoining transmission lines, the construction of the 400/220/110 kV Žerjavinec substation by HEP in Croatia and the reconstruction of key transmission facilities by ZEKC in Bosnia and Herzegovina such as the 400/220/110 kV Mostar substation and a large part of the country's 400 kV grid together with the reconstruction of several 220 kV lines between both countries.

After the completion of all investment projects in August 2004, the whole electricity system of Bosnia and Herzegovina was reintegrated into the 1st UCTE synchronous zone.

Thus a 400 kV ring, which strengthens the Croatian system and the system of Bosnia and Herzegovina increasing the security of electricity supply, was closed comprising the nodes Ernestinovo – Žerjavinec – Tumbri – Melina – Velebit – Konjsko (in Croatia) and Mostar – Sarajevo 10 – Tuzla – Ugljevik (in Bosnia and Herzegovina).

The main preconditions for the reconnection of both UCTE zones were herewith fulfilled.

Finally, in late September 2004, another precondition – the harmonization of phase sequences on the interfaces of the Croatian electricity system was successfully carried out by HEP by rearranging the physical couplings on towers. Due to the close co-operation with neighbouring systems such as ELES and MAVIR, and other TSOs and partners, and thanks to the careful implementation of detailed programmes and the effective co-ordination, grid users were not affected; the island operation of the grids of Croatia and Bosnia-Herzegovina lasted only 4 seconds. <<<

UCTE Executive Team for North-South Resynchronization (UCTE ET)

At its meeting in Zagreb on 12 March 2002, the UCTE Steering Committee (UCTE SC) established the UCTE Executive Team for North-South Re-synchronization (UCTE ET) that was charged to act as »project manager« of the reconnection process.

The UCTE ET was composed of representatives of TSOs along the whole interface between both zones and from other countries involved, namely Bosnia-Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Greece, Hungary, Romania, Slovak Republic, Slovenia, Serbia and Montenegro and Ukraine. Both UCTE Co-ordination Centres (RWE Transportnetz Strom in Brauweiler, Germany, and ETRANS in Laufenburg, Switzerland) were also represented in the UCTE ET.

Mr. Jirí Feist (CEPS, Czech Republic) and Mr. Ivica Toljan (HEP, Croatia) were appointed co-convenors. After Mr. Feist left CEPS and UCTE at the end of July 2004, Mr. Milan Jevšenak (ELES, Slovenia) was appointed new co-convenor. Throughout the course of the work of UCTE ET, Mr. Damjan Meimorec (HEP, Croatia) acted as secretary of the ET.

The UCTE ET steered the complex reconnection process through monitoring the preparation activities and proposing the necessary requirements to UCTE SC. Among the co-ordination activities of the ET were the preparation, harmonization and testing of electricity and telecommunication facilities, organizational measures for the necessary infrastructure to manage the new control blocks of UCTE, as well as the organization of necessary calculations and analyses in order to avoid negative impacts on the entire UCTE system. The minimum grid configuration needed for re-synchronization was defined and the design of control blocks for the period after re-synchronization was approved.

The progress made in (re)construction of the grid infrastructure affecting the re-synchronization was monitored by standardised inventory reports on a regular basis and by progress reports.

In conclusion, the Multilateral Resynchronization Program (MRP) summarizing all activities and their results, was prepared by the UCTE ET and signed by its members. After all previously agreed mandatory technical and organizational conditions (such as functionality and readiness of control blocks, measures to preserve steady-state and dynamic stability of the whole reconnected system, etc.) were fulfilled in mid-September 2004, the Steering Committee of UCTE gave its final approval to the proposed date of resynchronization and the sequence of switching, as well as to the complete MRP at its meeting in Sarajevo on 23 September 2004. *(see figure 1)*

10 October 2004: resynchronisation

The final phase of the major technical challenge, which was one of the most significant electricity-related events in Europe in the recent years, took place on 10 October 2004.

The resynchronisation procedure was co-ordinated by Mr. Toljan and Mr. Jevšenak from the HEP premises in Zagreb, in direct communication with national co-ordinators along the resynchronisation interface (Bosnia-Herzegovina, Croatia, Hungary, Montenegro, Romania, Serbia and Ukraine), and with contact persons of control blocks in the 2nd UCTE synchronous zone (JIEL, Bulgaria and Greece). >>>

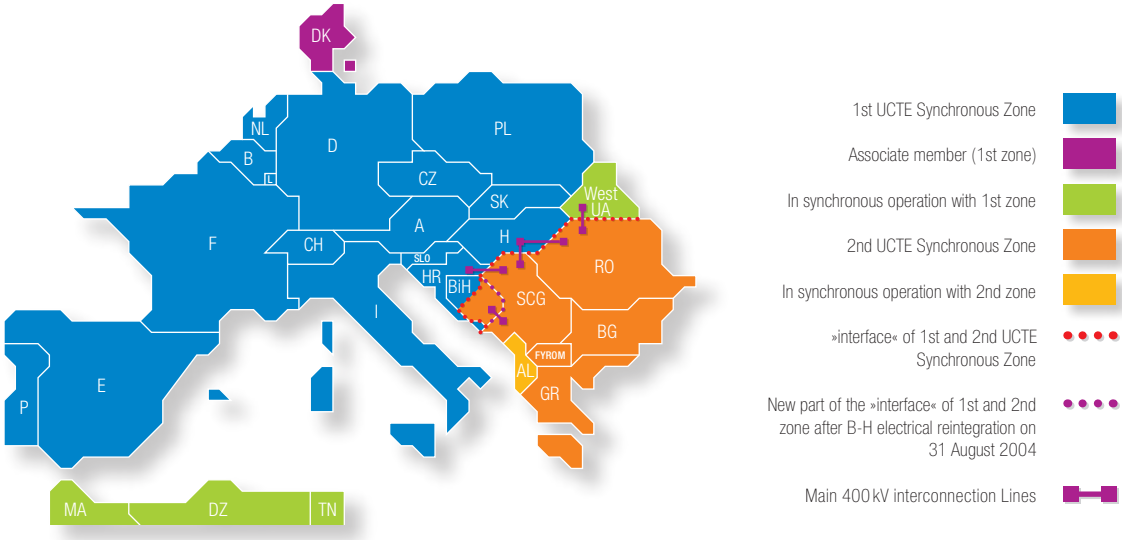


Figure 1: Resynchronization interface with main 400 kV lines

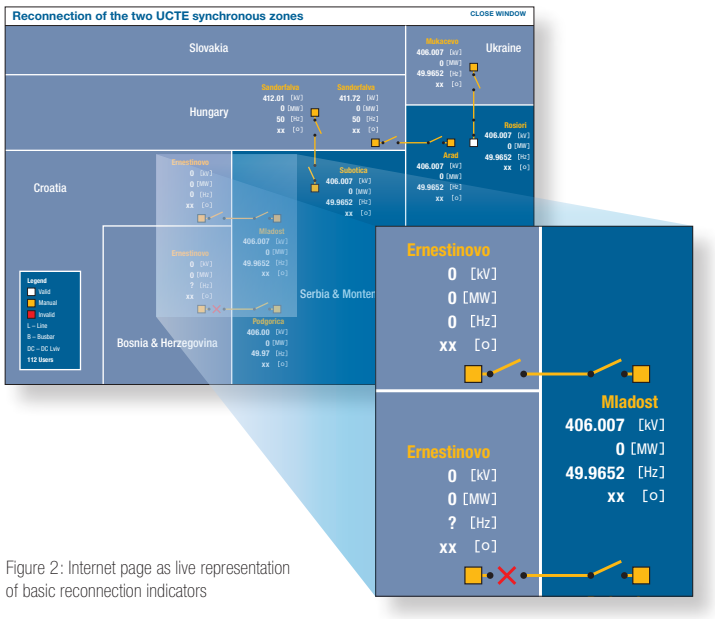


Figure 2: Internet page as live representation of basic reconnection indicators

>>> In order to have a visual representation of all relevant data from the main (400 kV) lines across the resynchronisation interface also for all TSOs involved and the interested UCTE audience, a dedicated web site with restricted access was put in place by HEP using data (voltages, active power and frequency values, as well as the status of circuit-breakers in all key facilities) collected from the SCADA and IT systems of the respective TSOs. *(see figure 2)*

After performing the prescribed preparatory steps aimed at fulfilling the conditions for switching, the physical re-synchronization of the 2nd UCTE synchronous zone to the main UCTE grid took place at 9:34 (Central European Summer Time), by switching the circuit-breaker of the Sandorfalva line in the Arad substation (Romania). >>>

>>> Following the necessary steps of confirmation and fulfilling all the conditions, the line Sandorfalva-Subotica was switched on at 9:41 by closing the circuit-breaker of the Subotica line in the Sandorfalva substation (Hungary). It was observed that the power oscillations were more significant than on the first line, though only transiently (as expected according to the preliminary steady-state analysis) so that the continuation of the switching sequence was not endangered.

The Trebinje-Podgorica line followed already at 9:58 by closing of the circuit-breaker of the Podgorica line (Serbia and Montenegro) in the substation Trebinje (Bosnia-Herzegovina). This was considered to be the most critical part of the sequence due to the significant voltage difference between Podgorica and the Trebinje substation during a longer period before switching. But thanks to well co-ordinated series of operational activities on both sides including the help of neighbouring TSOs, this voltage difference was reduced in a rather short time without a negative influence upon other conditions required for switching (such as angle difference).

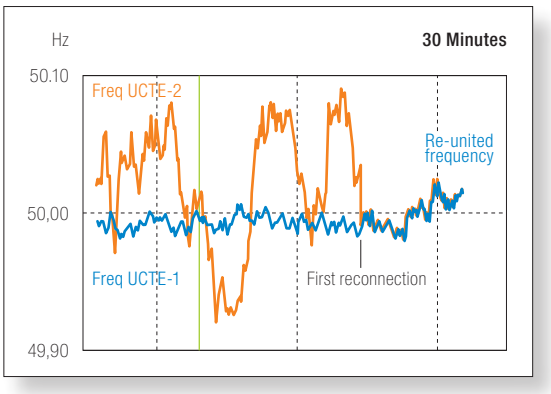


Figure 3: Two UCTE frequencies merging into one on 10 October 2004 at 9:34 (according to ETRANS measurements in Switzerland and in Greece)

Afterwards, at 10:07, the line Mukachevo-Rosiori was switched on by closing the circuit-breaker of the Mukachevo (Ukraine) line in the Rosiori substation (Romania).

The switching sequence of the five 400 kV lines ended at 10:20 with the line Ernestinovo-Mladost that was switched on by closing the circuit-breaker of the Mladost line (Serbia and Montenegro) in the Ernestinovo substation (Croatia). As expected (according to the load-flow analysis specifying the switching sequence) major power flows (300 – 400 MW) were observed on this line as a consequence of parallel flows from both former synchronous zones. The same effect, but to a smaller extent, was noticed over other closed 400 kV lines bridging the interface.

The last of three lines of lower voltages (220 and 110 kV) connecting Bosnia-Herzegovina and Serbia was successfully switched on at 10:58, taking over some of the parallel flows on the southern part of the former resynchronisation interface from the Trebinje-Podgorica line.

The reconnection was accomplished according to the prepared time schedule of the Multilateral Resynchronisation Programme in an atmosphere of professional co-operation amongst the representatives of the ten countries directly involved. Full trial operation of the reconnected system started from 11 a.m. (Central European Summer Time) on 10 October 2004. <<<

Trial operation after reconnection

With the UCTE reconnection, the whole European mainland became a single UCTE synchronous area, the second largest in the world. The completion of the UCTE reconnection process had an impact on operational conditions at regional and European level (whole UCTE) to the extent expected.

Nevertheless, during trial operation for obvious security reasons, electricity trading was not allowed across the former interface until early November 2004. Based on the successful results of the trial operation, a gradual increase of commercial electricity exchanges across the former interface (from the former 2nd zone to the 1st zone only) was recommended in order to monitor the global system response to the new flow patterns. The following capacities were allowed since no unforeseen operational events occurred in the meantime: 30% of the indicative and preliminary NTC values (according to UCTE calculations and as published on the ETSO website *www.etso-net.org*) for November, 60% for December, and from 1st January 2005, full NTC values (based on harmonized technical calculations).

Since the mission of UCTE ET was successfully completed, the Steering Committee decided to dissolve the UCTE ET at the meeting held in Sofia on 25 November 2004.

Further monitoring of the developments on and around the former interface in the next months (especially the new flow patterns) has become a normal UCTE operational issue and was therefore entrusted to the WG Operations and Security, more specifically to its SG TSO-Forum.

The final assessment from a stability point of view, particularly regarding the damping behaviour and the conclusion about possible further needs of PSS optimisation in the whole former 2nd zone will be made after one year of operation, based on WAMS monitoring.<<<

Technical conditions for the European electricity market: UCTE contribution to the Athens process

The reconnection has a Europe-wide impact to the whole electricity sector beyond transmission, as it physically integrated regional electricity markets in South-East Europe into the Internal Electricity Market of the European Union. This fact also influences the development of further electricity infrastructure projects.

From the very beginning of the Athens Process (in South-East Europe), the role of UCTE has been recognized as a provider of basic technical preconditions for a gradual establishment of a single European electricity market and for the further development of the economies of the countries within the UCTE system, both EU and Non-EU members.

The Athens Forum especially acknowledged the substantial improvements achieved in terms of regional infrastructures and the fact that operational agreements in all relevant control blocks were signed. <<<

3 UCTE SYSTEM OPERATION IN 2004 : RETROSPECT AND OUTLOOK

Overview

Also in 2004, the conditions under which UCTE member TSOs put to practice their core competence – the operation of their own systems and the co-ordination within the synchronously interconnected UCTE system – - have continued to rapidly change and evolve.

The events in summer and autumn 2003 had already brought to painful evidence that solidarity and complementary TSO action are an essential factor for maintaining the systems in acceptable reliability conditions.

In 2004, TSOs mastered a lot of complex situations in their day-to-day business. Thus, they prevented detrimental effects on a larger number of consumers, and provided markets with a reliable platform.

Detailed information about all significant events and disturbances affecting the operation of the UCTE interconnected system is published on a yearly basis on the UCTE website at *www.ucte.org/ourworld/living_grid/2004/e_default.asp*

These events of a natural, technical or human origin could in most cases be locally restricted thanks to the 24 h/day availability and the high skills of all TSO personnel used to rapidly and securely handling such events.

However, some incidents that occurred in 2004 had an impact on customers, and the resulting »visibility« to a broader audience made clear once more that the operation of the UCTE system might be getting closer to its limits.

Among the main reasons for such situations were »unforeseen« power flows at regional level *(see p. 25)* and the decrease of system adequacy and reserves. The situation is further aggravated by the fact that the location of generation is no longer under the direct control of the TSOs and that new bulk capacities are installed in intermittent generating units such as wind power plants. Further, not all TSOs are responsible for balancing the system. <<<

The Wind Challenge

Fast capacity growth, stochastic feed-in characteristics, limited predictability and geographical concentration in coastal and remote areas constitute a major challenge to the successful integration of wind power into the European electricity system. If this challenge is to be met, a number of actions need to be taken.

The installation of new wind turbines must be synchronized with the parallel development of the properly planned and designed grid infrastructure both at national and international levels. Compared to the rapid building of new wind turbines, the realisation periods for new power lines last far too long and may take up to 10 years or more due to time-consuming licensing procedures. UCTE therefore calls upon both European and national legislators to take appropriate steps with a view to accelerating approval procedures for new grid infrastructure.

In order to maintain sufficient conventional capacities and to ensure their reasonable allocation over the respective grid areas, existing priority rules for the transport of RES electricity need to be examined. Production limitations should be in place to permit a reduction of power output in any operating conditions and from any operating point. Due to the limited control of output of wind power capacities, sufficient reserve and balancing power capacities are required to cover the differences between demand and generation. The necessary grid and generation capacities must be available.

The expansion of intermittent wind power generation in some EU Member States has significant repercussions on the European electricity system as a whole. The concentration of wind power in Northern Germany is already producing huge power flows through the neighbouring transmission systems in Benelux and >>>

>>> Central Europe. These spontaneous flows reduce system stability and increasingly affect trading capacities. In order to better analyse the future development of RES generation in Europe and the related impacts on the electric infrastructure as a whole, a thorough examination is needed and should be carried out on the European level.

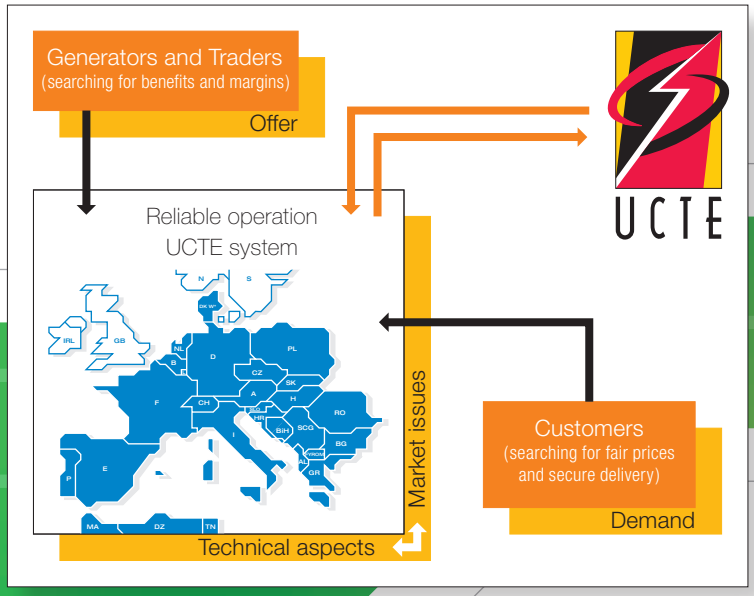
Along with an in-depth analysis of the shape of the future European Transmission Network, a special R&D focus should be on the development of more advanced solutions like improved forecasting tools, better storage systems as well as technically advanced grid infrastructure.

TSOs are therefore permanently active in order to improve the quality of their services and to anticipate the challenges of tomorrow by innovative solutions.

In this context, it seems a matter of evidence that TSOs will have to achieve a better internal system development: this means that TSOs might be increasingly expected to organize and implement a regional approach (at least between a group of countries), possibly coordinated or even integrated at the level of the synchronous zone. This is already an explicit requirement mentioned in the last version of the guideline on congestion management.

Specifically, this might soon cover better harmonized planning standards defining the requirements for users of interconnected transmission networks (mainly generators and distribution networks within the UCTE zone) concerning distributed generation and protections (load shedding) in distribution networks. Coordinated system planning should provide for harmonization of international and related national transmission infrastructure planning within the UCTE system in order to best support the integration of markets with reduced adverse effects on the economy as well as on environment protection. <<<

Figure 4: UCTE as a key provider of electricity market in the European mainland



Outlook

UCTE member TSOs have a crucial role to play in the context of quality of (international) transmission and system services. Quality of (international) transmission and system services is a concept that applies directly to each synchronous zone and is very close to TSO business. There is no question that security of supply is a broader concept that concerns both generators and TSOs. It may be understood as encompassing more than one concept which can be performed by involved parties with different responsibilities according to national legislation and regulation.

Finally, UCTE might sharpen its international role towards stakeholders. UCTE's main stakeholders are market parties, intermediates and customers. Therefore, UCTE has also responsibilities in relation to the introduction of new EU policies and especially in their implementation. In addition, UCTE assists EU in transposing and/or extending EU legislation to non-EU countries.

As core partner of the EU and regulators, UCTE supports the principles of the Internal Electricity Market. UCTE is lobbying EU in terms of specific objectives, namely: providing the UCTE markets with a reliable platform, while the UCTE grid is serving as market place between competing generators and customers of the UCTE zone. *(see figure)*

At the borders of the association, the classical role of UCTE member TSOs concerning the external system development is also evolving *(see report on page 18 about a new major study concerning the IPS/UPS system)*. It appeared in 2004 that the UCTE system – as the only European system that may extend for obvious geographical reasons – might succeed in integrating new systems into a harmonized wider-than-EU-market platform depending on the positive assessment of three criteria:

– technical interoperability,

– a sustainable reciprocity in terms of market/regulatory conditions and environment and

– the organizational manageability of the created entity (decision-making processes, etc.).

However, the current UCTE procedures for system development are limited to a feasibility assessment tool of the inter-operability of requesting systems. The two other main aspects, the economic and organizational dimensions (e.g. reciprocity, regulatory conditions and environment) are presently not receiving the proper attention. Such a perspective is out of touch with the reality of UCTE markets and customers. In the context of the IPS/UPS feasibility study, UCTE itself admitted that it will be necessary to look at the contractual and the regulatory dimensions of the case. <<<

4 DEVELOPMENTS OF THE UCTE SYNCHRONOUS AREA

For the last fifty years, UCTE has contributed to building one of the largest synchronous interconnected power systems in the world, supplying hundreds of millions of customers in a safe and reliable way.

However, TSOs around the world and in the UCTE system have experienced power outages during the last few years which have had dramatic consequences. This experience confirms that the main focus of UCTE is, must be and will remain the security and adequacy of the interconnected system.

The focus on security applies particularly to the issues of the extension of the UCTE synchronous zone. The effort of UCTE in these matters, as it has been in the process of creation of the present system, is to investigate all possible consequences that an extension may have on the system. UCTE has always pursued its efforts to develop the synchronous area while observing objective criteria and procedures in order to prevent a deterioration of the present level of reliability and stability. <<<

Turkey

The potential connection of Turkey to the UCTE system through lines between Turkey and Bulgaria and a future line between Turkey and Greece follows the same rules of the UCTE process, i. e. ensuring overall security and reliability. The Terms of Reference of the feasibility study have been finalized and a solution for funding of the study has been found between UCTE, the European Commission and the Turkish Ministry of Energy and Natural Resources.

The Turkish feasibility study will be performed by a consortium of UCTE members led by RWE Transportnetz Strom for the stability study and by HTSO for the load-flow study. The preparation of the contract was well advanced at the end of 2004. The study will last 15 months and is likely to start in mid-2005. In addition to the study, UCTE is reviewing its catalogue of measures in order to define the necessary provisions on field tests to check the behaviour of the Turkish electric system. <<<

Tunisia-Libya

The closure of the 220 kV lines between Tunisia and Libya would lead to the connection of the following five countries: Libya, Egypt, Jordan, Syria and Lebanon (LEJSL), to the already synchronously connected countries Morocco, Algeria and Tunisia.

Although the total installed capacity of these eight countries represents roughly 40,000 MW only (approx. one third of the French capacity) UCTE pays great attention to the possible impact of this connection on the UCTE system. The main issue is related to potential inter-area oscillations between the generators of the two systems.

Taking account of the studies already implemented, UCTE decided to proceed to a series of measurements that will help UCTE to take a decision. These measurements, first on the LEJSL system alone, are in preparation and could start in mid-2005. After a two-month campaign, UCTE will decide whether a second three-day measurement campaign with the link closed can be envisaged. The in-depth analysis of the results will help to define the final UCTE position on this issue.

As regards these two projects, UCTE is following the process that is imperative to keep reliability and stability of the whole system at the high quality level known. As the most recent developments of the UCTE system have shown, this attitude is beneficial to all grid users, both on the UCTE side and on the applicant side. <<<

5 FEASIBILITY STUDY : SYNCHRONOUS INTERCONNECTION OF THE POWER SYSTEMS OF IPS / UPS WITH UCTE

In 2002, UCTE received a request from RAO UES Russia acting on behalf of EPC CIS and Baltics for a synchronous interconnection of the IPS/UPS power systems with UCTE. After completion of a pre-feasibility study in 2003, dealing with steady state system analysis, UCTE decided to launch a broad feasibility study in order to answer the three main questions:

- Is a synchronous interconnection of IPS/UPS and UCTE possible?
- What measures have to be taken on both sides?
- What are the associated costs?

The results of the three-year project will be used as a basis for further decisions on system extension on both sides.

The feasibility study is another milestone in the history of UCTE: the interconnection would lead to synchronously interconnected power systems spanning 13 time zones and serving about 700 million customers. Presently, there is no example in the world of synchronous operation to this extent. *(see figure 6, next page)*

On 25 March 2004, Dr. Matthias Luther (E.ON Netz, Germany) was appointed Project Manager by the Steering Committee of UCTE. After nomination, he had to set up the Consortium, form the project management team and working groups of experts on the UCTE-side and finalize the Terms of References. *(see figure 5)* <<<

Responsible for the UCTE-IPS/UPS Study:
Dr. Matthias Luther (E.ON Netz, Germany)

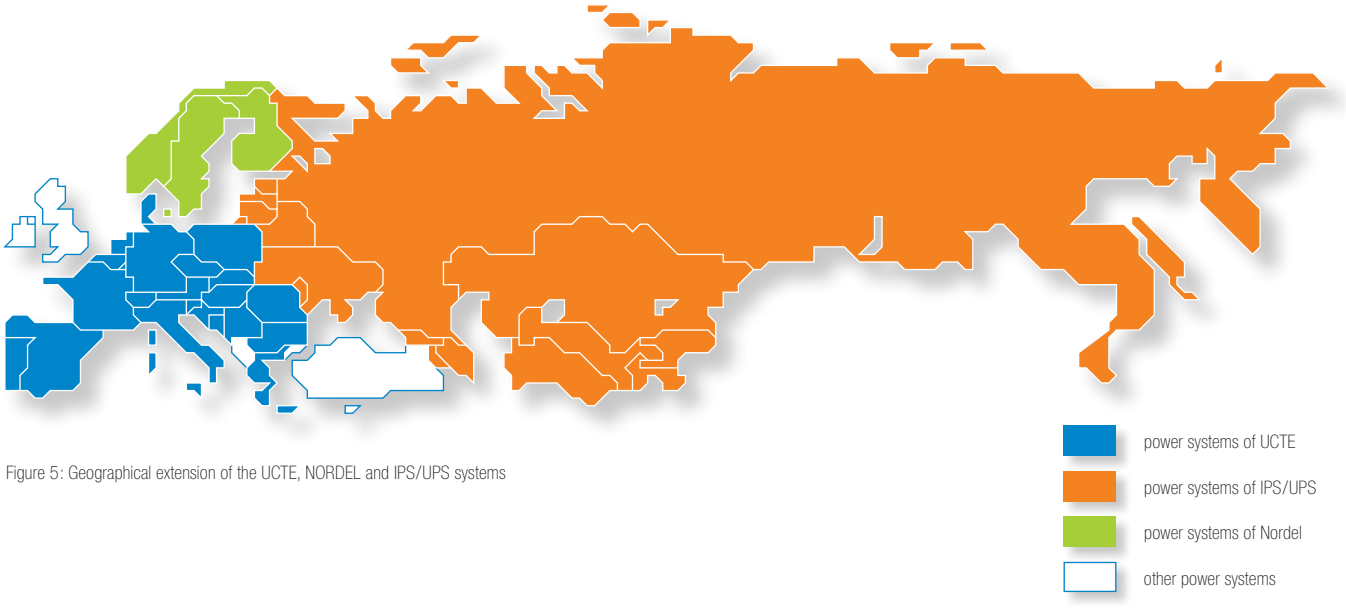


Figure 5: Geographical extension of the UCTE, NORDEL and IPS/UPS systems

The project

The project itself is an important part in the context of the EU-Russia Energy dialogue. On 23 April 2004, the Project Management filed an application for funding under the Trans-European Network (TEN-Energy) Program of the European Commission (EC). <<<

The responsible UCTE-Consortium

The UCTE-Consortium responsible for the project consists of 11 TSOs from 9 countries, namely:

- E.ON Netz GmbH (Germany)
- ELIA System Operator S. A. (Belgium)
- MAVIR Hungarian Power System Operator Company (Hungary)
- Natsionalna Elektricheska Kompania EAD (Bulgaria)
- PSE-Operator S.A. (Poland)
- Red Eléctrica de España S.A. (Spain)
- Réseau de Transport d'Electricité (France)
- RWE Transportnetz Strom GmbH (Germany)
- Slovenská *elektrizačná* prenosová sústava, a. s. (Slovak Republic)
- National Power Grid Company »Transelectrica« (Romania)
- Vattenfall Europe Transmission GmbH (Germany) >>>

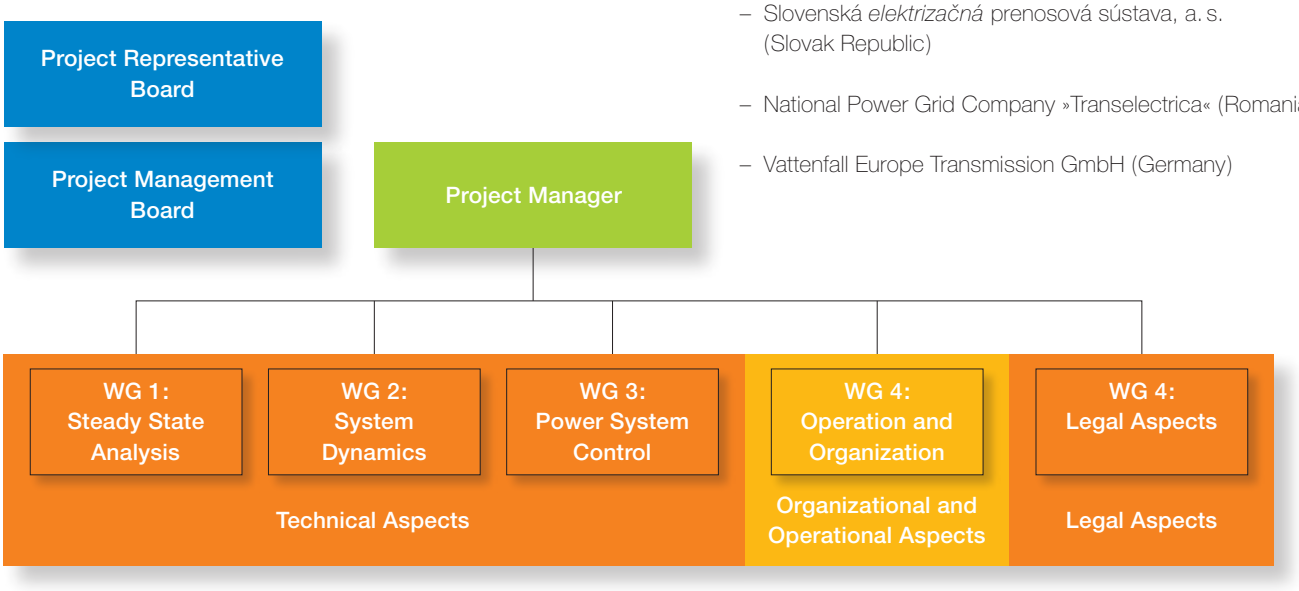


Figure 6: General project organization: joint structure from the working to the Board level

>>> A Consortium Agreement was signed by the companies on 24 November 2004. Other UCTE-TSOs support the project by data provision.

On the IPS/UPS-side, a group of 7 companies have established a joint agreement for the project:

Belenergo (Belarus), Eesti Energia (Estonia), Latvenergo (Latvia), Lietuvos Energia AB (Lithuania), Ukrenergo (Ukraine), Moldelectrica (Moldova) and System Operator – Central Dispatch Organisation of Unified Energy System of Russia (RAO UES) which has the leading role for the Eastern partners.

The study is considered as a joint project under the responsibility of UCTE. More than 100 experts from both sides are involved in the project. This huge amount of personnel resources is an attribute not only to the size of the system to be investigated, but also to the broad aspects of the tasks to be fulfilled: each of the two interconnected systems has been developed independently in terms of technical, organizational, operational and legal aspects in the past.

On the working level, five working groups deal with the subtasks of steady-state analysis, system dynamics, power system control, operational and organizational issues and legal aspects. All internal and external activities are co-ordinated by the project management. <<<

Further project entities are:

– Project Representative Board, which accompanies the project on the political level. It shall consist of representatives from the European Parliament, European Commission, UCTE, Baltic States and CIS countries.

– Project Management Board, which is responsible for steering the project and taking decisions on further steps. Furthermore, it shall approve of working group progress and reports. This joint board consists of representatives from UCTE and IPS/UPS.

At the end of 2004, negotiations on the Co-operation Agreement took place between the UCTE-Consortium and the IPS/UPS companies. This agreement defines – on a legal basis – the overall framework of the co-operation between both parties. From the goals reached in 2004, UCTE looks forward to an early project kick-off in spring 2005. <<<

6 SYSTEM ADEQUACY ASSESSED ON A LONG-TERM BASIS

This year, the system adequacy forecast report provided for the first time some forecast data over a 10-year period, from 2005 to 2015.

Existing investment decisions seem sufficient, at UCTE's level, to ensure a reasonable level of adequacy from now on to 2010. Nevertheless, security will be at risk after 2010 if further investment decisions are not taken in due time – or even earlier if extra decommissioning occurs before this time horizon.

Major improvement of the forecasting methods

In 2004, the UCTE has continued to improve the completeness of the system adequacy reports and its core concept of remaining capacity (RC). Major developments concerned the extension of the time horizon up to ten years ahead, the introduction of a new reference point closer to synchronous peak, the use of 2 different scenarios for the long-term forecast and a new method to assess the margin of generation adequacy based on a probabilistic approach.

The extension of the time horizon led to a new approach in terms of uncertainties concerning future generation, considering that today it takes only two or three years to build new power plants. This has led UCTE to develop long-term scenarios whose aim is to evaluate the range of uncertainties and the risks concerning security of supply over the next ten years.

The first scenario

is called »conservative scenario« *(scenario A/see fig. 7, page 24)*; it only takes account of the new power plants whose commissioning can be considered as sure: plants under construction or plants whose investment decision is notified as firm to the TSOs.

This scenario shows the evolution of the potential unbalances likely to occur if no new additional investment decision were taken in the future.

- In the short term, it allows to verify the capability of the existing capacity and capacity under construction to cover peak load.
- In the long term, the objective is to reflect the additional generating capacity likely to be required to achieve generation adequacy.

Major results of the System Adequacy Forecast 2005-2015

The second scenario

is called »best estimate scenario« *(scenario B/see fig. 7, next page)*; it takes account of future power plants whose commissioning can be considered as reasonably probable according to the information available to the TSOs: commissioning resulting from governmental plans or objectives, concerning for example the development of renewable energy sources in accordance with the European legislation, or estimation of the future commissioning resulting from the requests for connection to the grid or from the information given by producers to the TSOs.

This scenario enables potential future developments to be evaluated, provided that market signals give adequate incentives for investments.

Developments have also been performed in order to improve the adequacy index (Adequacy Reference Margin – ARM). The margins necessary to provide a given level of security of supply have been estimated taking account of the characteristics of every subsystem. For that purpose, a probabilistic approach has been used which enables the statistical characteristics of these margins to be defined as the results of the probabilistic characteristics of each component: load and unavailability of generation.

Considering a level of risk for each national system corresponding to 1 %, this shows that for the UCTE system and some national systems, an ARM at peak load of 5 % of the national generating capacity is sufficient to provide a reliable supply. For some other national systems, more sensitive to random factors (load variations or unavailability of generation), ARM should represent around 10 % of the national generating capacity.

Thus, when considering individual countries, generation adequacy will be assessed on the basis of the comparison between Remaining Capacity and ARM. <<<

Overall conclusions

Analysing a longer forecast period, the newly improved report shows that the adequacy of the UCTE System as a whole is expected to stay at an acceptable level over the *2005–2007* period; substantial developments of generation capacity are envisaged, among which renewable energy sources represent a growing share.

Up to *2010*, firmly decided power plant commissioning helps to partly cover the load increase; the security margin is decreasing but stays at acceptable levels.

Between *2010 and 2015*, security will be at risk if further investment decisions are not taken in due time. Around 30 GW firm investment decisions would be necessary to counterbalance the potential deficit in generation.

Projects for developing international interconnections should help to improve the reliability of deficit areas. Nevertheless, the number of projects is limited, which reflects the difficulties encountered by the TSOs to get these projects accepted by locals. >>>

>>> *Regional conclusions*

The *CENTREL block* seems to be the only one in a position to remain a structural exporter. But future environmental legislation could affect this position.

In the *UCTE main block*, which represents a major part of the installed capacity and was until now exporting towards the surrounding areas, the remaining capacity is facing a slow decrease until 2010. This block will become a net importer in unfavourable situations if the investments envisaged (on the basis of information available to TSOs) are not realized.

The increase of capacity in the *Iberian block* mainly results from combined cycles and renewable sources. Till 2010, despite a slightly higher capacity compared to last year's forecast, the reliability margin can hardly face the large uncertainties affecting this block. Additional investments in generation and interconnections are needed to ensure the reliability of this region.

A strong development in generation is expected in *Italy* and should maintain the reliability of the system.

Generation adequacy will be maintained at a satisfactory level in Romania and Bulgaria over the period 2005–2010. If the investments envisaged are not realised, the rest of *South-East Europe* will be in a weak position concerning generation adequacy. Power exchanges that already improved in 2004 thanks to the re-connection of the two UCTE zones will be of utmost importance for the reliability of this region. <<<

General trends and challenges

There is an increasing impact of renewable energy sources, mainly wind power, on the generation mix of the UCTE system. This development brings new challenges to TSOs concerning the short-term variations of power flows across the international transmission system and the availability of balancing power. In the countries with high shares of wind power (especially Spain and Germany), a significant development of the transmission network is necessary *(see figure 7)*. <<<

It is noticeable that the mismatch between Remaining Capacity and the Adequacy Reference Margin, expected in 2010 in last year's System Adequacy Report, has been postponed to the period 2010–2012 in this year's forecasts.

Adequacy Retrospect 2003

UCTE published its Retrospect 2003 in June 2004. This report was also subject to major new developments leading to some new information and messages. A comprehensive analysis of the congestions observed on the system lines has been introduced. The frequency of congestions on international interconnection lines, congestion management and the description of the main congestions on national networks are now an integral part of the UCTE System Adequacy Retrospect *(see figure 8)*. <<<

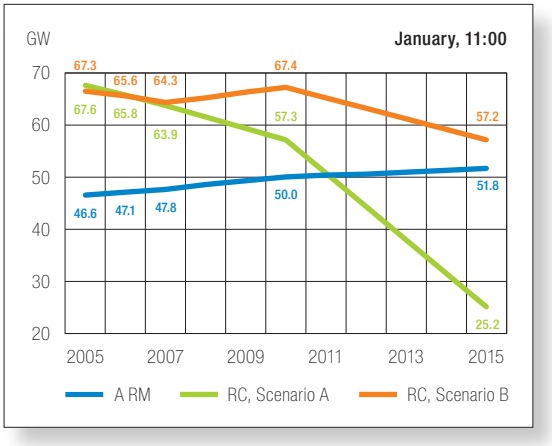


Figure 7:
Adequacy Reliability Margin and Remaining Capacity – »conservative« scenario A and »best estimate« scenario B

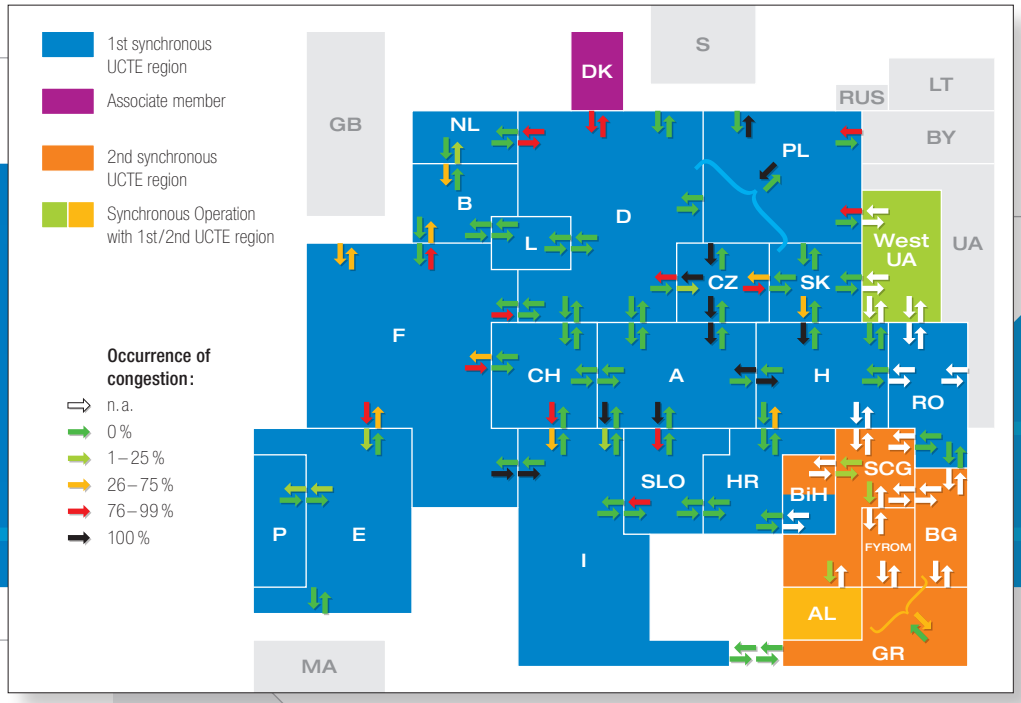


Figure 8:
Occurrence of congestions in the UCTE synchronous zone in 2003

Major results of the System Adequacy Retrospect 2003

The overall electricity consumption in mainland Europe increased by 3 %, while generation capacities slightly increased by 1.6 %. In particular, power generation from renewable energy sources increasing by 21 % covered a growing share of power demand. Although the retrospect shows sufficient generation capacities, tight situations appeared in several countries during the summer. The market development led to a sensible increase in international power exchanges of nearly a quarter of the overall consumption in Continental Europe. Some critical levels of congestion were reached in Italy, Poland, the Czech Republic, Austria and Hungary

(the full »UCTE System Adequacy Retrospect 2003« can be downloaded from http://www.ucte.org).

The results of the monthly survey show sufficient generation reserves for the sum of UCTE countries' remaining capacities. The rule of thumb according to which 5 % are needed for secure operation was easily met on reference days of 2003. However, extremely high temperatures occurred in late July and early August compared to those reference days. As a result, special environmental measures had to be taken, such as a reduction in power plant deliveries which led to tight situations in Germany, France, Belgium and the Netherlands and already to rolling shortages in Italy in late June.

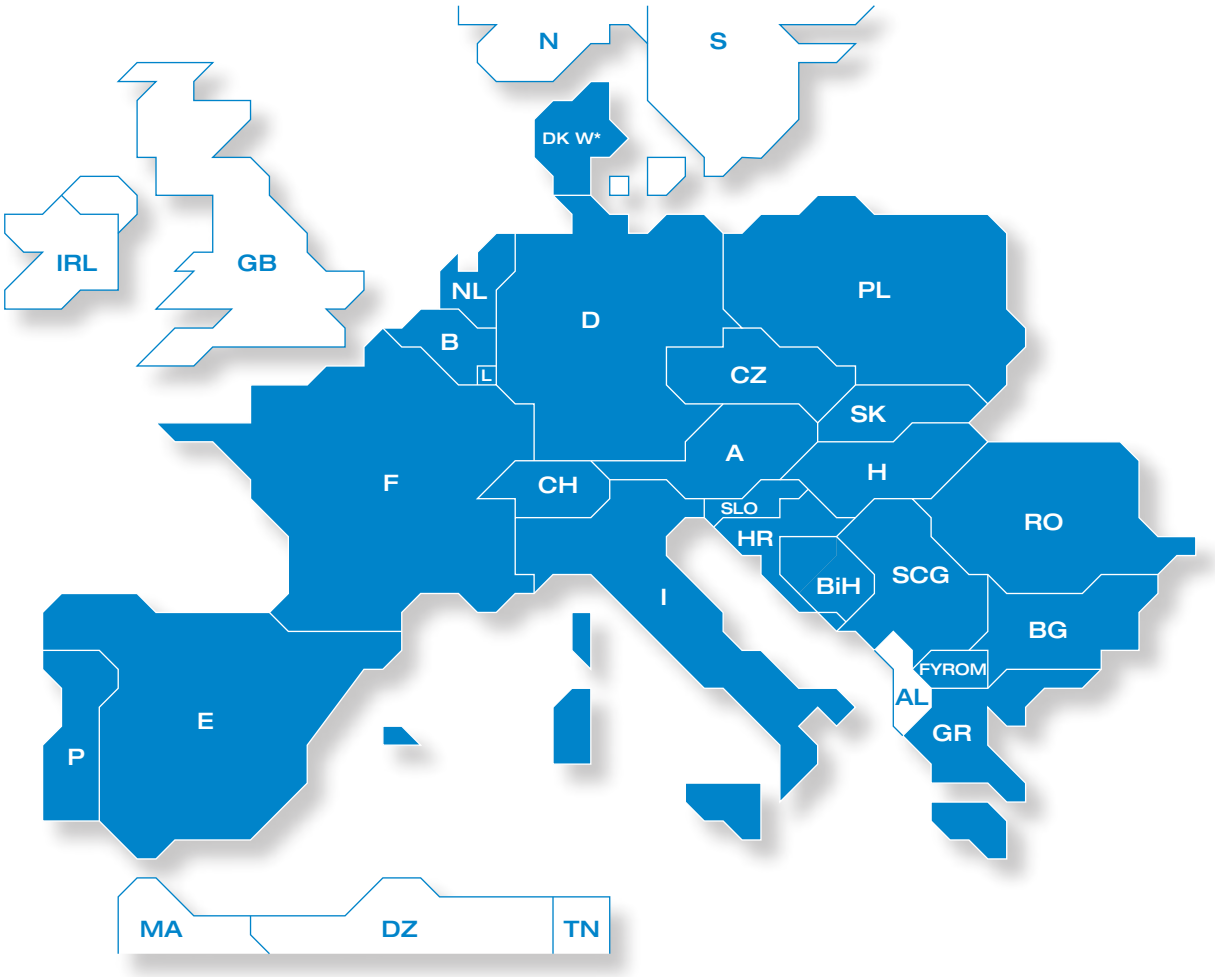
These events have put forward system reliability concerns and should remind all market players and authorities that an adequate level of investment and optimal management of available resources are indispensable to allow consumers to benefit from the market opening process.

Another main result of this retrospect is the average increase of consumption (+ 3.1 %, + 69 TWh), much higher than in the previous years (0.6 % and 2.4 % in 2001 and 2002, respectively). [...]

On other occasions, the UCTE security rules were violated due to high flows on the system. A single major outage in the context of the high flows across the Belgian system in March, April, and July and across the Austrian north to south 220 kV lines in winter could have had severe consequences. <<<

7 INSIDE UCTE

The European area covered by UCTE members



Member companies in UCTE as of 1 January 2005

Austria	TIRAG VERBUND–APG VKW ÜN	*Tiroler Regelzone AG* *Verbund–Austrian Power Grid GmbH* *VKW-Übertragungsnetz AG*
Belgium	Elia	*Elia System Operator*
Bosnia-Herzegovina	JPCC	*Joint Power Coordination Center*
Bulgaria	NEK	*Natsionalna Elektricheska Kompania EAD*
Croatia	HEP	*Hrvatska Elektroprivreda d. d.*
Czech Republic	CEPS	*CEPS, a.s.*
France	RTE	*RTE Gestionnaire du Réseau de Transport d'Electricité*
FYROM	ESM	*Elektrostopastvo na Makedonija*
Germany	EnBW TN E.ON Netz RWE TSO Vattenfall Europe Transmission	*EnBW Transportnetze AG* *E.ON Netz GmbH* *RWE Transportnetz Strom GmbH* *Vattenfall Europe Transmission GmbH*
Greece	HTSO/DESMIE	*Hellenic Transmission System Operator/Diachiristis Elinikou Sistimatos Metaforas Ilectrikis Energias*
Hungary	MAVIR	*Magyar Villamosenergia-ipari Rendszerirányító Rt.*
Italy	GRTN	*Gestore della Rete di Trasmissione Nazionale*
Luxembourg	CEGEDEL	*Compagnie Grand Ducale d' Electricité du Luxembourg Net S.A.*
The Netherlands	TenneT	*TenneT bv*
Poland	PSE-Operator	*PSE-Operator S.A.*
Portugal	REN	*Rede Eléctrica Nacional, S.A.*
Romania	Transelectrica	*Transelectrica S.A.*
Serbia and Montenegro	EPCG EPS	*Elektroprivreda Crne Gore* *Elektroprivreda Srbije*
Slovak Republic	SEPS	*Slovenská elektrizačná prenosová sústava, a.s.*
Slovenia	ELES	*Elektro Slovenija*
Spain	REE	*Red Eléctrica de España S.A.*
Switzerland	ATEL BKW UTN EGL Grid EOS ETRANS NOK	*Aare-Tessin Ltd. for Electricity* *BKW Übertragungsnetz AG* EGL Grid AG *Energie Ouest Suisse* *Etrans Ltd.* *Nordostschweizerische Kraftwerke AG*
Denmark	ELTRA*	*Eltra*

* Associate member

The Bureau, from left to right:
Antonio Serrani (I), Vice-President
Martin Fuchs (D), President of UCTE
Marcel Bial, Secretary General
Gerard Maas (NL), Chairman
of Steering Committee.

Bodies

The decision-making bodies of UCTE are the Assembly consisting of all 33 full members of UCTE and one associated member, and the Steering Committee with one representative from each one of the 22 countries represented in UCTE.

The Bureau representing the Association externally consists of the President, Martin Fuchs (D), the Vice-President of the Association, Antonio Serrani (I), the Chairman of the Steering Committee, Gerard Maas (NL), and the Secretary General, Marcel Bial. <<<

Working Groups

The 5 Working Groups composed of experts from the member companies, focus their activities on operations and security, system development, communication and European issues, statistics and legal issues. They are installed and entrusted with specific missions by the Steering Committee to which they report according to the Articles of Association. <<<

Secretariat

The Secretariat is led by Marcel Bial, who has been elected for a 4-year term starting on 1 January 2002. The premises of the Secretariat are located in Brussels,

Boulevard Saint-Michel 15, B-1040 Brussels,
Tel.: +32 2 741 69 40, Fax: +32 2 741 69 49,
http://www.ucte.org
E-Mail: info@ucte.org

The Secretariat is responsible for the assistance and the support to the bodies of the association. Furthermore, it is responsible for the UCTE web site, the information system, all kinds of publication and the implementation of all the statistical and communication measures decided by the Steering Committee. <<<

National representatives in the Steering Committee as of 1 January 2005

A	*Heinz Kaupa*	H	*Antal Tombor*
B	*Hubert Lemmens*	HR	*Ivica Toljan*
BG	*Mitiu Christozov*	I	*Carlo Sabelli*
BiH	*Josip Jerkovic*	L	*Georges Bonifas*
CH	*Patrick Braun*	NL	*Ben Voorhorst*
CZ	*Petr Zeman*	P	*José Penedos*
D	*Wolfgang Neldner*	PL	*Jerzy Dudzik*
E	*Angel Landa*	RO	*Ion Merfu*
F	*Pierre Bornard*	SCG	*Dusko Tubic*
FYROM	*Pande Lazarov*	SLO	*Vekoslav Korosec*
GR	*Adrianos Papathanassiou*	SK	*Alena Salamonova*

Organisational chart as of 1 January 2005

Bureau

– President:
Martin Fuchs (D)

– Vice-President:
Antonio Serrani (I)

– Chairman SC:
Gerard Maas (NL)

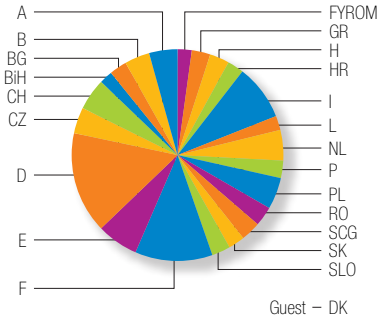
– Secretary General:
Marcel Bial

Assembly

33 TSOs from 23 countries

President: Martin Fuchs (D)

Voting rights:



Steering Committee

1 representative per country

– Chairman:
Gerard Maas (NL)

Secretariat

– Secretary General:
Marcel Bial

Working Groups

Operations and Security
Convenor:
Klaus Kleinekorte (D)

System Development
Convenor:
Georges de Montravel (F)

Statistics
Convenor: Jacek Ratz (PL)

Liaison Advisory
Convenor: Carlo Crea (I)

Legal Issues
Convenor: Luigi De Francisci (I)

Subgroups

– *Network Models and Forecast Tools*

– *TSO Forum*

– *Electronic Highway*

– *Mediterranean Ring*

– *Turkey*

– *Study Tool*

– *System Adequacy*

Technical Committees/ Networks of Experts

TC Albania
Convenor:
Antonio Serrani (I)

Network of Experts Windpower
Convenor:
Juan Manuel Rodríguez-García (E)

*SYSTINT**
Convenor:
Georges de Montravel (F)

* joint Task Force UCTE/EURELECTRIC

Fom left to right:
Georges de Montravel (F), Marcel Bial, Jacek Ratz (PL), Carlo Crea (I), Martin Fuchs (D),
Luigi De Francisci (I), Antonio Serrani (I), Gerard Maas (NL), Klaus Kleinekorte (D).

Abbreviations used

ARM	*Adequacy Reference Margin*
CEER	*Council of European Energy Regulators*
CENTREL	*Control block covering Czech Republic, Hungary, Poland and Slovakia*
CIS	*Commonwealth of Independent States*
CMEP	*Compliance Monitoring and Enforcement Process*
COMELEC	*Comité Maghrébin de L'Electricité*
DACF	*Day Ahead Congestion Forecast*
EC	*European Commission*
EPC-CIS	*Electric Power Council of the Commonwealth of Independent States*
ETSO	*European Transmission System Operators*
ITRE	*Committee on Industry, Research and Energy of the European Parliament*
JIEL	*Control block of Serbia and Montenegro and FYROM (Former Yugoslav Republic of Macedonia)*
LEJSL	*Libya, Egypt, Jordan, Syria and Lebanon*
MLA	*Multilateral Agreement*
NTC	*Net Transfer Capacities*
PSS	*Power System Stabiliser*
RC	*Remaining Capacity*
R & D	*Research & Development*
RES	*Renewable Energy Sources*
SCADA	*Supervisory Control and Data Acquisition*
TEN	*Trans European Networks*
TSO	*Transmission System Operator*
UCPTE	*Union for the Co-ordination of Electricity Generation and Transmission*
UCTE	*Union for the Co-ordination of Transmission of Electricity*
UCTE ET	*UCTE Executive Team for North-South Resynchronisation*
UPS/IPS	*Unified Power System/Interconnected Power Systems (of CIS and Baltic Countries)*
WAMS	*Wide Area Measurement System*

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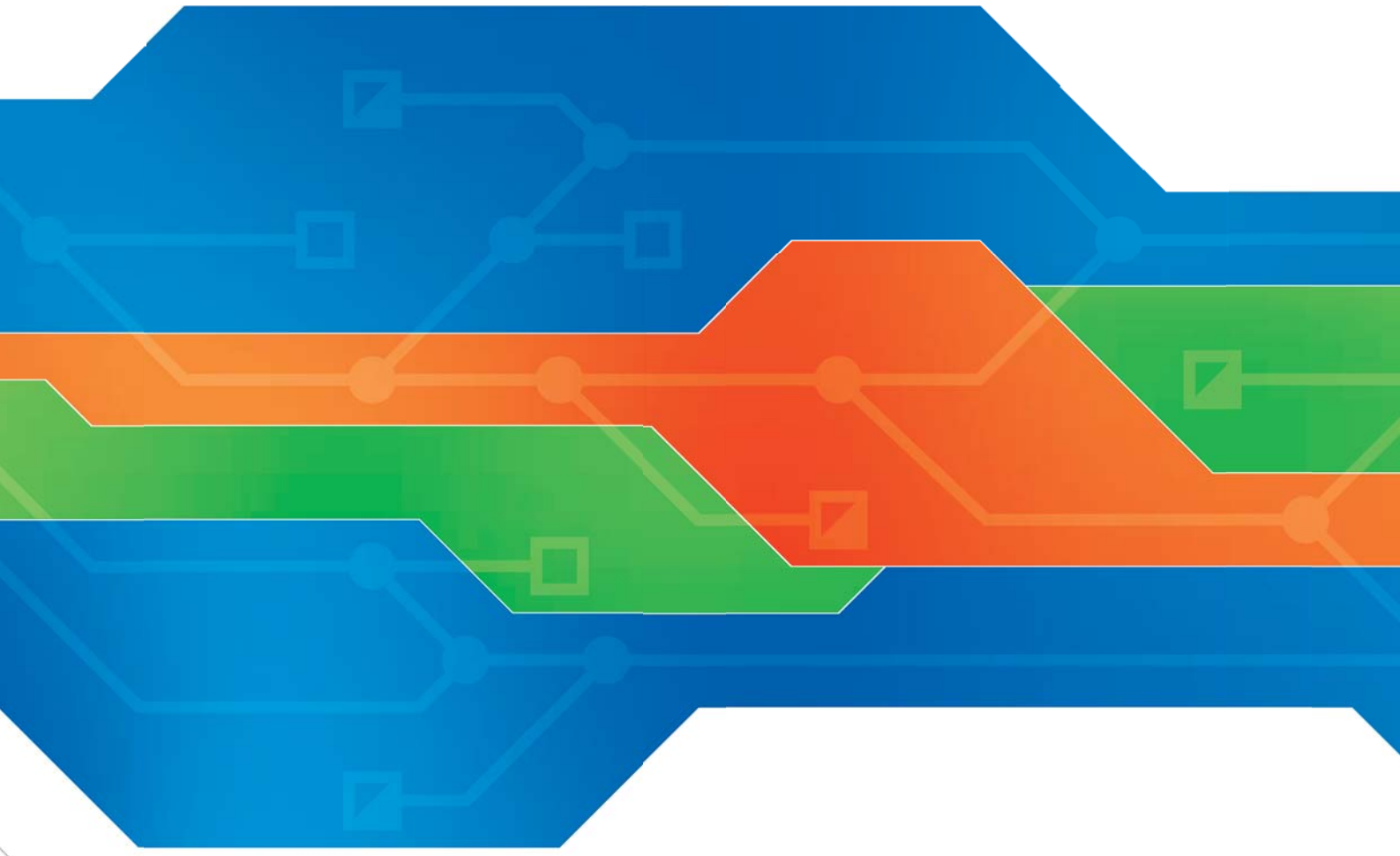

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