

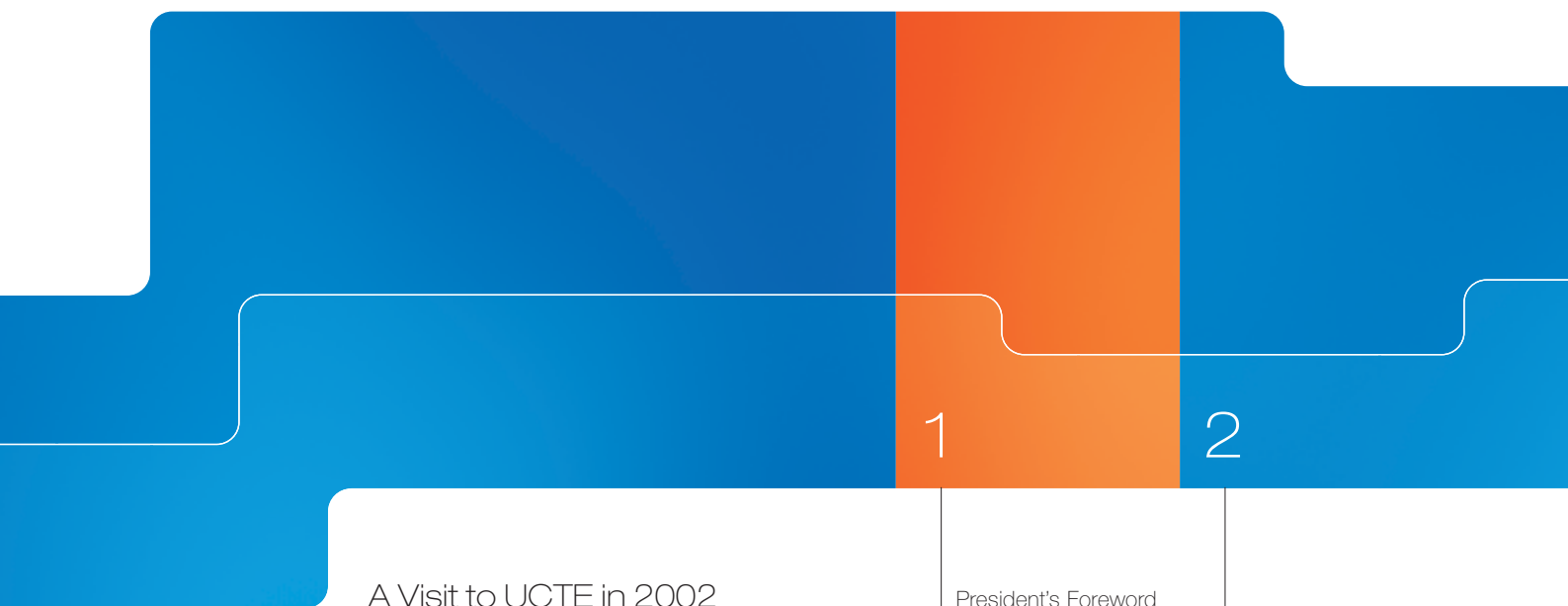


A visit to UCTE in

2002

union for the co-ordination of transmission of electricity

# UCTE Annual Report 2002



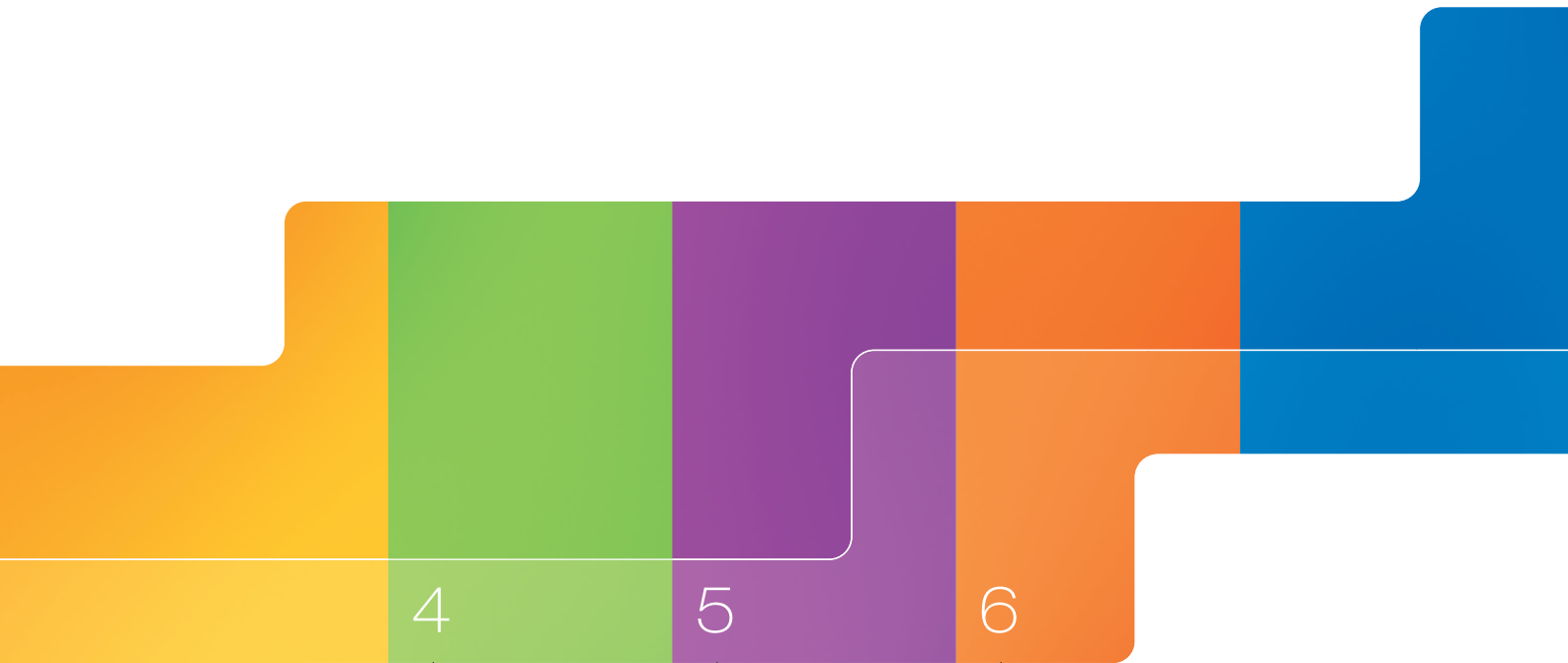
A Visit to UCTE in 2002

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# President's Foreword

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## PRESIDENT'S FOREWORD

*»Though we had set ourselves ambitious goals, we*

As Union for the Co-ordination of Transmission of Electricity we had proposed for the year 2002 to place greater emphasis than hitherto on the discussion about the refinement of the European electricity infrastructure. We wanted to make clear that the functioning of the market platform of the European interconnected power system is based on the smooth concurrence of our electricity networks.

Looking back at the year 2002, I can draw the following conclusion: Though we had set ourselves ambitious goals, we have managed to achieve them. The UCTE as guarantor of the reliability and availability of the interconnected power system on the European mainland is partaking in numerous important discussions about the future of the European electricity environment:

- In the context of the »Florence Process«/Electricity Regulation Forum, we have been explicitly entrusted with specific tasks by the European Commission, such as the development of binding rules for the interconnected operation between electricity networks.
- We are taking an active part in the Commission's formation of opinion concerning the promotion of infrastructure measures and the refinement of the technical foundations of the common European energy market.
- The European Commission has put us in charge of the lead in political discussions when it is necessary to assess from a technical point of view whether and, if applicable, in which way today's interconnection extending from Poland to Portugal can be expanded beyond this region, as proposed by UPS/IPS\*. Apart from the European Union, the UCTE is thus the essential force to assess the Russian desire for an extension of interconnection to Russia and associated countries like Belarus and Kazakhstan up to Mongolia.

Especially the question concerning the attitude of the UCTE towards an extension of interconnection far beyond the Ural Mountains and finally as far as to the Western Chinese border has been a matter of priority in our internal discussions. At the General Assembly in Bratislava in April 2002, there was already a consensus of opinion that such a proposal of extension entails first of all a substantial need for technical investigations. This resulted in a schedule which >>>

\* UPS/IPS – the Unified Power System is composed of Interconnected Power Systems (IPS) of Russia and Power Systems (PS) of Commonwealth of Independent States (CIS) countries except Armenia, and PS of Baltic states

Martin Fuchs  
President of UCTE



experience in this respect through the extensions realised during the past 10 years. Decision-taking bodies in Europe are increasingly using this experience as a basis for their decisions.

The reorganisation of our structures, in particular tightening-up of the committees' activities, has proven to be successful during the first whole year after entry into force! Through the results of

*have managed to achieve them.«*

>>> describes the further steps to be taken by the UCTE with a view to examining the Russian desire for synchronous interconnection.

In the context of an intensive strategic discussion at the end of November we agreed on the prospects of development in the light of today's electricity interconnection on the European mainland:

Our common standard for any kind of development is the current excellent security and availability level of our interconnected power system. The high reliability of our network which has not been affected by any major disturbance was again impressively manifested during the year 2002. This reliability is the basis for a secure, efficient and increasingly competitive electricity supply to more than 400 million customers in 21 European countries. It is an important location factor in view of the economic and social efficiency in these countries. We consider it to be our mission and challenge to maintain this high standard. We will test the appropriate tools and implement them in the scope of our activities.

In the current process of reconnection of the South East European countries, we will for instance soon extend our interconnection to new powerful partners. Romania, Bulgaria and the Western part of Ukraine are successfully undertaking considerable efforts to join this system in synchronous interconnection. In view of the present value, any other form of extension needs to be critically measured against the security standard achieved. We have gained valuable

their work, the Working Groups have contributed to a considerable strengthening of UCTE's outstanding expertise. Its spectrum covers a wide variety of subjects, ranging from statistical analyses and forecasts over the draft of an operational handbook for the operation of related fields of activity of network operators, the pre-feasibility study on a connection of UPS/IPS, improvement of the UCTE's external appearance and of international communication within the Union, to first proposals regarding the legal relationship between the Union's members.

Thus, in the final analysis, the UCTE committees have helped to achieve the ambitious targets that we had set ourselves: Strengthening of our internal and external profile so as to ensure that well-functioning electricity transmission across European power highways, which is supposed to be a matter of course, is conceded the importance it actually deserves as an extremely complex process.

A handwritten signature in black ink, appearing to be 'M. Fuchs', written over a white background.

Martin Fuchs

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## COMMON BINDING RELIABILITY STANDARDS AND SYSTEM DEVELOPMENT

### UCTE's challenges in the changing TSO business environment

During the year 2002, UCTE has reaffirmed its clear commitment to its mission as facilitator of the European common Electricity Market in a fast changing business and regulatory framework. In this respect, UCTE is facing today three main challenges:

- to maintain the reliability of the electric system at its present high level; this will imply a. o. modifications and contractual enforcement of operational standards made necessary by the development of the electricity market and the emergence of new types of actors and products (such as traders, electricity-based financial products, etc.),
- to implement a coherent strategy for the further development of the UCTE synchronous area,
- to further develop the tools for monitoring system adequacy.

These three challenges are cross-linked with mutually interfering aspects:

- The development of the synchronous area will be based on contracts, to be set up on a case by case basis, with the operators of the concerned areas. Such contracts shall ensure compliance, as far as needed for the realization of the interconnection, with the reliability standards governing the interoperability of the member control areas.
- The UCTE activities concerning the monitoring of the system adequacy will be guided by the increased role of TSOs and UCTE with regard to this issue. This increased role results a.o. from the draft revised Electricity Directive, as is mentioned below. <<<



## Institutional changes



On 25 November 2002, a political agreement was reached on the revision of the internal market Directive and on an accompanying regulation concerning the access to the network for cross-border trade.

The proposal amending Directive EC 96/92 refers to UCTE concerns on many issues, of which two deserve specific attention:

– *Article 4* addresses the problem of system adequacy by prescribing monitoring of the security of supply to the Member States.

It is to be expected that in most of the Member States this task will be assigned to Transmission System Operators (TSOs). UCTE has already a long-standing experience in producing system adequacy forecasts. Despite increasing difficulties to meet this task accurately in a liberalised and unbundled TSO environment, UCTE will extend the time horizon of its forecast to 10 years in order to comply with the expectations of its stakeholders.

– *Article 7.5* of the Proposal allows TSOs to play an active role in the tendering process for generation capacities when this is needed for security of supply.

With respect to security of supply, UCTE points out that the potential responsibility of TSOs for monitoring the security of supply or for organizing tenders, does not per se confer the responsibility for the security of supply itself to TSOs. Indeed, this results from the share of responsibilities between the various parties in the market, as defined in the national Grid Codes.

With respect to the Development of the synchronous area, other institutional aspects, often reaching beyond the European electricity market, are to be borne in mind. Indeed, the synchronous area is now composed of countries which are UCTE members and countries which are not or not yet UCTE members. Furthermore, UCTE has also to answer to requests for interconnections from countries or systems, which do not necessarily aim at becoming UCTE members nor want to comply with the full set of UCTE technical rules. <<<

## Transforming rules and recommendations into reliability standards

In the past, voluntary compliance rules were adopted by »peer pressure« between vertically integrated regional utilities. The existing scheme of voluntary compliance with industry reliability rules is no longer adequate for today's Internal Electricity Market. The grid is now being used in ways for which it was not designed and there has been a steep rise in the number and complexity of electricity trade business. As a result, there has been a marked increase in the number and seriousness of violations of reliability rules. The users and operators of the transmission system, who used to co-operate voluntarily on reliability matters, are now competitors without the same incentives to co-operate with each other or to comply with voluntary reliability rules.

UCTE answers to these challenges by introducing a new set of standards – the first draft of the Operational Handbook – to the 9<sup>th</sup> European Electricity Regulatory Forum in Rome in October 2002. The Operational Handbook summarizes and updates all relevant existing UCTE rules and recommendations and transforms them into a stringent set of policies, which are intended to serve as a basis for the binding reliability standards. Such standards are needed, among others for the settlement of disputes, for the quantification of ancillary services and for the assessment of investment decisions, of congestion management tools, etc. in due respect of related reliability criteria.

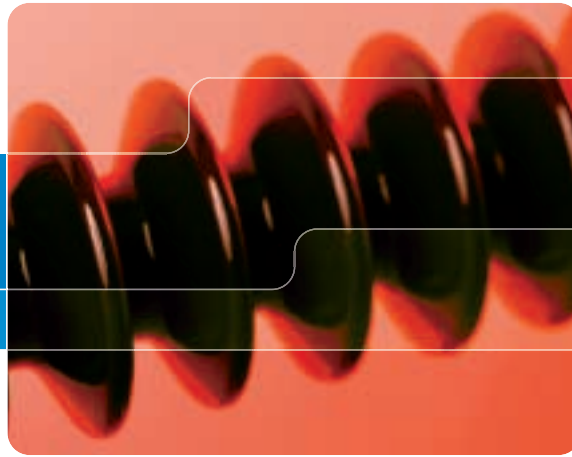
With regard to the enforceability of these standards, the legal experts of UCTE member companies investigated different possibilities to set up a binding legal framework. EU regulation might be considered as a basis for the EU countries.

For larger geographic perimeters, it remains to be examined whether the GATT or GATS rules are relevant, or if the framework of the Energy Charter Treaty should be taken into consideration.

At the last Steering Committee meeting of 2002, UCTE opted for the multilateral agreement amongst TSO parties as the preferred framework to achieve enforceability. All the members (which are the 31 TSOs of the UCTE synchronous area assuming responsibility for the operation of a control area and its inter-area interconnections) could undersign a multilateral agreement, by which they would be contractually committed and bound to observe the provisions indicated in the Operational Handbook. Such an agreement should clearly define responsibilities and liabilities between the TSOs concerned, and have a corresponding penalty system (possibly with liquidated damages) on a contractual basis. A dedicated Legal Experts Network has been set up to this aim, as commented further in this report.

### *Monitoring of system adequacy*

The assessment of the medium-term adequacy between generation and load has been one of the main concerns of the UCTE. The control systems – no matter how technically advanced – can do little for reliability and security if generation is inadequate or transmission is weak. As a response to market expectations, from the next years on, the System Adequacy Forecast report will therefore cover a longer period (see »Working Group Statistics«, see page 22). This UCTE tool becomes more than ever a powerful instrument to fulfil the task of monitoring and early warning for stakeholders and market players. <<<



## The UCTE Executive Team for the re-synchronisation of both UCTE zones

Since the early nineties, UCTE's top priority has been to reconnect the two synchronous zones that were separated by war events in the South-east of Europe.

An »Executive Team« was set up between all the TSOs involved with the main objective to sign a »Multilateral Re-synchronisation Program« and a »Multilateral Operational Coordination agreement«. This »Executive Team« is thus coordinat-

ing restoration works along the UCTE North-South interface, and defines technical procedures of resynchronisation incl. data acquisition, settlements of unintentional deviations, co-ordination of energy exchanges and maintenance of transmission lines. A major reconstruction project for the Ernestinovo substation was launched by HEP (Croatia), and other crucial projects for the region (*Mostar* and *Gacko* substations, Adriatic line) are in progress.

## Development of the UCTE synchronous area

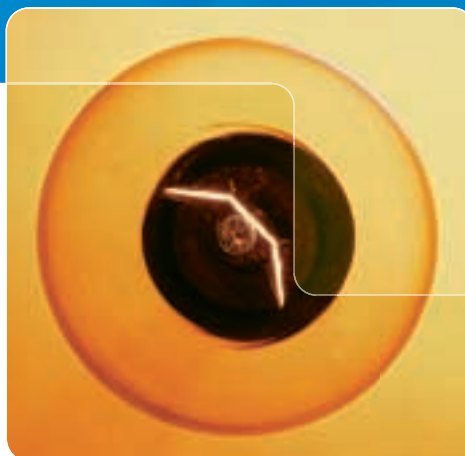
In the section on the Working Group System Development, further in this report, the various developments realized or under way in 2002, as well as the requests for further development, are commented.

We here address some general issues related to system development:

The nature of the technical problems has changed. Historically, the process involved a step-by-step integration of relatively small systems which were meshed in the synchronous area. This process is now challenged by, on the one hand, the request for a synchronous interconnection of systems which are in size comparable to the whole UCTE system (i.e. the UPS/IPS request) and, on the other hand, a demand for synchronization of a big system with other standards and relatively weak interconnection to UCTE (i.e. the Tunisia-Lybia interconnection).

Besides, more and more stakeholders are concerned by the interconnection of a new system to the present one, and more and more elements have to be taken into account.

Considering the requested interconnection with the UPS/IPS electric system, issues such as nuclear safety, environmental compliance, market reciprocity and cost-based pricing have been put forward by national and European authorities and stakeholders as prerequisites for interconnection. >>>



>>> With regard to the technical and operational aspects of potential interconnections, which are clearly within the UCTE competence, several organisational and institutional questions have arisen:

- Technical feasibility: Feasibility studies have to be performed relative to the various demands, arising the question of their financing;
- Necessary investments: To guarantee the technical feasibility and the security of the system, investments may be necessary on different parts of the system, and in particular on facilities like power plants (Power System Stabilizers – PSS, for example) which are not directly concerned by the new interconnection. Who takes the decision to make these investments, and again who will bear the related costs?
- Consequences on the present system: The connection of a new system may have an impact for example on transmission capacities inside the individual systems. This impact on the existing transmission capacities has to be agreed by the different market participants.
- Operational and commercial rules: The players partaking in the new system will have to agree on a minimum of operational and commercial rules. Moreover, as long as the contractual framework between UCTE and the other system and its organizational model have not been defined, it will often be impossible to make binding conclusions on the technical characteristics of a given interconnection. For example, the transfer capacity on a given interface depends on the organisation of ancillaries on either side and on the market models for capacity allocation.

This list is certainly not exhaustive but it shows that the connection of a new system involves many stakeholders. <<<

## Which relationships can be developed with areas neighbouring the UCTE system?

In the case of existing High Voltage Direct Current (HVDC) interconnections, the relation between UCTE and the adjacent areas is managed by agreements between the respective TSOs and neighbouring UCTE members.

In the case of new HVDC interconnections, UCTE governing bodies may decide, on grounds of interoperability and/or security, that the interconnection concerned shall be submitted to an approval procedure. In accordance with this procedure, such HVDC interconnection shall in principle be governed by an Interface Agreement, signed on the UCTE side by one or more members.

In the case of new AC interconnections, possible formulas to be considered for the relation between UCTE and other synchronously connected areas are: Inter-Area Cooperation Agreements and, as an alternative solution, Interface Cooperation Agreements.

1. Inter-Area Cooperation Agreements between the UCTE members and the TSO (or group of TSOs) of a synchronously connected non-UCTE area will define the operational and system conditions of the respective areas which are necessary to ensure a well-functioning synchronous interconnection (comprising a.o. control characteristics and parameters, stability issues, etc.). Such an Inter-Area Cooperation Agreement is the basic option for cooperation between UCTE and the TSOs of the interconnected areas.
2. Interface Cooperation Agreements might be developed in the future between UCTE members and the TSO (or group of TSOs) at the other side of the interface, defining operation rules and disconnection criteria at the interface.

The choice between the two types of agreements shall be based on criteria such as: the strength of mutual interaction between the systems, the possibility of system decoupling without jeopardizing system security, the responsibilities assumed by the UCTE member(s) adjacent to the extension.

On a case-by-case basis, the Steering Committee will decide on which procedure to follow. <<<

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# ATHENS MEMORANDUM 2002

## Towards a regional electricity market in Southeast Europe

On 15 November 2002, a Memorandum of Understanding on the Regional Electricity Market in Southeast Europe and its integration into the European Union's Internal Electricity Market («The Athens Memorandum – 2002») was signed at governmental level, a.o. by all Southeast European UCTE members and all parties synchronously connected to the UCTE interconnected systems in Southeast Europe.



The document sets up ambitious goals:

*»To establish an integrated regional electricity market in Southeast Europe by 2005 and ensure its integration into the European Union's Internal Electricity Market. This market will be based on the principles set out in the Electricity Directive and other legislation relating to the operation of the European Union's Internal Energy Market«.*

The more specific missions assigned by »The Athens Memorandum – 2002« to the countries and the represented TSO associations UCTE and ETSO were:

- »To implement Grid Codes by June 2004, that have common elements across the region that allow basic operation of the grid and do not discriminate against regional trade«;*
- »To identify all relevant technical norms for the operation of national markets, under the co-ordination and control of the European Transmission System Operators and the Union for the Co-ordination of Transmission of Electricity by June 2003«;*
- »To implement, in collaboration with the European Transmission System Operators and the Union for the Co-ordination of Transmission of Electricity, an appropriate method for collaboration and information exchange between national dispatch centres by June 2003«;*
- »To implement the SECI Working Group Plan for Tele-information Systems among national dispatch centres with the agreement of European Transmission System Operators and the Union for the Co-ordination of Transmission of Electricity, by 2005«.*

UCTE sees its main contribution to the »Athens process« in the co-ordination of activities aiming at the resynchronisation of the two separated zones which will substantially improve security of supply in the countries of Southeast Europe with a positive impact on market development. Furthermore, UCTE mandated its regional organisation SUDEL to take an active part in this process. In this respect, UCTE designates the President of SUDEL as UCTE representative in the Regulatory Forum for Southeast Europe. <<<

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# ACTIVITIES OF THE UCTE WORKING GROUPS



The Convenors of the permanent Working Groups, from left to right: Georges de Montravel (System Development), Carlo Crea (Communication Policy), Klaus Kleinekorte (Operations and Security), Jacek Ratz (Statistics).

As competence centers of UCTE, they made a cooperative contribution to the following objectives:

- Maintain the reliability of the power system in order to create and operate a robust, competitive, and non-discriminatory electric power market
- Gain and maintain the confidence of network users, government entities and market participants by providing them in a non-discriminatory way with high-quality data and information services
- Address the needs and requests of network users or neighboring systems to extend the UCTE synchronous area without jeopardizing the high quality standards developed by UCTE.



## Working Group »Operations and Security«

Convenor  
Klaus Kleinekorte



The Working Group's activities focused on drafting the UCTE Operation Handbook. This work started already in 2001 and basically consists in the transformation of UCTE ground rules and recommendations into a set of operation policies.

The 8<sup>th</sup> European Electricity Regulatory Forum in spring 2002 welcomed the UCTE approach on this item and asked to present a set of reliability standards. Therefore, the Working Group, in consultation with the Steering Committee, rescheduled its work plan to give initially priority to reliability aspects when developing the operation handbook. Three teams were set up to prepare draft documents for internal discussions. This task was mastered successfully, and UCTE was able to contribute a preliminary set of operation policies to the Regulatory Forum in October 2002.

#### IV. Security and reliability standards

*A comprehensive set of common security and reliability standards to be observed by TSOs and network users should be presented and further developed and put in the public domain in order to ensure the efficient and secure functioning of the interconnected system and appropriate quality of electricity supply. The UCTE, together with Nordel and other network associations were invited, in close collaboration with the Commission, the CEER, ETSO and other relevant stakeholders, to present and further develop such standards, and to present them for discussion by 1<sup>st</sup> September 2002.*

Excerpt of the  
»Conclusions – Eighth  
Meeting of the European  
Electricity Regulatory Forum  
– Florence 21-22 February  
2002«.

Another activity led to the introduction of the Multi Time Frame System for energy exchange schedules between load frequency control blocks. After careful analysis and extensive simulation of the system behaviour, the decision was taken to

leave it to the discretion of the control block leaders whether to implement exchange schedules with neighbours based on 15-minute, 30-minute or 60-minute intervals. Starting from October, exchange schedules were introduced as a pilot project by Austria and Germany on the basis of 15-minute intervals.

The Sub-group »TSO-Forum« provides a platform for the exchange of experience gained in system operation. The TSO-Forum is responsible for the definition of the share of primary control reserve among the control blocks. It was agreed to fix the starting date for the newly confirmed shares on 1 January, to go along with time intervals for tendering procedures in different member countries according to new rules of the liberalised market. The forum initiated another frequency measurement campaign whose results will be available in spring 2003. An ad hoc team was nominated to review the document on the distribution aspects for primary control reserve. Technical pros and cons have to be analysed to give an answer to the question under which conditions primary control reserve may be contracted as part of the ancillary services on a broader geographical basis. The report on extraordinary operational events which is part of this annual report was prepared by the TSO-Forum.

>>>



>>> The Sub-group »Network Models & Forecast Tools« prepares, on a regular basis, reference network data sets (load-flow models, snapshots) and completes UCTE network models that are required for load-flow analyses, congestion forecasts and short-circuit calculations. Today the group is also responsible for the calculation of Net Transfer Capacity (NTC) values that are communicated through European Transmission System Operators (ETSO) to all market participants. All operational issues of the so-called Day Ahead Congestion Forecast (DACF) are co-ordinated by the Sub-group. In 2002, the daily day-ahead congestion forecast was implemented successfully among a greater number of UCTE members. This procedure was originally implemented by TSOs in Belgium, France and The Netherlands as the core team of the DACF methodology. The common goal is to implement the DACF procedure throughout the UCTE on an hourly basis. In 2002, the Sub-group also worked on an enhanced UCTE data format defi-

nition that is approaching finalisation. The »UCTE Format« is the basis for a standardised exchange of network model data.

A new Sub-group was formally founded with a view to tackling all operational issues of the Electronic Highway (EH) which was established on the initiative of ETSO, but is an operation tool today. The EH is a high speed data exchange infrastructure used among TSOs. It constitutes the backbone for a Europe-wide TSO Intranet. While it is mainly used for off-line data exchange today, there are plans to extend its use even to real-time data exchange. Some members are in a test phase already. Common goals are to enhance the topology of the EH with a view to achieving an even higher redundancy than it exists already today, and to enlarge the EH to the Southeast European region, to support the reconnection of the separated zone to the UCTE zone. <<<

Policy 1 – Load-Frequency Control and Performance	Policy 2 – Scheduling and Accounting	Policy 3 – Operational Security
<i>Policy Subsections</i>	<i>Policy Subsections</i>	<i>Policy Subsections</i>
A) Primary Control	H) Scheduling	3.1 N-1 Security (operational planning and real time operation)
B) Secondary Control	I) Online Observation	3.2 Voltage control and reactive power management
C) Tertiary Control	J) Accounting	3.3 Network faults elimination, short circuit currents
D) Time Control		3.4 Stability
E) Measures for Emergency Conditions		3.5 Technical requirements for inter-operability between TSOs
F) Performance Standards and Control Surveys		3.6 Co-ordinated switching
G) Technical Requirements and Qualifications for Generation		3.7 Outages scheduling
		3.8 Communication between TSOs

Excerpt of the draft of Policy 1 of the Operational Handbook of UCTE.

## Working Group »System Development«



Convenor  
Georges de Montravel

During the last fifty years, UCTE has contributed to build one of the largest synchronous interconnected systems in the world supplying hundreds of millions of customers in a secure and reliable way.

The liberalisation of the electricity market has put new challenges on the UCTE:

- The commercial exchanges are growing dramatically and, as a result, the demand in transmission capacity exceeds by far the capacity offered, especially on international interconnections;
- the driving forces for the development of the system are now mainly defined by market considerations and less by security matters.

UCTE has thus to face simultaneously numerous challenges:

### *The creation of the internal electricity market*

The first goal of UCTE is to maintain the security and reliability of the system. This forms part of UCTE's commitment to facilitate the creation of the European electricity market through providing a reliable market platform. UCTE has to deal with the congestions appearing on the different borders, and has also to study the reinforcement of the European network.

### *Ongoing projects*

Three projects which are not finished yet are on the agenda of UCTE: the permanent connection of Bulgaria and Romania with the second UCTE zone, the connection of the Burshtyn island with the first UCTE zone and the reconnection of the second UCTE zone (extended to Bulgaria and Romania) to the first one.

### *Requests for system development*

UCTE has received a request from new countries or a group of countries, respectively, to be interconnected with the UCTE synchronous system: Turkey (supported by the neighbouring Greek TSO) and the UPS/IPS system (including Russia, Ukraine, Moldavia, Belarus, and Central Asia, and the Baltic States).

Beyond these formal requests, the connection of the systems of Libya, Egypt, Jordan, Syria and Lebanon to Tunisia which is synchronously interconnected with the UCTE system would lead to the creation of a loop around the Mediterranean Sea, known as the Mediterranean Ring.

Having to face these new challenges, UCTE asked the »System Development« Working Group to study different scenarios regarding the strategy for the development of the system and possible impacts on the UCTE as an Association. In parallel with previous activities, the Working Group continued its work on concrete projects.

### *Financing of the studies*

The present system has been constructed by vertically integrated utilities which shared among themselves the consequences of system extension (studies, investments in generation, etc...). UCTE is now a pure TSO Association which has the exclusive responsibility for technical and operational issues concerning the whole grid. With the liberalisation of the electricity sector in Europe, many stakeholders are now concerned with the interconnection of new systems. There is a large variety of issues they have to deal with, such as: nuclear safety, reciprocity in opening-up the market, investments in generation, investments in the network, commercial rules, effects on transit capacities between countries, etc...

>>>



>>> One of the issues is the financing of the studies. To maintain the present security and reliability of the system, it is necessary to study the impact of the connection of the new system on the present one. These studies mainly consist in load-flow and dynamic stability analyses. Their costs are in the order of magnitude of 1 to 2 million €. This cost must be shared between the requesting system and other stakeholders, the European Commission being one of the key stakeholders.

### *Turkey*

The inventory phase of projects and studies as well as the assessment of the studies have been performed in 2002.

This led to a program of work that was approved by the UCTE Steering Committee. This program consists in a load-flow study, tests on the Turkish system and a stability study which completes the study performed in 2001 in the framework of the TEN program »Feasibility and evaluation study of the electricity interconnection Greece-Turkey«. Two scenarios will be studied, one with a connection between Turkey and Bulgaria only, and a second one with a line between Turkey and Greece.

The physical connection of Turkey implies two prerequisites: positive results of the study and the reconnection of the second UCTE zone to the first one. Regarding the stability study, contacts have been established with the European Commission to settle the question of financing.

### *UPS/IPS*

UCTE has received a request from RAO for synchronous interconnection of the two power systems. UCTE has decided to address this matter as a strategic issue, and has started the inventory of projects and studies already performed on the subject.

After finalisation of this inventory phase, and in view of the fundamentally different approach for system extension (the two systems are of comparable sizes and have different philosophies in terms of operation), UCTE decided to proceed in three main steps:

- a first load-flow study which will give some results on the ability of the UCTE system to host new transits
- a thorough analysis of the results at the UCTE General Assembly in May 2003, and a decision on a feasibility study
- a feasibility study that may require two years for analysing all the aspects inherent in the project.

Regarding the first load-flow study, first results are expected at the beginning of 2003.

### *Tunisia-Libya*

The request of the five countries (Libya, Egypt, Jordan, Lebanon and Syria) already interconnected, to be connected to the synchronous system via 225 kV lines between Tunisia and Libya, has been studied during the year 2002. The following work has been implemented in this respect:

- inventory of projects and studies;
- description of the power systems (representing 40,000 MW of installed capacity from Morocco to Syria);
- description and analysis of the defence plans;
- description and analysis of the protections on the Spain-Morocco cable;
- analysis of the results of the study performed by REE and Hydro-Québec in the framework of a contract with GECOL and STEG.

According to the conclusions and recommendations of the study, it is not recommended to close the Tunisia-Libya line in view of the present status of the network and defence plan. UCTE is now waiting for the countries concerned to show how the recommendations have been implemented. Furthermore, the study did not tackle the issue of potential inter-area low-frequency oscillations between the UCTE system and the electric systems of North Africa. This matter will be studied in 2003. <<<

## Working Group »Communication Policy«



Convenor  
Carlo Crea

Since a substantial part of implementation of the new UCTE strategy (on system development, Operational Handbook, enforceability of standards) depends on the communication performance of the association – internally and, above all, externally – the Working Group »Communication Policy« and the UCTE Secretariat have focused their activities on improving the public perception of major strategic issues.

After definition of the UCTE's communication goals, the Working Group determined the most effective ways of communication for each target group. There was a substantial increase in press releases and media contacts managed by the Secretariat. Thus, a mechanism was created for regular reporting on UCTE main issues. Inside the association, communication activities channelled the exchange of experience and results of the Working Groups. In this context, the first UCTE internal seminar was organised in 2002. Due to a broad participation, a direct dialogue was established at all levels of the association.

In order to mirror individual TSO activities in the context of the association, the new quarterly publication »Newsgrid« was introduced.

### *UCTE web site*

The main UCTE communication effort of the Secretariat has been to improve the UCTE information system.

Thanks to the renewed UCTE web site, public awareness about UCTE's rule-setting for operation and transmission and for system adequacy increased during the last year.

The new Web site has optimised the flows of information about UCTE's missions and activities. It represents an essential means to make UCTE publications available and to provide information about UCTE to the public.

### *UCTE Flyer*

The UCTE Flyer is a new and easily readable leaflet presenting the profile of UCTE to the external world. Particular emphasis is laid on the Association's scope of work, on memberships, and on services and projects which serve internal and external benefits.

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### >>> *Newsgrid*

Newsgrid is the new quarterly newsletter of UCTE providing information on the main activities of the Association as well as information contributed by the TSO members. Subscription to the Newsletter is free of charge at the UCTE Web site, while paper copies may be obtained through e-mail addressed to [info@ucte.org](mailto:info@ucte.org)

### *Seminars and Conferences*

To facilitate the exchange of experience and Working Group results, the first UCTE internal seminar has been launched in 2002. The outcome of the seminar has been used to draw up the new UCTE strategy for the future. The seminar has contributed to increase the awareness of TSO members with regard to the efforts undertaken and the activities performed by the Association.

### *UCTE Press Conference*

On the occasion of the opening ceremony of the UCTE Secretariat in Brussels, a press conference was held in order to officially present the Association as the responsible body for security and reliability of the interconnected system.

### *Media contacts*

Press releases and media contacts were increased in order to generate a mechanism for regular reporting about UCTE's main issues and activities such as:

- the new online access tool to UCTE statistics and databases containing up-to-date statistics and information on production, load, consumption, physical exchanges in the 23 countries of the UCTE area;
- the new forecast method adopted by UCTE to prevent major grid disturbances;
- the presentation of the new draft for operational standards on the occasion of the last Electricity Regulatory Forum held in Rome.

The main efforts of external and internal communication will be focused for the time being on giving substantial value to the key strategic issues supported by UCTE, and on reprocessing their respective contents for presentation to the public.

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## Working Group »Statistics«



Convenor  
Jacek Ratz

The ongoing deregulation of the European electricity market had also in 2002 a direct impact upon UCTE statistics. Steadily growing expectations of market participants, consultants, political and regulatory bodies towards statistical information are still putting great challenges on the Working Group.

On the other hand, the unbundling process of the European electricity industry and the increasing shares of renewable energy sources and smaller producers make it more difficult to collect precise information in some statistical areas. New statistics on unavailability of international tie-lines, network reliability and scheduled electricity exchanges are new achievements meeting expectations of market participants and regulatory bodies.

The activities of the »Statistics« Working Group during the year 2002 were therefore mainly focused on the following key issues:

- introduction of the new statistics,
- improvement of the quality of data collection, processing and publication,
- appropriate follow-up of the enlargement of the UCTE synchronous zone,
- improvement of the Power Balance Forecast report with a view to adapting the scope.

The work on new statistics started two years ago with the report of the ad-hoc group »Statistics in the liberalised electricity market«. The main goals to be achieved by this new publication policy were:

- to satisfy the increasing demands of political, regulatory institutions as well as those of market participants,
- to satisfy the needs of TSOs,
- to support the strategy and image of TSOs and of UCTE,
- to define an early warning system for grid issues and
- to determine measurable criteria for reliability and quality.

After a successful trial period in 2001, during which all new statistics were collected, processed and monitored via internet technology, the regular publication of data on scheduled exchanges, network reliability and unavailability of international tie lines started in January 2002.

One of the greatest concerns of the »Statistics« Working Group – an issue that is becoming more and more difficult in the unbundled context of the European power industry – is the quality of statistical information. The Working Group maintains the high quality of its information by means of control procedures, an extensive use of internet technology and by promoting fruitful direct contacts between National Correspondents, the »Statistics« Working Group and the UCTE Secretariat.

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>>> The annual Statistical Workshop, which took place in Brussels in May 2002, has been one major measure to ensure an efficient internal communication between all parties involved in UCTE statistics. This year's event was concentrating on data quality, the whole process of data collection and processing as well as on the clarity and impact of UCTE's statistical publications. The second part of the workshop was oriented towards external stakeholders.

Another challenge for the Working Group is directly linked with the enlargement of the synchronous area. The Working Group actively sup-

ported these evolutions while starting a test collection of statistical data from the Burshtyn Island, Romania and Bulgaria. From January 2003 on, those new regions will be fully integrated in the UCTE Monthly Statistics.

The »Power Balance« Sub-group drafted the reports »UCTE Power and Energy Balance – Retrospect for the year 2001« and »UCTE System Adequacy Forecast 2003-2005« on the basis of current operating data. These reports evaluate the UCTE system adequacy and have been published in the Half-Yearly Reports I and II, and on the UCTE Web site.

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## System Adequacy Forecast 2003-2005

The expected development in the national and international transmission systems in the 20 UCTE countries shall reduce or prevent existing or foreseeable transmission bottlenecks by reducing internal constraints and/or by facilitating the energy flows. The European Internal Energy Market should take advantage of these developments although heavy transmission loadings, congestions and system limitations are expected to continue in some areas.

Concerning the adequacy of installed generating capacity compared to the load, the report points out the situation of the system in terms of Remaining Capacity. Remaining Capacity can be interpreted as the excess of the installed capacity necessary to cover the difference between the monthly peak load and the UCTE coincident reference load, and longer term power plant outages, and is often estimated at about 5% of the installed capacity. Expected remaining capacity shows a substantial increase over the period from 2003 to 2005 (essentially concentrated on the first half-year 2004, then stable). This will improve the security of the UCTE system.

For the UCTE as a whole, over the period from 2003 to 2005, the remaining capacity represents more than 8% of the total generating capacity, but this overall potential sometimes cannot be exploited by all the UCTE members due to transmission system bottlenecks; thus, the situation should also be analysed on a region-by-region basis.

The above-mentioned additional power plant operator reserves of about 5% will not be fully available in Belgium (in winter), Germany (in summer), Italy and the Netherlands. However, these countries consider that national system security will not be at risk thanks to the use of interconnection capacity, new generating capacity, long-term import contracts and participation contracts in power plants located outside the national territory.

In the second UCTE synchronous zone (Greece, Federal Republic of Yugoslavia (YU), Former Yugoslav Republic of Macedonia), the increase in generating capacity seems to be inadequate to match load growth. In January 2004, the remaining capacity will be equal to zero in this zone. From July 2004 on, an improvement of this situation is expected when the additional 5% reserves will be nearly reached. Concerning the individual countries in this zone, there will be no evolution in the YU generating capacity while the load increases. In Greece, peak load will be covered by hydro production and imported energy, especially in case of delays in the construction of the new power plants. Therefore, interconnections will play a key role for ensuring the security of supply. The resynchronisation of this second synchronous zone to the main part of the UCTE network, expected by the end of 2003, will also improve the import capacity. So, the use of interconnection capacity is likely to relieve this system, and its security will not be compromised.





## Legal Experts Network (LEN)

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In response to the developments in the European electricity market, UCTE introduced some fundamental methodology changes in the preparation of the power balance forecasts in 2000. This year's reports adhered to this new methodology, but starting from this year's forecast, some supplementary information was given on transmission grid developments. The aim is to provide a more complete overall view on the power system evolution, and to investigate not only generating capacity adequacy but also transmission system adequacy. The contents of these reports were also made known to interested parties through Press Releases, increasing notably the resonance of this information in the European Press.

From the next years on, the System Adequacy Forecast report will therefore cover a 5-year period with the same quantitative data as in the past, and include an additional 5-year period with more qualitative information on the UCTE system. This becomes more than ever a powerful tool to fulfil the task of monitoring and giving an appropriate early warning system to all stakeholders of the electricity sector, thus supporting UCTE's mission as the organisation responsible for the security of interconnected system operation.

In the field of security of supply, the »Statistics« Working Group will co-operate with the ETSO Task Force »Security of supply« which is dealing with market aspects of this issue, and which covers a broader geographical range than UCTE.

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The first major task of the Legal Experts Network after its setting up in June 2002 was to prepare a procedure with a view to making UCTE standards enforceable – according to the request of regulators at the spring session of the »European Electricity Regulatory Forum«.

Three basic options of how to achieve this goal were investigated by LEN:

1. To modify and amend the present Articles of Association,
2. Voluntary adherence to a multilateral agreement between TSO – UCTE members, and,
3. To incorporate UCTE standards into the European legislation.

All three possibilities were analysed, and a multilateral agreement was identified by a majority of TSOs as the preferred direction for making standards enforceable and binding. Simultaneously, modification of the Articles of Association is examined.

By undersigning a multilateral agreement, TSOs shall be contractually committed and bound to observe the provisions indicated in the Operational Handbook. Such an agreement shall settle relations not only between UCTE and its members but also between TSOs themselves. A gradual penalty mechanism and compensation for possible damages caused by parties shall be introduced. Additionally, the LEN examines provisions of WTO and the Energy Charter Treaty, and their interference with a multilateral agreement.

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# THE EFFECTS OF SYSTEM EXTENSION ON INTER-AREA OSCILLATIONS

UCTE is experiencing the phenomena of inter-area oscillations – like other large synchronously interconnected power systems world-wide, too. This phenomenon has an increasing meaning in extended power systems, especially if they are loaded by high power transits. It has to be tackled in an adequate manner as otherwise the risk of instability may arise in certain system conditions with serious consequences for the system security.

The origin of inter-area oscillations can be illustrated by a spring-mass system, which is a mechanical analogue of a two area power system, see Fig.1 a. The masses represent the aggregated inertias of the rotating generators and turbines of both areas, each having a well meshed grid inside the areas. The spring corresponds to a relatively weak interconnection line.

The two masses may oscillate against each other causing spring forces. The oscillations  $\Delta x_1$  and  $\Delta x_2$  of the two masses correspond to the local frequency deviations  $\Delta f_1$  and  $\Delta f_2$  in the two areas. The spring force  $F_{12}$  is the analogue of the oscillating power exchange  $\Delta P_{12}$  between the two areas.

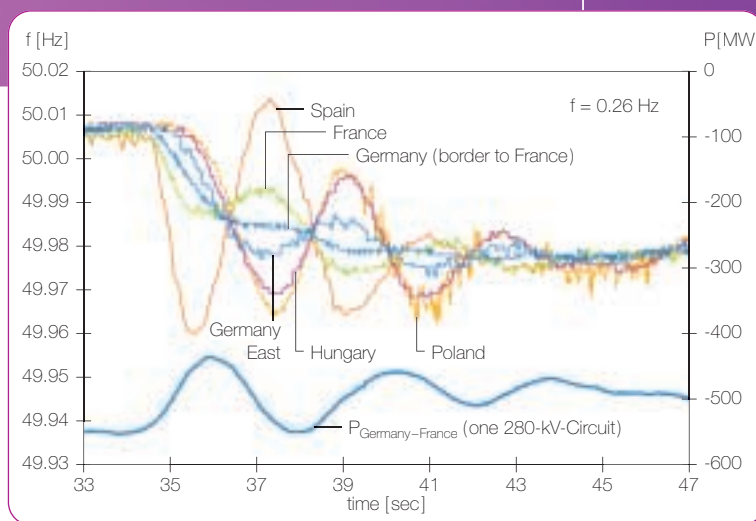
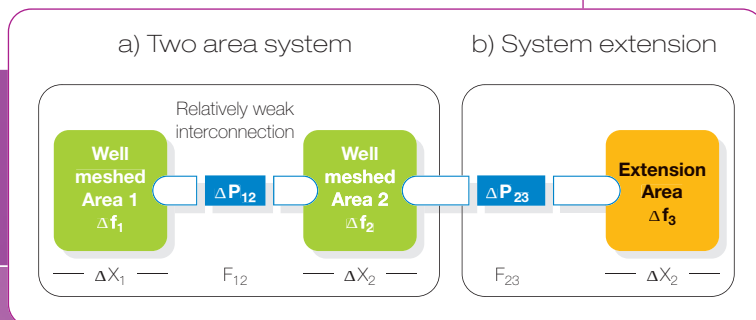
Fig.2 shows recordings of inter-area-oscillations in the UCTE system stimulated by a generation outage. The frequency oscillations of the border areas are in phase opposition, which shows that

the border areas Spain and Poland/Hungary are swinging against each other as illustrated in principle by the (very simplified) two mass model. The power flow corresponding to the spring force in the centre of the system is also shown in the diagram. During this incident, the oscillations disappear after around two cycles and do not affect system security.

The damping of the oscillation depends on the system loading, the load characteristics and generator/turbine control. A poor damping may be a severe security risk for the whole system. Insufficient damping may become a problem especially for systems with such oscillation frequencies which are not damped by the generators and their standard control systems. Unfortunately, an oscillation frequency ( $\approx 0,26\text{Hz}$ ) exists in the UCTE system, which lies in this critical range of poor natural system damping. Therefore, damping had to be improved by optimising parameter

Fig. 1 a) Mechanical analogue (spring-mass system) interarea oscillations  
 b) Extension of the system by interconnection with an adjacent power system

Fig. 2 Inter-area oscillations after a power plant outage in Spain, 900 MW, 17.01.1997



settings of generator voltage control and implementation of Power System Stabilisers (PSS).

The mechanical model illustrates that the supra-regional structure of the system is the main factor regarding the basic dynamic system characteristic, whereas the regional grid design has only little influence. It is evident that the system dynamics will change significantly in case of interconnection with a further area, see Fig. 1 b. The new system configuration may lead to new frequencies of possible oscillations.

This aspect is presently an important issue dealt with by the UCTE Working Group on System Development. While the UCTE system has grown more or less gradually in the past, UCTE is now faced with requests to extend the synchronous area in relatively large steps through interconnection with other existing interconnected power systems. UCTE has to investigate careful-

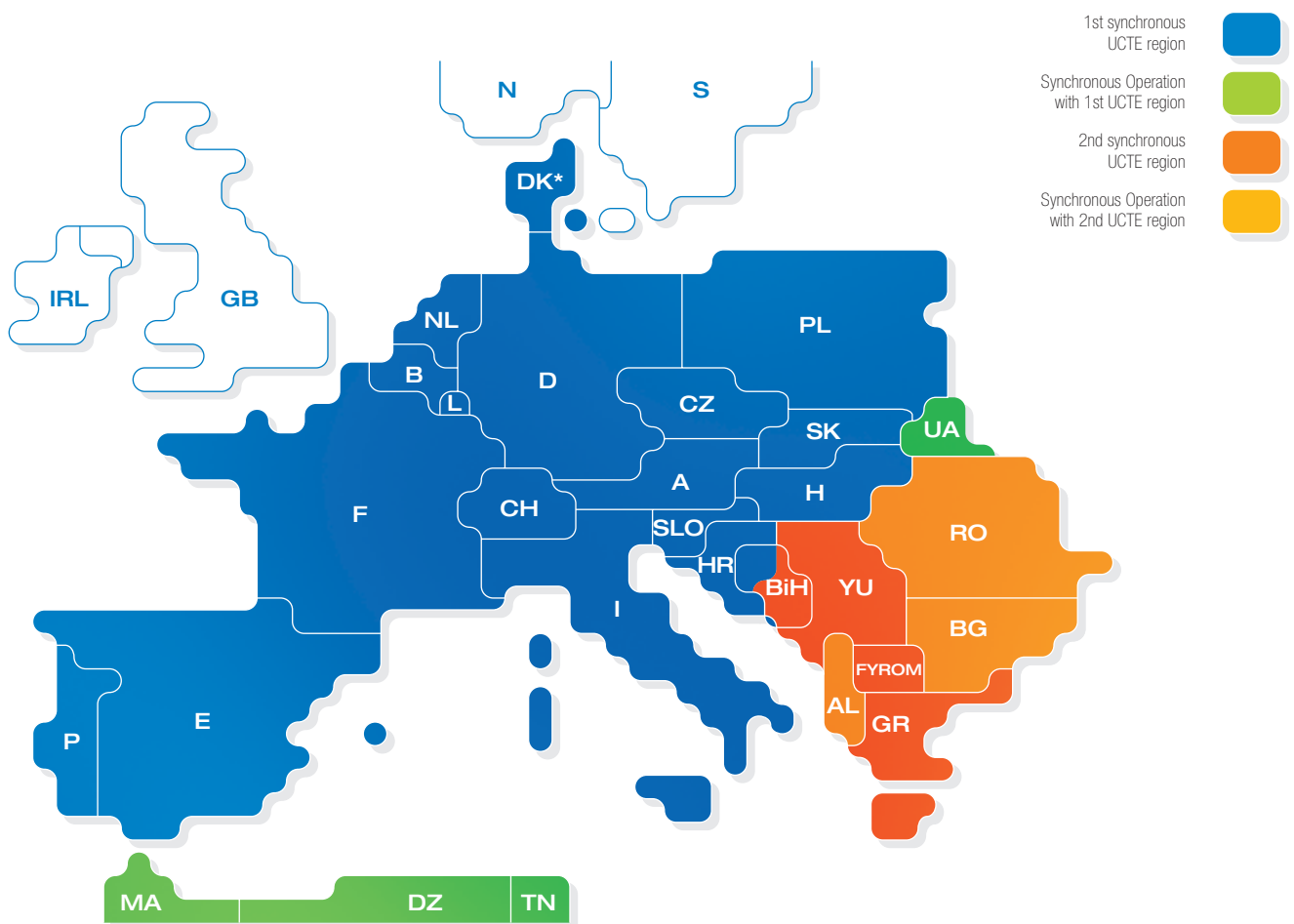
ly the effect on the dynamic system behaviour before synchronising an adjacent system.

To this end, UCTE uses a complete dynamic model for the synchronous area representing the 380/220kV grid and all large generation units including their generator and turbine control functions. This model is validated by recordings from the real system. This process is also required from the extension area: modelling on the basis of dynamic data and validation by recordings collected during isolated operation. The technical requirements are defined by investigations of the whole extended synchronous area. Using modern techniques for power system analysis and control, UCTE meets its obligation to maintain the system security, and enables the technical means to be optimally used for reliable parallel operation with new partners. <<<

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# UCTE'S INTERNAL STRUCTURE

The European area covered by the UCTE



All member countries are represented in the Steering Committee, which is the executive body of the association.

\*Associate member

## Member companies in UCTE as of 1/1/2003

Austria	TIRAG VERBUND APG VKW	<i>Tiroler Regelzone AG Verbund – Austrian Power Grid VKW-Übertragungsnetz-AG</i>
Belgium	Elia	<i>Elia System Operator SA / NV</i>
Bosnia-Herzegovina	JPCC	<i>Joint Power Coordination Center</i>
Croatia	HEP	<i>Hrvatska elektroprivreda d.d.</i>
Czech Republic	CEPS	<i>CEPS, a.s.</i>
France	RTE	<i>Gestionnaire du Réseau de Transport d'Electricité</i>
FRY	EPCG EPS	<i>Elektroprivreda Crne Gore Elektroprivreda Srbije</i>
FYROM	ESM	<i>Elektrostopastvo na Makedonija</i>
Germany	EnBW Transportnetz E.ON Netz RWE Net Vattenfall Europe Transmission	<i>EnBW Transportnetz AG E.ON Netz GmbH RWE Net AG Vattenfall Europe Transmission GmbH</i>
Greece	HTSO/DESMIE	<i>Hellenic Transmission System Operator/Diachiristis Elinikou Sistimatos Metaforas Ilectrikis Energias</i>
Hungary	MVM Rt.	<i>Magyar Villamos Művek Rt.</i>
Italy	GRTN	<i>Gestore della Rete di Trasmissione Nazionale</i>
Luxembourg	CEGEDEL	<i>Compagnie Grand Ducale d'Electricité du Luxembourg</i>
The Netherlands	TENNET	<i>TenneT bv</i>
Poland	PSE	<i>Polskie Sieci Elektroenergetyczne SA</i>
Portugal	REN	<i>Rede Eléctrica Nacional, S.A.</i>
Slovak Republic	SEPS	<i>Slovenská Elektrizáčná prenosová sústava, a. s.</i>
Slovenia	ELES	<i>Elektro Slovenija</i>
Spain	REE	<i>Red Eléctrica de España S.A.</i>
Switzerland	ATEL BKW FMB Energie  EGL Grid EOS ETRANS NOK	<i>Aare-Tessin Ltd. for Electricity BKW FMB Energie AG/ BKW FMB Energie S.A.  EGL Grid AG Energie Ouest Suisse ETRANS AG Nordostschweizerische Kraftwerke AG</i>
Denmark	ELTRA*	<i>Eltra</i>

\*Associate member



The Bureau, from left to right: Frank Vandenberghe (B), Chairman of Steering Committee, Martin Fuchs (D), President of UCTE, Marcel Bial, Secretary General and Alexander Ksinan (SK), Vice-President.

## Bodies

The decision-making bodies of UCTE are the Assembly consisting of all 31 members of UCTE and one invited associated member, and the Steering Committee with one representative from each one of the 20 member countries and representatives of Bulgaria and Romania as guests.

The Bureau representing the Association externally consists of the President, Martin Fuchs (D), the Vice-President of the Association, Alexander Ksinan (SK), the Chairman of the Steering Committee, Frank Vandenberghe (B), and the Secretary General, Marcel Bial.

## Working Groups

In 2002, a Legal Experts Network was installed in addition to the 4 permanent Working Groups, due to the growing importance of legal aspects of the TSO business.

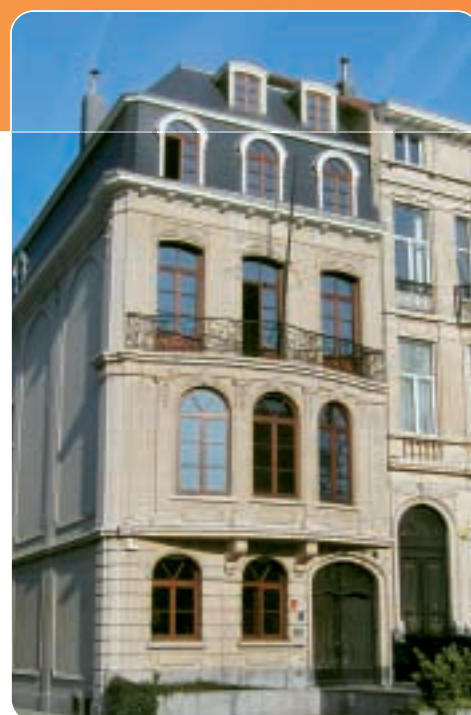
The 4 Working Groups composed of experts from the member companies, focus their activities on operations and security, system development, communication policy and statistics. They are installed and entrusted with specific missions by the Steering Committee to which they report according to the Articles of Association.

## The Secretariat

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

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<http://www.ucte.org>  
E-Mail: [info@ucte.org](mailto:info@ucte.org)

The Secretariat is responsible for assistance and 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.

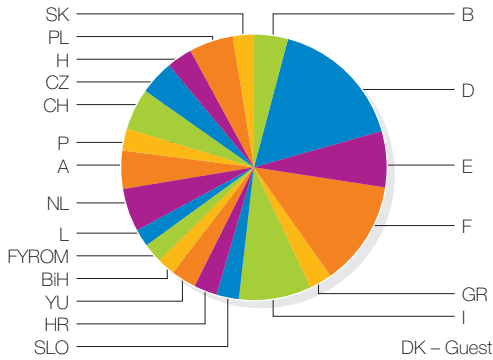


## National representatives in the Steering Committee

A	<i>Heinz Kaupa</i>
B	<i>Daniel Dobbeni</i>
BiH	<i>Milenko Cokorilo</i>
CH	<i>Pierre Gfeller</i>
CZ	<i>Jiri Feist</i>
D	<i>Wolfgang Neldner</i>
E	<i>Angel Landa</i>
F	<i>Pierre Bornard</i>
FYROM	<i>Pande Lazarov</i>
GR	<i>Adrianos Papathanassiou</i>

H	<i>Antal Tombor</i>
HR	<i>Ivica Toljan</i>
I	<i>Carlo Sabelli</i>
L	<i>Georges Bonifas</i>
NL	<i>Gerard Maas</i>
P	<i>José Penedos</i>
PL	<i>Jerzy Dudzik</i>
SLO	<i>Vekoslav Korosec</i>
SK	<i>Alena Salamonova</i>
YU	<i>Vladimir Marjanovic</i>

# Organizational chart as from 1 January 2003

<i>Bureau</i>	<i>Assembly</i>	<i>Secretariat</i>
<ul style="list-style-type: none"> <li>– President: Martin Fuchs (D)</li> <li>– Vice-President: Alexander Ksinan (SK)</li> <li>– Chairman SC: Frank Vandenberghe (B)</li> <li>– Secretary General: Marcel Bial</li> </ul>	<p>31 TSOs from 21 countries Chairman: Martin Fuchs (D)</p> <p>Voting rights:</p>  <p><i>Steering Committee</i></p>	<ul style="list-style-type: none"> <li>– Secretary General: Marcel Bial</li> </ul>
<i>Working Groups</i>	<i>Subgroups</i>	<i>Technical Committees</i>
<p><i>Operations and Security</i> Convenor: Klaus Kleinekorte (D)</p>	<ul style="list-style-type: none"> <li>– <i>Network Models and Forecast Tools</i></li> <li>– <i>TSO Forum</i></li> <li>– <i>Electronic Highway</i></li> </ul>	<p><i>UCTE/BG-RO</i> Convenor: Vekoslav Korosec (SLO)</p>
<p><i>System Development</i> Convenor: Georges de Montravel (F)</p>	<ul style="list-style-type: none"> <li>– <i>East of CENTREL</i></li> <li>– <i>Mediterranean Ring</i></li> <li>– <i>Turkey</i></li> <li>– <i>Study Tool</i></li> </ul>	<p><i>UCTE/Ukraine</i> Convenor: Ireneusz Radzio (PL)</p>
<p><i>Statistics</i> Convenor: Jacek Ratz (PL)</p>	<ul style="list-style-type: none"> <li>– <i>Power Balance</i></li> </ul>	<p><i>Executive Team for North-South reconnection</i> Convenors: Ivica Toljan (HR) Jiri Feist (CZ)</p>
<p><i>Communication Policy</i> Convenor: Carlo Crea (I)</p>		<p><i>SYSTINT*</i> Convenor: Georges de Montravel (F)</p>
<p><i>Legal Experts Network</i> Convenor: Luigi De Francisci (I)</p>		<p>* joint Task Force UCTE/EURELECTRIC</p>





## Used abbreviations

DACF	<i>Day Ahead Congestion Forecast</i>
EH	<i>Electronic Highway</i>
ETSO	<i>European Transmission System Operators</i>
HVDC	<i>High Voltage Direct Current</i>
IEM	<i>Internal Electricity Market</i>
LEN	<i>Legal Experts Network</i>
NTC	<i>Net Transfer Capacity</i>
PSS	<i>Power System Stabilisers</i>
TSO	<i>Transmission System Operator</i>
UCTE	<i>Union for the Co-ordination of Transmission of Electricity</i>
UPS/IPS	<i>Unified Power System/Interconnected Power Systems (of CIS and Baltic countries)</i>

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