



UCTE

On The Move

ANNUAL REPORT 2008

UCTE: On The Move

Dear Reader

The title of this year's Annual Report stands - besides the required reporting on the activities of UCTE - for two quite different points of view on our organization: On the one hand it ought to be a symbol for all the big and important developments that will happen in the upcoming years - as we all know, the European Electricity Market will never be the same again.

On the other hand the work and the results we achieved within the UCTE brought the markets together and made them fit and well prepared for all the future challenges.

Therefore this Annual Report is the perfect occasion to throw a look at the past, at the history of UCTE and the achievements for a secure supply of electricity

for more than 500 million people - a reason to be very proud of for all of us!

As a matter of course a glance at the past not necessarily has to be as dry as dust. When people are closely working together across a multitude of countries, languages and cultures there always not only occur historically important facts but at the same time very human and emotional side-stories, too. This matter of fact has also been kept in mind when producing the Annual Report on the year 2008.



Monika Walser
Convener WG Communications



CONTENT

President's Forword	4
Chairman's Statement	6
Workgroup Operations and Security	8
Workgroup Compliance Monitoring	10
Workgroup Coordinated Planning	16
Workgroup System Strategy	20
Workgroup Data	22
Workgroup Communications	24
Workgroup Legal Affairs	26
Crisis Management Platform	28
Electricity Grid Reliability Conference	30
System Extension Studies and Projects	32
Integration of Renewables – EWIS Project	40



PRESIDENT'S FOREWORD

From UCTE to ENTSO-E

In 2008, and following more than 5 decades of pioneering cooperation on the operational aspects of system operation, UCTE has again contributed substantially to develop the TSO products and initiatives to enhance cooperation for the largest synchronously operated electrical grid, the UCTE system.

This report provides to readers some insight on progress achieved in 2008 besides a review of UCTE history main achievements.

However, the European Commission launched in September 2007 proposals for a 3rd package of energy legislation. These proposals were in 2008 amended by the European Parliament and are likely to be adopted in 2009. This legislative initiative of the European Commission foots on one hand on the acknowledgement that the current multilayer, voluntary cooperation among TSOs has no doubt delivered a fundamental contribution to the development of the European Internal Market. It has also boosted the efficiency and reliability of the transmission networks to the level of reliability enjoyed by European citizens and industry at the eve of the 21 century.

Nevertheless, the increased complexity of electricity systems and of the challenges resulting from the large-scale integration of renewable energy sources for de-carbonizing European industry in the next decades has brought to evidence that the current modalities for TSO co-operation have also their limits. TSO skills and assets will need to be backed by a substantial effort in the field of research and development to see the European transmission system evolving in a sustainable way from the infrastructures and their

historically designed functionality towards the "smarter grids" of the future.

A special effort of harmonization through European member states is needed to speed-up the permits to establish new overhead lines and underground cables not only in each country but also to assure an increased cross-border capacity of transmission.

Converging in the analysis of the above said, the Presidents of all current TSO associations decided already in 2007 to actively anticipate the 3rd legislative package and to agree rapidly on how TSOs should organize themselves to formalize TSO-cooperation. This resulted in the founding of the new Pan-European body ENTSO-E (European Network of Transmission System Operators) on 19 December 2008, in which all UCTE TSOs are founding members.

The key areas of work tackled in a multilayer structure of the unified TSO community will be:

- Coordination of grid operations.
- Development of technical and market codes including a monitoring role over TSOs implementation.
- Investment planning at the European interest level.
- Generation adequacy and outlook reporting for the market.
- Primary focus and organization for wide ranging consultative processes with all industry stakeholders on issues of European significance.
- Developing effective working interfaces with the European Commission and the future Agency for Cooperation of Energy Regulators (ACER) EC and the ACER.
- Grid connection and access rules.
- Data exchange and settlement rules.
- Inter operability rules.
- Operational procedures in case of emergencies.
- Capacity allocation and congestion management rules .
- T ransparency rules.
- Balancing rules including reserve power rules.
- Rules regarding harmonized transmission tariff structures including locational signals and Inter-TSO Compensation rules.

UCTE will bring into the new TSO body its grown up experience related to essential aspects of system operation and system development;

I am firmly confident that this restructuring of the transmission sector in Europe will be beneficial for markets and customers and enhance the perception by the civil society of the pivotal role of the transmission sector for delivering to Europe a reliable and competitive electricity supply, giving to European citizens the sentiment of a really integrated European market.



Jose Penedos
CEO of REN



CHAIRMAN'S STATEMENT

The future of TSO cooperation in the Continental Synchronous Area

The International Non-Profit Association "European Network of Transmission System Operators for Electricity ENTSO-E was established on 19.12.2008. At the same time, several Regional Groups of permanent character have already been established within the new body and have kicked-off their activities. Among these Regional Groups, the Regional Group "Continental Europe" will be the one to which the core activities of UCTE will be transferred.

The Regional Group "Continental Europe" will become operational following a positive decision of the Assembly of ENTSO-E regarding the proposed terms of reference upon assessment of the ENTSO-E System Operations Committee.

Since all stakeholders views converge on the fact that system reliability must be preserved with the highest priority in each existing synchronous system as a pillar for pan-European integration and further development of a pan-European Electricity market. The main purpose of the Regional Group "Continental Europe" is to promote the reliable and efficient operation of the Continental Synchronous Area. This includes the following activities:

- All operational issues (among others those related to frequency regulation, scheduling and accounting, coordination services).
- Regional Technical Network Codes for the Continental Synchronous Area.
- Implementation of codes and the procedures in case of potential infringements (Multilateral Agreement).
- Compliance monitoring for the Regional Technical Network Codes.
- Interoperability assessments (DC links, underground and submarine cables, integration of Renewable Energy Sources, requested extensions of the synchronous system) in close cooperation with ENTSO-E System Development Committee.

Thus, the transition from UCTE to ENTSO-E doubtlessly opens a new area of cooperation among all TSOs. One expects from the new structure a faster and more focused development towards the needs and goals set by the European Union. UCTE in the past has been developed through the initiative from TSOs and their dedicated individuals without laws and given rules by authorities. This spirit of initiative and responsibility should be preserved also in the future.

It means that the winding-up of UCTE as associative structure will definitely not screen off the numerous achievements of UCTE.

In the new framework of the 3rd Energy Package establishes new roles for all players. A very strong cooperation is foreseen between ACER and ENTSO-E. Only if this cooperation becomes trustworthy and is born of mutual understanding and respect great achievements will be possible.

The very ambitious goals of the European Union regarding generating electricity substantially from renewables, will demand substantial investments and much more resources to adapt the grid to the needs for consumers and generators.

The new area will challenge the TSO community even more than the past. Therefore the good old core virtue – a sound, reliable technical expertise and judgment as it was viable in UCTE – will be even more necessary than in the past.

A handwritten signature in blue ink, appearing to read 'Hans Peter Aebi'.

Hans Peter Aebi

Chairman of the Steering Committee



WORKGROUP OPERATIONS AND SECURITY

Requirements for generators relevant to system security

Secure system operation is only possible by close cooperation of generating units with the TSOs, because the system behaviour especially in disturbed operating conditions largely depends on the response of generating units to deviations from nominal values of voltage and frequency. It is therefore of crucial importance that generating units are obliged by the TSOs to meet technical requirements relevant to system security. Moreover appropriate dynamic behaviour of generating units, protection levels and control facilities are necessary in normal operating conditions and in a range of disturbed operating conditions in case of perturbations to the system or during system restoration in order to preserve or to re-establish system security and equipment integrity.

To ensure system security within the interconnected UCTE system and to provide a common security level, UCTE developed a technical paper "Definition of a set of requirements to generating units".

The minimum requirements as included in this paper set up a common framework for grid connection agreements between TSOs and power plants. The implementation of the requirements by generating units and the respective impact on secure system operation will be observed and analysed continuously by UCTE and experiences derived therefrom will result in a further development of this set of requirements.

Follow-ups on IC recommendations

During 2008, different work streams for follow-up of the recommendations coming from the IC were completed. The individual results and experiences following major disturbances gave progress and improvement for the operation and security of the UCTE system. If feasible, they were already integrated into the running UCTE standardisation procedures and the new revisions of different policies of the UCTE "Operation Handbook". Further investigations concerning "coordination between TSOs" have been carried out together with the WG System Strategy.

Update and revision of the policies of the UCTE "Operation Handbook"

From 2002 on and with the support of all stakeholders, UCTE developed a fully fledged security package around the UCTE "Operation Handbook". This handbook sets technical and organizational standards that constitute a common reference for all TSOs in UCTE for a secure and reliable operation of the transmission system.

Building on the return of experiences following major disturbances in the system as well as adapting to the changing TSO operational conditions UCTE launched a revision for all Policies of the Handbook. As part of UCTE standardisation procedures related to the operation and reliability of the system, in 2008 UCTE had successfully revised the UCTE "Operation Handbook" Policies 1, 2 and 3. Since the revisions for the policies have been consolidated, UCTE performed a public consultation on Policies 1, 2 and 3 at the UCTE Website.

UCTE - History I

Foundation and initial tasks

The UCLPTE (Union for the Co-ordination of Electricity (Production and) Transmission) was established in 1951 at the instigation of the Organization for European Economic Co-operation by the then vertically integrated electricity companies of Austria, Belgium, France, Germany, Italy, the Netherlands and Switzerland.

Its original role was to contribute to the development of economic activity through the improved exploitation of energy resources associated with the interconnection of electricity systems. Fuel economy was the central focus of joint work undertaken during the first phase of reconstruction, which was still marked by the effects of the war which had recently ended. UCPTTE's main objective was the optimum operation of electric power plants. For example, a surplus of production in countries whose generation was mainly based upon hydro power might be used to balance a shortfall in production beyond the borders of those countries, thereby allowing savings in coal consumption. Preventing a loss of surplus production was one of the first major successes of UCPTTE.

One of the essential technical requirements for interconnected operation in Western Europe at that time was the introduction of the primary and secondary control needed to ensure the frequency quality required and comply with the scheduled energy exchanges. Primary control allows for frequency stabilization in the event of an imbalance between production and demand by mutual assistance of all interconnected partners. Secondary control ensures that such an imbalance is in the end compensated by the party causing it.

By setting common operational rules and by organizing the international co-operation between the electricity system operators, the UCPTTE has assumed an increasing responsibility in the secure operation of the European interconnected electric system. These operational rules serve to guarantee security of supply and allow for safe operation of the synchronously interconnected UCTE system.

Finalization of the Policy 8 “Operational Training”

In the year 2008, UCTE community has finished the first release of the UCTE “Operation Handbook” with the publication of the Policy 8 “Operational Training”. By this, the full set of eight policies for operation was now completed successfully. The new Policy was also integrated under the “Multilateral Agreement” and application of its standards became mandatory for all TSOs in the UCTE community.

Policy 8 defines a standard framework for training in order to provide reasonable assurance that the transmission system operators within UCTE have and hold up the knowledge and skills to operate the power system in a safe and reliable manner. It provides a common framework for training of operating and supervisory personnel which enables building personnel competency in normal and insecure system conditions. Policy 8 gives a special focus to inter-TSO trainings to ensure that coordinated actions will be performed with a due quality by means of visits, workshops, on shift cross periods or bilateral/multilateral common training sessions on Dispatcher Training Simulator (DTS).

UCTE Frequency Quality Investigation

The last few years the UCTE grid is experiencing increasing frequency variations at hour boundaries. The frequency of the UCTE system can be seen as a global quality criterion for real-time power and energy balances, system disturbances and operation of control power depending on operation of generation units, daily and seasonal availability of power resources, typical daily and seasonal changes in the demand and real-time behaviour of third parties and grid customers. In 2008, a team of technical experts ended the investigation on the experienced changes in the quality of the frequency in the UCTE synchronous area. The main identified cause is a mismatch between fast and slow generation, leading to short term unbalances in the system. The existing requirements for generators cannot prevent from the experienced changes in the quality of the frequency.



WORKGROUP COMPLIANCE MONITORING

Compliance monitoring activities in UCTE have already three years. The objective of the Compliance Monitoring Process is to encourage TSOs' compliance with the UCTE Operation Handbook necessary to preserve the reliability of the UCTE synchronous area. In this way Compliance Monitoring contributes to a reliable electric supply in UCTE. For this purpose the UCTE Steering Committee set up in September 2004 the Ad hoc Working Group Compliance Monitoring and Enforcement Process. The main task of this group was to advise to the SC on how to further design the UCTE compliance monitoring program in terms of best balance between efficiency, reasonable workload and credibility of the process.

The first Programme was elaborated for the 2006 process (CMP-2006). The main principles of this first process were as follows:

- Standards and Requirements of Operation Handbook were converted into compliance questionnaires in order to give a common understanding of the OH rules.
- Checking of compliance was performed via reviews of member self-assessments and subsequent relevant information provided by the member TSOs.
- Inputs were entered and submitted electronically via the password protected UCTE extranet by the Control Area Managers.
- In case of non-compliance the affected TSO were obliged to submit a mitigation plan and (if requested by UCTE) subsequent progress reports.

CMP-2006 assumed mandatory assessment of first three Policies of the OH approved in July 2005:

- **Policy 1** – Load-Frequency Control and Performance
- **Policy 2** – Scheduling and Accounting
- **Policy 3** – Operational Security

Compliance/non-compliance was assessed according to the following classification:

- Guaranteed compliant (**GC**)
- Fully compliant (**FC**)
- Level 1 (Mainly compliant) (**L1**)
- Level 2 (Non-compliant) (**L2**)
- Level 3 (Severe non-compliant) (**L3**)

During the self-assessment process TSOs used comments to explain the chosen level of compliance and a reference list of relevant documents. Each TSO had opportunity to make suggestions to improve the OH as well as the compliance monitoring process itself by additional comments.

In 2007 AHG CMEP was transformed into Working Group Compliance Monitoring and Enforcement. Compliance Monitoring Programme 2007 had a little different principles resulted from first experiences and remarks obtained from UCTE members during trial process. Second Compliance Monitoring Program Mandatory assumed assessment of next four Policies of the OH approved in May 2006:

Policy 4 – Co-ordinated operational planning

Policy 5 – Emergency procedures

Policy 6 – Communication infrastructure

Policy 7 – Data exchange

Compliance /non-compliance classification was simplified as the former five levels caused difficulties at applying and assessments were done according to the following levels:

- fully compliant (**FC**)
- sufficiently compliant (**SC**)
- non-compliant (**NC**)
- not applicable (**N.A.**)

Compliance Monitoring Program 2008

The Compliance Monitoring Programs in 2006 and 2007 checked the compliance of TSOs with all UCTE Operation Handbook Policies existing at that time (Policies 1–7).

The Compliance Oversight Report 2008 contains the results achieved in 2008 within the scope of the regular self-assessment process in which the WG CME re-checked the compliance of the UCTE member TSOs with some especially important requirements and standards which are:

- Related to regional coordination and/or exchange of information between neighbouring TSOs and with UCTE (agreements, data exchange, etc.).
- Critical for the operation of the interconnected system (n-1, real time data exchange, etc.).

The WG CME identified the following 16 such rules.

This approach was approved by the UCTE SC. Similarly as in 2006 and 2007, the process was based on TSOs declarations (self-assessment) which were collected via Excel questionnaires and analyzed by the WG CME. It does not contain additional information collected during voluntary audits conducted at VE-T and TenneT.

The Compliance Monitoring Process 2008 was put in place after having introduced a few minor changes in the methodology which resulted from the Compliance Monitoring Processes 2006–2007, but developed new questions to help in-depth investigation going further than the rules themselves in order to check whether the general conclusions from CMP 2006–2007 are still valid.



Aside this Compliance Monitoring Program 2008 it is to be noticed that for the first time UCTE has launched voluntary audits for two voluntary TSOs (VE-T and Tennet) conducted by two teams composed of members of the WG CME. The goal was to check on site the relevance of answers to the CMP 2008, the audits having taken place in October. The results of audits were presented in Annexes to the main Compliance Oversight Report 2008.

In the CMP 2008 the WG CME continued to apply the same three compliance levels already used in 2007:

- Fully compliant **(FC)**
- Sufficiently compliant **(SC)**
- Non-compliant **(NC)**

Because of TSOs' concerns that compliance monitoring via self assessment requires a lot of workload, the Compliance Monitoring Process was designed streamlined and filling of the questionnaire was done through an Excel tool.

General results of Compliance Monitoring Program 2008

Detailed analysis of answers confirm main findings from 2006 and 2007 processes, that there is still a need and space for better coordination and cooperation between TSOs. The compliance monitoring process 2008 positively triggered the bilateral cooperation between neighbouring TSOs leading to an intensive exchange of information between neighbours and clar-

ification of their respective positions related to the monitored OH rules. This contributed to more self-criticisms in case of a lot of TSOs concerning the completeness or even nonexistence of internal or bilateral procedures and improved the quality of answers delivered in the questionnaires

The answers the TSOs delivered in the questionnaires within the scope of the self-assessment process 2008 are significantly better in comparison with those obtained during the last three years in which Compliance Monitoring was applied. The limited set of rules on the one hand and the more detailed questioning and cross-checking border by border on the other hand might be responsible for the more serious self-assessment.

The applied methodology of the self-assessment process proved it's functionality in 2008. Three compliance levels in conjunction with qualitative comments and the need to list the reference documents forced the TSOs to think conscientiously about their answers and delivered a sound set of information to the WG CME. This opened the possibility to closer inspect the TSO's actual situation concerning their compliance with the monitored Operation Handbook rules and to eliminate a large amount of the remaining discrepancies between them during the second part of the self-assessment process in the improvement loop which was performed in July/August.

The compliance monitoring of OH Standards and Requirements by the WG CME and the comments of TSOs gathered in the course of the self-assessment process represent a valuable feedback for the further improvement of the UCTE OH. Main conclusions from

compliance monitoring process concern the necessity of clearness, precise assignment of responsibilities and measurability of standards and requirements in OH.

The compliance monitoring in 2008 has proved that the process itself based on the self assessment has reached its maturity and further improvements do not rise compliance monitoring on a higher level. The workload for the WG CME increased heavily in comparison to the previous years. This might be obvious when reading the COR 2008 and considering that the WG performed two on-site audits (at Vattenfall Transmission and TenneT) in addition to the self-assessment process. Without an extraordinary dedication on behalf of many members of the WG this would have not been possible. This high level of commitment can't be kept in 2009 without a strong support of the UCTE (or ENTSO-E) Secretariat. Preparation of on-site audits, drafting of reports, analyzing self-assessment results, general assistance to the WG CME and coordination of its meetings justify the need for one full-time employee at UCTE (ENTSO-E) to support the Compliance Monitoring Process in the future.

During the Compliance Monitoring Process 2008 the following standards/requirements were identified as those most difficult to comply with:

P4-D-S2

Joint measures

P5-A-S2.3

Procedures for cross-border remedial actions

P5-A-S3.2

Common set of cross-border remedial actions available

P5-A-S4

Limiting the risk and propagation of the disturbance (common emergency procedures to be agreed)

P5-A-R1.1

Inter-TSO actions

P5-A-R1.3

Inter-TSO alarm on system states

P5-B-R2.1

Preparation of actions (common actions to be taken in case of system restoration)

The highest number of levels SC and NC refers mainly to rules related to bilateral agreements (especially to Policy 5 Emergency Operations).

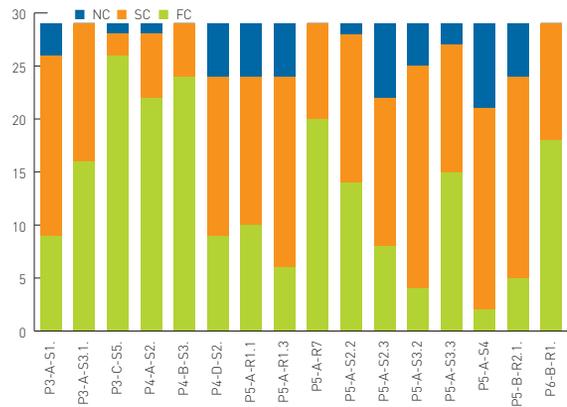


Figure 1. Compliance with monitored OH rules

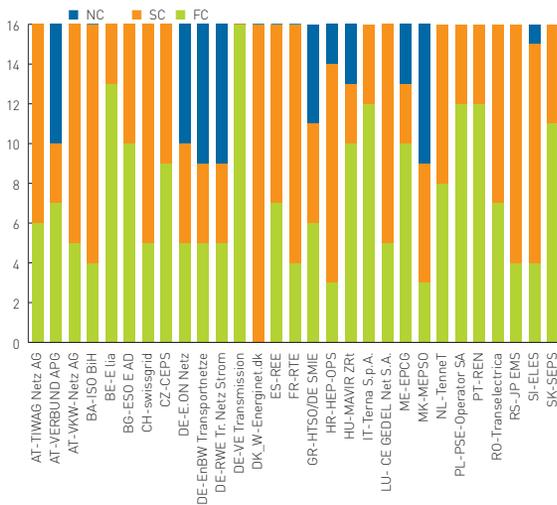
In 2008 in 52 cases TSOs increased their declared compliance level in comparison with 2006 and 2007. In 99 cases TSOs changed the compliance to a lower level in comparison with 2006 and 2007.



In opinion of the WG CME this is not necessarily the evidence of an overall compliance level decreasing, but rather an indication that the TSOs applied the self assessment process more thoroughly in 2008 and that the compliance awareness increased.

The overall compliance of the TSOs with the monitored standards and requirements can be assessed as satisfactory. VE Transmission declared itself fully compliant with all OH rules. On the other hand, several TSOs declared that they have about 50% of the monitored OH rules with which they are only sufficiently compliant or even non-compliant. In case of E.ON Netz, EnBW, APG and RWE the main reason is probably a strong self-criticism. In case of MEPSO the compliance is similar to that declared in 2007. Therefore, the lack of compliance of the latter is beyond any doubt.

There is a need for a harmonisation of the assessment. The lack of precise criteria results in a different assessment of the same situation by different TSOs.



Not all TSO answered the question on the workload, but the mean value for those who answered is about 25 hours (for 16 standards/requirements i.e. 105 minutes in average per standard/requirement) in comparison with 53 hours (for 129 standards/requirements) declared in 2007 (which means an average duration of around 25 min for each). The time spent by the TSO for answering some questions depended also on the number of the neighbours of the given TSO.

The above figures don't contain the additional workload (especially due to harmonization of answers with the neighbours) resulting from the review process between June 9 and August 20, 2008,.

Voluntary compliance audits

In 2008 UCTE for the first time performed the voluntary audits to the middle of October 2008. [VET: 13.10–14.10.2009, TenneT: 16.10 –17.10.2009]. Audit Teams were selected taking into account knowledge of languages and impartiality aspect. For instance there were no Audit Team members from audited TSO or from its neighbours. During audits the auditors reviewed the documents evidencing compliance with OH rules and put additional questions. They had a much better opportunity to clarify issues than within the scope of the self-assessment process.

Figure 2. Compliance with OH rules by TSOs

UCTE - History II

Gradual enlargement

In 1987, the original eight founding members were joined synchronously by Spain, Portugal, Greece and the former Yugoslavia. Subsequently regional groups such as UFIPTI consisting of France, Spain and Portugal or SUDEL made up of Austria, Italy, ex-Yugoslavia and Greece started to develop. These regional groupings formed a platform for discussing and handling operational problems of non-UCTE-wide interest.

In parallel to this evolution in Western, Central and Southern Europe the former COMECON countries Russia, Ukraine, Poland, former East Germany, former Czechoslovakia, Hungary, Romania and Bulgaria founded the IPS (Interconnected Power System)/CDO (Common Dispatching Organization) with headquarters in Prague.

Due to the different control philosophies of the two systems and the resulting frequency differences direct coupling of the two grids was not feasible. Thus possibilities for energy exchanges were limited and could only be performed on a small scale via radial operation. For increased exchanges, new technologies such as HVDC back-to-back links were required. The first DC link was commissioned in 1983 in Dürnrohr/Austria to be followed in 1993 by two more links in Wien Südost/Austria and Etzenricht/Germany.

In 1991 electricity companies in Poland, Slovakia, the Czech Republic and Hungary started their electrical separation from the former IPS / UPS system aiming at parallel operation with the UCTE grid. The foundation of CENTREL by these four countries on 12 October 1992 was the next step on their way to full integration which was achieved upon fulfilment of all technical conditions. These conditions had been defined by UCTE experts in a dedicated "Catalogue of Measures" and allowed finally (after some intermediate testing in the years 1993 and 1994 and synchronisation of the networks of VEAG [former GDR grid] and Bewag [Berlin]) for the synchronous operation on 18 October 1995. Following a year of trial parallel operation, the synchronous operation was declared permanent and the full membership of Poland, Slovakia, the Czech Republic and Hungary achieved in October 1997.

The first observations from 2008 audits indicate that Compliance Audits requires a good preparation of both the Audit Team and the representatives of the audited TSO. The audit itself absorbs a time, patience and full concentration of the participants

Audits in general confirmed self-assessments done by VE-T and TenneT. VE-T and Tennet demonstrated that they are well organized TSOs and that the representatives of VE-T and TenneT were well prepared. The audits took place in an open and friendly atmosphere. In the preparation phase the audit teams should have common understanding about the intention of the audited standards and should in advance set limits for what could be accepted as a level "sufficiently compliant" and where is the "limit" to "not compliant".

Onsite audits are the very good way to check the compliance of a TSO with the OH rules because:

- The audited TSO does a better and deeper self assessment.
- WG CME gets a better view on the transformation processes of OH rules into practices in the member TSOs.
- That can result in a better feedback to the WG O&S and the drafting teams and in a better process of developing OH.

The voluntary pilot audits conducted at VE-T and Tennet clearly demonstrated that the on-site checking of the TSO's compliance with the OH rules is one of the best methods for receiving clear and precise information on the audited TSO and to revise its list of evidences.

The Compliance Monitoring and Enforcement Working Group would like to thank Vattenfall Europe Transmission GmbH and TenneT TSO B.V., and their personnel who invested their time and many hours of work that led up to progress in UCTE compliance monitoring.

UCTE Workshop on Compliance Monitoring

The first European Workshop on Compliance monitoring was held on January 25, 2008 in Brussels. In the Workshop took part 46 participants including UCTE Control Area Managers, members of WG CME, representatives of WG OS, Nordel, ETSO, UKTSOA, European Commission, ERGEG/CEER, NERC. During the Workshop members of Working Group Compliance Monitoring and Enforcement gave presentations on results of compliance monitoring and on practical experiences gathered during compliance monitoring programs 2006 and 2007. Representatives of other TSOs associations (NORDEL, UKTSOA, NERC) presented experiences of compliance monitoring in their organisations.

Participants generally welcomed the UCTE Workshop as an open opportunity to present the key results of compliance monitoring programs 2006 and 2007, to exchange views based on the return of experience from UCTE Control Area Managers, to promote a common understanding on compliance process principles, and discuss the future of the compliance monitoring in Europe, which will substantially contribute to increase transparency of enforceability constraints impacting system operation.



WORKGROUP COORDINATED PLANNING

During the year 2008 major progresses have been made in the improvement of the coordination of planning activities between TSOs. These improvements have been materialized by the first release of the UCTE Transmission plan and by the completion of the common data basis for network planning studies. Works on system adequacy have been continued with the release of the System Adequacy Forecast and System adequacy retrospect reports. In addition preparatory works in order to change the current UCTE data exchange format to a CIM-based format have been undertaken; these developments will improve the flexibility of data exchanges and allow for more detailed modelling in planning studies

Release of UCTE First Transmission Development Plan (June 2008)

For the first time UCTE has released a UCTE Transmission Development Plan. This document is a survey of investments in the transmission grid that UCTE TSOs have either approved or are considering. It has been prepared on the basis of the inputs provided by the TSOs in the different regional for a.

Most of those investments have already been presented in the TSOs' respective Transmission Development Plans. The document provides a detailed list of cross-border investments and an overview of the internal investments forecasted in each country.

It is obvious that in order to meet the European energy policy objectives, the transmission grid must be developed while maximizing security and allowing an efficient use of the generation and by this way minimise total cost(from generation to retail).

Grid development is influenced by two interrelated parameters: consumption and generation. If consumption is expected to follow a rather low growth rate as a result of improved energy efficiency, generation

is affected by major changes resulting from the development of renewable energy sources and the renewal of the oldest thermal plants.

It results that the projects already submitted to the TSOs over the next 10 years should result in a net increase (including expected decommissioning of existing plants) of installed generation capacity in UCTE of approximately 220 GW (including 80 GW of wind power).

As consumption over the same period is forecasted to increase by only approximately 90 GW, it results that part of the generation projects should not be realised, that creates high uncertainties in the identification of future network development needs.

Globally, this means that UCTE TSOs should dedicate a total investment of around 17 000 M€ to the development of interconnections and the main internal transmission grid over the coming 5 years. Remarkable is that most of these projects refer to overhead lines. If due to external pressure, a more extensive use of underground cables would have to be considered, the investment costs would dramatically increase.

The materials gathered in this report, especially the status of the main cross border transmission projects will be regularly updated in order to make a real monitoring of these projects.

SAF (2009–2020)

UCTE has published its annual report on the future reliability of the synchronous power system. The UCTE System Adequacy Forecast report aims at providing all players of the European power market with an overview of generation and demand in the UCTE system by 2020, assessing the ability of the power system to supply electricity in standard and in most of the situations (system adequacy), for individual countries, Regional Blocks and UCTE as a whole, stressing the role of transmission capacities.

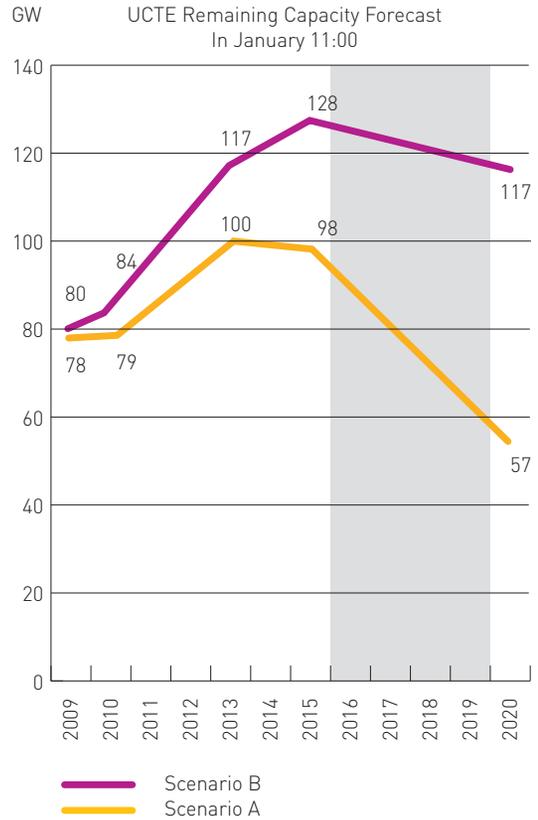
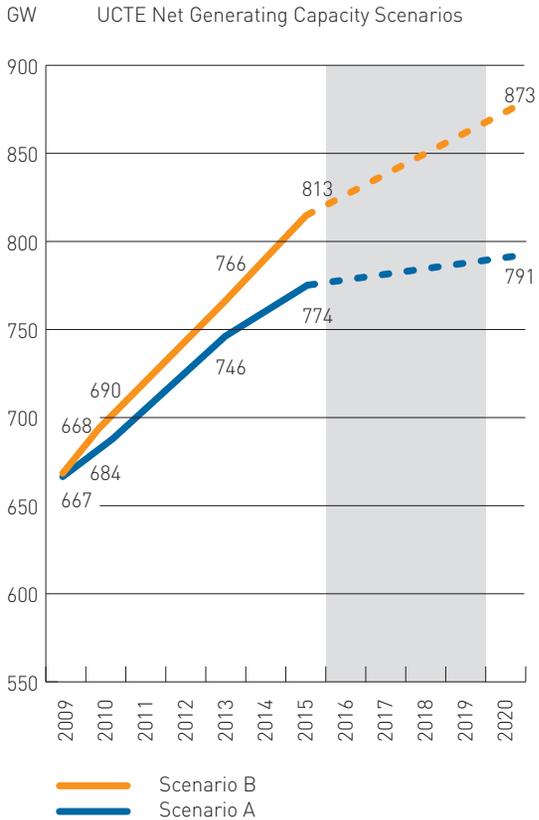
The main outcome of the "System Adequacy Forecast 2009-2020" is that investment in generating means is more than required to sustain the present level of power system security, even with the growing importance of Load Management.

UCTE countries need to go on investing in electricity generation to face a consumption growth of 1.6 % on average: in order to maintain generation adequacy in most situations in 2020 at the required level, more than 20 GW of additional investments in generating capacity will have to be confirmed and commissioned before 2020 (or even 56 GW to maintain it at the 2009 level).

The comparison of Remaining Capacity and Adequacy reference Margin shows that generation adequacy of the UCTE system should not be at risk up to 2015 in any generation scenario and in 99 % of the situations. However 2015 could mark a temporary peak of capacity as 2016-2019 is a period of uncertainties where decommissioning of older fossil fuel fired power plants could be carried out as a result of increased requirements on emission limitations.

Moreover the analysis of the adequacy per regional block shows, as observed in the UCTE Transmission Plan, that the sum of the generating capacities in the five regional blocks is globally higher than the UCTE forecasted consumption. So one can reasonably expect some market adjustments to make the investment profitable and thus reach a level of adequacy not so high as forecasted in this report. These adjustments may be sped up by the recent economic and financial context, keeping in mind that data was collected before mid-September at a time where there was no clear assessment of the impact of the crisis on the economic activity and its consequences on the electricity consumption as well as on the investments in new generation capacity. These likely adjustments in generation investment policies should lead to stress the role of interconnectors between regional blocks.

Moreover, it is not possible to tell whether the reported trends actually match the EU "20-20-20" targets or not: overall energy savings and cuts in CO₂ emissions may result in an increased electric consumption due to transfers from some primary energies to electricity, depending on national policies. Also, specific RES development and CO₂ emissions targets for the electricity sector itself are not yet defined at EU level.



Methodological improvements

Provision of 4 network models (Winter & Summer 2013 & 2018) for development studies

Preparing consistent network models for some reference times at the scale of the UCTE system will provide a common reference for the TSOs which will enable to perform common studies at the regional or interregional level in a more efficient manner and with improved quality.

This consistent modelling of the European system allows to focus on specific issues or projects while taking into account their potential influence on the surrounding areas. These base cases also provide a sound basis for further variants and scenarios adapted to future issues.

Launching the migration process from the current UCTE data exchange format to a CIM-based format and setting up the collaboration with CIM users and software providers

This change in the data exchange format aim at providing more flexibility in the content of data exchanged while keeping a common framework whatever the time horizon (operation or planning) and the nature of the studies is concerned.

It will allow to adapt the nature and completeness of data exchanged to the objectives of the study, like an increased information on the generating units which will provide a significant improvement for planning studies.

During the year 2008, the UCTE profiles have been defined and the migration tests with the software providers are organized early 2009.



WORKGROUP SYSTEM STRATEGY

2008 Progress towards TSO Coordination Services

Coordination at international level is fundamental for the security and reliability of the UCTE synchronous area. An improved TSO coordination will result in improved reliability. In 2008 UCTE progressed towards a system-wide coordination, both in operation and planning in order to increase the security and reliability of the system.

In 2008, System Strategy WG including experts from Operation and Security and Legal Affairs WGs carried out further investigations about the Coordination Service. The results were in particular:

- From system security point of view, to propose certain predefined Regions which form appropriate areas for a Coordination Service.
- In each region, the proposal is, first of all, to create a common IT-platform among the involved TSOs. Furthermore, if more than one TSO is willing to take advantage of a centralized coordination service, a physical center for one region gathering the data and performing the system reliability functions will be created.
- A preliminary legal and organizational analysis of the proposal for a Coordination Service was also examined.

In September 2008, UCTE established a dedicated Project Group on UCTE coordination service, in charge of the preparation of a detailed proposal taking advantage of coordination service initiatives launched by several TSOs so far.

Strategy towards “UCTE System Extension” was adapted and revised in 2008

Background

Today UCTE coordinates the operation and development of the electricity transmission grid from Portugal to Poland and from the Netherlands to Greece. The extension of this system since the first interconnections to the present status has been a success story. The reason for this success is that all extension steps have always been well planned and studied, and that all systems of UCTE members share the same, strict, technical standards and rules.

Currently UCTE is facing the challenge of extension requests – synchronous interconnections – in several directions, i.e.:

- To the south – east with the request for the interconnection of Turkey.
- To the south towards Africa with the request for the interconnection of Tunisia – Libya which, if successful, would bring the UCTE frequency up to Syria.

The request of Ukraine and Moldova for synchronous interconnection.

UCTE - Besides History I

It was a long process of pondering about what sort of tie to pick up for my brand new suit selected and bought especially for my first UCTE WG Communication meeting in Rome. My flight was after sunset and I was like a mole the whole day browsing the hell out of google to choose from plenty of Roman sights worth seeing. The plane took off and landed just by the book. As soon as it touched the ground I already pictured myself showing off in my new suit, which to me was supposed to have a 'baptism-of-fire' kind of symbolic meaning to accompany my first appearance in WG Communication.

I love Rome, that's an indisputable fact. My baggage, however, obviously does not. Why? Well, no amount of my trying to find it before the meeting yielded any success. And it wasn't the airport 'lost baggage' staff to blame. They really did their best to hunt it down, but to no avail. This, plus the fact that I was dressed up in a T-shirt and motley coloured short panties instead of wearing my famous suit, which meanwhile was probably having an adventurous ride with the suitcase bound for an unknown destination, drove me angry, very angry. To chill the situation out a bit, I was politely given a dressing-bag lavishly stuffed with a tube of toothpaste, a soap, some vitally important toothpicks and, last but not least, a snow-white, beautiful T-shirt with the 'Sky Chiefs' sign on it. Plus the assurance that my luggage will be found in two days, which was exactly when my flight back home was scheduled to go. And I thought to myself, what a wonderful world... My taxi got me to the hotel at 11.00 p.m. so going out for shopping at that time was out of question. Fortunately, I was able to find a compromise solution to the urgent 'short panties' problem thanks to the pair of jeans that I had in my rucksack. Anyway, now I had a delicate choice to make as to what to wear at the meeting. Either the white 'Sky Chiefs' T-shirt, which was astonishingly clean and devoid of natural odours, or the black-blue one I was wearing by default, which wasn't. However, the latter had similar colours as those found on the UCTE logo and that tipped the balance in favour of it. After having a long relaxing shower and some espresso, I was ready and still keen on showing up at the meeting, which I did but trying to keep a low profile for obvious reasons. Against all odds, everything went cool and I met some nice people out there.

Back at the airport, my self-willed baggage was patiently waiting for me, in the company of other defectors alike, at a storage facility and we both took off each happy about having his own mission accomplished. I did not kick it, at least not very hard. By the way, not that I'm a conspiracy theorist or suspicious, but just can't help mentioning the solid fact that the meeting actually took place on April 1st...

General strategy towards UCTE System Extension

In particular, three pillars of the UCTE Strategy towards UCTE System Extension are developed hereafter :

1. Reliability of the UCTE synchronous area is the issue of primary consideration and top priority importance when considering new interconnections. Secure operation and high quality of electricity delivery in the long-run should not be jeopardized by any new extension
2. UCTE is today the only competent body responsible for the synchronous extension of its synchronous area. However besides the technical aspects associated with a new Interconnection other non-technical aspects – such as Market Structure and Unbundling in the applicant's country, Environmental Issues, Wind Production issues etc – are becoming very important. UCTE shall provide the widest possible publicity on any new extension examined, in order to inform and collect opinions and consult with its stakeholders, both from the European political level and from the European electricity business.
3. In each case of synchronous interconnection request a DC connection investigation may be carried out in parallel to the AC investigation, to provide a viable alternative in case the AC connection is not found feasible

In 2008, System Strategy WG proposed a UCTE position paper on HVDC link projects

HVDC links can provide a very reasonable alternative versus AC links for UCTE system enhancement and extension to other networks. The typical large-scale investigation which includes studies, measurements and tests done for AC extensions is not required since HVDCs can link systems with different control philosophy, frequency quality and AGC performance.

Technical matters related to HVDC connections, i.e. impact of concurrent failure of such links and poor coordination of controllers can be dealt with by affected TSOs on a local basis or, depending on the size of the link by the TSOs in a region.

In principle, a UCTE decision is not needed for such links, unless the size and the number of links in a specific geographical area are very large. The issue can be decided on a specific project-per-project basis and lead to system wide investigation. In accordance with this procedure, such HVDC expansion to external systems shall be governed by an Interface Agreement, between the concerned TSO and the external counterpart.

Other than technical matters, such as compliance with EU regulations on market, environmental safety, fair competition, etc, (although very important) are beyond the responsibility of UCTE.



WORKGROUP DATA

Data on the UCTE interconnected system are the basis for the daily work of UCTE, its TSOs and numerous external stakeholders. Thus, in 2008 the focus was set to the consolidation of the various forms of data collected and continuous improvements of the quality of the provided data. With the publication of the first UCTE Data Handbook and the first written UCTE Data Policy, we answered to external expectations and our own self understanding as the source for reliable data on the UCTE interconnected grid.

Providing the basis for the daily work of Europe's electricity industry

High quality information is key asset for the success of any business. UCTE has been a reliable source for data on the synchronously operated system, providing all market participants and stakeholders with a transparent and open access to a common set of information.

Data are collected for numerous tasks and in the frame of the various Working Group activities. Most of the data are for public access in raw format and directly available on the UCTE website or published in one of the several UCTE publications such as the Statistical Yearbook. Other data are used for the elaboration of reports like the UCTE System Adequacy reports. All in all the amount of gathered data has increased significantly over the last years. The growing interest is well reflected by a growing number of data requests that are answered according to the UCTE Data Policy. Queries of the statistical database on the UCTE website and downloads of statistical publications increased again significantly. Among others, this increase of interest triggered an internal process in the consolidation of the data collection processes

within the year 2008, leading to a gain in efficiency in the collection and quality of the collected data.

With the establishment of ENTSO-E and the extension of the areas covered by the new association it must be expected that the strong interest in reliable TSO data will further increase over the coming years in Europe.

Data Handbook development

The UCTE Data Handbook was released for the first time in May 2008. It has become the reference document for all data gathering activities in UCTE, especially for the several experts delivering national data. The UCTE Data Handbook gives a detailed overview of the existing databases, reports, publications and the schedules of data collection and publication. It is structured in six chapters: UCTE Data Handling Principles, Statistical Data, System Adequacy Data, System Studies, Operational Data and an extensive Appendix including definitions and some specific technical issues.

After its publication, the UCTE Data Handbook was presented to members of ERGEG and the EC. Its content will flow into the new pan-European TSO Association ENTSO-E, therefore it will undergo an updating process in the beginning of 2009 in order to reflect the most recent situation of data of the UCTE area. This will ensure that the Data Handbook will serve as a valid and profound basis for a new data approach in the new association.

Cooperation beyond association borders

Since 2007, WG Data has been maintaining bilateral contacts with the members of COMELEC, the three Maghreb countries that are interconnected with UCTE: Morocco, Algeria and Tunisia. All UCTE data management processes, tools and statistical products were presented and made available to the TSOs of COMELEC. First tests for exchange of statistical data were performed during 2008. UCTE expressed its will to further deepen the data exchanges with COMELEC.

Steps towards ENTSO-E

As data harmonization is one of the key challenges in the frame of the transition towards ENTSO-E, WG Data started cooperation on data issues with specialists of all other future ENTSO-E associations at the end of 2008.

In the setup phase of the new Association, UCTE agreed with the other TSOs from NORDEL, UKTSOA, ATSOI and BALTSO to develop a matrix approach to tackle data issues in ENTSO-E. This will allow on the one hand having a consistent and transparent data management approach over the whole Association and on the other hand to allow for individual data activities within the three ENTSO-E Committees Market, Operations and System Development. UCTE will help drafting a concept to set-up a common ENTSO-E Data Working Group and Data Groups at Committee level with clear interfaces and split of responsibilities amongst each other.

Second huge challenge in ENTSO-E data management will be to define which data should be fully harmonized and jointly reported for ENTSO-E and which data should remain relevant at regional level.

Last but not least, a common approach towards a common Data Policy, definitions and IT tools must be found for ENTSO-E.



WORKGROUP COMMUNICATION

To rethink the role of UCTE in a reformed electricity legislative environment does not imply only to reconsider the scope of operability of a TSO association but also the interrelation within the organization and with the external world in order not to lose the exclusivity for guaranteeing security and reliability of the transmission system.

Considering the increasing numbers of actors and associations in the context of the liberalized electricity market, it is fundamental to show the capability to innovate and diversify services in accordance with the member's needs.

Through adequate and "lived" Communication Policy, WG Communication strengthened the image of the UCTE as Reference Centre for reliability and technical consultancy towards European institutions, market parties and other external stakeholders.

Over the last year the Association has undertaken considerable actions in order to make its day by day work, services, products and actions transparent and visible to all the members. Adequate communication/information platforms were established for UCTE groups, bodies and member companies, ensuring consistent, regular, transparent and reliable information flows within the Association and the coordination of external communication activities.

For UCTE communication, the 2008 year was a year of major events and new projects and services for all members that rewarded and encouraged membership participation and satisfaction.

For the first time in the history of UCTE:

- A Crisis Communication tool was developed and implemented. The brown-out of November 4, 2006 in the UCTE system had as an immediate positive consequence that UCTE started an active process for the definition and implementation of a reliable and professional crisis management system, especially from a communication perspective. The Communication Working group launched an initiative that led to the constitution of a communication and information platform aiming at an effective alert mechanism, as well as a fast, consistent and correct channeling of information and reporting of events in case of major disturbance in the UCTE system. It is important that TSOs share the same basic information about facts and speak with one voice, thus giving proof of their professionalism and coordination capacity. It is also important that the necessary level of confidence be created within parties so that information can be duly shared.

- A Conference on Reliability of Power Grids in Europe was organized. The Conference confirmed a great consensus in the key role of Transmission System Operators in the reliability of the European electricity grid and the achievement of the ambitious 20-20-20 targets of the European Commission. It was underlined that reliability today can only be ensured by system operators, provided that their efforts are backed by a consistent action at the interfaces of system operation, namely by policy-makers, regulators, grid users, and R&D entities. The conference was attended by some 380 participants from 42 countries who actively participated in a broad exchange of views on expectations of all involved parties.

A new concept for UCTE website was implemented with the goal of ensuring the recognition of our association as the reference centre for the TSO industry, as it was recognized that besides the UCTE members as a primary target group, it is indisputable that both media and political representatives need to be supported and informed about any international TSO topic.





WORKGROUP LEGAL AFFAIRS

The legal group's main mission is to provide a high quality, creative, and result-oriented legal work to both the association and its working groups. This is accomplished by providing strategic legal advice and seeking to ensure that the association conducts its activities in accordance with applicable laws and regulations and consistently with the articles of association and the internal regulations of UCTE.

According to the mission statement of the group, the lawyers perform the following core-tasks:

- Improvement of the legal framework of UCTE, including for the reliability and security standards.
- Identification of possible legal and regulatory issues interesting for the association and its members.
- Providing legal support for the association's decisions.
- Providing legal advice in case of problems arising among members of UCTE or between members and UCTE.
- Identification of all possible relevant legal issues for the association.
- Support the enforcement of UCTE decisions.
- Gather legal know how for the association.
- Etc.

UCTE - History III

Unifying force in times of political instability

When the former Republic of Yugoslavia split up into 5 independent states also the UCTE grid was separated in two due to the war destruction of key substations and associated transmission lines. On September 26, Serbia and Montenegro, parts of Bosnia and Herzegovina (BiH), Macedonia, Albania and Greece formed the second synchronous UCTE zone. As a result of the disintegration of the IPS/UPS system Romania and Bulgaria were provisionally also interconnected to this second synchronous zone. Following their application for membership and upon successful completion of trial parallel operation in 2003 Bulgaria and Romania became full members of UCTE.

Also the application of the so-called Burshtyn Island, a part of the Ukrainian high-voltage grid, that had been carrying out electricity deliveries to the UCTE system in radial operation since 1995, was accepted and following the necessary trial period Burshtyn was synchronously interconnected in 2003.

The successful reconnection of the first and second UCTE synchronous zones was completed on October 10, 2004 and the same 50 Hertz-rhythm pulsed again in the by then 24 UCTE member countries.

Over the last year, the lawyers have more specifically contributed to the:

- Improvement of the Security Package, including drafting amendments of the Multilateral Agreement (**MLA**) and follow up of addenda to the MLA.
- Improvement of protection of confidentiality for information exchanges taking place in the framework of UCTE, including drafting/reviewing non disclosure agreements and confidentiality undertakings.
- Preparation of the transfer of UCTE rights, obligations and activities into ETNSO-E;
- Drafting of the contractual framework necessary for the contemplated synchronous interconnection with the Turkish Transmission System Operator (**TSO**) TEIAS.
- Drafting the contractual framework for synchronous operations with the Albanian TSO OST.
- Review, from the legal point of view, of documents prepared by the other working groups of the association.
- Etc.

Through its activities, WGLA thus actively contributes to the evolution of the nature of the activities of the association (from voluntary to binding) and to the geographical extension of the UCTE synchronous area.





CRISIS MANAGEMENT PLATFORM

Security of Operation is one of the major concerns of UCTE and for all its TSO members.

It is also regarded as a priority by the European Commission and by all stakeholders in the community.

The brown-out of November 4, 2006 in the UCTE system had as an immediate positive consequence that UCTE, as an organization representing all TSO's in its synchronous zone, started an active process for the definition and implementation of a reliable and professional crisis management system, especially from a communication perspective.

An initiative was launched to create the constitution of a communication and information platform aiming at an effective alert mechanism, as well as a fast, consistent and correct channeling of information and reporting of events in case of major disturbance in the UCTE system.

In that respect it is important that UCTE and its members – and in the near future ENTSO-E and its members – share the same basic information about facts and speak with one voice, thus giving proof of their professionalism and coordination capacity.

So the crisis management platform, which is accessible from all over the world at any time, was created. Designated people, called "responsible person", set up their messages regarding an upcoming crisis or an

already on going crisis, to inform all TSOs within the UCTE synchronous grid. The responsible person and at least a deputy per member get an alert by sms and an e-mail at the same time. So they can log into the web to get further information from the reports. Whenever a new report is uploaded on the web, an e-mail as well as a sms is sent out again.

Following a workshop with the responsible person a test message was sent out in the evening hours of December 2008. The "TSO UCTE" declared having a serious problem in the grid. In the report on the web one could read that it is a test and that they have to send an e-mail to UCTE. So it could be assured that everybody was reading and reacting to a crisis alert. To finalize the exercise a conference call was scheduled an hour after the event started. That was the termination of the crisis exercise as well as another check of having everybody participating in the exercise. More than 80% of the TSO reacted in the acknowledge time framework, what can be seen as a great success.

In the year 2009 a larger exercise will take place to assure once again everybody knows how and when to use the crisis management tool.

FOR SAFETY REASONS:

<http://crisis.ucte.org/>





ELECTRICITY GRID RELIABILITY CONFERENCE

Although it wasn't carried out in 2008, the 1st European Electricity Grid Reliability Conference, held at the European Parliament in Brussels on January 8th, 2009, has its place in the 2008 Annual Report as its complete preparation has been done in the year under report.

The first Conference on Reliability of Power Grids in Europe proved to be a great success, as it was attended by about 380 participants from 42 countries. This impressive number alone proves that the achieved consensus in the key role of Transmission System Operators in the reliability of the European electricity grid and the achievement of the ambitious 20-20-20 targets of the European Commission are of great value for the future.

The conference addressed the issue about reliability of the European power grid in three panels. In the context of system operation, both stakeholders and TSOs underlined the key importance of reliability standards among others related to the smooth integration of the ongoing large-scale development of RES. Further the main challenge still remains to achieve as soon as possible enforceability of standards at Pan-European level. It was pointed out that diverging legal and regulatory frameworks may severely impact system operation. A fair share of duties and responsibilities among all players concerning system operation is also at stake. Besides system-wide operational standards, system operation remains an issue with a regional dimension calling for a flexible reinforcement of international cooperation. Related to transmission grid

development, the conference pointed at a dramatic need for speeding up well coordinated authorization procedures for grid infrastructures. This will be based on improved long term adequacy statements of both grid development and generation scenarios. Participants also emphasized in this context the need for consistent legislation and regulation guidelines allowing the transmission development needs to be taken into account when developing renewable energy sources. Participants' views converged on the fact that reliable grids are a key element for achieving the 20-20-20 targets. Related to interoperability, the role of TSOs of assessing the technical feasibility of requested system extensions was in the core of the debate. Main issues discussed related to potential limits of requested system developments, always perceived as pioneering European integration: potential limits to system interoperability, the interaction between interoperability and market design, technological developments and the interactions between interoperability and environment policies. "One of the key conclusions of the day is that system operation has numerous interacting interfaces that call for bundling our efforts towards developing a more flexible system", said Hans-Peter Aebi, UCTE Chairman, with a glance at necessary future activities.



..... UCTE 

Thursday, 08 January 2009
**1st European Electricity
Grid Reliability Conference**





SYSTEM EXTENSION STUDIES AND PROJECTS

Introduction

Energy is today and for the years to come a priority topic the European Union's agenda at all levels (Council, Commission, and Parliament). It can be assumed that the foreseen developments of the primary energy dependency of the European Union will continue to impose to follow a balanced cooperation/integration course especially towards Russia (primary resources) and Ukraine (transit country)

In spite of market liberalization and changes in the sector, the electrical system integration is perceived by stakeholders as pre-requisites or pioneering elements of any European integration policy. This is why

UCTE, even if well recognized today by EC as "independent business association", is clearly expected to remain active as technical entity to assess the first of 3 EU-"pillars" (1-technical/operational feasibility, 2-reciprocity in market conditions and 3-compatibility in environmental standards) of the concrete implementation of such projects

UCTE has always pursued its efforts to develop the synchronous area while observing objective criteria and procedures in order to maintain the whole system at the present high level of reliability and stability.

UCTE - History IV

Mediterranean Ring

In the Barcelona Declaration adopted in 1995 the then 15 EU member states and the 12 Mediterranean countries Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Palestine, Syria, Tunisia and Turkey agreed to form a free trade area that was also to include energy until 2010.

Presently, there are two synchronous areas in North Africa, the south-eastern bloc with Libya, Egypt, Jordan, Syria and Lebanon and the south-western bloc with Morocco, Algeria and Tunisia. UCTE is now synchronously connected to the south-western bloc via a 350 MW cable from Spain to Morocco.

Towards the single market

Following the adoption of its new statutes effective January, 1 1997, UCPTÉ became the operational organization responsible for the definition of the technical rules to ensure the reliable operation of the interconnected systems of its member countries.

In 1999, UCPTÉ modified its Articles of Association in order to cope with the philosophy of the European Directive no. 92/96 EC. The name of the association changed into Union for the Coordination of Electricity Transmission UCTE to underline the unequivocal orientation towards Transmission System Operators' tasks. UCTE's activities are now centred around the creation of the prerequisites for reliable operation against the background of a competitive European electricity market.

Feasibility Study for the Interconnection of Power Systems of IPS/UPS with UCTE

The Study analyzing the feasibility of a possible synchronous coupling of the power systems of the IPS/UPS with the UCTE was successfully closed.

Launched in 2004 the project was carried out by a UCTE consortium in close cooperation with a group of companies from the IPS/UPS. It is recognized by stakeholders as an important venture in the framework of the EU-Russia Energy Dialogue and co-financed by the TEN-Energy programme of the European Commission.

The Study, unique in its ambitions and scope, investigated all technical, organizational and legal aspects for a possible synchronous operation of both power systems, operated separately today. A synchronous coupling would create a transmission system serving more than 700 million customers on two continents and spanning ten time zones.

Combining analyses and power system simulations for two synchronously coupled systems the project work gave first priority to maintaining the current level of system security and reliability in the systems concerned. The Study, being unprecedented with regard to the resources employed and the advanced investigation methods and technologies applied, can be used as a basis for any further decision making by the stakeholders concerned in system development on either side.

During the closing session in Brussels on 5 December 2008 a public summary of the major findings and results was presented and endorsed by all study partners. This "Summary of Investigations and Conclusions" underlines the overall complexity of a synchronous coupling taking into consideration both system security and market aspects. Even if a synchronous coupling appears viable, it must be considered as a long-term option. In addition, non-synchronous system coupling by HVDC back-to-back links is also considered as an alternative to achieve a coupling of IPS/UPS with the UCTE transmission system in a medium-term perspective. This, however, will need separate investigations and the decisions by the stakeholders concerned.



Interconnection of Turkey Power System with UCTE

The process for investigation of the Turkish Power System and the preparatory works for its synchronous interconnection to the UCTE network are progressing well under the coordination of the UCTE Project Group. A number of Reports on the Turkish Power System was finalized and approved. Besides the Reporting activities, Project Group progressed with performing unit tests at the power plants. The unit tests of a conventional type thermal Power plant were finalized and approved. Unit tests of a combined cycle natural gas type thermal Power plant were scheduled. The drafting of the Contractual Agreement by the Project Group is a significant step in the direction of the synchronous interconnection. The studies for finalization of the Contractual Agreement are still continuing.

Technical Studies

The First Feasibility Study for investigation of the Turkish Power System was successfully completed in 2007. Although according to the study results interconnection of the Turkish Power System to UCTE system is found feasible but the necessity of the frequency control improvement in the Turkish Power System and the sufficient damping performance of the generation units regarding low inter-area oscillations was emphasized as a precondition for reliable synchronous operation.

In order to meet the UCTE requirements regarding the frequency control quality, TEIAS decided to launch in 2008 a Project named "Rehabilitation of the Frequency Control Performance of the Turkish Power System for Synchronous Operation with UCTE". The Project will be financed by the EC and will be carried out by the Consortium of TSO members of the UCTE. Besides to the UCTE member TSOs, which participate to the Project, experts from Technical Universities and manufacturers of the units control systems, turbine governors and excitation systems implemented in the Turkish power plants will also participate to the Project as sub-contractors. Besides EUAS (Turkey) and TEIAS (Turkey) which will have an important role in the Project as the owner of important power plants in Turkey and TSO, there are a set of UCTE member TSOs, which declared their interest to participate to the Project. Those TSOs are namely RWE TSO (Germany,) EMS (Serbia), ESO (Bulgaria), HTSO (Greece), RTE (France), SwissGrid (Switzerland) and TERNA (Italy). RWE TSO will be the Consortium leader of the Consortium which will perform the studies.

The main goal of the Project is to prepare the Turkish Power System for future synchronous operation with UCTE regarding power and frequency control, steady state and transient stability. The following topics are subject of the Project:

- Survey of the power plants.
- Investigation and elaboration of recommendations for the generating units' control systems improvement: settings and structure optimization of turbine governors.
- Secondary Control System improvement. Optimization on control parameters.
- Design and optimization of AVR and PSS.
- Emergency Control System on the interface with UCTE and Restoration Plan of the Turkish Power System .
- Staff training.

Rehabilitations of the Control system at major Power Plants had already started under the UCTE Project Group coordination.

Thermal Power Plants

Some units of conventional type thermal power plants were under rehabilitation during 2008. Soma-B TPP (4 units out of 6), Catalagzı TPP (2 units), Seyitomer TPP (3 units out of 4), Tuncbilek-B TPP (2 units), Orhaneli TPP (1 unit), Kangal TPP (2 units out of 3). In total 13 units with 160 MW installed capacity each and one unit 210 MW are subject to the rehabilitation program. Part of the rehabilitation program was already completed in 2008.

Hydro Power Plants

Rehabilitation of the control systems of Oymapinar HPP (4x135MW) have been finalized.

Ataturk and Karakaya Hydro Power Plants, 14 units x 300 MW, are under rehabilitation including:

- Modification and tuning on the existing control system.
- Studies related to the new replaced control system.

Based on the results of the studies performed in the "Rehabilitation of the Frequency Control Performance of the Turkish Power System for Synchronous Operation with UCTE" the requirements to the control systems of the major power plants will be defined and their implementation including parameter tuning and onsite tests will be done in close cooperation with the manufactures.



Interconnection of Ukraine/Moldova Power Systems with UCTE

BACKGROUND

- European Commission has clearly voiced its interest in including Ukraine in the framework of the external relations of European Union in the broader context of the future security of energy supply for Europe.
- In March 2006 the Ukrainian company NPC Ukren-ergo and the Moldovan Company Moldelectrica applied for a separate investigation of the full joint integration of the Ukrainian IPS and Power System of Moldova into UCTE synchronous area.
- On 23 November 2006, UCTE launched the Project Group with immediate task to work out the Terms of Reference of the Project and goals to assess all the technical, regulatory and operational requirements for the full integration of the Ukrainian and Moldavian electrical systems into UCTE electrical system.
- In January 2008 the Terms of reference were approved by UCTE Steering Committee.

The document was worked out around the following 4 main chapters:

1. Technical requirements and Operational Aspects
 2. System delimitation clause
 3. Congestion Management
 4. Legal / Regulatory Conditions
- Estimated cost of the Project: 4,446 mil €.
 - Estimated implementation period for the project (studies + implementation of recommendation + tests + trial operation) is 7.5 years, depending on the period for implementation of the UCTE recommendations by Requesting Parties.

The work of the PG will be structured in three phases as follows:

Phase A

Work-out of a proposal for a Contractual Agreement to be signed by Ukrenergo/Moldelectrica and UCTE or involved consortium parties, to be checked with statutes. Phase A closes with the 1st Intermediate Report to SC. Once approved by SC, the Agreement is signed by the Parties.

Phase B

Implementation of the Contractual Agreement statements by Ukrenergo and Moldelectrica, and the assessment of the results. Phase B closes with a 2nd Intermediate Report to SC about the compliance of the requesting Parties with the signed Contractual Agreement.

Phase C

Preparation and performing the tests in isolated operation and interconnection tests and the assessment of the results. Phase C closes with the Final Report to SC and with the request to start a longer test interconnection period or to go straight to a permanent interconnection.

PROJECT FINANCING

After several meetings between UCTE, Ukrainian/Moldavian and European Commission, the financing solution was defined: Ukrainian Government and European Commission had agreed that part of the funds received under the Financial Support of the Ukrainian Power Strategy Implementation from the European Commission to be used for financing the UCTE Project.

CURRENT STATUS AND NEXT STEPS

Actually the Project Group and the Requesting Parties are collaborating in order to finalize the Financing Contract between UCTE (as "Study Performer") and Ukrainian Government/CFCU (as "Contracting Authority" and "Funds Administrator").

Upon finalization of all contractual arrangements for project financing, the Consortium creation activities will start.

Considering the actual process of European Network of Transmission System Operators for Electricity (ENTSO-E) creation and the transfer of all UCTE activities and contractual commitments, the project will be transferred and will be fulfilled within the new association.



Interconnection of Tunisia/Libya and LEJSL System with UCTE

At the request of Tunisia and Libya, the UCTE established a process for the closure of the Tunisia–Libya interconnection, which had its genesis of the previous studies carried out for both REE and HQI concerning this interconnection. The expansion request involves the closure of two existing 225 kV lines, between Tunisia and Libya which, if successful, would extend the UCTE synchronous zone from Spain to Syria involving in addition Libya, Egypt, Jordan and Lebanon.

The Tunisia–Libya interconnection, today out of service, is formed by two AC 220 kV overhead lines: a double circuit OHL between Medenine (Tunisia) and Abou Kamash (Libya), and a single circuit OHL between Tataouine (Tunisia) and Rowies (Libya). The total thermal transmission capacity (TTC) is 270 x 3 MVA. On November 21st 2005, at 12:00 (CET) the process of synchronization of the UCTE + TAM and LEJS power systems was initiated, according to the procedure agreed and closely followed by UCTE. A synchronization trial was therefore defined between the Maghreb and Mashrek, planned to last three days following the closure of the Libya and Tunisia interconnection. After 7 minutes, the defense plan opened up the lines between Libya and Tunisia, but lines were also triggered between Morocco and Algeria. Following consultations with the various utility companies, the test was interrupted.

The main conclusions of after-event analyses can be summarized as follows: being connected to a big system with a very large inertia as the UCTE is, any power deviation or load-generation unbalance are compensated by the bigger system, so normal daily load deviations can often activate the defense plans at international tie lines. In addition to this, the networks in North Africa and Near East were linked as a chain, not as a “spider-net” like the UCTE ones, so these power deviations at international tie lines increase the Transmission Reliability Margin (TRM) consuming an important part of the Total Transmission Capacity (TTC) at the international interconnections.

To prevent these problems and in order to take advantage of the exchange capacities among countries, it was agreed that the necessary actions to implement were in two main directions:

- Reduction of the power flow deviations.
- Increasing the settings of the defense plans/network developments.

Last year developments have been oriented to achieve the two directions here listed; however some delays on the commissioning of critical 400 kV lines had happened. It is important to remark that important progress have been recorded regarding to the improvement of the National Control Centers, especially in Algeria and Libya. Too, the adaptation of the defence plans has been studied and agreed waiting for the readiness of the new transmission facilities.

UCTE - Besides History II

Commedia dell'Arte in Europe's capital city

He is a big man, with his height of almost two metres and weighing more than 100 kilos, this expert from the UCTE secretariat. He used to boast during his night strolls through Brussels that he feared no-one, and on the contrary the others wondering through deserted places at night should fear him. And more over there is of course his experience from every possible poor country outside Europe.

On his way to work his acquaintance, a DG TREN dignitary who lived in the neighbourhood, would often overtake him on his bike. He would never forget to play a little prank on him - slap his back, pull off his hat and so on.

One evening after an exhausting day in the office, our UCTE expert is on the way home through the Cinquantenaire Park. He hears quickening footsteps behind him and thinks - aha, this will be yet another of those pranks. But then he is suddenly held from behind by someone's crushing arms. The grip however does not ease off and further two wrestlers are trying to push him to the ground. Obviously this is no prank this time. Finally he is down on the ground clutching his rucksack. The robbers are brutally hitting his head and he figures out: it is better to stay alive without the rucksack than to be beaten up like a dog - and thus without any further resistance he lets himself be robbed. The police arrive, and then an ambulance arrives and then follows a night at an intensive care unit with drip tubes plugged in. And in the morning he wilfully flees the hospital - surely he will not let his air ticket home lapse!

He was lucky, in spite the fact that his now badly bashed face bears no resemblance to the photo in his passport, the police again does nothing and let him graciously on the plane. They cannot but „expel“ such a person out of the Kingdom!

Integration of Albania

During 2008 PG Albania continued the evaluation of the Albanian System , applied the UCTE Compliance process (CMP) to Albanian system and concluded to the measures that need to be taken by OST to achieve compliance to UCTE OH. OST progressively implements the measures and there is a definite plan to implement them within a period of two years. Special Protection Schemes were installed and additional procedures were put in place to ensure the interface to UCTE and as a result to protect the security in the neighbouring UCTE area.

A temporary agreement between UCTE and Albania is considered a necessary to cover the operational issues and to define compliance process , for the above period of about two years ,during which Albanian system will continue to operate connected to UCTE although not fully complying to UCTE OH and not having signed the MLA.

it is envisaged that OST In the end of the agreement period will have met full compliance to OH and be in position to be accepted as a UCTE member and sign the MLA. The agreement is scheduled to be signed in the first semester of 2009 and then transferred to ENTSO-E.



INTEGRATION OF RENEWABLES – EWIS PROJECT

In 2008 the 15 electricity Transmission System Operators (TSOs) participating in EWIS have submitted their interim report to the European Commission (EC). The interim report has been approved by the EC and is ready to download from www.wind-integration.org. The EWIS interim report describes the chosen methodologies and study activities now in progress. To fulfill the objectives of the study and to offer recommendations that better facilitate the integration of wind generation in Europe, it is important that the study's activities are relevant to the present situation and that they address the expected future challenges. The interim report seeks to summarize the present context for the study so that stakeholders can offer their views on the suitability of the approach and the priorities which have been identified.

With significant growth in wind generation underway, European TSOs are already active in addressing the issues associated with efficiently accommodating wind onto the transmission networks:

- Establishing direct connections to large wind farms both onshore and offshore.
- Planning the connections and interfaces with increasingly active distribution networks connecting wind generation.
- Reinforcing network pinch-points within and between national networks.
- Participating in market developments, such as establishing intraday markets, market coupling, and forming regional markets.
- Developing balancing arrangements through enhanced control arrangements and commercial mechanisms.
- Developing appropriate grid codes to facilitate large scale wind entry.

TSOs are working with stakeholders to best understand the service required from the transmission networks and to identify and transfer best practice. However, to successfully reach the EU's 2020 targets, TSOs recognise that more initiatives are required. Given the characteristics of wind energy and its interaction with other generation sources, there are particular benefits to TSOs coordinating in order to address wind conditions across Europe. Such coordination can maximise the carbon reduction benefits of wind production by displacing the most carbon intensive energy sources when wind is available. It can also minimise the costs of managing the variability of wind by harnessing diversity and optimising the required flexibility and backup sources. The approach taken by EWIS anticipates that such coordination will be achieved by developing an efficient internal electricity market.

To deliver these developments, a wide consensus and political support is needed. TSOs hope that EWIS will provide a positive and constructive input to the process and look forward to stakeholder feedback on the interim report.

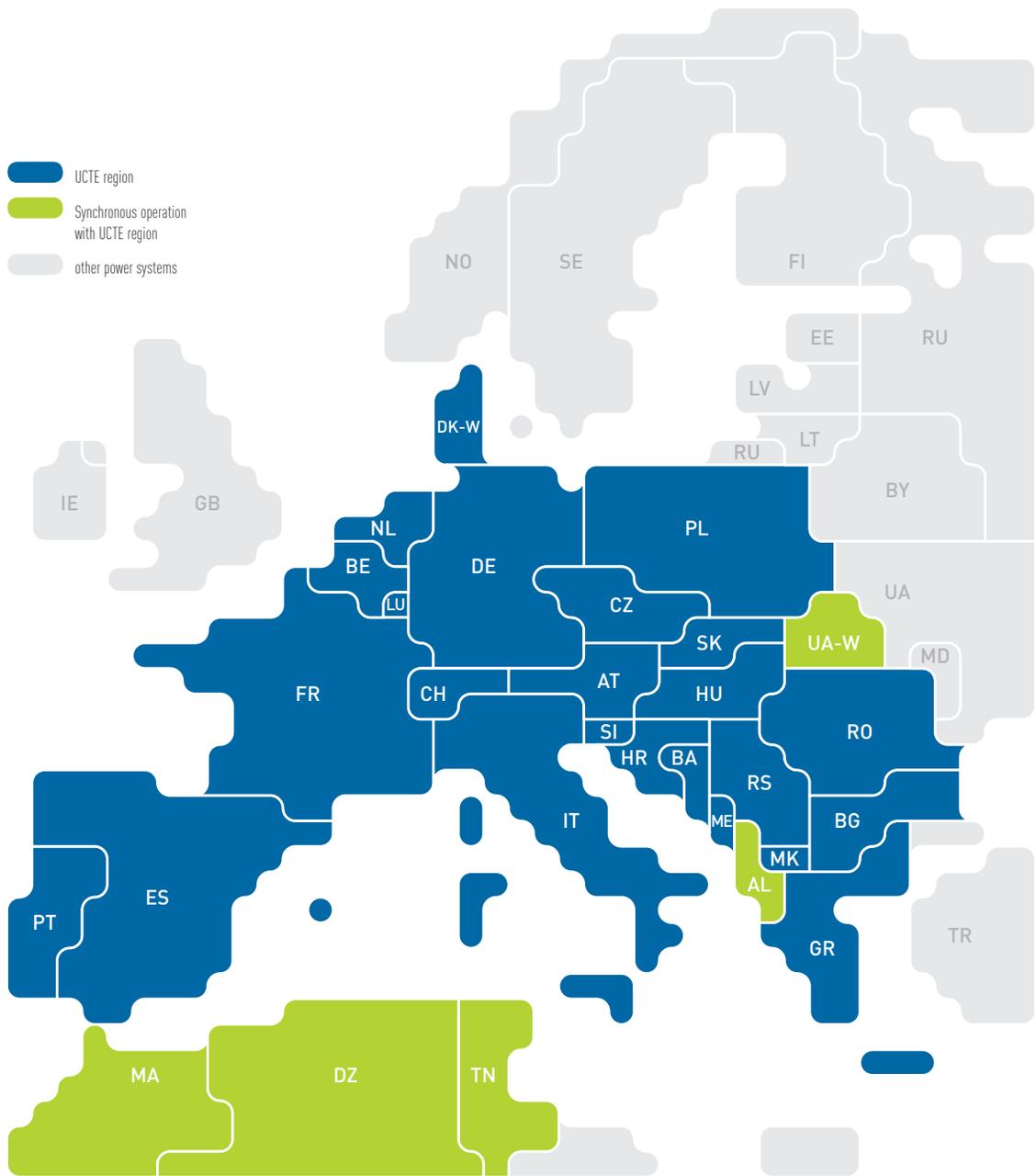
Earlier EWIS work has successfully identified the mitigation methods needed to accommodate renewables in a secure manner onto the existing European transmission network. For the remainder of the study, EWIS is engaged with in-depth and extensive investigations of scenarios representing 2015, where the implementation of measures requiring new investments, control systems and market incentives can be considered. This analysis will permit the implications of the 2020 renewables targets to be assessed. The EWIS Final Report is expected towards the end of 2009.

INSIDE UCTE

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

Member companies in UCTE

Austria TIW	AG-Netz	TIWAG-Netz AG
VERBUND	APG	Verbund – Austrian Power Grid AG
VKW-Netz	AG	VKW-Netz AG
Belgium Elia		Elia System Operator SA/NV
Bosnia-Herzegovina ISO	BiH	Nezavisni operator sustava u Bosni i Hercegovini
Bulgaria ESO-EAD		Electroenergien Sistemen Operator EAD
Croatia HEP-OPS		HEP-Operator prijenosnog sustava d. o. o.
Czech Republic	CEPS	CEPS, a. s
Denmark West	Energinet.dk	Energinet.dk
France RTE		RTE EDF Transport S. A.
FYROM	MEPSO	Elektrostopastvo na Makedonija
Germany	EnBW TNG	EnBW Transportnetz AG
E.ON	Netz	E.ON Netz GmbH
RWE	TSO	RWE Transportnetz Strom GmbH
VE	Transmission	Vattenfall Europe Transmission GmbH
Greece	HTSO / DESMIE	Hellenic Transmission System Operator / Diachristis Elinikou Sistimatos Metaforas Ilectrikis Energias
Hungary MA	VIR ZRt.	MAVIR Magyar Villamosenergia-ipari Rendszerirányító Zártkörűen Működő Részvénytársaság.
Italy	Terna S.p.A	Terna – Rete Elettrica Nazionale SpA
Luxembourg	CEGEDEL Net S. A.	Compagnie Grand Ducale d' Electricité du Luxembourg
The Netherlands	TenneT	TenneT TSO B. V.
Poland	PSE – Operator	PSE – Operator S. A.
Portugal REN		Rede Eléctrica Nacional, S. A.
Romania T	ranselectrica	C.N. Transelectrica S. A.
Serbia JP	EMS	JP Elektromreža Srbije
Montenegro EPCG		Elektroprivreda Crne Gore
Slovak Republic	SEPS	Slovenská elektrizacná prenosová sústava, a. s.
Slovenia ELES		Elektro Slovenija
Spain REE		Red Eléctrica de España S. A.
Switzerland swis	sgrid	swissgrid ag





Bodies

The decision-making bodies of UCTE are the **Assembly** consisting of all 29 member companies of UCTE and the **Steering Committee** with one representative from each of the 24 member countries represented in UCTE.

The **Bureau** that represents the Association externally, comprises the President José Penedos Protugal, Vice-President Malgorzata Klawe (Poland), the Chairman of the Steering Committee, Hanspeter Aebi (Switzerland), and the Secretary General, Marcel Bial.

Working Groups

In 2007 UCTE started working in its new structure to better meet the requirements and expectations from its members and external stakeholders. The Working Groups (4 Competence Center Working Groups and 3 Service Center Working Groups) are composed of experts from the member companies. They focus their activities on operations and security, system strategy, co-ordinated planning, compliance monitoring and enforcement, communication, data management and legal affairs. They are installed and entrusted with specific missions by the Steering Committee to which they report according to the Articles of Association and Internal Regulations.

Member companies in UCTE in the World Wide Web

TIWAG-Net www	.apg.at
VERBUND APG	www.tiwag-netz.at
VKW-Netz AG	www.vkw-netz.at
Elia www	.elia.be
ISO BiH	www.nosbih.ba
ESO-EAD www	.tso.bg
HEP-OPS www	.hep.hr/ops
CEPS www	.ceps.cz
Energinet.dk www	.energinet.dk
RTE www	.rte-france.com
MEPSO www	.mepso.com.mk
EnBW TNG	www.enbw.com
E.ON Netz	www.eon-netz.com
RWE TSO	www.rwetransportnetzstrom.com
VE Transmission	www.vattenfall.de/transmission
HTSO/DESMIE www	.desmie.gr/home
MAVIR ZRt.	www.mavir.hu
Terna S.p.A	www.terna.it
CEGEDEL Net S.A.	www.cegedel.lu
EPCG www	.epcg.cg.yu
TenneT www	.tennet.org
PSE – Operator S.A.	www.pse-operator.pl
REN www	.ren.pt
Transelectrica www	.transelectrica.ro
JP EMS	www.ems.co.yu
SEPS www	.sepsas.sk/seps
ELES www	.tso.eles.si
REE www	.ree.es
swissgrid www	.swissgrid.ch

Secretariat

The Secretariat is led by Marcel Bial. 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; media@ucte.org

The Secretariat is responsible for the assistance and the support to the bodies of the association. Furthermore, it provides support with data management expertise and 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

Austria Heinz	Kaupa
Belgium Hubert	Lemmens
Bosnia – Herzegovina	Omer Hadzic
Bulgaria Bozhidar	Pavlov
Croatia Ivica	Toljan
Czech Republic	Petr Zeman
Denmark West	Per Sørensen
France Jean-Pierr	e Desbrosses
FYROM Blagojc	e Trpovski
Germany Rainer	Joswig
Greece Ioannis	Theodorakopoulos
Hungary Lajos	Oroszki
Italy Carl	o Sabelli
Luxembourg Carl	o Bartocci
Montenegro Br	anko Stojkovic
The Netherlands	Ben Voorhorst
Poland Jerzy	Dudzik
Portugal Jor	ge Liça
Romania Octavian	Lohan
Serbia Dusk	o Tubic
Slovak Republic	Vladimir Jendryscik
Slovenia P	avel Omahen
Spain	Luis Imaz Monforte
Switzerland Rudolf	Baumann

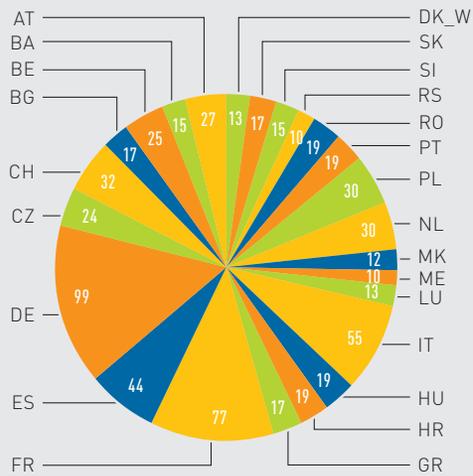
Organizational chart

Assembly

29 TSOs from 24 countries

● Chairman: José Penedos (PT)

Voting rights as of May 2007:



Steering Committee

1 representative per country

● Chairman H. P. Aebi (CH)

Secretariat

- Secretary General: Marcel Bial

Bureau

- President : José Penedos (PT)
- Vice-President : Malgorzata Klawe (PL)
- Chairman SC : Hanspeter Aebi (CH)
- Secretary General : Marcel Bial

Working Groups

- Operations and Security, Convenor: Klaus Kleinekorte (DE)
- System Strategy, Convenor : Georges de Montravel (FR)
- Compliance Monitoring and Enforcement
Convenor: Jacek Ratz (PL)
- Co-ordinated Planning, Convenor: Jean Verseille (FR)
- Data, Convenor: Olivier Feix (D)
- Communication, Convenor: Monika Walser (CH)
- Legal Affairs, Convenor: Pierre Bernard (B)

Project Groups

- UCTE-IPS/UPS Study, Project Manager :
Matthias Luther (DE)
- European Wind Integration Study (EWIS)*
Project Manager: Wilhelm Winter (DE)
- PG Albania, Project Manager: Ioannis Blanas (GR)
- PG Turkey, Project Manager: Bozhidar Pavlov (BG)
- PG Ukraine-Moldova, Project Manager: Marian Cernat (RO)
- SYSTINT**, Convenor : Georges de Montravel (FR)

* together with ETSO, NORDEL, UKTSOA, ATSOI

** joint Task Force UCTE/EURELECTRIC



ABBREVIATIONS

ATSO	Albanian TSO	IEM	Internal Electricity Market
ATSOI	Association of the TSOs in Ireland and Northern Ireland	KOTK	Commission on Operational and Technological Coordination for the Joint Operation of Power Systems of the CIS and Baltic States
CEER	Council of European Energy Regulators	LFC	Load Frequency Control
CFCU	EC Central Finance and Contracts Unit	NORDEL	Association of the TSOs in Northern Europe
CMEP	Compliance Monitoring and Enforcement Process	OH	Operation Handbook
COMELEC	The Maghrebian Committee of Electricity, including countries Morocco, Algeria and Tunisia	SAF	System Adequacy Forecast
DACF	Day Ahead Congestion Forecast	SAR	System Adequacy Retrospect
DG TREN	Directorate-General for Energy and Transport, European Commission	SC	Steering Committee
DH	UCTE Data Handbook	TSO	Transmission System Operator
EPC-CIS	Electric Power Council of the Commonwealth of Independent States	UCTE	Union for the Co-ordination of Transmission of Electricity
ETSO	European Transmission System Operators	UKTSOA	Association of the TSOs in Great Britain
EWEA	European Wind Energy Association	WAMS	Wide Area Measurement System
EWIS	European Wind Integration Study	IPS / UPS	Interconnected Power Systems (of CIS and Baltic Countries) / Unified Power System

Imprint

Publisher :
Secretariat of UCTE
Boulevard Saint-Michel 15
B-1040 Brussels

Executive Editor :
Monika Walser
Managing Editor :
Fritz Wagner

Printed by:
Druckerei
Robert Hürlimann AG
Trittligasse 2
8001 Zurich

May not be reproduced without
prior permission of UCTE