THE RETECHNOLOGIZATION OF ROSIORI 400/220 kV POWER STATION–AN IMPORTANT ASPECT OF THE INTERNATIONAL INTERCONNECTION REGARDING ROMANIA'S INTEGRATION INTO THE UNION FOR THE COORDINATION OF TRANSMISSION OF ELECTRICITY – U.C.T.E.

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Abstract : This paper presents the importance of the retechnologization of Rosiosi 400/220 kV power station from Satu Mare county – an important aspect of the international interconnection regarding Romania's integration in the Union for the Coordination of Transmission of Energy – U.C.T.E. and, consequently, Romania's integration in the European Union.

Keywords : retechnologization, European integration, The Union for the Coordination of Transmission of Energy – U.C.T.E.

1. INTRODUCTION

The Rosiori 400/220 kV power station is located in Rosiori village, Valea Vinului commune, Satu Mare county and belongs to the Center of Exploitation of the Transmission Electricity Networks Baia Mare – Electricity Transmission Cluj Branch.
The power station is located in the north of the country and repreNESts an important junction for the National Electricity System, since it is a station of international interconnection, coupling with The National Electricity System of Ukraine, through the 400 kV station Mucacevo. The station 400/220 kV Rosiori, through station 400 kV Mukacevo connects our country to The National Electricity System of the European Union.

2. PRESENTATION OF ROSIORI 400/220 kV POWER STATION

Currently, in Rosiori 400/220 kV power station there is an ongoing, complete retechnologization taking place. All the air electrical lines and the primary and secondary circuits hace been deactivated.

2.1 Presentation of the components of the 400 kV power station

-LEA 400 kV GADALIN**:**

-119 km. LEA (OL-AL);
-s= 2 x 450 mm^2 / phase (fascicled conductors)

-LEA 400 kV MUCACEVO - UKRAINE:

-153 km.LEA (OL-AL) -39 km.on Romanian terrirotry;
- s= 2 x 450 mm^2 / phase (fascicled conductors)

-LEA 400 kV ORADEA:

-133 km. LEA (OL-AL);
-s= 2 x 450 mm^2 / phase (fascicled conductors)

-AUTOTRANSFORMER 400 / 220 kV

- S = 400 MVA.

-REACTANCE COIL 400 kV

- Q = 100 MVAr.

2.2 Presentation of the components of the 220 kV power station

-LEA 220 kV VETIS:

-35 km. LEA (OL-AL);
-s= 450 mm^2 / phase.

-LEA 220 kV BAIA MARE – double circuit

-33 km. LEA (OL-AL);
- s= 450 mm^2 / faza.

-AUTOTRANSFORMER 220 / 400 KV
- S = 400 MVA

3. THE QUALITY OF ELECTRICAL ENERGY IN THE PERSPECTIVE OF THE NES INTERCONECTION WITH THE EUROPEAN SYSTEM – U.C.T.E.

Romania's future perspective is of integration in the European Union and, consequently, the produced, transmitted and distributed electrical energy has to comply to the quality standards and criteria, in accordance with the rules of the western European countries

3.1 Main quality indicators for electrical energy– depending on the electrical energy supplier and transporter:

1. Deviation from frequency;
2. Deviation from tension;

In this situation, in order to minimize the tension loss, the 220 kV tension system will be replaced with the 400 kV tension system, LEA Oradea – Rosiori.

1. Amplitude of tension variance;
2. Temporary and transitory overloads;
3. Tension gaps.

3.2 Secondary quality indicators for electrical energy– depending on the perturbing consumers' operation :

1. The flicker effect (tension oscillation)
2. Fast tension fluctuations caused by various events in consumers' installations;
3. Un-symmetries;
4. Deviation from the sinusoidal shape caused by the un-sinusoidal periodical regimes (deformed).

4. THE INTERCONNECTION OF TRANSELECTRICA S.A. TO U.C.T.E., A FIRST STEP IN ROMANIA'S INTEGRATION TO THE EUROPEAN UNION

From 1977 until the putting into service of Isaccea 750 kV station, Rosiori 400/220 kV station has been the most important station of international interconnection to the 400 kV tension from Romania.
- through the lines of interconnection with connection in this station, NES operates in parallel with NES of former Soviet Union and, from here, with all the other NES of the European countries participating in CAER and which were coordinated by the Central Department of Dispatcher DCD in Prague:
Czechoslovakia, Poland, GDR, Soviet Union
- up to the 1990s, our country's NES functioned in the CAER system.
- in 1991, Romania made its first steps towards joining UCTE, the main west European system.
- in 1993, the operation within CAER is officially ended.
- in 1997, Romania officially requests their interconnection in UCTE.
- 08.05.2003, Transelectrica's interconnection to the European system UCTE.
- until the resynchronization of the two UCTE zones, our country's NES functioned in the second synchronous zone UCTE, together with the energetic systems of Greece, Serbia and Montenegro, Macedonia, Bulgaria, Albania and a part of Bosnia-Herzegovina.
- at 23.09.2004 the resynchronization of the UCTE zones took place.
- at 10.10.2004, Sandorfalva (Hungary) - Arad 400 kV line was connected to the synchronism, thus accomplishing the resynchronization of the two UCTE zones by Transelectrica.
- for the resynchronization of the two zones, the connection of the following lines of interconnection was provided:
  - -LEA 400 kV Sandorfalva (Ungaria) – Arad (Romania)
  - -LEA 400 kV Sandorfalva (Hungary) – Subotica (Serbia)
  - -LEA 400 kV Trebinje (B&H) – Podgorica (Muntenegru)
  - -LEA 400 kV Mukacevo (Ukraine) – Rosiori (Romania)
  - -LEA 400 kV Mladost (Serbia) – Ernestinovo (Croatia)
- in this way, the commercial energy trades between Romania and Europe were made possible.
- in November 2004, Transelectrica became full member of ETSO, The European Transmission System Operators.
- consequently, Romania became through Transelectrica, the first south-eastern European country outside the European Union integrated in two specific organizations of the transmission and system operators from the European Union, ETSO and UCTE.
- it was transited to tension of 400 kV LEA Oradea-Rosiori which functioned before at a 220 kV tension.
- Transelectrica investment program was included in establishing LES 400 kV Arad – Oradea.
- in this way an international connection will be established on our country's terrirtory Rosiori (Mukacevo) – Arad (Sandorfalva).
- Romania's admission to UCTE caused a series of retechnologizations for entering UCTE.

5. REGIONAL ORGANIZATIONS OF ELECTRICITY IN EUROPE

5.1 UCTE (The Union for the Coordination of Transmission of Energy)

General presentation
- The Union for the Coordination of Transmission of Energy (UCTE) was established in 1951 by the founding countries: *Austria, Belgium, France, Italy, Luxembourg, Holland, Switzerland and Germany.*
- The Union for the Coordination of Transmission of Energy (UCTE) is the association of the transmission system operators from continental Europe, insuring a secure market basis by secure and efficient "electric highways".
- UCTE networks supplies electrical energy for more than 450 million people. The annual electricity consumption totals being of almost 2300 TWh.
- The Union for the Coordination of Transmission of Energy (UCTE) coordinates the operation and the development of the electrical energy transmission networks from Portugal to Poland and from Holland to Romania and Greece. UCTE, the association of the transmission system operators from continental Europe in 23

countries provides a reliable market platform to all participants of the Internal Electricity Market (IEM) and beyond.
-UCTE also monitors and supervises the development of the UCTE synchronous area. The resynchronization process of the two UCTE zones split in 1991 due to the war events in former Yugoslavia was successfully achieved on 10 October 2004.
Presently, the following requests for enlargement of the UCTE area are investigated:
-the interconnection of Turkey
-the interconnection Tunisia – Libya that would bring the UCTE frequency up to Syria and Lebanon
-and, most significantly, the assessment via a major feasibility study on the interconnection of the two largest systems (UCTE and IPS/UPS) - that would result in one electricity system spreading from Lisbon to Vladivostok.

Member countries :
Austria, Bosnia-Herzegovina, Belgium, Bulgaria, Switzerland, Serbia and Montenegro, Czechoslovakia, Germany, Spain, France, Greece, Croatia, Hungary, Italy, Luxembourg, Macedonia, Holland, Poland, Portugal, Slovenia, Slovakia, ***Romania****, West Denmark.*

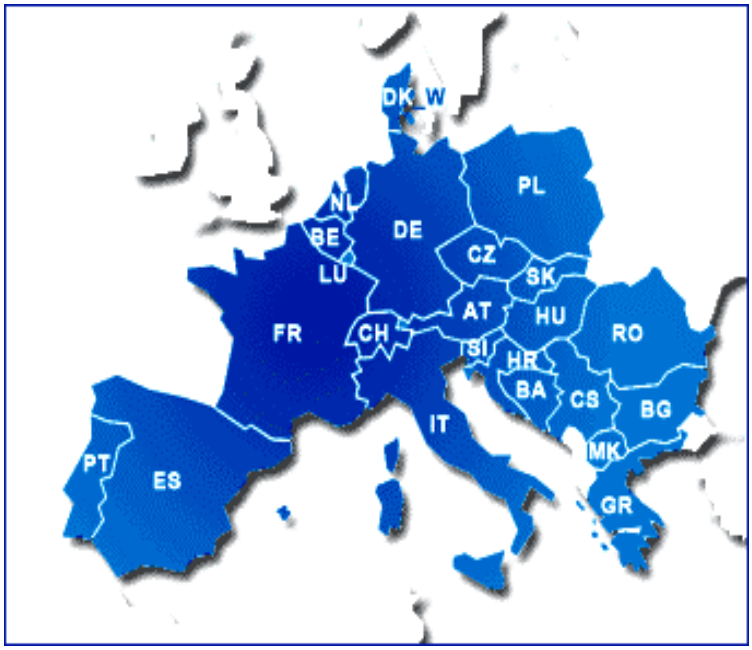

Figure 1.
Map of UCTE member countries

5.2 ETSO (European Transmission System Operators)

General presentation
Electricity utilities have been co-operating for decades, mainly in order to maximise the system's reliability and quality of supply, while optimising the use of primary energy and capacity resources. Four regional organisations have emerged from this co-operation:

- TSOI, the association of TSOs in Ireland;
- UKTSOA, the United Kingdom TSO association;
- NORDEL, the Nordic TSOs, and

- UCTE, the Union for the Co ordination of Transmission of Electricity, association of CENTREL, TSOs of the Continental countries of Western and Central Europe

-Upon the emergence of the Internal Electricity Market (IEM) in the European Union, the leaders of the four above-mentioned regional organisations recognised the need for an EU-wide harmonisation of network access and conditions for usage, especially for cross-border electricity trade. In 1999, ETSO was created as an association with ATSOI, UKTSOA, NORDEL and UCTE as founding association members. However, on 29 June 2001 ETSO became an International Association with direct membership of 32 independent TSO companies from the 15 countries of the European Union plus Norway and Switzerland. At the end of 2001 ETSO membership was enlarged to Slovenia and CENTREL countries as full and associate members respectively. The Czech Republic was admitted as full member in June 2003 and Hungary, Poland and Slovakia in 2004.
The Estonian TSO has become ETSO Associate Member in September 2004 and the Lithuanian TSO in February 2005. The networks represented by ETSO supply more than 450 million people with electric energy. The consumption of electric energy amounts to approx. 3000 TWh per year.

Member countries :

-Austria, Belgium, Czechoslovakia, Denmark, Estonia – associated member - , Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania – associated member - , Luxembourg, Holland, Norway, Poland, Portugal, ***Romania****, Slovakia, Slovenia, Spain, Sweden, Switzerland, Great Britain.*

5.3 SUDEL

General presentation

-The regional group for the co-ordination of production and transmission of electricity was founded by prominent representatives of electricity companies in *Austria, Italy and Yugoslavia* on April 22, 1964 in Ljubljiana.
-In 1972 PPC, the Greek electricity company, was admitted first as extraordinary and in 1976 as ordinary member. Following the dissolution of the former Federal Republic of Yugoslavia the successive individual states of Croatia, Slovenia, Bosnia-Herzegovina, Serbia, Montenegro and FYROM became members in their own right.
In 1999, when the CENTREL companies from Poland, Czech Republic, Slovak Republic and Hungary, joined UCTE as associated members, *Hungary* also became meber of Sudel.
In the new Articles of Association as adopted on March 2, 2002 by the SUDEL Extraordinary Assembly in Athens, Bulgaria and Romania are already admitted as extraordinary members and Turkey and Albania have observer status.
According to the Decision of the Enlarged Executive Committee in the meeting in Budapest on June 27, 2002 the Bulgaria and Romania are accepted as full members (after their official application).
According to the Decision of the Enlarged Executive Committee in the meeting in Belgrade on June 16, 2005, the new SUDEL Statute was adopted and signed (Articles of Association and Internal Regulations) according to which Albania and Turkey are accepted as full members.

Member countries

-Italy, Austria, Greece, Slovenia, Croatia, Bosnia-Herzegovina, Serbia and Montenegro, Macedonia, Hungary, ***Romania****, Albania, Turkey.*

5.4 NORDEL

General presentation

Nordel is an association for electricity co-operation in the Nordic countries. It was established in 1963. Its primary task is to create prerequisites for efficient utilization of the Nordic electricity generation and transmission systems.

Member countries

-Denmark, Finland, Island, Norway, Sweden

Interconnections between Nordel and other countries
-Denmark – Germany
-Finland – Russia
-Norway – Russia
-Sweden – Germany

6. CONCLUSIONS

Station Rosiori 400/220 kV have a major importance in the transmission of electrical energy from the European Union and towards European Union and the retechnologization of the station is unavoidable. Through the retechnologization we may obtain much better parameters, in accordance with the standards imposed by the European Union in this field.

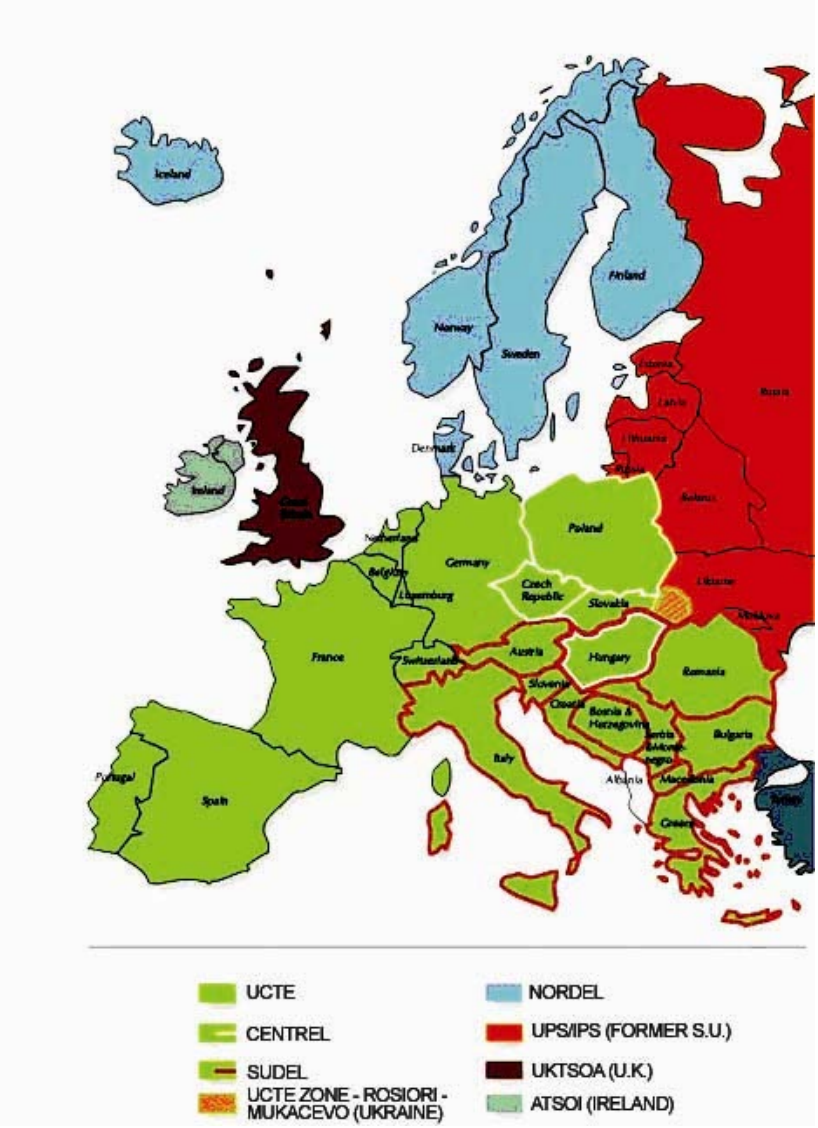

Figure 2.
EUROPEAN POWER SYSTEMS

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