

**WORLD
ENERGY
COUNCIL**

**COMITETUL
NAȚIONAL ROMÂN**



FOREN 2018

MESSAGE



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Contents

Foreword	4
Keynote Events	5
KA 1 Session	7
RTF 1 Session	7
WF 1 Session	8
Regional Energy Day	9
WF 2 Session	9
Energy Trilemma	11
RTF 3 Session	11
WF 3 Session	12
KA 2 Session	12
RTF 4 Session	13
Discussion Sessions	14
FEL Romania Workshop	16
Messages, conclusion, recommendations	17

FOREWORD

CEE Regional Energy Experts Met at FOREN 2018

The 14th edition of Central & Eastern Europe Regional Energy Forum - FOREN 2018 - brought together over 550 participants in order to address a variety of the most topical subjects under the main theme "*Central and Eastern Europe in the New Era of Energy Transition: Challenges, Investment Opportunities and Technological Innovations*"

FOREN 2018 was organised by the Romanian National Committee of the World Energy Council, under the auspices of the World Energy Council – London Office, with the support of the Ministry of Energy and took place in Vox Maris Grand Resort, Costinesti – Romania between 10 and 14 June 2018.

Having been organized every two years, starting from 1992, FOREN has already become a key traditional event for the Romanian and European energy community, has the status of the regional event for Central and Eastern Europe and is considered as the leading technical and scientific event dedicated to energy and environment sectors in the region.

The main issues of the today's and tomorrow's energy were debated during FOREN 2018 by governmental and business representatives, national authorities and organisations, energy regulators, CEOs and outstanding energy experts, academia and industry and electricity consumers representatives, officials from the World Energy Council.

A WIDE RANGE OF EVENTS

During its **24 sessions**, among which major events, interactive workshops and Round Tables, FOREN 2018 offered a platform for approaching the hot topics of energy challenges in the new transition era, the potential investment opportunities and the facets of modern technology and innovation.

The latest novelties from the World Energy Council were delivered by Mr. *Einari Kisel*, regional manager for Europe within the Council and by "the Big 4" (*Pricewaterhouse Coopers, KPMG, Ernst&Young, Deloitte*) consultants. At the level of the region, experts from the Republic of Moldova actively participated in the debates related to the energy future in Romania and in the Republic of Moldova. The event was also attended by a secondary school class from Bucharest, for their being acquainted with the energy field.

Expo FOREN 2018 was one of the most successful exhibitions in the history of FOREN. Organised according to the highest international levels, it contributed to best promoting the technical and scientific products and services of the 24 companies operating in the energy industry. Also within EXPO FOREN 2018, the team of school pupils, specialised in robotics, made a practical demonstration.

The main topics brought to the attention of FOREN 2018 participants outlined the following issues:

- Energy supply for a sustainable economy development;
- Improving energy use by decarbonising energy intensive processes;
- Increasing the share of renewable energy sources and energy storage;
- Improving energy efficiency
- Integrating internal energy market into the European single market;
- Training future energy professionals;
- Providing clean energy access.

All FOREN 2018 events ended with a package of remarks and messages which outlined the current challenges faced by the energy sector, which might contribute to the elaboration of Romanian energy sector development plans, complying to those in the region.

Attendance: The event was attended by over 550 members from the energy community, among which: Romanian Academies (3), Universities (9), Research and Development Institutes (6), International Organisations (6), companies (83), Outstanding personalities from abroad (36), Romanian mass media (9).

Sessions: 11 Keynote Events have been held (KA1, Regional Energy Day, Energy Trilemma, KA2, RTF1, RTF2, RTF3, RTF4, WF1, WF 2, WF3), five sessions of scientific communication and six Round Tables at corporate level. There have been 101 speakers and 27 diplomas and six prizes have been awarded.

Sponsors: FOREN 2018 was supported by 26 sponsors.

KEYNOTE EVENTS

FOREN 2018 Opening Session

The Opening Session of FOREN 2018 brought together over 400 participants. Welcome addresses were delivered by representatives of the Government of Romania, officials within the World Energy Council executive board, members of the academia, industry and research experts: Mr. *Iulian Iancu*- chairman of the WEC Romanian MC, Mr. *Doru Vișan*, Secretary of State – Ministry of Energy, Mr. *Einari Kisel*, regional manager for Europe - World Energy Council, Mr. *Adrian Badea*, chairman – Academy of Romanian Scientists, Ms. *Paula Pîrvănescu*, Secretary of State – Ministry for Business Environment, Trade and Entrepreneurship, Mr. *Dumitru Chiriță* - chairman of ANRE, Mr. *Adrian Borotea*, manager - CEZ Romania, Mr. *Adrian Constantin Rusu*, chairman of the Steering Committee of CNTEE Transelectrica, Mr. *Dan Cătălin Stancu*, general manager - Electrica SA, Mr. *Frank Hajdinjak*, general manager - E.ON Romania, *Eric Stab*, CEO - general manager - ENGIE Romania, Mr. *Corneliu Bodea*, chairman of CRE, Mr. *Florin Gugu*, manager - ENEL Romania, Mr. *Constantin Gheorghe*, chairman – Regulatory Authority for Offshore Operations in the Black Sea, Mr. *Cornel Brezuică*, chairman – Environmental Fund Administration, Ms. *Nataliya Zaiser*, Executive Secretary – Russian Member Committee of the World Energy Council.

Key messages delivered to the participants

► *"As in the past two years we faced peculiar energy situations, we managed to do an in-depth analysis in order to identify the most efficient methods to meet our main energy goals in the new European and global context. Our primary concerns go to providing the highest energy quality parameters to consumers, and strengthening Romania's role in the energy field. The power engineer profession is hard, but extremely rewarding, as it affords light, heat and means of development to the humanity. (Doru Vișan, Secretary of State - Ministry of Energy)*

► *"Increased energy efficiency and energy security are the most important goals for any society. Efforts are further on needed to find out the appropriate investment sources for the energy sector development to the benefit of mankind. Energy sector undergoes a major transition period and focus should be laid on the 3 D – Decarbonation Decentralization and Digitalization; they will contribute to meeting the targets of energy*

efficiency, energy sustainability and energy security." (**Einari Kisel**, regional manager for Europe within the Council)

▶ "Starting from January 2017, mankind entered a new development transition era, which requires totally different approaches towards environment, life and the way we think, produce and use the energy. It is energy that will gradually become the key of all problems, both in political, economic, and social terms, and it is energy that will give us the solution." (**Iulian Iancu**, chairman of RNC-WEC)

▶ "The Ministry for Business Environment, Trade and Entrepreneurship is a point of contract for foreign and domestic business environments. Our team can offer guidance throughout the implementation of a business plan, starting from the idea up to its changing into a success story, both in Romania and abroad." (**Paula-Marinela Pîrvănescu**, Secretary of State - Ministry for Business Environment, Trade and Entrepreneurship)

▶ "FOREN 2018 events are a guarantee that Romania has a safe future in gas and electricity sectors. You may contribute to the economic and social stability, together with the regulatory authority and the competent line ministries, so that Romanian consumers and operators may enjoy harmony in their daily business." (**Dumitru Chiriță**, chairman of the Romanian National Energy Regulatory Authority - ANRE)

▶ "Romania needs an environment able to stimulate investments by also protecting the customers. In the upcoming years, improving energy system performance should be our particular concern" (**Frank Hajdinjak**, general manager - E.ON Romania and CEO-ACUE)

▶ "In Romania, focus should be placed on modernising energy equipment and technologies, developing new energy sources, improving the environment quality and building power grids, digital networks included. Therefore, we should say "no" to coal and to "hackers!" (**Eric Stab**, manager and CEO- Engie Romania)

▶ "In order to meet the ambitious EU targets concerning decarbonation, high investments are needed" (**Cătălin Stancu**, general manager - Electrica SA)

▶ "Promotion of "smart" solutions, meant to minimize energy loss and increase energy supply need significant efforts and only together we shall overcome." (**Adrian Borotea**, manager-CEZ Romania)

▶ "Since coal-based electricity production will be more restricted, energy storage is to be obviously promoted and the appropriate mechanisms should be identified to flatten the load curve by peak demand decreasing "Smart metering" may also play a significant role for energy saving." (**Florin Gugu**, manager of ENEL Romania)

▶ "New regulations and a more active involvement of experts are required in the innovation, research and modernisation process. The progress in the energy sector is also determined by the level of investments in the next years. As human resource is the most important resource of any country, its development and preservation is by far of the utmost importance and it should be paid a particular attention. Training courses for the new energy professionals should be given equal attention." (**Adrian Constantin Rusu**, chairman of the Steering Board of Transelectrica)

▶ "Romania should be much more involved in the activities developed at the level of EU." (**Corneliu Bodea**, chairman of the Romanian Energy Center (CRE) and CEO-Adrem)

Session KA1: “Financing Resilient Energy. Challenges and solutions”

KA 1 session was moderated by Messrs *Doru Vișan*, Secretary of State – the Ministry of Energy, *Adrian Țuța*, Head of Regulatory - Transelectrica and Professor *Virgil Mușatescu*, advisor to the WEC Romanian MC.

The topics addressed, relying on The Council’s studies, were: identification of the risks which might bring about additional challenges for power systems; present concepts underlying the design, building and financing the energy systems evolution of energy cyber security in the wake of digitalisation.

Relevant issues

- Grid operators must pay due attention to the climate pattern change (severe draught during summer, frost during winter, volatility of renewable energy sources);
- The theme is highly topical and its better addressing and understanding is just the first step. Conclusions and recommendations in this respect should be sent to the appropriate decision makers;
- The solutions adopted by other European countries should be analysed and smartly applied in Romania, as well;
- The Council’s surveys have identified three types of new risks (severe weather risk, energy– water– food connection, cyber risk), which result in additional challenges for the current energy systems;
- The events generated by severe weather and cyber-attacks could negatively impact power system operation and generate considerable loss;
- As integrated energy market development will depend on the new interconnection projects of the countries in this region, the Projects of Common Interests should be highly supported. Energy price will further on be a major concern, especially along with renewables share increase; however, there are also good news related to the favorable dynamics of their investment costs, whose decreasing trend is visible;
- The increased penetration of weather-dependent sources is still a major problem for transmission and distribution grids; therefore, additional measures are required aimed at increasing their resilience and adequacy.

Key Messages

- Financing power system improved resilience should consider the following aspects: drawing up coherent energy strategies and policies, improving the legal and regulatory framework, directly involving the companies to solve up these issues, an appropriate understanding and support on behalf of the financing institutions ;
- A balanced energy mix is crucial for a secure, affordable and clean future and for meeting the EU objectives;
- Companies must have a response program in order to avoid energy supply failure and to safely ensure business continuity;
- Coherent and predictable economic and energy policies, a stable and fostering framework for long-term investments, appropriate regulatory measures and promotion of research and development are strongly needed.

Session RTF 1: “Worldwide Energy Scenarios: Electrical mobility – an Optimization of Solutions for Energy, Transport, and Environment Solutions”

RTF1 session was moderated by Messrs *Călin Vilt*, advisor within Romanian MC and *Einari Kisel* - regional manager for Europe - World Energy Council.

The topics addressed were: issues related to smart cities with minimum GHG emissions; transition to a pollution-free electrical transport, supplied from smart power grids; the Council's concerns on decarbonation, transition towards a global zero emissions, electrical mobility. At the global level: digitalization will have a major impact on the energy industry and electricity transport systems, from the hydrocarbon era to the electrical mobility. The World Energy Council and other international bodies carry out studies on strategies and action plans towards 2035 and 2050.

Relevant issues

- Smart cities and smart grids promotion should be strengthened in Romania, with a special emphasis on electrical mobility and environmental pollution reduction;
- At a global level, digitalisation will have a major impact upon the energy industry and equally to the transportation systems, which evolved from hydrocarbon era to electrical mobility;
- According to CEZ studies in the field, most Romanians agree to less polluting transportation means and consider that electrical engines and high-performance accumulator batteries will have major impact on urban transportation;
- As e-mobility is undergoing a significant transformation, with a high impact on the Power System, much more open-mindedness, extensive cooperation and institutional dialog are required in industries and at the governmental level.

Key Messages

- Electrical mobility is currently undergoing a consistent development, which strongly impact the Power System;
- Energy industry should step up efforts towards the rapid development of the automotive industry and research works in the field.

Session WF 1: "Human Resources and Work Safety for Energy"

Session WF1 was moderated by professor *Horia Necula*, dean of the Faculty of Electrical Engineering- Politehnica University of Bucharest (UPB), Mrs. *Silvia Viăsceanu*, general manager of ACUE and Mrs. *Corina Popescu*, general manager of SDEE Electrica Muntenia Nord.

The topics proposed for debate were: lack of workforce in the Romanian energy field; personnel recruitment, selection and training; wage policies and improvement solutions advanced to avoid risks .

Relevant issues

In order to solve up the issues related to human resources in the power field, several measures have been identified:

- New partnership agreements concluded between energy industry and universities by internships programmes and part-time jobs as early as in final student years
- Matching the university and vocational high-school curricula to the new technologies and energy requirements on the energy labor market;
- Promoting a new manner to approach personnel recruitment and training, with due consideration to the employers latest needs and to the advanced technologies in the field;
- A much more open attitude of the Romanian companies to the potential offered by the young energy professionals;
- Implementing a continuous staff training stages and specific incentives a life-long;
- Training the new generations of power engineers according to the latest requirements and technologies.
- Stimulating the young professionals to developing innovative and creative projects, with direct applicability.

Key Message

- Investing in personnel training is equally important as investing in assets, in order to improve labor productivity and performance, with a view to creating a sustainable energy future. Costs incurred now will be the future benefits.

Regional Energy Day: "The World Energy Grand Transition. Disruption trends, Environment Challenges, Security requirements"

The event was moderated by Messrs *Gianfranco Chicco*, head of Energy Department – Faculty of Torino, *Ioan Dan Gheorghiu*, vice-chairman of the WEC Romanian MC, *Viorel Gafița*, chairman of the Board of Directors of Romelectro and *Einari Kisel*, regional manager for Europe - World Energy Council.

The topics addressed were: the grand challenges of the moment: decarbonation, digitalization, deregulation, blockchain technology, smart grids, cyber security, power storage, E-mobility, IoT, Power-to-X; the great transition of world energy and scenarios of the World Energy Council; disruptive transformations in world energy; energy resource balance: primary resources (coal, gas, oil); renewable energy sources; energy efficiency; market liberalization and new market instruments; national and regional strategies – in compliance with world directives.

Relevant issues

- Emphasis was placed on the relevance of monitoring the energy issues in the region, by means of the World Energy Council;
- New challenges may be noticed in the financial and political field (US Policies, economic growth of China, EU cohesion), in the environmental field (CCS), social field (energy price affordability), climate and others;
- The new legal package "Clean Energy for all Europeans" lays down ambitious targets, a stronger integration through the domestic market and focuses on the role of shared interest projects;
- Three fields are identified, where innovation and emerging technologies will play a crucial role: a) the need for a dynamic power grid (artificial intelligence to optimize energy storage, consumption and sale, block-chain technology included); b) transformations in the power field should also pay due attention to consumers; c) new business models (including new goods and services);
- The European Commission has identified four key dimensions in respect of innovation and change of energy systems, in particular: data management (digitization), new business models, regulatory and, most of all, involving the consumers in the transformation process;

Key Messages

- Global energy transition in the next years should rely on a fully agreed solidarity, by promoting social and economic development programs meant to protect the environment, while also managing to preserve the each country competences;
- The Romanian Power System has to adapt to the digitalization era.

Session RTF 2: "Global Energy Resources. Management of Primary Energy Resources. Current challenges"

Session RTF 2 was moderated by Messieurs *Alexandru Pătruți*, advisor with RNC-WEC, *Doru Vișan*, State Secretary with the Ministry of Energy, and *Sorin Gal*, general manager of the National Agency for Mineral Resources.

The topics addressed were: present deep changes in the energy sector and their impact on the management of primary energy resources at global, national or company level; Romania benefits of a great diversity of energy resources (primary, renewable and non-renewable, conventional or non-conventional). However, operators in the energy industry have to face the challenges generated by their sustainable operation.

Relevant issues

- The new emerging technologies existing at world level in energy systems require a complex management of primary energy resources;
- The sustainable operation of Romania's wide diversity of renewable and non-renewable energy sources is a major challenge for Romanian companies;
- A more consistent use of renewable energy still does not lead to decarbonation; it is important not only to have low carbon facilities, but also to make them work. The answer to a successful decarbonation is also a more efficient use of GHG generating sources. Decarbonation requires a dedicated and determined approach.

Session WF 2: "Energy efficiency – A Straight Path Towards Eenergy Sustainability"

Session WF 2 was moderated by Mrs. *Carmen Neagu*, CEO- ENERGOBIT Group, Mrs. *Mirela Pleșca*, ANRE the Romanian National Energy Regulatory Authority] and by Mr. *Vasile Rugină*, advisor with the WEC Romanian MC.

The main topics addressed were: latest evolution and trends on energy efficiency at European and national level; improving energy efficiency at electric and thermal power generation and at renewable sources of energy; promoting a high efficient cogeneration; importance of scientific research in energy efficiency improvement; raising public awareness with respect to energy efficiency.

Relevant issues

- Clean Energy Package 2016 review is in progress at European Union level;
- The new EU Energy Performance of Buildings Directive is approved by the European authorities ;
- Combating energy poverty is important debate at European and national level, and a several short-term measures (government financial involvement) must be considered in this respect;
- Local public administration authorities in localities of 5,000-20,000 inhabitants are obliged to develop energy efficiency improvement programs to include short-term measures and measures for 3-6 years;
- Higher energy education is most important in promoting energy efficiency;
- Implementation of energy efficiency and renewable energy policies must be supported by awareness-raising activities for energy users for the next generation of energy professionals.

Key Messages

- Romania is on its way towards meeting the targets set for 2020 within the EU 20-20-20 legislative package, and there is a guarantee of their fulfillment
- The revised form of the EU-EPBD Energy Performance of Buildings Directive for the 2030 horizon will boost the pace of thermal rehabilitation of homes, reduce greenhouse gas emissions and generate new jobs and growth - especially for SMEs
- Although Romania has an important potential for increasing energy efficiency in industry and SMEs, significant financial resources and a more active contribution by public authorities - including through fiscal policies – will be required in order to manage the penetration of some new and innovative funding schemes;

Energy Trilemma: “Development of the Distributed Energy Sources Policies

“Energy Trilemma” session was moderated by Mr. *Gheorghe Indre*, advisor with the WEC Romanian MC, professor *Nicolae Olariu*-CEO of SUN E and Mr. *Sorin Petre*, Partner - PriceWaterhouse Coopers.

The topics addressed focused on: disseminating Energy Trilemma Report for 2017, elaborated by the World Energy Council, in partnership with the consultancy company Oliver Wyman; analysing the specific aspects of Romania's energy policy that can help balance the values of the three key elements of the energy trilemma (energy security, energy accessibility, environmental sustainability).

Relevant issues

- Promoting efficient energy use can lead to improving Romania's indicator in the “Energy Trilemma” report;
- Energy policies and energy strategy cannot be decoupled from the Romanian Power System and from the economic development planning ;
- Opinions of investors and of business people should be given due consideration when drawing up primary legislation;
- Given the need for network investment projects, the impact on conventional energy sources and on the Romanian Power System has to be assessed both to ensure network adequacy and to get a better predictability.

Key Messages

- An active involvement of the WEC Romanian MC, through its experts, is required in the process of developing energy policies and strategies;
- Participation of experts and decision-makers from the Ministry of the Environment is a must in the future debates related to “Energy Trilemma” study;
- Energy poverty and its impact on the quality of life should be reviewed within the chapter on primary legislation included in the draft Romanian Energy Strategy proposal and also in the regulations issued by the Romanian Energy Regulator-ANRE.

Session RTF 3: “Development in Energy Transport (oil and gas). Cooperation within the region”

Session RTF3 was moderated by professor *Niculae Napoleon Antonescu*, honorary rector of UPG Ploiesti and Chairman of the Scientific Board of RNC – WEC, Mr. *Niculae Havrileț*, advisor with the Ministry of Energy and Mr. *Andrew Costin*, CEO of Petroleum Club of Romania.

The debates approached: monitoring and control systems; diversification of supply sources and interconnections with neighboring countries; non-destructive identification methods for pipe flaws and their refurbishment; hydrocarbon market; regulatory and legislative issues on exploration, operation, treatment, transportation, processing and use of crude oil, natural gas, fuels, etc.

Relevant issues

- Due several objective and subjective elements, Romania's oil and gas production has dropped sharply. Therefore, Romania depends to a large extent on the import of large quantities of crude oil and especially of natural gas;
- Crude oil production has to increase at the most; the final recovery factor from the deposits still in operation, the prospecting / exploration procedures and

urgent exploitation of deposits at depths greater than 4000 m are needed. Nonconventional oil fields, such as oil shales, must be researched, explored and exploited;

- Romania's short, medium and long-term perspective to increase natural gas production is encouraging, due to the conventional landfills recently discovered in Buzau and Satu Mare counties, respectively on the The Black Sea continental shelf. There are also some unconventional deposits- from gasifying clays, hard deposits and possibly methane hydrates- which could be potentially explored in the near future.
- There are good expectations to cover the gas demand through new on-shore and off-shore discoveries.

Key Messages

- In the 100 years that have elapsed since the Romania's Great Union, the Romanian oil and gas industry has witnessed over 70 years an outstanding development; Romania was one of the leading countries worldwide, as far as hydrocarbon exploration, refining, higher processing and use, oil equipment construction, transport and distribution, expert training, international cooperation, are concerned etc.
- At present oil and gas industry is in a somewhat critical situation in Romania, mainly in terms of oil production, but it is however expected that, at least in the medium term (30-50 years) it will continue to play an important role in Romania's economy.

Session WF 3: "Financing the Sustainable Energy Development"

Session WF 3 was moderated by professor *Ionuț Purica*- advisor with RNC-WEC.

The main topics addressed were: sustainability principles and their correlation with investments in dedicated projects; structure of financing and associated risks; role and potential steps to be taken by the various financing bodies, including governmental involvement, which is of an utmost importance for the success of wide range.

Relevant issues

- The importance of research and innovation of energy technologies and also funding mechanisms were highlighted in order to increase system security and reduce GHG emissions;
- The need for massive CO₂ reduction projects and providing the necessary financial resources and new type of financing structures were also pointed out; financing the small, but numerous residential projects included in the on-going EBRD-GEFF Program represent an important issue for emission reduction.

Session KA2: "Renewable Energy Systems Integration. Development of European Energy Markets. Covering Energy Needs -in the context of Markets Interconnection"

Session KA was moderated Mrs. *Cristina Șetran*, program director of OPCOM, Mr. *Wilhelm Kappel* - ICPE CA, Ms. *Doina Ilișiu*, manager of Transelectrica and professor *Nicolae Golovanov*, advisor with the WEC Romanian MC.

The topics addressed referred to: solutions to increase the share of renewable energy sources; forecast of renewable resource generation; technical, economic and financial criteria for the use renewable energy sources; features of renewable source production; market access of the energy generated from renewable sources; prosumer integration in

the electricity market; management of electricity sources provided from the electric power system in the presence of renewable energy sources

Relevant issues

- Regulators are ready to take the necessary measures and improve energy markets operation in line with European regulations, taking into account the new trends in the development of energy systems;
- To further promote renewable energy sources, several technical and normative issues must be cleared up together with the The Romanian Energy Regulator-ANRE and the energy market administrator-OPCOM;
- An improved share of renewable energy sources and the development of distributed energy sources can lead to a transition in the energy system, in the short-run
- Reducing system inertia by connecting these sources through frequency converters could impact power system stability and the the quality of electricity supplied to end-users. Transmission and distribution operators manage work for the stable operation of the system.

Key Messages

- The regulator's role is important in promoting electricity generation from renewables;
- Increasing renewables share is necessary to cut down environmental pollution and reduce energy generation from fossil fuels;
- New solutions are needed to minimise perturbations caused by renewables volatile production;
- Efficient integration of renewables into the power system, without affecting the quality of the electricity supplied to users, can be ensured by increasing the "smart" level of the power grids, developing energy storage systems and involving the users by controlling the load curve;
- Particular attention is paid to promoting small users and producers (prosumers), which will ensure the efficient use of local energy sources.

Session RTF 4: " Technical, Economic and Environmental Performance of Generating Plants

Session RTF 4 was moderated by Mr. *Ovidiu Tuțuianu*, advisor with the WEC Romanian MC, *Constantin Ioanițescu*, advisor with the Ministry Energiei and Mrs. *Elena Nekhaev*, manager - Generation Performance Management (GPM)-London.

The topics addressed were: "Good practices" on power plants availability and economic efficiency; "Good practices" of environmentally friendly power plants; cogeneration and remote transmission of heat; electricity and heat distributed generation.

Relevant issues

- Under Romania's specific conditions, coal-fired power plants will further on contribute to the safe operation of the power system; however efforts are needed to reduce the environmental impact. To meet this goal, the existing power units should undergo rehabilitation and modernisation programmes and the new ones have to implement the latest technologies: boilers with ultra-supercritical parameters, coal gasifying cycles;
- Energy producers (including coal-fired power plants) should be encouraged to diversify their fuel mix, such as the performance of each one, or at least the national performance - the CO₂ intensity indicator at the national level (gCO₂ / kWh) - be able to meet European requirements;

DISCUSSION SESSIONS

Discussion Session DS 1: *"National Policies and Objectives to meet EU Energy Environment. Safe and Sustainable Energy Supply. Conventional and Technological Issues on Renewables. Financial mechanisms"*

The topics addressed referred to: energy policies and national strategies; security of energy supply; renewables increased share; electricity storage; finding out smart solutions to connect the power system of the Republic of Moldova to the European power system, by means of the Romanian energy system.

Relevant issues

- It is absolutely necessary to analyse the risk categories associated to the implementation of large production units from renewable sources connected to transmission grids and in distribution networks;
- Labor security in the electricity and power system requires that a special attention must be paid on reviewing the regulations, followed by designing protective devices in power plants;
- Switching to an energy system mainly powered by renewable energy sources requires the design of a technological and operational transition;
- Nuclear technologies is most important in ensuring a sustainable development of the Romanian power system.
- Possibility to implement hydro-power plant projects under the present Romania's conditions;
- Practical solutions to achieve the interconnection of the power system of the Republic of Moldova with the Romanian power system;
- Practical alternatives to mitigate the impact of coal-run power plants on the environment.

Discussion Session DS 2: *"Energy Markets. Market vs. Planning. Transmission and Distribution Operator's Role in Energy market. Stability vs. Flexibility"*

The main topics approached the electricity market in the current stage power system development and the transfer of information among grid operators; interconnectivity on the European energy market and management of interconnected systems; regional market and capacity market; technical and social impact of electrical installations; communication infrastructure; data security; renewables integration in power grids.

Relevant issues

- The analysis conducted to identify potential reasons why prices of offers and transactions recorded on the DAM, PI and Balancing Market in January, February, July and August 2017, clearly showed an interdependence between such prices;
- When significant electricity deficiencies are recorded, revenues from the Balancing Market can be maximised, by supplying electricity to power growth with hourly prices up to 450 lei/ MWh
- Adopting differentiated tariffs in hourly zones may have benefits in terms of flattening the load chart and making important savings, especially at generation level;
- The "human" capital is the most valuable "fuel" for achieving smart economic growth.

Discussion Session DS 3: "Energy Efficiency. Renewable Energy Sources. New Trends and Issues"

The topics addressed: increased energy efficiency – national and local priority; renewable energy sources and integration in the energy system; covering ancillary services; increased energy efficiency in electricity grids; cogeneration; energy efficient and environmental friendly technologies and equipment; the provisions of the EU legislative Package, with its three main goals (ranking energy efficiency first, reaching the world leadership in the renewable energy field and providing fair conditions for users).

Relevant issues

- Drawing up programs to improve energy efficiency plays is a must in a modern economy;
- Sustainable development of the localities designated as "national growth" poles is a priority;
- Building "zero" or "almost zero" energy houses (passive houses) is both a strategic goal, and a legislative provision;
- Identifying the impact of renewable electricity generation plants on the safe operation of the national power system, in terms of static and dynamic stability, voltage and frequency, is a matter major concern;
- Transition to 100% renewable sources is absolutely required for a sustainable energy future;
- Energy storage systems are useful to maximise energy efficiency of non-continuous and semi-continuous processes;
- Energy and environmental concerns require increased energy and environmental performances of the equipment and systems.

Key Messages

- An important contribution would be setting up *Task Force* with precise terms and responsibilities for energy management, permanent improvement of its structure and defining the hierarchical collaboration steps;
- Renewables use directly depends on the state support for certain technologies and on special tariffs for the energy generated by these technologies.

Discussion Session DS 4 A: "Oil and Gas – Conventional and Non-conventional"

The topics addressed included the following: mining of oil and gas deposits; transport of hydrocarbons, risks and environmental protection.

Relevant issues

- The papers dealt with important and topical issues for the oil and gas industry and for relating fields;
- Authors outlined modern and highly efficient investigation methods and techniques; many of theoretical and experimental investigations ended with case studies, carried out directly in the industry, with extremely favorable outcome;

Discussion Session DS 4B: "Nuclear Energy"

The debated topics referred to the "Candu Reactor" and "Alfred Demonstrator", the outcome of research – development and technological engineering in the Romanian nuclear field, current issues related to the design of the CANDU type reactor.

Relevant issues

- Nuclear energy is most important to achieving decarbonation targets;

- Nuclear energy would allow all low-carbon technologies to compete on a level-playing field without jeopardising climate and energy targets. This is also topical at EU level as the European Commission is at present working on a strategy proposal on the long -run EU greenhouse gas emission mitigation, meant to shape Europe's policy for years to come.
- Nuclear energy enables to meet the three specific goals set forth in the European Energy Policy Framework, related to: energy security, by ensuring viable energy solutions; competitiveness, by providing affordable prices for private and industrial use; sustainability, by decreasing the greenhouse gas emissions and minimizing the pollution;
- Development and implementation of the lead cooling demonstrator, ALFRED, in Romania will ensure the link between Romanian research and the priorities of European research, would help at developing of a state of the art technology, in the medium and long term, would contribute to new jobs etc.

Discussion Session DS 5: *"Coal and Clean Technologies"*

The main topics addressed were: challenges facing the coal-based electricity producers because of the accelerated increase of carbon certificate prices; analysis of current solutions to mitigate environmental pollution; implementation of the modern concept of "continuous improvement".

Relevant issues

- A long-term market for coal is needed, with a view to maintaining the energy safety of the system and to providing the energy supply service for users;
- Possibilities to extend the use of sorted coal for house heating are necessary;
- The equipment used in mining operations has to be modernised and in order to be more efficient;
- A balanced approach for the development of renewable energy sources, in order to avoid any imbalances which they could create and which may only be removed through storage and reserve of capabilities.

FEL Romania Workshop: *"Youth Role in the Romanian Energy Industry"*

Relevant issues

- Youth need to learn how to learn and understand technological processes, in order to acquire the pleasure of finding out new concepts and technologies and to become skilled; to keep in touch with the school throughout their professional carrier;
- Lack of vocational energy schools and of campaigns conducted in secondary schools and high-schools, which could raise the students' interest for the energy sector results in decrease of the young people wishing to join the energy sector;
- Political and economic decision makers should make an effort to determine the youth who left the country to return.

Key Messages

- As far as Romania has to meet the challenges of this century, by innovating and reaffirming commitment to a successful Europe in the context of current global challenges, the labor force has to be the concern of all interested parties, both in qualitative and quantitative terms;
- In order to avoid critical moment, education should be given first priority;
- Cooperation with the private environment, academia and NGOs is one of the proven solutions to be applied at national level, with a special focus on information, skills, creativity and professionalism rather than on diplomas or certificates;

- Practice and inter-disciplinarity should be compulsory in the educational process, from early ages, such as the future potential energy professionals may understand the processes, improve team work, increase curiosity and creativity, devote to innovation.
- There is a stringent need for predictability on medium and long term and also the approach to learning content through interdisciplinary and transdisciplinarity.

FOREN 2018 Exhibition

EXPO FOREN 2018 was one of the most successful exhibitions in the history of the 14 editions of the Regional Energy Forum FOREN, organized at the high level of the international exhibition standards.

The main features of the FOREN 2018 Exhibitions were as follows:

- There were 24 stands from 33 companies in the energy industry, from Romania and abroad;
- It benefited from a new and vast venue, structured in a modern architecture and the exhibitors showed their achievements, products, services and business models in a unique manner.

Within Expo FOREN 2018, a group of students from three high-schools in Constanta, interested in robotics and who participated in the robotics competition FIRST Tech Challenge Romania within the "Nație prin educație" [*Nation through Education*] Association, also carried out a demonstration with robots, which performed various simultaneous tasks, in a logical sequence.

MESSAGES, CONCLUSIONS, GENERAL RECOMMENDATIONS FOREN 2018

GENERAL MESSAGES

FOREN 2018 debates were focused on the main challenges, evolutions and opportunities of the energy industry in Central and Eastern Europe for a sustainable development. Although renewable energy sources have reduced the dependence on fossil sources (coal and oil), there is however a massive increase in natural gas dependency that provides the transition to the energy of the future, with zero emissions targets. Off-shore gas discovery in the Black Sea and the possibility to get gas through deep-sea drilling raises the question of how these gases can be used to Romania's benefit. The special situations the Romanian power system was confronted with in the last two years, require an in-depth analysis meant to find out the most efficient methods in order to meet the main energy objectives, by ensuring the highest quality conditions for the Romanian consumer and increasing Romania's role in the energy field in European context and globally. Romania needs an environment to stimulate investment opportunities, while also protecting the consumers; a particular focus must be laid on enhancing energy system performance. Increasing energy efficiency and energy security are objectives whose solving is essential for the development of society.

Efforts are needed to find sources of investment that enable the development of the energy sector as a prime concern for a sustainable energy future. Energy digitization, smart and "blockchain" technologies, are important issues that need to be approached with the utmost attention. At the level of the European Union, a new research development program has been created: *Horizon Europe*, which is the successor to *Horizon 2020*. A Technical Power Authority should be also set up, in order to monitor the editing of Energy Norms / Norms.

SPECIFIC MESSAGES BY ACTIVITY FIELDS

ENERGY SECURITY

- Energy security and an increased energy efficiency are objectives whose solving is essential for the development of society;
- The last two years particular energy situations, require that the Romanian energy system operators and decision-makers should deeply analyse their causes and jointly identify the most efficient methods to enable, even under the new European and global context, the achievement of the main energy objectives, both regarding the assurance of the highest quality parameters for the Romanian consumer, as well as the increase of the energy role of Romania;
- Several important measures are needed to finance the energy system increased resilience, including: developing coherent and predictable economic and energy strategies and policies, a stable and encouraging regulatory framework for long-term investment, promoting R & D, direct involvement of companies;
- Maintaining a balanced mix of energy sources is essential for achieving operational safety and environmental targets

ENERGY EFFICIENCY / RENEWABLE ENERGY SOURCES / ENERGY MARKETS

Energy efficiency

- Romania follows a favorable path towards the achievement of the targets set for 2020 within the European Union's 20-20-20 legislative package and it can be said that there is practically a guarantee of their fulfillment;
- The revised form of the EU-EPBD Energy Performance of Buildings Directive for the 2030 horizon will boost the pace of thermal rehabilitation of homes, reduce greenhouse gas emissions, generate new jobs and development, especially for SMEs, and will have positive effects for European energy consumers (increasing the quality of life, lowering energy bills and reducing energy poverty);
- Although Romania has a significant potential to improve energy efficiency in industry and SMEs, significant financial resources, more substantial funding and a more active contribution by public authorities will be needed to achieve the new energy efficiency targets - including policies fiscal;
- Promoting efficient energy use can lead to improve Romania's indicator in the "Energy Trilemma" Report.
- Development of the integrated internal energy market will depend on the new interconnection projects of the countries in the region, hence the importance of supporting Joint Interest Projects.

Renewable energy sources

- Ensuring transition to decarbonation and coal gradual replacement with renewable energy sources in generating electricity is extremely important, as far as it has been already accepted that the development of renewable sources is conditional on electricity storage;
- The failure to solve the problems related to the electrical energy storage systems means that the essential problem of the Romanian Power System is not solved, (i.e. the imbalances that may arise in the functioning of the system);
- Evolution of the green certificate price has been much above European Commission's forecasts, and the impact has been harsh on coal-based production;
- The focus to be placed on the 3 **D** – **D**ecarbonation, **D**ecentralization and **D**igitalisation is of utmost importance in order to meet the goals of energy efficiency, energy sustainability, energy security;
- Renewable energy sources will become really significant in the future. Since wind and photovoltaic (most currently used) plants have an unpredictable and volatile production, the overall conclusion is that, in order to be optimally used, these production systems must be accompanied by energy storage equipment.

Energy market

- The Regulator has an important role in electricity production promotion from renewable energy sources;
- Improving the share of renewable energy sources is required in order to mitigate environmental pollution and the country's electricity requirements, by reducing the share of energy from fossil sources;
- New solutions are needed in order to mitigate disturbances determined by the volatile generation of renewable energy sources;
- Effective integration of renewable sources into the power system, without affecting the quality of the electricity supplied to users, can be ensured by increasing the smartness of electricity grids, developing smart grids, energy storage systems and involving the users through demand response control, ;
- Particular attention is paid to promoting small users and producers (prosumers), which will ensure the efficient use of local energy sources.
- Interconnectivity degree of the European energy system will increase from 10% up to 15%. The highest risks are the technological, relating to policies/regulatory and environment, and not the financial ones.

NATURAL GAS, CRUDE OIL

- Due to objective and subjective causes, crude oil and gas production in Romania has dramatically dropped, and Romania is at present largely dependent on the import of important quantities of crude oil and especially natural gas
- With regard to crude oil, it is very important to highly increase the final recovery factor from exploitation, as well as exploration, followed by an urgent exploitation of deposits at depths exceeding 4000 m. They should be investigated, explored and exploited and unconventional oil fields, such as oil shale;
- In the short, medium and long term, Romania has an optimistic forecast as regards the increase of natural gas production, due to conventional landfills

(recently discovered in the Buzau and Satu Mare counties), respectively on the Black Sea mainland platform and unconventional deposits (those from gasifier clays, hard deposits, mining areas and possibly methane hydrates), possibly exploited in the near future;

- There are good opportunities to cover the natural gas needs through the new on-shore and off-shore gas discoveries,

NUCLEAR ENERGY

- Nuclear energy is most important to achieving decarbonation;
- Nuclear energy enables to meet the three specific goals set forth in the European Energy Policy Framework, in respect of: energy security, by the provision of viable energy, depending on the requirements; competitiveness, by providing affordable prices for private and industrial use; sustainability, by decreasing the greenhouse gas emissions and minimizing the pollution;
- Development and implementation of the lead cooling demonstrator, ALFRED, in Romania will ensure the link between Romanian research and the priorities of European research, would help at developing of a state of the art technology, in the medium and long term, would contribute to new jobs etc.

COAL AND CLEAN TECHNOLOGIES FOR THE GENERATION OF ELECTRICITY

- Under the specific conditions for Romania, coal-fired thermal power plants will keep on making their contribution to the safe operation of the Romanian Power System with increased effort to decrease the environmental impact, by upgrading and modernizing the existing units and by using performant technologies in the new units (boilers with ultra- supercritics, coal gasification cycles);
- Energy producers (including coal- fired thermal power plants) shall diversify their "fuel mix", so that their performance at national level meets EU requirements;
- In the conditions specific for Romania, heating power plants running on coal will continue to contribute to the safe operation of the National Energy System, however, with increased efforts to mitigate their environmental impact. Under the conditions specific to Romania, coal-fired thermal power plants will continue to contribute to the safety of the Romanian Power System peration, but with increased efforts to reduce the impact on the environment.

SMART GRIDS / DIGITALIZATION

- Technology is advancing fast, while at world and regional level, new automation and digitalization solutions are being implemented. Technology is advancing rapidly, and new global automation and computerization solutions are being implemented worldwide and regionally.
- Romanian electricity market must cope with with new emerging technologies, and to this purpose major investments are needed to resuscitate the energy sector
- As energy sector is currently facing major challenges, the technological revolution needs to be supported by the IT&C revolution
- Given the new players emerging in the electricity market (i.e. companies with advanced technologies and start-up companies), competitiveness is the key element to differentiate them;
- Moving towards a stronger, interconnected energy system based on digital technologies where energy and information circulate in both directions is envisaged;

- Challenges on promoting the concept of "smart" cities and smart grids in Romania needs must have clear objectives related to developing electric mobility and reduction the environmental pollution;
- At global level, digitization radically transforms the energy industry, but also transmission systems, which evolved from the hydrocarbon era to electrical mobility;
- Since electromobility field undergoes a deep transformation with a major impact on the Power System, much more openness, collaboration and institutional dialogue at all levels is needed, both between industry and government.
- The fast automotive industry digitization development require acceleration of the energy industry's efforts to ensure the conditions for the infrastructure of loading the electric cars and producing the necessary energy.
- Areas where innovation and emerging technologies will play a crucial role are: a) a dynamic energy grid (artificial intelligence for storage optimization, energy consumption and sale + blockchain technology); b) implementing this dynamic grid transformation by also including the consumer; c) developing new business models, including new products and services;
- The Romanian Power System needs to adapt to the digitization era; its estimated renewal would amount to more than EUR 10 billion, so as to gain maximum effect with minimum effort;
- Romania has the opportunity to become a Leader in the digitization of energy systems in the region

HUMAN RESOURCES

- Investments in personnel training are at least equally important as the investments in assets. Investments need to be made in the human capital, in order to improve labor productivity and performance, with a view to creating a sustainable energy future. Costs incurred now will translate into future benefits.
- The Ministry of Energy, the Ministry of National Education and the Ministry of Research need to have an inter-disciplinary and integrated approach to the Human Resources field.
- Collaboration with the private, academic environment and NGOs is one of the proven solutions to be applied, at national level, with a special focus rather on information and ,skills, than to diplomas or certificates.
- There is a stringent need for medium- and long-term predictability and approaching the actof learning through interdisciplinary and transdisciplinarity.
- The role of the younger generation of energy professionals is particularly important, and the training of new specialists is essential for Romanian energy.

ACKNOWLEDGEMENT

FOREN 2018 was appreciated by the participants as a successful and the unique event of such size and complexity organized at the level of the Central and Eastern Europe Region, similarly to the major conferences or congresses in the field.

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