

SMART GRID FORUM Moderator: Dr. Dragoslav JOVANOVIĆ CIREĐ Serbia

For SMART GRID FORUM 8 papers were presented out of a total of 8, which were included in the Conference programme.

After the presentation of papers, a brief but fruitful discussion developed. It can be said that in our country still the initial steps are being made, primarily due to the limited construction of distribution generators. Forum presented us with a tangible progress in Serbia compared to the situation in the UK, and it was given a new insight into the upcoming problems.

It was concluded that the trends in the development of smart grids are accelerating, the research is directed in several directions, but that there is still no clear answer about what is certain in this field. The only conclusion that is known is that all the activities are driven by profit and thus so the activities in this field.

It is expected that the situation in the region will continue in the direction of constructing new energy sources and that this will be followed up suitably.

EC 1 – NETWORK ELEMENTS Chairman: Prof. Dr. DRAGAN TASIĆ Faculty of Electronics, Niš, Serbia

Within EC-1, Distribution substations and power lines, 27 papers were presented out of a total of 28 papers included in the Conference programme. Prof. Dr. Dragan Tasić conducted the Session work with the assistance of expert reporters Ljiljana Funduk and dr. Vladimir Šiljkut.

After presenting the papers, the following conclusions were adopted:

1. The proposed new technical solutions and new equipment should be paid more attention, both from the technical, and from the economic standpoint.
2. The implementation of new technological solutions and technologies should be stimulated and operating experience analyzed.
3. When applying new technical solutions, the effects of relocation and replacement of existing equipment must be considered, bearing in mind the possibility of loading and life expectancy of equipment.
4. Adequate attention should be dedicated to the analysis of operational experience, both from the aspect of distribution substations and power lines maintenance, and from the aspect of envisaged future states.
5. It is necessary to work on the development of monitoring and diagnostics and maintenance strategy for network elements
6. It is necessary to use adequate mathematical models and state of the art software tools for analyzing the network components in normal and emergency conditions, and also to conduct verification of the proposed models by an adequate measuring.
7. The calculation of the electric and magnetic fields, due to the operation of the network components, should be given more attention.
8. It is necessary to analyze the environmental impact of grid components and take measures on reducing the harmful effects.

The most prominent paper: [**R-1.21 OVERVOLTAGE TRANSIENT ANALYSIS DUE TO VACUUM CIRCUIT BREAKER SWITCHING AND POSSIBILITIES FOR THEIR MITIGATION**](#)

[**Ranko JASIKA, Jovan MRVIĆ, Ninoslav SIMIĆ, Stefan OBRADOVIĆ, Elektrotehnički institut "Nikola Tesla" a.d., Beograd, Goran LEPOVIĆ, Siemens d.o.o. Beograd, Serbia**](#)

EC 2 - POWER QUALITY IN POWER DISTRIBUTION SYSTEMS Chairman: Prof. Dr. Vladimir KATIĆ, Faculty of Technical Sciences, University of Novi Sad

In the absence of the Chairman, the session was chaired by doc. dr. Velimir Strugar.

Within EC 2 preferential subjects were the following: 1. Quality of delivered power (voltage quality) - higher harmonics, flicker, voltage sags, short breaks and other deviations in consumer supply – causes, expansion, immunity, elimination.

2. Devices and methods for measuring and monitoring power quality (diagnostic methods, equipment, steps, etc.).

3. Domestic and European power quality technical regulations (standardization, technical regulations and methods).

4. Conditions of attaching nonlinear consumers – higher harmonics, flicker, asymmetries – sources, expansion, conditions of attachment, elimination methods.

5. Influence of insufficient quality to consumers operating – voltage sags, short breaks and other deviations in consumer supply – causes, expansion, immunity, elimination.

6. Electromagnetic compatibility, safety and interference

7. Over-voltage and over-voltage protection in power distribution networks, ground disturbances and other subjects.

At the session of this expert committee, 16 out of 17 accepted papers were presented, which were presented within given preferential topics, 8 within the first, 2 within the second, 3 within the fourth, and 3 within the seventh preferential topic. After presenting their papers, all of the authors answered the questions of the expert reporters, the chairman and the audience. The work of all present at the session can be considered as very successful, and it was marked by a very large attendance. Obviously, the quality of preferential topics, as well as the material that the authors treated in their papers, contributed to the great interest of the participants, the extremely constructive and well-intentioned discussion, very focused on the topics of papers. The general impression is that all papers contributed significantly to the quality of the Conference and a better understanding of the contemporary problems regarding energy quality in power distribution networks. After the session, a meeting was held. The attendees were:

1. Doc.dr Velimir Strugar, Chairman of the session

2. Doc.dr Zoltan Chorba

It was concluded that many authors have considered the need of more active work on the regulations and technical recommendations. As preferential subject 3 had not had papers, it is recommended to intensify all activities within this subject and to motivate potential authors to write on it.

The most prominent paper: [R-2.14 MITIGATING DISTURBANCE INJECTION INTO UTILITY GRID FROM WOOD PELLET PLANT](#) [Nikola LAKETIĆ, Avalon Partners, Elektrotehnički fakultet, Beograd, Borko ČUPIĆ, Visoka škola elektrotehnike i računarstva strukovnih studija, Elektrotehnički fakultet, Beograd, Serbia](#)

EC 3 - MANAGEMENT AND PROTECTION IN ELECTRICITY DISTRIBUTION Chairman: Dušan Vukotić, M.Sc.

Subsidiary "EPS Distribucija" d.o.o. Beograd

In EC 3, were presented 18 papers and pieces of information out of a total of 20 expert papers, accepted for this year's Conference programme.

After the presentation of papers through 3 subject areas:

1. Managing electricity distribution networks	2. Protection of power distribution networks	3.
Telecommunications in power distribution networks		

the following conclusions were made related to protection and management in power distribution networks:

1. Presented unification of process sizes and graphic representations in dispatching centers of

the ODS (NDDC / DDC / PDC / ODC) is unambiguously indicating the direction in which the Distribution System Operator (ODS) goes, in the implementation of the latest projects. The established goal of modernizing dispatch centers has an imperative to achieve the same information and telecommunication platform at the ODS level, creating all preconditions for the planned optimization of the number of dispatch centers in order to improve and optimize the overall performance management of the distribution system. The focus shifted to the organizational issues of the dispatching centers in relation to technological solutions, unambiguously indicates that the implemented solutions have proved good in practice, and that this is primarily due to the good strategic planning by ODS in the last couple of years.

2. Implementation of the automation solution for the medium voltage power distribution network (SNDM) has largely enabled the efficient SNDM network management, which reduced the need for engaging dispatching teams in the field when changing the network's reconfiguration (reconfiguration), either for the needs of the planned works or the location of the site failure after let-down. Solutions that are practically standard in the SNDM network have achieved a high degree of unification and standardization, which enabled a very efficient way of their integration into SCADA systems, but also practically centralized maintenance of embedded equipment. The presented papers pointed out new tendencies and conceptual solutions for the equipment for the automation of the SNDM network, one focus being placed on latest solutions for the indication of the failure of the fault flow, which is very important considering that more than a decade of its use in the SNDM network, on a new technological wave come the solutions that significantly increase the level of functionality of the device through the implementation of modern protocols with advanced algorithms for more precise identification of the failure of the fault flow. And if it was a conclusion from the previous Counseling, it was reiterated that the implemented, but also planned automation solutions, must largely be in line with the recommendations and technical specifications of the automation equipment that should be finalized and adopted at the ODS level.

3. In recent years there have been significant changes in terms of the characteristics of the SNDM network, since SNDM networks are largely becoming active networks, due to the increasing presence of distributed production within it. The change in the flow of energy in the SNDM network has caused the need for the use of protective devices in the depth of SNDM at the points of connection of the distributed production, but also with the increasingly efficient coordination of the operation of protective devices in order to achieve the desired level of selectivity after the occurrence of the outburst. Since the distributed production is largely connected through automated connection and distribution devices (PRPs), but also that the connection initiators are significantly automated, it is evident that there is a need to make a new approach in the consideration of all the necessary protection schemes to be implemented in the protection settings plan in the SNDM network.

4. Presented reports showing the directions of development and the degree of implementation of information and telecommunication systems within the ODS by individual distribution areas, unambiguously indicate that telecommunications in electricity distribution systems are increasingly occupying a focus, as there is a need to increasingly exchange large amounts of information between dispatching centers and embedded equipment along the depth of the SNDM network, but also between the end devices themselves. The approach in solving the coverage with the telecommunication system in a certain area of the ODS led to the expected results that the designed telecommunication system achieved, which unambiguously set the direction for further development of telecommunication systems in other distribution areas that do not or that partially have the necessary telecommunication infrastructure. Also, the emphasis were put on a need to implement a unique telecommunication infrastructure at the level of dispatch centers, primarily based on radio systems, that would enable efficient communication with dispatching teams on the ground.

The most prominent paper: [R-3.04 OPTIMAL AUTOMATION SCENARIO IN DISTRIBUTION NETWORKS IN THE PRESENCE OF UNCERTAINTY](#)

[Željko POPOVIĆ, Fakultet tehničkih nauka, Novi Sad, Stanko KNEŽEVIĆ, Schneider Electric DMS NS, Novi Sad, Serbia](#)

EC 4 - DISTRIBUTED PRODUCTION AND EFFICIENT USE OF ELECTRICITY Chairma
n: dr Željko POPOVIĆ

Faculty of technical sciences, Novi Sad

1. Integration, management and role of distributed power sources in distribution networks Exp
ert reporter – Dr. Predrag Vidović, Faculty of technical sciences, Novi Sad Serbia

In addition to analyzing the impacts on losses and voltage variations in the distribution network, which was discussed in some presented papers, it is also necessary to analyze the impact of distribution generators on other business processes in the distribution system. First of all, it is necessary to analyze the impact of distribution generators on the long-term distribution grid development planning process, taking into account all relevant aspects of planning (investment costs, costs of losses, costs of outages, short-circuits values, operative restrictions).

2. Efficient use of electricity in load control Expert reporter - Saša Marčeta, ODS EPS Distribucija, Novi Sad, Serbia

For the purpose of obtaining higher efficiency in electricity distribution, it is necessary, among other things, to continuously monitor the total electricity losses (technical and non-technical) on all voltage levels. In order to allow quality monitoring of the site of electricity distribution and quality assessment of energy and power in the grid, appropriate tools need to be used (e.g. tools which allow grid modeling, topology analysis, state estimation, load flows calculation) within a single distribution management system (DMS), which is one of the basic components required for implementing the Smart Grids concept. The above system needs to integrate the corresponding data on all grid elements (e.g. from GIS) and the best quality data in the grid consumer nodes (e.g. from the AMI/MDM and CIS systems). On the basis of such a system, macro-localization of increased non-technical losses can be carried out, and based on that, also by applying appropriate technical solutions, micro location of unauthorized consumption can be conducted as well.

3. Load management and Smart meters and remote measuring and control systems Expert reporters - Stanko Knežević, Schneider Electric DMS NS, Novi Sad, Serbia and Boris Holik, ODS EPS Distribucija, Novi Sad, Serbia

a. Load management is one of the important resources used in Smart Grids in a significant number of business processes (operative management in normal and emergency conditions, grid development planning). That is why it is necessary, in addition to the benefits that load management may bring to some customers, also to perceive and assess the possible benefits for other participants as well (electricity producers, transmission and distribution system operators, retailer, and wholesale tradesmen, aggregators). Only by perceiving all the benefits, and taking into account the relevant costs, can the effectiveness of a load management programme be evaluated.

b. Introducing advanced metering and the AMI system are the basis for Smart Grids development contributing to the development of the electricity market and higher operational efficiency in electricity distribution companies.

c. Updating of the metering infrastructure needs to be speeded up in compliance with the adopted AMI/MDM system concept

d. Activities in the field of integration of data from the AMI/MDM system with other technological and business processes within the business distribution system operator need to be speeded up.

e. For the purpose of higher efficiency in struggling with the non-technical electricity losses, utilization of available data from the AMI/MDM system (logs, log books on events, alarm systems, etc.) needs to be more intensive

In order to select the most prominent paper, all presented within EC were evaluated on the basis of the following criteria: 1. Defining the problem and the purpose of the research 2. Review of literature

3. Designing a research

4. The relevance of the research and the possibility of generalization and transfer of research results

5. Presentation of results

6. Discussion of results and conclusions.

The most prominent paper is:

R-4.01

**OPERATION METHOD OF THE SYNCHRONOUS GENERATOR IN SMALL
HYDROELECTRIC PLANTS IN CAPACITIVE REGIME – ADVANTAGES AND PROBLEMS**

**Radovan LEKIĆ - ODS "EPS distribucija" DP Kraljevo, mr Vladimir OSTRAĆANIN – JP
EPS, TC Kraljevo, dr Radomir TODORVIĆ – JP EPS Beograd, Nikola M.PAVLOVIĆ – JP
EPS, TC Kraljevo, Serbia**

EC 5 - DISTRIBUTION SYSTEM PLANNING Chairman: Dr.Aleksandar Janjić Faculty of Electronics, Niš

In this session, 16 of 18 accepted papers were presented, covering all seven given preferential subjects. The expert reporters for some preferential subjects were Miroslav Dočić, Mirko Luković, Dr. Dragoslav Jovanović, Saša Minić and Dr. Saša Đekić.

CONCLUSIONS

1. Monitoring and consistent implementation of legislation is crucial in the process of planning a new distribution network, but the legislation needs to be adapted to the real practice in Serbia.
2. It is necessary to continue with the use of modern software tools for planning the distribution network. These tools include geographic information systems as well as "big data" analytics for forecasting loads and production of electricity.
3. Planning the connection of small power plants should be carried out systematically, by searching for the optimal solution for a longer period of time. It is also necessary to strengthen coordination of activities and information exchange between different amenable institutions.
4. Increasing efficiency and reducing losses in the network should be carried out using verified solutions, such as relocating the measurement location, but also the statistical analysis that can indicate the areas and causes of the increase in losses.
5. The reconfiguration of the distribution network should be carried out by respecting all constraints, with the satisfaction of several criteria and total costs in the network.

The most prominent paper: [R-5.16](#) [OPTIMAL RECONFIGURATION OF THE DISTRIBUTION NETWORK](#) [Darko ŠOŠIĆ,](#)
[Predrag STEFANOV, Đorđe LAZOVIĆ, Univerzitet u Beogradu – Elektrotehnički fakultet,](#)
[Serbia](#)

EC 6 – DEREGULATION, OPEN MARKET AND EFFICIENT USE OF ELECTRICITY Chairm
an: Dr. Nenad Katić

Faculty of Technical Sciences, Novi Sad, Serbia

Session members and expert reporters: Dr. Gordan Tanić, Energy Agency of the Republic of Serbia, Belgrade, Vladimir Janković, M.Sc., EMS, Belgrade, Dr. Savo Djukić, Faculty of Technical Sciences, Novi Sad, Serbia

At the Session held on 29th September, 2016 in Vrnjačka Banja during the 10th Conference on electricity distribution were presented and considered six papers in accordance with the preferential subject of the Session:

- Opening of the electricity market and deregulation of electricity sector in the region.
- Methodologies of regulation and experience.

- Principles and experience of electricity markets, new electricity providers and experience in contracting deliveries.
- Smart Grid solutions in competitive environment of open electricity market.

After discussion the following conclusions were made: 1. Due to the reorganization of EPS, it is necessary to define precisely the new roles of ODS in the transitional electricity market.

2. In the following period it is necessary to define more clearly the relationship of the operator of the disrupted distribution system with other participants in the electricity market.

3. Improving the regulatory framework to increase the efficiency of the regulated activity of the EPS group.

4. The exploitation agreements between the distribution system operator and the transmission system operator should also include the emerging situations in the distribution networks arising from the increasing presence of distributed sources (especially the return of electricity from the distribution to the transmission).

The most prominent paper: [6.08 ADMS FUNCTIONALITIES THROUGH PROJECT "SMART CITY" IN THE BRANCH "ED NOVI SAD"](#) [Milica POROBIĆ, Slobodan MILIVOJEV, ODS "EPS Distribucija" d.o.o, Beograd, Ogranak "ED Novi Sad", Novi Sad, Gordana JOVANOVIĆ, ODS "EPS Distribucija" d.o.o, Beograd, Novi Sad, Branislav BOGDANOVIĆ, ODS "EPS Distribucija" d.o.o, Beograd, Ogranak](#)

"ED Novi Sad", Novi Sad, Ratko ROGAN, ODS "EPS Distribucija" d.o.o, Beograd, Serbia