



Serbian National Committee of
International Council of
Major Electrical Networks

36. Conference CIGRE Serbia 2023

ELECTRIC POWER SYSTEM
FLEXIBILITY

FIRST ANNOUNCEMENT

May 22-26, 2023, Zlatibor

www.cigresrbija.rs

**Ladies and gentlemen,
Dear Colleagues,**

The National Committee of **CIGRE Serbia**, as part of the CIGRE global community founded in 1921 in Paris, a joint global community that shares knowledge and expertise, which has a basis for work in 60 organizations whose work involves 15,000 professionals individually from over 90 countries, including the world's leading experts in certain fields of electric power systems and 1250 members of companies, institutes, universities, faculties, higher professional schools, associations and other professional vocational organizations are organizing their 36th conference. During its 101 years of operation, CIGRE has contributed to the key technical foundations of the modern power system.

In 2023, it will be 72 years since the establishment of the National Committee of the International Council on Large Electric Networks CIGRE Serbia, which in itself indicates the extremely significant contribution of CIGRE Serbia to the development of the electric power sector in Serbia.

The 36th CIGRE Serbia conference will be held from May 22 to 26, 2023 at Zlatibor.

The goal of the 36th CIGRE Serbia conference is to bring together scientific and professional workers, organizations from the fields of science, electrical engineering and electrical industry, who will contribute to solving current problems related to the operation and development of the electric power system through written professional-scientific papers and a comprehensive expert discussion.

The 36th CIGRE Serbia conference is being held in a year in which, according to all relevant observations and announcements for the year 2023, a comprehensive energy crisis will continue in Europe and partly in the world.

Within all current topics important for overcoming the existing energy crisis and for the development of the electric power and energy sector, possible reforms of the pan-European electricity market initiated by the unsustainable increase in electricity market prices will certainly be announced.

Completion of investment projects is always a hot topic, so there will be talk about the completion of the Kostolac B3 thermal power plant and the completion or nearing completion of the construction of wind turbines and solar power plants that will be connected to the transmission system and the distribution system.

In 2023, the Energy Sector Development Strategy of the Republic of Serbia and the Integrated National Energy and Climate Plan should be completed, which should clearly indicate the development projects and development measures that will enable the reduction of greenhouse gas emissions (GHG emissions) undertaken by the Republic of Serbia through the NDC (Nationally Determined Contribution), i.e. National binding contribution within the framework of international obligations to reduce the impact on climate change, which for the Republic of Serbia is a 33.3% reduction of GHG gases in 2030 compared to 1990, i.e. a 40% reduction of GHG gases, including LULUCF, in 2030 compared to 1990.

Some of the conditions for achieving these goals in the electric power system of Serbia are the increase of energy efficiency in all areas, especially through the construction of cogeneration plants, the continuation of the integration of conventional renewable energy sources, the continuation and increase of the integration of variable renewable energy sources, with the application of European network rules and other European regulations and directives within the framework of the amended legal regulations in the field of energy from the Third Energy Package of the European Union and from the Fourth Energy Package of the European Union (Clean Energy Package), which was adopted in June 2019.

ABOUT THE CONFERENCE

One of the key things for achieving the stated goals is the flexibility of the Serbian electricity system in all its aspects, from customers/producers, the development of the electricity market in all areas, the expansion of the scope of application of smart grid technologies, new energy storage of all types, aggregation, new methodologies for planning multiple interconnected transmission networks and for the interaction of transmission and distribution systems.

All of the above is only a part of the professional, research and scientific topics for which there is a significant need for new knowledge, exchange of opinion and experience from domestic and international practice in the aforementioned areas, as well as all other areas from the preferential topics determined by the 16 following study committees:

- A1 Rotating electrical machines**
- A2 Power transformers & reactors**
- A3 Transmission & distribution equipment**
- B1 Insulated cables**
- B2 Overhead lines**
- B3 Substations & electrical installations**
- B4 DC systems & power electronics**
- B5 Protection & automation**
- C1 Power system development & economics**
- C2 Power system operation & control**
- C3 Power system environmental performance**
- C4 Power system technical performance**
- C5 Electricity markets & regulation**
- C6 Active distribution systems & distributed energy resources**
- D1 Materials & emerging test techniques**
- D2 Information systems & telecommunication**

The organizing committee of the 36th conference has planned to hold **PANELS WITH CURRENT TOPICS** from the power sector of Serbia, the Western Balkans region and Europe during the conference.

During the Conference, the **CIGRE Serbia EXPO 2023 TECHNICAL EXHIBITION** will be held, where the electrical industry and electrical equipment manufacturers from our country and abroad, consultants, scientific and research organizations and others will have the opportunity to demonstrate through business presentations and promotional activities the practical implementation of the subject matter of discussions at the Conference.

For all questions regarding participation in the **TECHNICAL EXHIBITION CIGRE Serbia EXPO 2023** and the **MARKETING PROGRAMME**, please contact the technical secretariat of the Conference:

BBN Congress Management d.o.o.

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Papers must be submitted via the following application:

<http://radovi.cigresrbija.rs/>

On the website given above authors should register and create an account which they will use to submit both the synopsis and co-author of the paper.

The synopsis should be submitted in Serbian in the following format:

Title of paper and short summary of maximum 300 words, without commercial aspects, with 4-6 key words

Abstract cannot contain special signs, formulas, tables or images and photographs

Registration fee for the 36th Conference is **€140** and includes:

- CIGRE business bag
- ID card
- Opening ceremony programme (in Serbian and English)
- Welcome cocktail invitation
- Joint dinner invitation
- Work programme and conference guide
- Proceedings - USB
- List of papers with reports of expert reporters
- Writing pad
- Pencil
- CIGRE souvenir

The deadline for payment of the registration fee for authors is **May 5, 2023**. Payment of the registration fee by the indicated date is a mandatory prerequisite for the inclusion of papers in the conference programme, proceedings of abstracts and proceedings of papers. Papers that are not included in the Conference programme cannot be presented at the Conference.

For all questions and assistance in using the application for submission of papers, please contact the technical secretariat of the Conference:

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IMPORTANT DATES

Submission of papers

January 15, 2023.

Acceptance of synopsis

January 23, 2023

Submission of papers

March 19, 2023

Reviews of papers

April 9, 2023

Submission of final papers

April 18, 2023

SC A1 ROTATING ELECTRICAL MACHINES

1. GENERATION MIX OF THE FUTURE

- Impact and effect of increasing renewable power mix on new and existing generators, generator auxiliaries and motors,
- Synchronous compensator and high inertia machine design and performance for supporting power generation networks,
- Adaptation of international standards for electrical machine design & performance to current power grid requirements.

2. ASSET MANAGEMENT OF ELECTRICAL MACHINES

- Experience with refurbishment, replacement, conversions, power up-rating and efficiency improvement of generators,
- Novel techniques to overcome known operational and design problems,
- Optimized condition monitoring, diagnosis, prognosis and maintenance practices to improve reliability and extend operational life of conventional plant and in new volatile grid conditions, including data handling and digital modelling.

3. DEVELOPMENTS OF ROTATING ELECTRICAL MACHINES AND OPERATIONAL EXPERIENCE

- Latest design, specification, materials, manufacture, maintenance and performance and efficiency improvements,
- Operational experience: Failures, root cause analysis, recovery options, cost and time reduction initiatives,
- Evolution and trends in designs of rotating electrical machines for renewable generation.

SC A2 POWER TRANSFORMERS & REACTORS

1. EXPERIENCE AND NEW REQUIREMENTS FOR TRANSFORMERS FOR RENEWABLE GENERATION

- Operational experience: problems, maintenance, condition assessment, monitoring, failure rate, lifetime, lessons learnt,
- Design, test, insulation, monitoring, maintenance of step-up, secondary substation and DC converter transformers,
- Design and operational requirements for future applications: wind and photovoltaic.

2. BEYOND THE MINERAL OIL-IMMERSED TRANSFORMER AND REACTORS

- Alternative technologies for improved safety and environmental performance: gas-insulated, ester-immersed, dry-type and solid-state transformers,
- Operational experience with transformers using these new technologies,
- Advantages and limitations, impact on specifications, high temperature applications, business cases.

3. BEST PRACTICES IN TRANSFORMERS AND REACTORS PROCUREMENT

- Return of experience: factory qualification, design reviews, implementation of new specifications, on-site vs virtual witnessing,
- Quality control and testing: manufacturing check points, sub-supplier qualification, validity period for type tests, enhancements to standards, special tests, short-circuit test, paper DP measurement,
- Dealing with non-conformities, performance guarantees, warranty.

SC A3 TRANSMISSION & DISTRIBUTION EQUIPMENT

1. DECENTRALISATION OF T&D EQUIPMENT

- New assets: e.g., DC switching equipment, fault current limiter,
- Influence of system changes on existing and new equipment,
- Equipment resilience against natural disasters.

2. DECARBONISATION OF T&D EQUIPMENT

- SF6 Alternatives for MV and HV application and HV vacuum application,
- Life cycle management and the impact on the design of T&D equipment,
- Health, Safety and Environment aspects of T&D equipment.

3. DIGITALISATION OF T&D EQUIPMENT

- Advanced sensors, non-conventional instrument transformers, monitoring and condition assessment,
- Digital twin and equipment reliability modelling,
- Pandemic influence on equipment.

SC B1 INSULATED CABLES

1. LEARNING FROM EXPERIENCES

- Design, manufacturing, installation techniques, maintenance and operation,
- Quality, monitoring, condition assessment, diagnostic testing, fault location, upgrading and uprating methodologies and relevant management,
- Lessons learnt from permitting, consent and implementation.

2. FUTURE FUNCTIONALITIES AND APPLICATIONS

- Innovative cables and systems, exploring the limits,
- Role and requirements of power cables in tomorrow's grids,
- Prospective impacts from the Internet of Things, Big Data and Industry 4.0 on power cable systems.

3. TOWARDS SUSTAINABILITY

- Environmental challenges impacting current, planned and future cable systems,
- Safety considerations, cyber and physical security, including case studies,
- Projects and initiatives to promote access to affordable, reliable, sustainable distribution and transmission cable lines for all.

SC B2 OVERHEAD LINES

1. CHALLENGES & NEW SOLUTIONS IN DESIGN AND CONSTRUCTION OF NEW OHL

- Design for reliability, availability, future climate parameters, more frequent extreme loads, design against theft, vandalism,
- AC/DC Hybrid Lines, multi-purpose utilization (e.g. renewables, telecommunication),
- OHL challenging construction projects: multiple circuits lines, high towers, long spans, heavy wind and ice, high altitudes, geology, access to site, no proper machinery, long lines and variation in reliability criteria etc.

2. LATEST TECHNIQUES IN ASSET MANAGEMENT, CAPACITY ENHANCEMENT, REFURBISHMENT

- Preparedness and countermeasures for natural disasters and other emergencies,
- Decisions of replacement based on monitoring, maintenance, operation, historical data,
- Strengthening of existing lines to improve reliability, ampacity, lifespan.

3. ENVIRONMENTAL AND SAFETY ASPECTS FROM OHL (JOINT PS WITH C3)

- Safety of workers in construction and maintenance of lines (equipment, methods, etc.),
- Reducing environmental impacts from new and existing OHL,
- Innovative engineering solutions/design to deal with environmental challenges.

SC B3 SUBSTATIONS & ELECTRICAL INSTALLATIONS

- 1. REVITALIZATION, MAINTENANCE, EXTENSION OF CAPACITY, AND OPTIMIZATION OF FACILITIES DURING CONSTRUCTION AND EXPLOITATION.**
- 2. SPECIFIC AND INNOVATIVE DESIGN SOLUTIONS, AND RISK MANAGEMENT IN THE DESIGN, CONSTRUCTION, AND EXPLOITATION OF SUBSTATIONS AND SWITCHYARDS.**
- 3. INCREASED IMPACT OF CLEAN ENERGY TRANSITION ON SUBSTATION DESIGN:**
 - On-offshore wind, PV, geothermal, etc.,
 - Energy storage, hydrogen, synchronous compensators, etc.,
 - GIS/GIL application for DC network.
- 4. MANAGEMENT, MAINTENANCE, MONITORING, RELIABILITY, AND SAFETY OF THE SUBSTATION AND SWITCHYARD.**
- 5. SUSTAINABILITY MANAGEMENT CHALLENGES IN SUBSTATIONS:**
 - External drivers for substation intervention such as resilience, reliability, security of supply, life expectancy coordination, etc.
 - SF6 alternatives and emission management, circular economy of materials such as reuse, reduce, recycle,
 - New set of skills for new technologies, knowledge transfer and high standards of education in engineering skills.
- 6. INTEGRATION OF INTELLIGENCE ON SUBSTATIONS (JOINT PS WITH B5)**
 - Data analytics, remote supervising & monitoring and autonomy application,
 - IoT and machine learning applications based on protection automation and control data including asset management, monitoring and data analysis,

- Expectations and benefits from digital substation, IEC 61850 Principles and applications to substations.

SC B4 DC SYSTEMS & POWER ELECTRONICS

- 1. HVDC TRANSMISSION AND FLEXIBLE AC SYSTEM (FACTS)**
 - Operating characteristics of existing HVDC systems, modernization of existing HVDC systems, and application of maintenance techniques aimed at increasing operational reliability.
 - Feasibility studies of new HVDC projects.
 - Criteria for planning, design, and reliability of new HVDC projects, including overload capability and market aspects.
 - Practical experience with the use of ground (earth) return (feedback) and the problems of design and maintenance of the grounding (earthing) electrode.
 - New development; new HVDC and FACTS projects.
- 2. APPLICATION OF POWER ELECTRONICS AND INNOVATION IN NEW AREAS**
 - Development of new semiconductor switches, suitable for medium voltage.
 - Distributed systems.
 - Quality of electricity (influence of energy converters).
 - Distributed generation and application of converters (wind power plants, solar power plants, micro and mini hydropower plants, biogas and biomass power plants).
 - Applications in DC distribution networks for urban environments (light HVDC).
 - Power converters in energy harvesting systems.
 - Bidirectional power converters for energy storage devices.

3. POWER ELECTRONICS SYSTEMS

- Systems for uninterrupted power supply of substations, power plants and dispatch centres.
- Power converters and regulators for power plants.
- Static compensators.
- Conception, implementation and testing of power electronics equipment, including control and protection.
- The use of power converters at medium voltage levels, for uninterrupted power transfer and electric motor drives.
- Application of power electronics in reducing the environmental impact of energy facilities.

SC B5 PROTECTION & AUTOMATION

1. INFORMATION TECHNOLOGIES IN PLANTS, SUBSTATIONS AND SWITCHYARDS AUTOMATION, PROTECTION, MEASUREMENT, LOCAL CONTROL - APPLICATIONS, BENEFITS, SECURITY, AND VERIFICATION OF DECLARED SYSTEM PERFORMANCE FOR TYPICAL APPLICATIONS IN ELECTRICITY POWER SYSTEM.
2. MODERN AND/OR NEWLY DEVELOPED DEVICES, ALGORITHMS, METHODS, AND CALCULATIONS, AS WELL AS THE REALIZATION OF NEW SYSTEMS OR SOLUTIONS IN THE FIELD OF RELAY PROTECTION, AUTOMATION, CONTROL AND MEASUREMENT.
3. TELECOMMUNICATION SYSTEMS INTENDED FOR THE OPERATION OF PROTECTION, CONTROL AND MEASUREMENT SYSTEMS - CONCEPTS, PERFORMANCE AND SECURITY OF THE SYSTEM.
4. ANALYSIS OF THE OPERATION OF EXISTING DEVICES AND SYSTEMS FOR PROTECTION, CONTROL, MEASUREMENT AND ASSOCIATED TELECOMMUNICATION DEVICES - EXPLOITATION EXPERIENCES, EXPERIENCES AFTER DISTURBANCES, CRITERIA FOR REPLACEMENT OR RECONSTRUCTION.
5. COLLECTION OF RELEVANT DATA AND OPERATING PARAMETERS OF THE ELECTRICITY POWER SYSTEMS (LOCALLY OR VIA REMOTE ACCESS) REQUIRED FOR EFFICIENT OPERATION OF PROTECTION, AUTOMATION, MEASUREMENT AND CONTROL.
6. RECORDING THE CHARACTERISTICS OF LINES IN

OPERATION (OVERHEAD AND UNDERGROUND CABLES), METHODS, DEVICES, EXPERIENCES, DIFFERENCES OF ESTIMATED (NUMERICAL) AND MEASURED PARAMETERS, INFLUENCE ON SETTINGS.

7. POWER QUALITY - METHODS, DEVICES, EXPERIENCES, REGULATION, RELATION TO CALCULATION OF ACCOUNTING MEASUREMENTS OF ELECTRICITY AND CHECKING (CONTROL) MEASUREMENTS OF ELECTRICITY (COHABITATION).
8. ADDRESSING PROTECTION RELATED CHALLENGES IN NETWORK WITH LOW-INERTIA AND LOW FAULT-CURRENT LEVELS
 - Asset protection challenges and system protection challenges,
 - Protection schemes: best practices, role of grid codes and impact of inverter characteristics and specifications,
 - New asset protection principles, advancements in inverter technologies, system monitoring
 - State estimation for aiding asset and system protection.
9. APPLICATIONS OF EMERGING TECHNOLOGY FOR PROTECTION, AUTOMATION AND CONTROL:
 - Virtualization; digital twins, protection automation and control functions independent of hardware, centralized protection systems,
 - New protection principles and monitoring principles for AC and DC grids including use of new sensors and better use of today's sensors and process interfaces.
10. INTEGRATION OF INTELLIGENCE ON SUBSTATIONS (JOINT PS WITH B3):
 - Data analytics, remote supervising & monitoring and autonomy application,
 - IoT and machine learning applications based on protection automation and control data including asset management, monitoring and data analysis,
 - Expectations and benefits from digital substation, IEC 61850 Principles and applications to substations.

SC C1 POWER SYSTEM DEVELOPMENT & ECONOMICS

1. SYSTEM TRANSITION RESILIENCE & ASSET MANAGEMENT RESPONSE

- Resilience metrics and measures to safeguard stakeholder value through grid forming, power electronics control, smart load shedding, fast restoration,
- Response to unexpected emerging system and business risks during the energy transition,
- New standards (equipment design and system planning) for resilient and life-cycle sustainable system.

2. ENERGY SECTOR INTEGRATION AND TACKLING THE COMPLEXITY OF MULTI-FACETED NETWORK PROJECTS

- Energy sector integration, hydrogen & power-to-gas, deep electrification: technical and economic aspects,
- Multi-purpose, multi-terminal, multi-actor, multi-jurisdiction grid projects: how to tackle their planning complexity,
- Including in the planning process the flexibility options from non-network-assets and non-electric solutions (storage, virtual power plants, DR, energy communities, behind-the-meter resources).

3. PLANNING UNDER UNCERTAINTY AND WITH CHANGING EXTERNAL CONSTRAINTS

- Modelling the impact of environmental conditions, technical advancements, greater stakeholder involvement, generation fleet shift, new type of contingencies, use of data driven network methods for long-term load

forecasting, including impact of COVID pandemic on load profiles, planning scenarios, investments patterns and assets' maintenance schemes,

- Decision-making under pervasive energy policies: optimising economic vs environmental benefits for consumers and matching centralized energy targets with private driven investments,
- Leveraging the evolving system services, market products and load profiles to optimize investment and timing, avoiding stranded assets (also from fossil plants dismissal).

SC C2 POWER SYSTEM OPERATION & CONTROL

1. SYSTEM CONTROL ROOM PREPAREDNESS: TODAY AND IN THE FUTURE

- Operator training, situational awareness and decision supporting tools,
- Effective and efficient use of synchrophasor data in power systems operation,
- Advanced and intelligent methods applied to power systems operation.

2. OPERATIONAL PLANNING STRATEGIES, METHODOLOGIES AND SUPPORTING TOOLS

- High share of grid-connected and distributed power electronic interfaced resources including hybrid AC-DC systems,
- Advanced and intelligent methods applied to power systems operational planning and day-ahead programming,
- Impact of low demand and other predictable extreme operating conditions.

SC C3 POWER SYSTEM ENVIRONMENTAL PERFORMANCE

1. SETTING AMBITIOUS CLIMATE STRATEGIES IN THE ENERGY SECTOR

- Effects of shortage of raw materials.
- Effects of modernization of existing generation capacities on energy transition and environmental protection.
- How to fight the negative impacts of the energy transition, for example, the effects of renewable energy sources on biodiversity.
- Standards and methods used in defining the goals on the way to CO₂ reduction.
- Reasons for establishing climate strategy and benefits of this way of managing development in the energy sector.
- Open questions about nuclear energy, its dangers, and its advantages.

2. BIODIVERSITY AND THE SUPPLY OF ELECTRICITY, RENEWABLES-BASED OR NOT: RISKS, CHALLENGES, SOLUTIONS AND OPPORTUNITIES

- Improvement of the attitude towards biodiversity in the projects of generation, transmission, and distribution of electricity.
- Development of special measures and activities aimed at protecting the biodiverse in the process of generation, transmission, and distribution of electricity.
- Problems of adapting the electric power infrastructure to the environment with minimal impact on the environment.

4. ENVIRONMENTAL AND SAFETY ASPECTS FROM OHL (JOINT PS WITH B2)

- Safety of workers in construction and maintenance of lines (equipment, methods, etc.).
- Reducing environmental impacts from new and existing OHL,
- Innovative engineering solutions/design to deal with environmental challenges.

SC C4 POWER SYSTEM TECHNICAL PERFORMANCE

1. OVERVOLTAGES AND COORDINATION OF INSULATION

- Analysis of atmospheric discharge characteristics.
- The influence of atmospheric discharges on the electricity power system.
- Protection of MV and LV power systems from atmospheric discharges and their standardization.
- Methods and tools for insulation coordination and analysis of electromagnetic transients in electricity power systems.
- Analysis of electricity power system protection against atmospheric and complex overvoltages in order to optimize costs and reliability.

2. ELECTROMAGNETIC FIELDS AND ELECTROMAGNETIC COMPATIBILITY

- High-frequency disturbances in electricity power systems as a result of HF and LF electromagnetic radiation.
- Methods of measuring, testing, and simulating electromagnetic compatibility.
- Effects of low-frequency electromagnetic radiation on human health.

3. POWER QUALITY

- Analyzes of continuity of the electricity supply and the quality of the supplied electricity (amplitude, frequency, symmetry, deformation of the voltage waveform).
- Measurement and simulation methods in the area of electricity quality.
- Techniques for improving the quality of electricity, taking into account a coordinated approach at all voltage levels.

4. MODERN METHODS, MODELS, AND PROGRAM TOOLS FOR ANALYSIS OF THE TECHNICAL PERFORMANCE OF ELECTRICITY POWER SYSTEMS

- Development of advanced tools and new analytical techniques for the assessment of dynamic/transient performance and security of the power system.
- Methods of management and modeling of existing and new equipment in power systems.
- Assessment and control of the stability of the power system in real-time.

SC C5 ELECTRICITY MARKETS & REGULATION

1. THE EVOLUTION OF MARKET DESIGN AND REGULATION TO INTEGRATE DISTRIBUTED ENERGY RESOURCES

- Market design developments to facilitate the integration of new participants and renewable resources,
- The role of retail electricity markets in the promotion of behind the meter technologies,
- Innovative contracts/services between market participants and with customers/distributed energy resource owners.

2. CHANGES TO MARKETS AND REGULATION TO ENHANCE RELIABILITY AND RESILIENCE

- The lessons for markets and regulation from major system disturbances and social disruptions,
- Market designs for reliability and resilience
- in systems with high penetration of asynchronous and low inertia connected facilities,
- Markets to coordinate resources that are not responsive to demand or price.

3. WORKING WITH INNOVATION AND DISRUPTION — PREPARING FOR THE FUTURE

- Innovative approaches to markets and regulation to achieve energy policy targets and to include edge-of-grid activities,
- The design and structure of retail and wholesale electricity markets to support capital-intensive investments,
- Sector regulation and tariff design in the face of technological disruption, e.g., vehicle to grid, hydrogen and new forms of storage.

SC C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES

1. CURRENT CONCEPT OF ADVANCED DISTRIBUTION SYSTEM WITH DISTRIBUTED GENERATION:

- Integration into the distribution and transmission system.
- Current technologies in the area of renewable energy sources.
- Experiences in the application of renewable energy sources in other countries.
- Maintenance and exploitation of systems with renewable sources of electricity.
- Possibilities for storing electricity produced from distributed generation.
- Hybrid systems with integrated systems for controlling and management.

2. NEW TECHNOLOGIES AND SOLUTIONS FOR DISTRIBUTION SYSTEMS WITH DISTRIBUTED GENERATION:

- Implementation, integration, control, and storage of energy.
- Systems for electrification and operation in an isolated mode in relation to the distribution network.
- Smart grid, smart city, design, and control of virtual power plant.

3. ELECTRIC VEHICLES:

- Concept of application of electric vehicles.
- Integration into the distribution power system.
- Infrastructure and technologies for charging electric vehicles.

4. PLANNING AND EXPLOITATION IN THE AREA OF DISTRIBUTED SYSTEMS.

5. ENERGY EFFICIENCY IN THE ELECTRIC ENERGY AND THE QUALITY OF DELIVERED ELECTRICITY IN THE DISTRIBUTION SYSTEM.

SC D1 MATERIALS AND EMERGING TEST TECHNIQUES

1. METHODS OF CHARACTERIZATION OF ELECTROTECHNICAL MATERIALS.
2. STABILITY OF CHARACTERISTICS OF ELECTROTECHNICAL MATERIALS, COMPONENTS, AND SYSTEMS IN OPERATING CONDITIONS.
3. CHARACTERISTICS OF ELECTROTECHNICAL COMPONENTS FROM THE ASPECT OF MINIATURIZATION.
4. ELECTROMAGNETIC AND RADIATION COMPATIBILITY OF ELECTROTECHNICAL SYSTEMS AND COMPONENTS.
5. MATERIALS IN ADVANCED TECHNOLOGIES AND NEW MATERIALS FOR DIFFICULT WORKING CONDITIONS.

SC D2 INFORMATION SYSTEMS & TELECOMMUNICATION

1. DEVELOPMENT AND MODERNIZATION OF SCADA SYSTEMS (NEW MODULES, FUNCTIONALITIES, TOOLS, ARCHITECTURE) IN ACCORDANCE WITH NEW NEEDS AND THE DEVELOPMENT OF HARDWARE AND SOFTWARE TECHNOLOGIES.

2. INTEGRATION OF LOCAL AND REMOTE-CONTROL FUNCTIONS IN SYSTEMS FOR AUTOMATION OF TRANSMISSION AND GENERATION FACILITIES AND APPLICATION OF EQUIPMENT BASED ON THE IEC 61850 STANDARD. DEVELOPMENT AND IMPLEMENTATION OF TELE PROTECTION SYSTEMS BASED ON THE APPLICATION OF THE IEC 61850 STANDARD.
3. INFORMATION AND COMMUNICATION TECHNOLOGIES FOR CONNECTING DISTRIBUTED ENERGY SOURCES (MONITORING, CONTROL, SECURITY, USE OF EXISTING STANDARDS, INTEROPERABILITY, CYBER SECURITY). SMART GRID APPLICATIONS IN THE LIGHT OF ICT FOR DSO (DISTRIBUTION SYSTEM OPERATOR) AND TSO (TRANSMISSION SYSTEM OPERATOR) ORGANIZATIONS.
4. COUPLING OF SCADA AND MMS/OMS/AMS SYSTEMS - SCADA AS A DATA SOURCE FOR MAINTENANCE MANAGEMENT SYSTEMS (MAINTENANCE MANAGEMENT SYSTEM - MMS), FAILURE MANAGEMENT (OUTAGE MANAGEMENT SYSTEM - OMS), AND EQUIPMENT MANAGEMENT (ASSET MANAGEMENT SYSTEM - AMS).
5. ENSURING THE SECURITY (CONFIDENTIALITY, INTEGRITY, AND AVAILABILITY) OF INFORMATION THROUGH THE SECURITY POLICY, AND THE ARCHITECTURE OF TC SYSTEMS AND EQUIPMENT WITH THE APPLICATION OF EXISTING STANDARDS RELATED TO INFORMATION SECURITY AND INTEROPERABILITY. CERTIFICATION OF THE RESILIENCE OF INFORMATION AND TELECOMMUNICATION SYSTEMS TO CYBER-ATTACKS. CLOUD SERVICES, IMPLEMENTATION, AVAILABILITY, AND SECURITY, AS WELL AS VIRTUALIZATION IN IT TECHNOLOGY. DISASTER RECOVERY SYSTEMS.

PREFERENTIAL SUBJECTS

6. EXPERIENCES IN THE CONSTRUCTION, INTEGRATION, AND EXPLOITATION OF THE TELECOMMUNICATION TRANSMISSION NETWORK AT THE MAIN AND REGIONAL LEVEL, FUNCTIONAL NETWORKS/SYSTEMS OF THE ELECTRICITY INDUSTRY, AND MULTISERVICE NETWORKS BASED ON MODERN TECHNOLOGIES. MIGRATION TO A MULTI-SERVICE IP/MPLS NETWORK OF THE POWER COMPANY AND PROVISION OF QOS QUALITY LEVELS FOR VARIOUS CRITICAL AND ADMINISTRATIVE (BUSINESS) SERVICES.
7. INCLUDING POWER COMPANIES IN THE DEREGULATED TELECOMMUNICATIONS MARKET.
8. IOT TECHNOLOGIES AND ARCHITECTURES IN ASSET MANAGEMENT,
9. ARTIFICIAL INTELLIGENCE, BIG DATA, AND ANALYTICS TOOLS TO IMPROVE ASSET MANAGEMENT IN POWER COMPANIES.
10. AUGMENTED AND VIRTUAL REALITY TECHNOLOGIES IN TRANSMISSION SYSTEMS, DISTRIBUTION SYSTEMS, AND POWER PLANTS.



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