

PREFERENTIAL SUBJECTS FOR THE 7th (13th) SESSION OF CIRED CROATIAN NATIONAL COMMITTEE, MAY 2020

SC 1: Network Components

1. New technologies and technical solutions

- Novelties in the production and development of network components
- New materials, products and technologies
- Pilot projects for the introduction of new technologies
- Technical solutions and calculations
- Innovative and special technical solutions
- Electric vehicles charging station connections
- Generation facilities connection
- Smart Grid components for the implementation of smart networks, smart cities and microgrids
- Devices and sensors for surveillance, signaling and protection
- Components for voltage regulation and automation
- Communication components of network components
- Power electronics devices
- Electric vehicles charging stations
- Electricity storage facilities and schemes
- Energy efficient network components
- Life cycle optimization of network components during design and exploitation
- Earthing and earthing systems
- Equipment technical and operational specification
- Quality control equipment
- Standardization of equipment and technical solutions
- Regulations and standards

2. Operation and maintenance

- Impact of network operation and maintenance on the quality of power supply
- Impact of network operation and maintenance on the electricity losses
- Operational experiences at the interface of distribution network with end-users' facilities and installations
- Operational experiences at the interface of distribution and transmission network
- Operational experiences in the cases of disturbed and emergency operation
- Operational experiences in the cases of force majeure or extraordinary circumstances
- Use of generating units for temporary supply (facilities and installations of network users or distribution network parts)
- Network faults and damages caused by external influences (storms, salting, ice rain, flood, fire, civil and similar works, estrangement, vandalism, ...)
- Diagnostic methods and tests
- Methods for assessing the condition of the equipment
- Use of 3D technology to evaluate the state and maintenance of overhead networks and plants
- Directives and criteria for equipment revitalisation and substitution (asset management)
- Harmful influences on the network components

- Monitoring and control systems
- Unmanned aerial vehicles for overhead lines and equipment inspection
- Live working
- Unauthorized electricity generation
- Application support
- Regulations and standards

3. Safety and environmental protection

- Interference of network components and environment
- Ecodesign of network components
- Hazards and hazardous events (for environment and the network)
- Waste and hazardous substances management
- Protection against electromagnetic fields
- Birds and small animals protection against electric shock
- Fire protection
- Noise protection
- Regulations and standards

SC 2: Power Quality and Electromagnetic Compatibility

1. Power quality

- Voltage stability, voltage dips, overvoltages, flickers, voltage harmonics and interharmonics, transient phenomenon, voltage unbalance...
- PQ measurements used for disturbance diagnostics and PQ problems solving
- Methods and procedures for disturbance reduction
- Permanent PQ monitoring systems
- Smart Grids and PQ
- PQ measurements in distribution networks (measuring equipment, procedures and methods)
- Field experience
- Standardisation

2. PQ regulation

- PQ regulation
- New regulatory procedures
- PQ indices (indicators)
- PQ monitoring and reporting
- Education

3. Economic aspects

- Influence of deregulated market on PQ
- Costs caused by insufficient PQ level
- Costs increasing PQ level
- PQ indices as a factor in economically based decision making
- Influence of energy efficient appliances on PQ
- Planning and network development influence on PQ

4. Electromagnetic compatibility

- Electric and magnetic fields
 - Measurements
 - Standardization
 - Methods for exposure reduction
 - Electromagnetic influence

5. Safety

- Earthing systems and safety
 - Atmospheric overvoltages and lightning protection
 - Earthing systems and voltage potential
 - Touch potential and ground potential gradient
 - Neutral point earthing technique

SC3 „Control, Protection, IT System and Telecommunications “

1. Distribution system control

- System control activities for improvement of quality of supply (voltage and continuity of supply)
- System control as service of distribution system and service service provider
- Auxiliary services in distribution system
- Distributed energy resources and system control challenges
- Reactive power flow management for voltage regulation
- Energy storage as new elements of system control
- Coordinated system control of distribution grid with transmission grid
- Procedures for power system restoration after blackout
- Control of distributed power plant in islanded operation
- Control of distributed energy resources in parallel operation with distribution grid
- Control of distribution system in emergency and faulty state
- Regulations and guidelines of system control and requirements for amendments
- Added value of advanced metering system within control system
- education and transfer of knowledge for system control operators in theory and real world.

2. Protection in distribution system

- State of the art and principles of protection of distribution system elements
- Protection strategies for faults and disturbances in distribution grid with distributed resources
- Rules for setting and planning of protective relaying
- Strategy for backup relaying
- New perspective on separation of power plant from distribution grid in inadequate state for parallel operation
- Protective relaying in island operation of distributed energy resource with segment of distribution grid, as auxiliary service
- Protection of high-resistance faults
- Protection of grid with energy storage as active elements of the grid
- Coordination of protection plans of grid protection with protection of distributed resources

- Advanced protection system solutions as elements of smart grids
- Requirements for other relaying equipment (current transformers, circuit breakers, ...)
- Testing and commissioning of end user plant protection system
- Education of experts on distribution system protection and its elements
- Statistical indices of faults and protection operation.

3. Automation in distribution system operation

- Application of automatic reclosing in distribution network with distributed resources
- Rethinking of applied setting of reclosing times of automatic reclosing (slow and high-speed)
- New technologies and solutions of automation in function of continuity of supply
- Automation of network operation functions based on sensors in network
- Automatic reactive power flow management of converters in voltage regulation mode
- Automatic voltage regulation in conditions of new distribution system elements
- Strategy of automated voltage regulation on power transformers with multiple MV levels
- Local automation in function of system control operation
- Advanced automation solutions as component of smart grid
- Fault location on power lines in real time
- Fault statistics and evaluation of contribution of automatic reclosing to continuity of supply.

4. Requirements for information and communication technology

- ICT system in function of control, protection, automation, measurement...
- New communication technologies
- ICT in function of digitalization of distribution systems (IoT, Mobile Computing, Big Data, ...)
- ICT for power generation and consumption management
- Event overload of communication channels and efficient solutions to overloading
- ICT in function of distribution system auxiliary services
- ICT system in function of advanced metering system development
- ICT in function of electromobility system development
- Development of ICT platform for interconnecting distributed resources and e-mobility charging infrastructure with control system
- ICT system support for implementation of smart grid and smart home solutions
- ICT business organization and its influence on business ability of DSO.

5. Protection and security of process and measurement data

- Cyber security and data protection status of process information in function of control system operation
- Information protection as support to the system control safety
- Upgrading the safety mechanisms on existing SCADA/DMS control system
- New procedures and good practice in protection of process data
- Protection and security of advanced metering infrastructure data
- Protection of process and measurement data on smart grid level.

6. Advanced application of IEC 61850 standard

- Key features of new IEC 61850 standard
- Application examples of IEC 61850 in substation secondary system - experiences
- Applicability in advanced metering infrastructure
- IEC 61850 in fault and disturbances protection
- Position of the IEC 61850 standard and its versions in smart grid designs.

SC 4: Distributed Energy Resources and Efficient Utilisation of Electricity

1. Experiences and Trends in Distributed Power Generation

- Distributed resources/generators technologies of all types and sizes
- Experiences and analyses of distributed resources with variable production
- Predicting the production of distributed renewable sources
- Methods of consumption and load forecast in the distribution area with a significant share of distributed production in LV and MV networks
- Rules and standards for the connection of distributed sources and interfaces
- New business models for distributed sources: collective models of production, self-consumption, blockchain, aggregators.

2. Electric mobility

- Technical characteristics of electric/PHEV vehicle charging stations/points
- Integration of electric vehicles in the distribution network: strategies, experiences, projects
- Electric and hybrid vehicles: battery characteristics, vehicle-to-grid strategy
- Electric vehicle as a household device - connection and standards, EU experience
- The impact of electric/PHEV vehicles on the electricity consumption profile
- Load management strategies in the distribution system with a significant share of electric vehicles
- Electric mobility development strategies
- EU electric mobility projects: realisation, experiences, plans.

3. Smart cities, smart islands and smart homes

- EU Initiatives and Concepts of Smart Cities and Smart Island: Experience and Implementation in Croatia and the EU
- Advanced Demand Side Management including public lighting
- Integration of distributed resources and energy storage into residential and business buildings
- Technical solutions for smart buildings and nZEB concept: KNX, Zigbee, Z-wave, user interfaces
- Technical solutions for the renovation of buildings in smart buildings and buildings with low energy consumption
- Models of Collective Energy Production: Energy Co-operatives, Ethical Financing, Partnership Citizens and Local Authorities
- Hybrid and multi-energy systems (cogeneration, heat pumps, heat exchangers, heat networks)
- Sustainable transport and electrification of public transport in cities.

SC 5: System Development

1. Methods for load forecasting and generation forecasting

- Consumption and load characteristics of typical customers
- Generation forecasting of distributed power sources with an emphasis on solar power plants
- Impact of the electric vehicle charging installations on the electricity demand.

2. Distribution System Performances

- Methods for determining technical and non-technical losses
- Estimation of network exposure to extreme climatic conditions
- Methods for performance assessment.

3. Distribution networks planning

- Planning criteria for active distribution networks/smart grids
- Probabilistic planning of distribution networks
- Improving efficiency in distribution networks considering electricity losses
- Improving technical conditions in the network in the process of connecting new users or through long-term network development plans
- Planning distribution networks considering extreme climatic conditions
- Usage of metering data from smart meters in planning distribution networks
- Planning criteria for distribution networks in areas of very low load density
- Planning criteria for distribution networks in areas with different seasonal consumption
- Modern tools for planning distribution networks
- Electricity storage as a new element in network planning.

4. Investment plans of distribution system operator

- Revitalization of aged parts of the distribution network
- Methodological solutions for distribution network development plans
- System problems in the preparation and implementation of distribution network development plans.

SC 6: Electricity Market and Regulation

SC 7: Distribution System and Environment