SEAM 2017 Spring Conference

"Innovations in Developing Stations of the Future"

CALL FOR ABSTRACTS

CEATI's Station Equipment Asset Management Interest Group (SEAM) participants want to further explore areas of innovation in topics related to development for future stations and ongoing maintenance.

The Grid today is immensely complex and evolving due to changing load patterns, expanding distributed generation, new forms of storage and renewable generation with other emerging technologies in both the utility and customer environments. Rather than continually getting bigger, the Grid is now increasing in intelligence. Intelligence, new technology and innovation enable an increased exploitation of existing facilities and apparatus. Many existing utility station assets are approaching their end of life and must be replaced. At the same time, technological developments in information technology, automation and design improvements raise exciting possibilities and opportunities for a reconfigured electrical grid, enabling more effective monitoring and maintenance techniques. Additionally, they are essential in ensuring the reliability of supply, sustainability of operations and affordability of electric service for customers.

New station designs must now consider interoperability and monitoring capability to fully utilize these new technologies. Telecommunications, information technology, security systems and infrastructure are all important elements for enabling smarter, more efficient and cost effective operation of station facilities. These factors create new challenges to advance the resiliency of substations, for improved reliability that must be addressed by:

- hardening of assets against damage from extreme weather events or malicious intent,
- improved physical and cyber security measures,
- creative use of microgrids,
- smart systems and energy storage projects.

As the planning horizon for utilities tends to be very long, there is a need to recognize those future trends and needs while planning for replacement and upgrades of existing assets, as well as new substations.

At the same time, regulatory authorities and stakeholders are also exercising increasing scrutiny, holding utilities accountable for managing costs, maintaining high standards of reliability, ensuring appropriate safeguards are in place and continuing to operate in a socially-responsible manner. Customers are increasingly looking for ways to manage their own energy, customizing how they use it and serving as suppliers of energy.

The Stations interest group promotes and facilitates communication and collaboration on topics associated with optimizing life cycle costs related to electrical utility station equipment and apparatus. Participants are interested in technological advancements and trends in station design, apparatus, construction and maintenance techniques, as well as the changing requirements of stakeholders, regulators, and customers associated with electric utilities.

This conference will provide an open forum for information exchange and deliberation, with a focus on technical presentations, case studies, and the sharing of ideas and experiences for the benefit of the industry.

POTENTIAL SESSIONS:

Keynote / Future View

- Vision of the future grid and the role of stations
- Alternatives to consider
- Social and economic benefits of innovation
- Sustainability of utilities; savings from modernization
- Utility regional integration

Security

- Security emphasis: prevention or deterrence?
- Physical security considerations in station design
- Impact on surroundings
    - Acoustics – alarms/sirens/continuity of noises and development options
    - Physical appearance – fencing, location, aesthetics
- Reconfiguring sub-transmission networks for security and stability
- Dispersed stations vs centralized stations
- Resiliency vs. security -- improvement by multiplicity?
- Cyber Security
    - Gateway architecture design for stations

Regulatory & Standards

- Regulatory developments or updates
- NERC Standards (CIP, FAC, PRC)
- Maintenance requirements and developments
    - Advancements in new testing technologies
    - Intelligent predictive or precursor analytics
    - Evolution of test equipment and methods
- Integration of microgrids
    - Station design and modifications in support of DG and community solar
    - Use of microgrids to optimize station operation and reliability
- Use of Synchrophasor data for enhanced applications

Station Materials, Design and Techniques

- Aesthetics, as well as security

- Underground stations
    - Concepts, approaches, benefits, risks, experience
- Materials – steel, always? Options using composites, other materials
    - Carbon fibre alternatives
    - Alternate insulating media
- Design enhancements – should standards be changed/are they changing?
    - Justification and support for new technology and developments
    - The consideration of constructing a "self-healing" substation
    - Levels of reliability and resiliency – customer requirements vs. system requirements
- New and innovative construction techniques
    - Affordability and cost effectiveness of station upgrades and retrofits
    - Modularized stations (standardized, prefab, quick install)
    - Practical examples and experiences in utilities
    - Consideration of small/readily deployable/downsized substations
    - "Right-sizing" construction practices
- Determination of appropriate and necessary lifetime of assets
    - Ratio of maintenance to replacement allocation
    - Capital expenditure vs. maintenance considerations (high front cost, low maintenance cost & vice versa)
- Acoustic emission conditions and station development options
- Oil containment technology and firewall designs

Environmental Conditions

- Environmental considerations affecting station design
- Climatological changes and design: hardening vs. restoration, alteration of standards
- Station and equipment hardening for extreme weather events
    - Ice storms, flooding, wind damage, excessive heat
    - Example applications
- Response to catastrophic events
    - Quick response disaster recovery
    - Environmental or social impacts
    - Case studies of disaster recovery
- Examples or case studies of environmental issues and mitigation techniques

Evolution of Station Equipment

- New or future developments in:
    - Transformers
    - GIS equipment
    - Circuit breakers
    - Solid dielectric materials and SF6 alternatives
    - Superhydrophobics/hydrophobic epoxies/coatings/contamination control
    - Bushings

- Future use of super conductors in station equipment
- Optically coupled devices in stations
    - Use of fibre cabling in switchyards replacing control cabling
- Equipment “hardening”
- Design for maintenance – benefits and problems of standardized designs
    - Development of a maintenance service center
    - Improvements for maintenance – auto rackout of breakers, built-in testing systems for breakers and feeders
    - Integration of test gear for self-diagnostic equipment (Intelligent, self-monitoring and reporting apparatus)