TIP 433: CEATI – Substation Equipment Program (SEP)

Context

The electricity industry is undergoing fundamental changes, moving from a regulated monopoly to a competitive industry. Now more than ever, there is a need to optimize the use of existing station plant assets and to develop new cost-efficient and reliable equipment applications.

This new reality is complicated by the fact that a significant amount of station equipment in use today has already accumulated 30 or more years of service. Maintenance costs will rise as the inherent reliability of an aging plant starts an inevitable decline.

At the same time, technological developments in information technology, and automation and design improvements, raise exciting possibilities and opportunities for a reconfigured electrical grid, enabling more effective monitoring and maintenance techniques.

All of this is essential in ensuring the reliability of supply, sustainability of operations, and affordability of electric service for customers.

Focus Areas

The Substation Equipment Program strategic plan serves as a roadmap to identify knowledge gaps and prioritize working group activities, such as projects, technology reviews, presentations, applied research, surveys, tutorials and workshops, to meet topics of priority in each of the Focus Areas.

- Focus Area 1 – Innovation & Design: Investigating and implementing new technologies, innovations, and developing understanding of the trends, needs and requirements for future designs and installations of stations.
- Focus Area 2 – Maintenance Practices: Standards, best practices, routine and specialized testing, solutions to equipment performance issues, etc.
- Focus Area 3 – Condition Assessment and Monitoring: Tools and methodologies to determine condition (health indices), remaining life, etc.
- Focus Area 4 - Risk Management: Tools, methodologies and standards for managing the asset life cycles, reliability, financial stewardship, compliance, etc., including software and systems used for business intelligence and data gathering.

SEP has three working groups:
- Gas Insulated Station
- Substation Infrastructure Design
- HVDC & FACTS Station

The SEP interest groups provide a platform for best practices and technical information exchange, and help to identify, develop, screen and recommend projects deemed beneficial to its participants.

Why It Matters

Advances in substation technology have made available different techniques and tools to gather information, accomplish tasks, and install or maintain equipment more efficiently. The challenge is to adapt this new technology to work effectively and to interface it with existing sometimes less sophisticated systems. New innovative techniques or technology or that adapted from other industries may be employed for new construction, additions or to increase station efficiencies.

Participation in this interest group offers investigation of these methods and support in the development of guidelines that will determine feasibility of replacing old technology with new and establishing where to focus those efforts.

Goals and Objectives

The goal of this program is to bring together interested parties to facilitate research that will optimize the life cycle management of station equipment and apparatus, reduce costs through collaboration of methods, practices, and use of new technologies to help utilities plan future development of their stations.

Deliverables

BPA representatives will engage in working group activities supporting substation asset management and value optimization.
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**Membership:** January 2020 to current year

**Links**

[CEATI Station Equipment Program](#)

**For More Information Contact:**

Technology Innovation Program Manager:
Cynthia Polsky
chpolsky@bpa.gov

BPA Representative:
Kevin Florence, TX Asset Reliability & Maintenance
kpflorence@bpa.gov

CEATI Program Contacts
Megan Owens
megan.owens@ceati.com
Gabriella Viard
gabriella.viard@ceati.com

**CEATI SEP Research Portfolio - 2021**

The following current projects will likely provide value to BPA workgroups:

- 30/137 Innovation and Development of Substations
- 30/136 Optimal Practices for Substation Maintenance
- 30/135 Guide for Condition Assessment of Service Aged Power Transformers using Dielectric Frequency Response
- 30/134 Arrester Temperature Monitoring System Development
- 30/133 Development of a Reference Standard of RCM Worksheet for Substation Assets
- 30/132 Station Battery Condition Assessment for NERC PRC005-02 Compliance using Automated Remote Monitoring Technology
- 30/128 Online Monitoring Partial Discharge Analysis of Substation Transformers
- 30/117A Settings Application Guide for Different Types of Monitors – Phase I
- 30/106B Criteria for Spare Equipment & Parts - Phase II

### Gas Insulated Substation

The primary objective of the SEP Gas Insulated Substation Working Group (SEP GISWG) will be exchanging information on GIS issues, identifying maintenance and operational best practices, discussing experiences and solutions, and providing a platform for mutual assistance in problem solving.

### Substation Infrastructure Design

The primary objective of the SEP Substation Design Working Group (SEP SIDWG) will be sharing and exchanging information on issues, experiences and solutions of civil works, structural, fire protection, containment and other ancillary equipment in substations, providing a platform for mutual assistance in problem solving.

### HVDC & FACTS Substation

The primary focus of the HVDC & FACTS Working Group (SEP HVDC FACTS WG) is exchanging information on issues, experiences and solutions regarding the treatment of technology related to direct current and flexible alternating current transmission systems. the applications of power electronic switching equipment and ancillary components to AC and DC transmission systems, the coordination of these systems at the interface between transmission and generation and the over-all studies of the parameters and performance of such systems.