CIGRE Study Committee B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° B3.53	**Name of Convenor:** Shinki Noguchi (JP) **E-mail address**: Noguchi.shinki@chuden.co.jp
Strategic Directions #[2]: 2,3	**Technical Issues #[3]:** 4,7
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 1,3,5,6	
Title of the Group: Guidelines for Fire Risk Management in Substations	

Scope, deliverables and proposed time schedule of the Group:

Background

Fires within substations can damage equipment, creating safety impacts for operating personnel, the public and emergency response personnel, causing environmental hazards and increased fire risks to nearby property,

Firefighting by water quenching may create additional safety and environmental issues and damage to certain electric equipment types. Effective fire protection measures can reduce fire risk, and should be integral to the planning, design, operation and maintenance of substations. Understanding the common causes of events and hazards, while considering the consequences of a substation fire, can improve the design and redundancy of the asset and improve electrical system reliability.

Scope

This work has the following objectives:

- Understand fire risk in substations, including the consequences and potential impact of fire on human safety, property and equipment.
- Summarize effective protection measures to mitigate the fire risk in terms of design, construction, operation and maintenance, for example.

The scope of work includes:

1) A survey to collect information on fire related experiences in substations.
   This survey will include the items below in order to capture the current situation concerning risk, impact and countermeasures to fire in substations:
   - Number/rates of fire incidents
   - Cause, scenarios, measures for fire incidents
2) Fire risk evaluation.
   Provide guidance on evaluation of fire risk and determining acceptable loss criteria in the case of a fire including:
   - Fire scenarios, consequence and probability
   - Grid/equipment reliability, cost-benefit analysis for countermeasures
3) Fire protection design and practices.
   Provide an overview of design methodologies and practices for fire protection with regards to indoor/outdoor or equipment fires in substations. Considering the following:
   - Outdoor (oil spillage prevention, layout design, separation, fire stops etc.)
   - Indoor/underground (Alarm/detection system, fire suppression, building structure, safety measures, evacuation route etc.)
   - Equipment (transformers, onload tap changers, oil-circuit breakers, capacitors, Bushings, new types of assets in/around substations – battery storage, telecom generators etc.)
4) Fire management during construction work

5) Fire management in Operations and Maintenance
   Practices in O&M to prevent fire incidents including:
   - Safety measures and rescue procedures (including training)
   - Fire plans, coordination with fire authorities
   - Mitigation for fire risk around substations
   - Wildfire and bushfire risks

6) Overview of new approaches and available technologies
   Available technologies for fire protection as well as new approaches will be discussed with examples of installations provided.

[Reference documents] CIGRE TB 136, 537, 560,720

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: August 2018 **Final Report**: August 2021

Approval by Technical Council Chairman: M. Walker

Date: 30/07/2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit