CIGRE Study Committee A2
PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

WG N° A2.55	**Name of Convenor :** Pascal Mueller (CH) **E-mail address**: pascal.mueller@ewz.ch
Technical Issues # (2): 8 / 10	**Strategic Directions # (3): 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Life Extension of oil filled Transformers and Shunt Reactors	

Scope, deliverables and proposed time schedule of the Group

Background :

Transformers are expensive assets that play an important role in the overall reliability and availability of the electrical network. With an ageing installed base worldwide, new operating and financial constraints and significant processing time to replace a transformer, asset and operation managers as well as maintenance staff are looking for solutions to optimize the performance of their installed assets with a minimum Total Cost of Ownership.

Many solutions are available today to assess the condition of a transformer such as visual inspections, off-line/on-line diagnosis and on-line monitoring. However, the challenge often remains to derive specific asset management actions, based on the conclusions from an assessment study and existing parameters such as health and safety, operational constraints, expected level of reliability, risks, environmental objectives, network planning, financial criteria, strategy of the company, etc. Asset managers can then either decide to replace the existing unit by a new one or to keep it in service. In the latter case the objective will be either:

- to define means to extend service life of a unit which is aged but in good enough condition while ensuring the required level of reliability at a targeted cost;

or

- to implement mitigation solutions to keep a failing unit in service until a planned replacement.

This guide will cover these two aspects aiming to provide a methodology for asset managers and technical experts in order to define possible solutions for the life extension of an ageing or failing transformer (maintenance, refurbishment, repair, upgrade, relocation, monitoring). The ultimate goal is to support the decision making process with technical and economical arguments for the different scenarios.

Scope :

The working group will:

- Review existing CIGRE documents and other literature that relate to this subject such as those related to diagnostics, monitoring, life management, maintenance, fire safety and economics. Where appropriate, these documents will be referenced in the Technical Brochure.
- Define families of ageing modes and related defects considering vintage, operation and maintenance history and events.
- Propose a structured method to:
  - analyse the case (condition of the unit, risks involved, parameters to consider, importance to the system)
  - determine possible solutions with actions to be implemented and fall back plans to limit risks
  - define the criteria to be consider, in order to decide what is the optimum solution given the existing priorities in the company and associated technical and economic arguments including end of live concept.
- Conduct a survey of best practice in utilities, industries, transformer manufacturers and service providers.
- Provide a catalogue of real cases, illustrating different solutions implemented to enhance lifetime and/or reduce risks for the major families of ageing modes and defects.

Deliverables :
- The Technical Brochure will be a guide for implementing a structured methodology for life extension of transformers with recommendations to identify problems, evaluate risks, and propose mitigation solutions with the related justification. he brochure will also present practical case studies illustrating major families of problems.
- ELECTRA publication.
- Tutorial material.

Time Schedule : start : Spring 2016 **Final report** : Spring 2019

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman :
Date : 07/03/2016

(1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2 - (4) Delete as appropriate

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 within distribution level and to the upstream network.
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 (cf. 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