

**IERE joint R&D project**

# **Methanol Ageing Marker for Power Transformers (phase 2)**

**Post-Mortem Sampling for Degree of Polymerization  
Deterioration Modelling**



**Electric Power  
Technology Platform**

# Background

- **METHANOL:** In recent years, analyzing the methanol content in transformer oil has been identified as an adequate ageing marker that aids significantly the insulation winding paper diagnostic and thus the transformer end-of-life estimation. Field experiences have shown that the implementation of the classical furan testing only appears not adequate enough for assessing winding paper ageing of many types of power transformers. The benefits of implementing methanol instead of or in combination with furans are especially for transformers with thermally upgraded paper or using inhibited transformer oil or with sealed atmospheric protection systems. Also evaluating premature winding paper ageing is more adequate using methanol compared to furans based on 'IERE methanol phase 1' study.
- **PHASE 1:** From 2012-2016, IERE instigated and hosted an international joint R&D project to introduce and trial the use of methanol as an ageing marker for power transformers. This multi-year project concluded the presence of methanol in aged transformers under different climates as observed by different utilities and companies.
- **DP & POST-MORTEM ANALYSIS:** To ascertain direct correlation between the methanol concentration with respect to the level of degradation or ageing of insulation materials, the most appropriate, necessary and reliable way is to examine the Degree of Polymerization (DP) of the insulation papers in the old/retired transformers. This requires post-mortem analysis of insulation materials in these transformers.

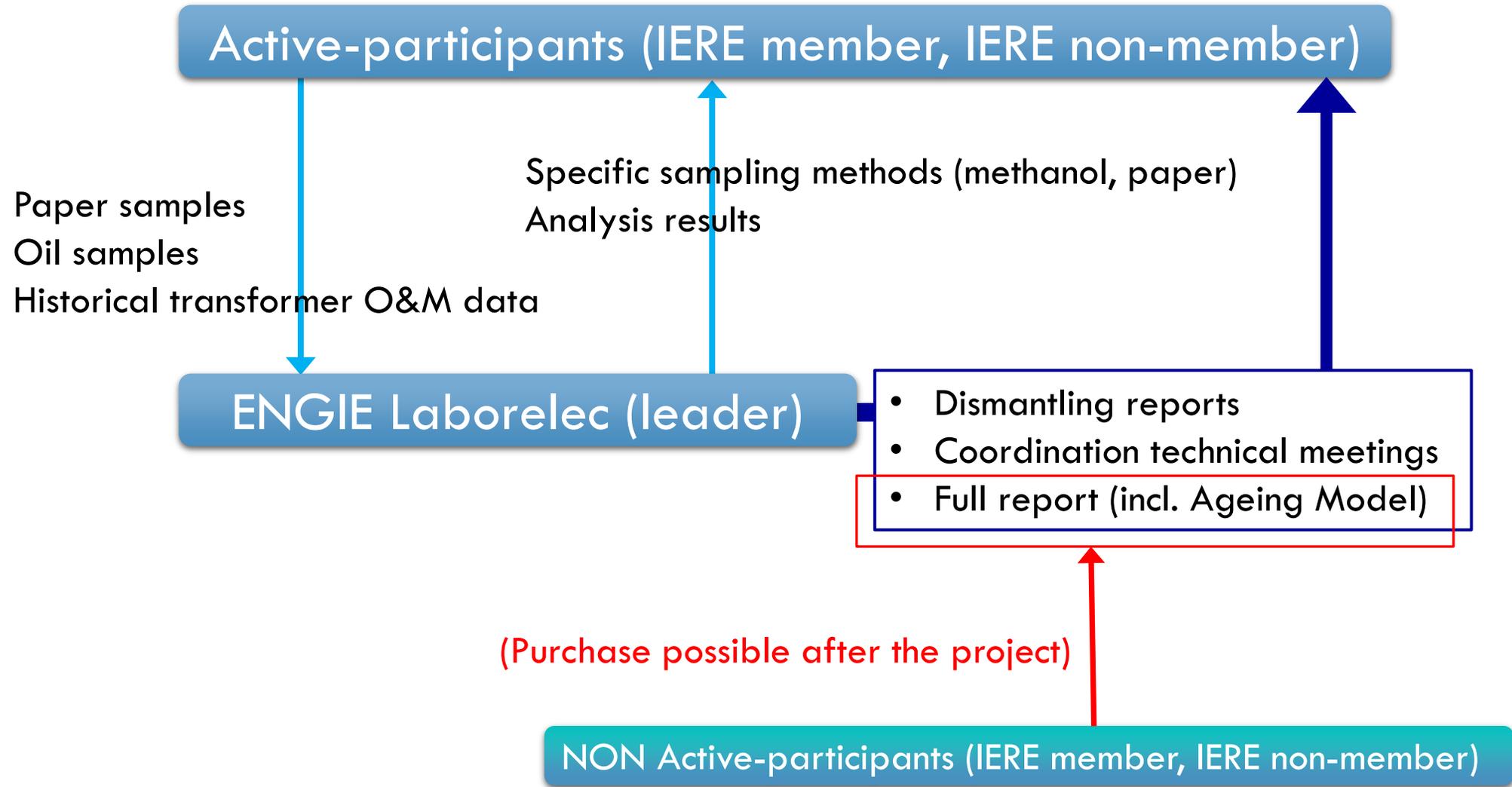
# Objective

The objective of the proposed Joint R&D project phase 2 is to analyze a collection of specific winding insulation paper material extracted during post-mortem dismantling of selected power transformers and to establish a robust degradation model by correlating the concentrations of temperature-corrected methanol-in-oil with the real winding paper degradation.

# Benefits

This project phase 2 will enable the development of a universal model and associated guidelines in using methanol as an ageing marker for power transformers, leading to a complimentary and preventive means to existing methods. Joining experts and efforts of different large power utilities, network operators, ... during this multi-year project will allow to gather enough specific post-mortem paper samples to have sufficient data to build this ageing model.

# Scope



# Duration & Technical meetings

- Duration: 2019–2023 (Extended for one year to the end of 2023)
- Technical meetings:
  - May 2019: Kick-off meeting (Daejeon, Korea)
  - Jun. 2021: Technical meeting 1 (online)
  - Oct. 2023: Technical meeting 2 (Tokyo, Japan)

## Active-participants (as of Dec. 2020)



# Project costs

- An upfront charge of 30,000 USD payable to ENGIE Laborelec per Active IERE Member participant
- An upfront charge of 40,000 USD payable to ENGIE Laborelec per Active IERE NON-Member participant

If a non-active IERE-member wishes to receive a copy of the full report including the detailed ageing model, it shall pay the amount of 45,000 USD to IERE. A non-IERE member can also buy the full report but for the amount of 60,000 USD.