



KINECTRICS

# Transformer Insulation Drying Using Low-Frequency Heating/Vacuum

## The Criticality of Moisture Management:

- Periodic moisture removal in power transformers is a fundamental maintenance activity, keeping equipment in peak operating condition while maximizing the life of the asset and mitigating the risk of dielectric breakdown and catastrophic failure.
- LHF dry-out is a fast, effective, and efficient moisture removal technology for mission-critical power transformer assets that reduces down-time and expedites return-to-service.
- A recent survey found 9.7% of 85,210 in-service transformers tested had unacceptable moisture levels (> 18% relative saturation).

Moisture is a byproduct of the **aging of cellulose insulation** and naturally accumulates over time

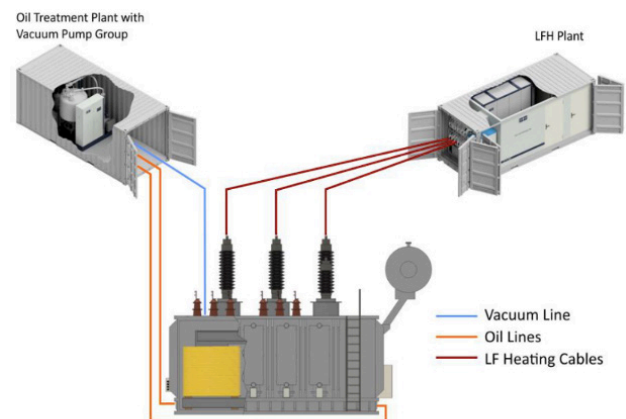
If not removed periodically, moisture can lead to **partial discharge, catastrophic dielectric breakdown, accelerated aging, bubble formation** during overload situations, & **anomalous gas** generation

Experience shows that processing the insulating oil on its own (even up to 10 recirculation passes) produces **poor long-term results** since deeply-embedded moisture remains in the insulating paper and over time simply leaches back into the oil

**Contact us for a quote today!**

Kinectrics' **LHF/Vacuum Insulation Dry-Out System** is the most powerful mobile system in North America. We offer the fastest and most-effective process for field-drying transformer insulation, achieving excellent results in days - not weeks or months!

## Process Overview:



General connection sketch, (oil tanks for oil drain purpose are not indicated)

- LHF, coupled with coordinated application of deep vacuum, is the most effective and fastest insulation dry-out technique available for field use. The insulating paper is heated directly by circulating current in the windings.
- Our equipment can dry quickly and efficiently transformers up to 1200 MVA, three-phase, 765 kV class. LHF current and vacuum application are computer-controlled to optimize the dry-out process to ensure safe yet rapid moisture extraction.
- Kinectrics can validate moisture removal from the insulation using dielectric spectroscopy, dewpoint measurement, and/or rate of moisture extraction.
- LHF is an effective dry-out technique for large, varnish-dipped, dry-type transformers and should be performed as part of the commissioning process ("bake-out") or if the unit has been stored for a significant amount of time.