

AT A GLANCE

Transformer Life Management

Program 37.101

Research Value

- Reduced operations and maintenance (O&M) costs through improved specification of emerging condition-monitoring techniques, based on solid facts and repeatable test protocols.
- Third-party, unbiased assessment of online monitoring technologies' life-cycle costs to aid industry specification and interpretation.
- Improved risk assessment of transformers, which translates into improved decision-making on these critical assets.

Member Benefits

- Effective knowledge transfer through the Copper Book and regular technical webinars. The guidebook is a comprehensive collection of transformer knowledge designed specifically for utility owners and operators.
- Novel technologies for continuous transformer dehydration—which, in turn, translates into reduced O&M and improved reliability.
- Valuable guidance on the application of novel fluids for transformers.
- Industry-standards-based loading methodologies for transformers and other equipment on the same circuit.

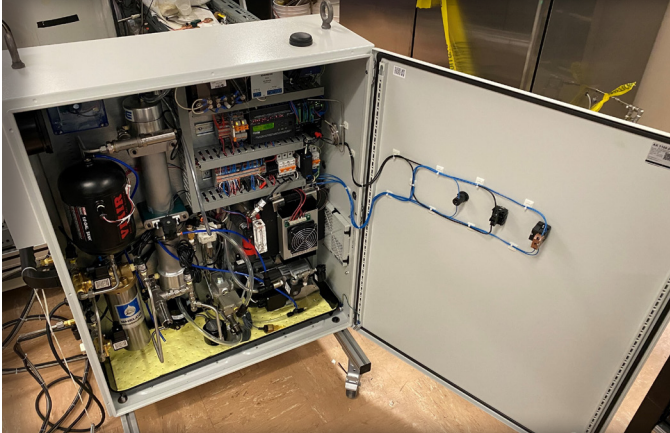
Unique EPRI transformer research laboratories and expertise are feeding the development of new tools and knowledge to help substation owners anticipate and prevent failures in transformers, extend transformer life, retain key subject knowledge, and specify new diagnostic equipment with confidence. With the increasing need to maximize transformer assets while maintaining the highest levels of system reliability, management of aging power transformers has become a critical issue facing today's substation owners.

The objectives of this research are to provide accurate, rapid, and useful research results to help members better specify, operate, and maintain transformers. Results take the form of hardware, software, laboratory results and guidebooks. Hardware prototypes are tested first in the laboratory and then piloted in utility substations, allowing for easy future adoption. Online monitoring technologies are thoroughly assessed using repeatable test protocols. Power Transformer Guidebook: The "Copper Book" is continually expanded and updated as a comprehensive reference guide that can be used by utility personnel responsible for all aspects of transformer operation, maintenance, procurement, and life-cycle management. The *Copper Book* is also used as the basis for regular EPRI technical training webinars.

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Research Highlights



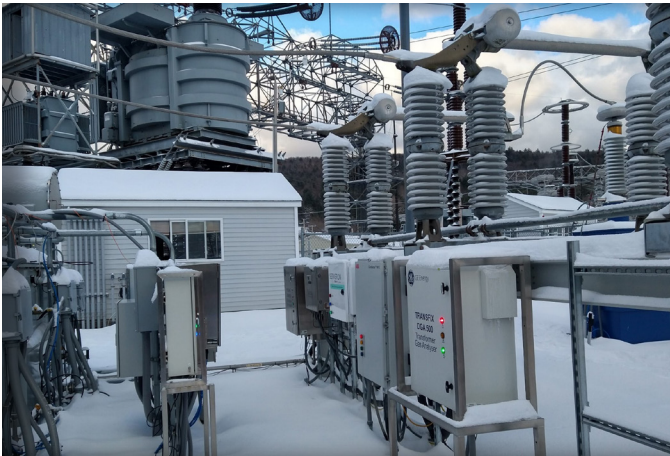
Membrane Technologies for Online, Low-Maintenance Dry-Out of Transformers

EPRI research has developed novel concepts for continuous on-line dry-out of transformers without the need for cartridge replacement. In 2024 research plans to enhance the on-line dehydration technology using Peltier cooling. The prototype is both smaller and more efficient. Field pilots in utility substations will continue to validate the technology and refine the concepts.



Alternative Fluids for Transformers for Increased Ratings and Reduced Environmental Impact

This research continues to perform valuable accelerated ageing on fully loaded model transformers in the laboratory to provide valuable guidance on aging, fire point changes, DGA patterns, and opportunities for increased transformer ratings. The results are useful for novel fluid selection and operation.



Transformer Online Monitoring Technologies: Laboratory Testing to Help Members in Specification Development

A full 138-kV EPRI research substation has been commissioned and energized to continue to support this research in 2024. EPRI laboratory test results are executed against a well-defined test protocol for online DGA monitors, online bushing monitors, on-line Partial Discharge monitors and on-line temperature monitors. The results provide valuable assistance in monitor specification, interpretation and adoption.

For more information, contact:

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