GE Energy

Transformer Monitoring and Condition Assessment Program

fact sheet

Introduction

GE Energy's Transformer Monitoring and Condition Assessment Program is a long-term comprehensive offering specifically designed to use actual transformer condition information to allow customers to make condition based maintenance and repair decisions.

Key benefits are to

- Minimize business interruptions through continuous monitoring and condition based maintenance.
- Reduce unexpected failure related costs by decreasing the probability of failure by approximately 60%.
- Defer major replacement costs by optimizing the transformers performance through continuous and periodic health inspections.

The reduction in costs starts with our expert service team members meeting with the customer to identify and assess their critical needs and then tailor this program to meet them. The program consists of initial monitoring equipment and condition assessment, followed by periodic on-site condition assessments.

GE Energy uses their transformer monitoring equipment to provide continuous on-line monitoring and interactive condition diagnostics with a range of IED's (Intelligent Electronic Devices). Transformer Condition Assessments are used to establish baselines of unit performance, develop life expectancy and /or capital planning, and to periodically perform off-line electrical testing and maintenance. All tasks compare data trends against the baseline to verify the current health of the transformer.

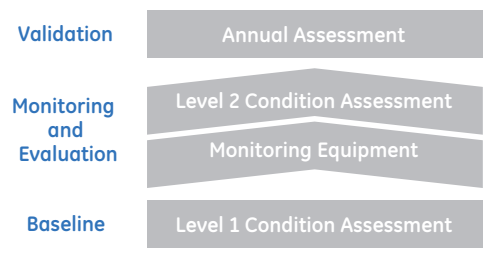
GE Energy can monitor and perform condition assessments on GE and non-GE transformers.

Service Description

The Transformer Monitoring and Condition Assessment Program is capable of continuously monitoring the transformer and it's associated equipment (i.e. load tap changers, bushings) in addition to periodic snap-shot reviews of the transformers health through Condition Assessments.

After an initial condition assessment is performed to establish a baseline, GE Energy will determine if any additional monitoring equipment is required for the oil-filled transformer. For example, a FARADAY® TMCS™ would be installed and commissioned. This system provides comprehensive monitoring and interactive condition diagnostics with a range of sensors, including the HYDRAN® M2. In most cases, detection of prevalent failure modes is possible well before the unit experiences catastrophic failure, thus avoiding expensive replacement, clean-up costs and unplanned downtime. Some of the available diagnostic models include transformer status, load current, apparent power, winding hot-spot temperature, moisture in insulation, bubbling temperature, insulation aging, cooling control, cooling system efficiency, tap changer temperature, tap changer position tracking, tap changer motor torque, dissolved gas analysis tool, and dynamic loading guide. In addition, the RMCS™ (Remote Monitoring and Control Software) is an optional easy-to-use graphical interface that provides connectivity to the TMCS™ systems via network communications or the Internet.

A Preliminary Condition Assessment will be performed during the first few months to establish a baseline health for the transformers. From this initial Condition Assessment, subsequent Condition Assessments will be performed throughout the program and will be compared to the baseline to look for variances. If there are variances, recommendations will be made to the customer that could include additional testing, maintenance, or monitoring equipment. Periodically during the contract period, GE Energy will perform On-Site Condition Assessments to assess the health of the transformers during the contract period as they are required.



Preliminary Condition Assessment – Level 1

The Preliminary Condition Assessment service will provide the transformer owner with a report on the condition of the transformer based on a review of transformer data provided to GE Energy from the customer about their unit(s). The customer provides data and documentation on the history of the transformer. A GE Energy transformer expert will evaluate the data and documentation and provide a recommendation regarding the transformers evaluated.

On-Site Condition Assessment – Level 2

The Level 2 condition assessment is an on-site service to determine the fitness of the transformer for continued service. The assessment includes a review of previous Level 1 assessment reports, review of the original manufacturers test report and specification, an external visual inspection, interviews with site personnel, evaluation of monitoring equipment data, and off-line tests of the transformer. De-energization of the transformer is required for this assessment. The customer will be provided a summary report that will include any areas of concern found by the GE Energy Transformer Experts.

Annual Report

On an annual basis, GE Energy will review the data from any monitoring equipment installed by GE Energy and the Condition Assessment reports. From this analysis, GE Energy and the customer will determine if any additional actions should take place to increase the transformer or system reliability (i.e. spare transformers).

Through this program, GE Energy will develop a long-term services strategy to reduce the customers' risk, increase the reliability of the transformers, and improve the profitability around their substation. In addition, other services can be added to the Transformer Monitoring and Condition Assessment Program such as pre-engineering or pooling of assets, repair or remanufacture of transformers, or asset financing depending upon the customers needs.

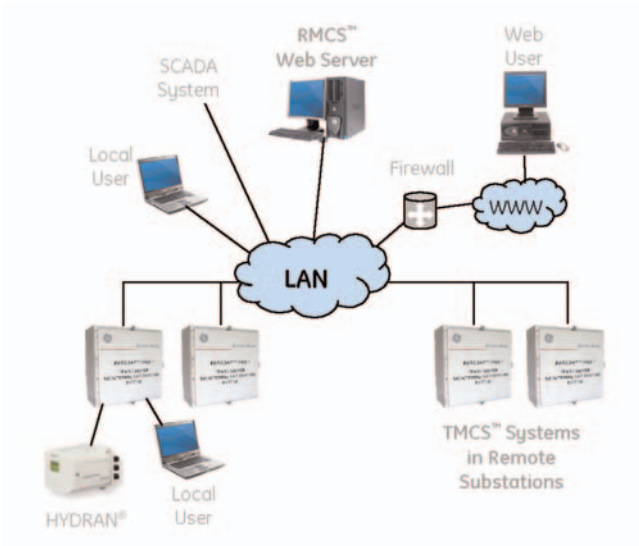
Other Services

Pre-Engineering/Spare Parts/Pooling of Critical Assets

GE Energy can offer customers an effective compromise between reducing inventory costs and maintaining the appropriate spare levels. GE Energy can offer customers access to a pool of shared assets to be utilized in case of an emergency. Pools of common assets can be strategically located to respond to customer operational needs. Various capital financing plans are available for new units, as well a program that could include the purchase of existing customer inventory while maintaining access to it. In addition, pre-engineering can be performed to reduce unplanned outage time.

Repair/Replacement/Remanufacture of Transformers

In addition, GE Energy can perform leak detection and repair, remanufacture, re-blocking, oil dry-out or replacement, remanufacture, cleaning, cooling upgrades, or other life extension upgrades for your transformer. Additionally GE also offers temporary rental arrangements for a Transformer Nursing Unit (portable diagnostic laboratory) as well as mobile oil cooling and purification rigs. GE Energy can also aid customers in making repair versus replace versus remanufacture decisions with their transformer assets.



To learn more about this offering, contact your GE Energy sales representative or visit gepower.com.

GEA-13955 (12/04)