PRESS RELEASE

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EnergyWise[SM] Tip: Dry Transformers

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It seems only fitting to have saved one of the driest energy-saving topics for the shortest month of the year. If you don't know what a dry transformer is, don't worry. There's a high probably you don't have one around your house to cause concern.

Nonetheless, realize that even the smallest of communities likely have a building or two that require more than one electric voltage to operate various equipment, appliances, lighting systems and plug loads. Some facilities that commonly use a dry transformer include airports, hospitals, industrial plants, grain elevators, shopping centers, schools and manufacturing facilities.

In fact, some farm operations have a variety of electrical requirements where a dry transformer enables the operator to suffice with only one electric service. The most common type is step-down single- or three-phase transformers that transform 480-volt (V) electricity to 240V, 208V or 120V.

Unlike liquid transformers, a dry transformer's circuitry and windings are not immersed in an insulating liquid. Therefore, dry-type transformers do not need to be placed inside of fire-proof vaults or catch basins and eliminate the concern of toxic gases potentially venting out. Since dry-type transformers are much safer, they can be placed indoors and closer to loads, which in turn provides greater efficiency.

While dry transformers can reduce the initial costs for electrical equipment, they can also be a source of additional ongoing cost due additional energy use. Often, purchasers base their decision on the lowest purchase and installation price without sufficient consideration of long-term economics. This approach to selection discourages manufacturers and contractors from offering or recommending the more expensive, energy-efficient options to customers who do not specifically request them.

Note that all transformers require a small amount of current to create a required magnetic flux in their magnetic core. This is referred to as "no-load current." While newer dry transformers have no-load currents

around two percent or less, units more than 20 years old frequently require an additional 3 –5 percent of their full load current rating to accomplish voltage transformation.

This electricity is used regardless of whether the equipment they power is operating or not. While this additional energy may not be noticed in an active facility, owners of vacant or sporadically-used properties are often surprised to see how much no-load current adds to their monthly utility bill.

As an example, a facility that uses an older 75 kVA dry transformer could require an additional 1,000 to 1,600 kilowatt-hours (kWh) a month before accounting for any equipment or lighting use. To avoid this, the transformer should only be energized on those occasions when the facility is used.

In 2016, the Department of Energy established new minimum levels of transformer efficiency of about 98 percent for the smallest units and increasing to more than 99 percent for the largest units. It's important to realize that these efficiency values are determined with linear loads at 35 percent of the transformer's nameplate-rated load.

However, computers, light fixtures, printers, elevators, or variable frequency drives are nonlinear and rich in harmonic content. Furthermore, actual connected load is likely not to be at 35 percent of nameplate-rated load all the time. These real life conditions may easily double, triple or quadruple actual efficiency losses.

Energy consumption by the transformer is not the only energy factor. Transformer efficiency losses are dissipated as heat. If the dry transformer is located inside a controlled temperature environment, this additional heat likely needs to be removed by air conditioning. A 75 kVA dry transformer with a monthly energy loss of 1,600 kWh will require an additional 450 to 650 kWh of electricity for cooling.

From a maintenance perspective, keeping dry transformers in top working condition involves continuous inspection. Operators must closely check and clean the grills, louvers or ventilation slits to make sure they are not blocked. Unfortunately, cleaning usually requires de-energizing the transformer, which can only be accomplished when the facility is unoccupied. Rather than coordinating an outage, this often leads to no cleaning. Omitting the cleaning decreases the transformer efficiency due to decreased airflow, decreases its lifespan and creates a fire hazard.

Before purchasing a new or replacement dry transformer, ensure you fully understand your existing and potential future electric loads in terms of size and duration. Consider not only your upfront purchase and installation costs, but lifespan costs over a dry transformer's average life of 15 to 25 years. When in doubt, seek engineering assistance to address these long-term considerations.

For additional information on how to make your home, business or school EnergyWise℠, contact Loup Power District, Cornhusker Public Power District, Nebraska Public Power District, or your local public power utility. While you're at it, check out the EnergyWise℠ programs designed to help you save money. Find energy efficiency information online at **www.loup.com**, **www.cornhusker-power.com**, and **www.nppd.com/save-energy**.

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