

HIGH-EFFICIENCY C&I TRANSFORMERS



Overview: Most of the electricity that powers the commercial and industrial sectors is stepped down in voltage by distribution transformers located on the customer side of electric meters. These transformers are relatively efficient; most convert in excess of 95 percent of input power to output power. However, because most transformers are energized 24 hours per day, 365 days per year, even small improvements can yield big energy and dollar savings for power users.

The market, divided between medium- and low-voltage equipment, has seen little efficiency improvement in the last 30 years. Average efficiencies for low-voltage equipment have deteriorated over time despite the availability of technology that could yield energy savings with simple paybacks of three years or less.

About This Market: About 233,000 low voltage, dry-type distribution transformers over 10 kVa are sold annually, 90 percent of which are sold to non-utilities. Most of these units serve lighting and plug loads in commercial buildings. Another 34,000 medium voltage units, split just about evenly between liquid-immersed and dry-type equipment, are purchased for industrial and large commercial applications.

Sales of energy-efficient low voltage transformers have been modest; representing less than 10 percent of units sold in 2003. There are a variety of reasons for this:

- Distributors, specifying engineers, electrical contractors and facility owners are not aware of the efficiency opportunities
- The typical purchaser or specifier of the equipment is not ultimately responsible for the electric bill (split incentives)
- Widespread perception that the equipment is already energy efficient
- Information about equipment efficiency is not readily available
- More efficient equipment is not readily available for the low-voltage product class

A cumulative result of these barriers is that the transformer market is largely first-cost driven. Purchasers search for the lowest priced equipment that meets the facility's needs and manufacturers compete by attempting to keep prices as low as possible.

Energy Savings Opportunity: According to Oak Ridge National Laboratory, potential annual energy savings exceeding 1 billion kWh could be realized if all new dry-type, low-voltage transformers met a NEMA standard established in 1996, called TP 1.

In addition, significant energy savings are available in the medium-voltage market if consumers evaluated their purchases based on sales price *plus* transformer operating costs. Since most transformers are operated for 30 years or more, the potential exists to lock in significant energy savings for decades.

FACT SHEET

Initiative Background: In 1998 CEE adopted the National Electrical Manufacturers Association (NEMA) standard, TP 1, *Guide for Determining Energy Efficiency for Distribution Transformers*, for low-voltage transformers. This standard was revised in 2002 (TP 1-2002). Products meeting the NEMA standard reduce transformer losses by about 50 percent, yielding simple paybacks of 1-3 years.

For medium-voltage products, CEE encourages purchasers to evaluate products according to the life-cycle operating cost methodology described in NEMA TP 1. NEMA standard TP 1 is published on the NEMA Web site (www.nema.org).

CEE's role in this initiative is that of organizer, facilitator and information clearinghouse. CEE's partners, including members of CEE and other organizations, implement the initiative. These implementers include electric utilities and statewide or regional efficiency organizations, which may be utility-based. Implementers participate in the initiative when they adopt the CEE efficiency performance specification for low-voltage equipment and undertake efforts to build awareness of efficient transformers.

Accomplishments: Over the last five years the number manufacturers participating in the ENERGY STAR program and, consequently, the number of qualifying products available on the market has increased dramatically. In addition to voluntary programs efforts, it should be noted that the adoption of NEMA TP-1 into statewide codes and standards also has had an impact on the market (e.g., California, Massachusetts, Maryland, Minnesota, New York, Oregon and Wisconsin). Most of the program and standards activity has focused on low-voltage, dry-type products commonly found within commercial buildings.

A new federal minimum standard for low-voltage, distribution transformers goes into effect on January 1, 2007, which is equivalent to the specification referenced by CEE and ENERGY STAR. As a result ENERGY STAR plans to "sunset" its label for distribution transformers as of December 31, 2006. CEE's Distribution Transformers Committee met twice in 2006 to discuss member interest in an enhanced performance specification. A draft specification is currently under review by the committee.

Which Transformers? CEE's initiative is closely coordinated with FEMP (for federal purchasing) and the ENERGY STAR[®] Transformers program, both of which have adopted the same NEMA standard for energy-efficient low voltage transformers. Under the ENERGY STAR program, manufacturers provide EPA with lists of equipment meeting the program specification. This list is published on the ENERGY STAR Web site (www.energystar.gov).

Contact: Additional information about CEE's High-Efficiency C&I Transformers Initiative is available at www.cee1.org or by contacting:

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