

ELECTRIC TRANSPORT REFRIGERATION UNITS



Photo courtesy of Carrier Transcold

DID YOU KNOW?

In addition to fuel cost savings, eTRUs can deliver ongoing maintenance cost savings because an electric motor requires less maintenance than a diesel engine. A side benefit of electric standby operation is life extension of the refrigerated trailer or “reefer.” The eTRU’s electric motor runtime replaces diesel engine operating hours each year. With less wear-and-tear on the diesel engine a reefer can operate for a longer period before being taken out of service for engine repairs or complete replacement. In one food distribution example, the life of a reefer was extended from five years to as many as seven years.

Electric transport refrigeration units (eTRUs) are gaining market momentum in the goods movement industry as a cost-effective alternative to diesel-powered transport refrigeration units (TRUs). Customer demand for more efficient, lower-maintenance solutions together with engine idling laws that restrict diesel-mode operation at loading docks, staging areas, or rest stops, are driving eTRU adoption.

HOW IT WORKS

Mobile refrigeration systems or TRUs provide temperature control for perishable goods during transport via truck, trailer, shipping container, or rail car. Historically, TRUs have relied on a diesel internal combustion engine (ICE) inside the unit’s housing to power the refrigeration compressor.

Commercialized over the last decade, eTRUs have electric components that power the refrigeration compressor. There are two common configurations. Hybrid-electric eTRUs use an engine generator set, which couples an integral diesel ICE with an electric generator to power the compressor. Electric standby eTRUs have a separate electric motor in addition to the diesel ICE; they can operate on either the ICE or electricity, plugged into the grid during loading and staging.

New eTRU technology can be used in both long-haul and short-haul operations. The market potential for eTRUs is particularly favorable in short-haul operations that return to base the same day and comprise approximately 40% of total refrigerated transport. The economics for conversion from solely diesel operation to eTRU are favorable for trucks that typically idle for more than 1,000 hours per year.

APPLICATIONS

Today’s eTRUs can replace traditional TRUs in most goods movement applications, including:

- Food manufacturing and distribution (produce, frozen food, meat, dairy, beverages, etc.)
- Food delivery services in small refrigerated trucks
- Pharmaceutical and cosmetics manufacturing and distribution
- Live products transport (plants, flowers, and animals)
- Cold storage
- Delicate furniture or equipment that requires temperature or humidity control during transport

BENEFITS

No emissions on site. At loading docks and staging areas where reefers may be parked for several hours or days, eTRUs plugged into the grid and operating solely on electricity emit zero local emissions. Diesel operation results in pollutant emissions that are more readily controlled where electricity is generated. State and local anti-idling laws further drive adoption of eTRUs.

Fuel cost savings. New eTRUs can deliver fuel cost savings of 40% to 70% compared to diesel operation, depending on fuel prices. This savings figure assumes at least 1,000 hours per year of operation, where idling on diesel is avoided.

Noise reduction. Diesel engines are noisy and may be problematic if they are operating during sleeping hours near residential neighborhoods. The electric motors and components that run refrigeration compressors in eTRUs are quieter.

Last-mile solution. The growing consumer demand for delivery of refrigerated foods ordered online increases the demand for both eTRUs and smaller refrigerated delivery vehicles for areas inaccessible to large trailers. Electric versions of both types of refrigerated transport can take advantage of investment in electric infrastructure to serve these needs.

LIMITATIONS

Higher capital cost. Although eTRUs generally cost more than traditional diesel TRUs, first cost is not as large a barrier as it once was, since hybrid-electric options are more commonplace today.

Infrastructure cost and integrity. The business case must be made for installation of robust electric infrastructure at the idling location to accommodate and facilitate the use of eTRUs with electric standby capability.

Behavior change. Drivers and all on-the-ground logistics personnel need education and reinforcement to ensure that eTRUs are plugged in whenever possible and unplugged when the truck and trailer depart.

Accurate economics and information outreach. Businesses operating TRUs underestimate the time spent idling and therefore the associated fuel and maintenance costs and environmental impacts. Often, they are unaware of alternatives.

On-road plug-in availability. Increased provision of plug-in infrastructure at rest stops and other locations would allow long-haul truck operators with eTRUs to take full advantage of their truck's electric capabilities.