Electric Transport Refrigeration Units (eTRUs)

Overview

Electric transport refrigeration units (eTRUs) are not only beneficial for company bottom lines, but they also are beneficial for the communities that surround distribution centers and the environment. Transport refrigeration units (TRUs) are mobile refrigeration systems that supply precise temperature control for perishable goods during transport and storage. These systems have traditionally been powered by a diesel internal combustion engine (ICE), but many industries are now making the switch to hybrid diesel eTRUs, which use electricity to power the unit while not in motion. Powering the compressor with electricity offers environmental benefits, increased efficiency, and lower maintenance requirements.

Did you know?
A majority of short-haul truck TRUs already have electric standby that is not utilized because businesses underestimate the time spent idling, the associate costs, or charging is not a standard practice or readily available.

eTRUs are gaining momentum, particularly as interest in online shopping for and delivery of refrigerated goods grows. The technology is being deployed in both long- and short-haul applications and can be used in the same industries served by conventional TRUs: food manufacturing and distribution, pharmaceutical and cosmetics manufacturing and distribution, plant, flower and animal transport, and delicate furniture or equipment transport, for example.

Cost Comparison

Cost	eTRU	TRU
Equipment Cost	$34,750	$30,100
Pedestal Plug Cost	$13,600	$0
Annual Fueling Cost	$1,680	$4,063
Annual Maintenance Cost	$2,000	$3,000
Total Annual Operating Cost	$3,680	$7,063
Total Cost of Ownership (NPV)	$69,201	$71,946
Pounds of CO2 produced over lifetime	110,880	266,560

This table is an example only. Cost estimates are based on the *Preliminary Cost Document for the Transport Refrigeration Unit Regulation* published by the California Air Resource Board. For actual projects, official equipment quotes from relevant vendors must be obtained to determine project payback. Manufacturer warranties may impact annual maintenance costs and should be considered.

Assumptions: Long-haul TRU (greater than 25-HP motor); one pedestal-style outdoor outlet installed at facility; 7-year life; 2,000 hours of idling per year; electricity cost = 10.5¢/kWh; diesel cost = $2.39/gallon; 3% escalation rate.

The pedestal-style outdoor outlet will have a longer life than the eTRU and will likely not need to be replaced when the eTRU is replaced. Additionally, if the facility does not operate with all trucks idling on-site simultaneously, fewer outlets can be purchased.

Benefits	Barriers
Emissions: Operating on electricity means no local, on-site emissions when parked and plugged in for hours or days, providing cleaner and healthier air for the surrounding environment. Many businesses underestimate time spent idling and its environmental and financial impacts. TRUs run while parked for temperature control (known as idling) commonly for 40-60% of engine run time while at the distribution center.[1] A reduction in greenhouse gas emissions may be achieved by using eTRUs and help companies meet sustainability goals.	**Upfront Cost**: eTRUs tend to cost more upfront than diesel-powered models, but lower operating costs can help make up the difference over time.
Ongoing Savings: eTRUs cost less to run and maintain. Electricity prices are cheaper and more stable than diesel fuel. Studies have shown eTRUs on grid-supplied electricity to reduce hourly operating costs by $1.41 – $2.68 per engine run hour[1]. Additionally, electric motors and electric/diesel hybrid equipment require less maintenance than diesel engines.	**Infrastructure Needs**: Electric infrastructure must be developed at idling locations as well as other non-transit locations, like truck stops, warehouses, intermodal stations or ports, and points of sale. Electric cooperatives and other utility providers are building this infrastructure to support industries' transition to eTRUs.
Quiet Operation: When connected to the grid, eTRUs are significantly quieter than their ICE counterparts, thanks to their electric motors and components. This benefit can be especially valuable if operating overnight near residential areas.	

Additional Information

eTRUs come in two common configurations, both with plug-in capability: hybrid-electric and electric standby. Hybrid-electric versions pair an integral diesel ICE with an electric generator. This engine-generator set powers the refrigeration compressor. Electric standby versions employ a diesel ICE and a distinct electric motor. Both configurations can operate on diesel when power is unavailable.

As with traditional TRUs, eTRUs support use cases including:

- Temperature or humidity control during precooling, loading, unloading, staging and long-term storage of goods
- Refrigerated trucking and cold storage
- Moving and transporting goods

Snapshot of eTRU Benefits

- Saves Operational Costs
- Helps Achieve Sustainability Objectives
- Improves Performance through Noise Reduction

eTRU Calculator: To assist in a tailored assessment of the benefits at your operations, including simple payback period, an eTRU calculator is available at: https://ncaecalc.epicenter1.com

Contact Us: For more information, please contact GoElectric@nreca.coop.

[1] Electric Power Research Institute. *Electrified Transport Refrigeration Units Technical Assessment: Refrigerated Fleet Technical Assessments for Electrification.*