

Diesel Emissions Reduction Act (DERA) Transport Refrigeration Unit (TRU) Factsheet

What is a “reefer?”

Refrigerated, insulated cargo trailers, straight trucks, intermodal shipping containers, and rail cars can all commonly be referred to as “reefers.” It originates from the word “refrigerated.”

What is a “TRU?”

A Transport Refrigeration Unit (TRU) is a refrigeration system installed on insulated cargo trailers, straight trucks, intermodal shipping containers, and rail cars used in transporting temperature sensitive goods. A conventional TRU is powered by a small diesel engine.

Truck TRUs are used to refrigerate insulated cargo vans mounted on the frame of a straight truck. Trailer TRUs are used to refrigerate insulated trailers mounted on semi-trailers. Railcar TRUs are used to refrigerate insulated railcars.

What is an “eTRU?”

Electric Transport Refrigeration Unit or “eTRU” is a term sometimes used to describe different types of alternatives to conventional diesel powered TRUs including hybrid electric TRUs, standby electric TRUs, and all-electric TRUs. In an eTRU, the refrigeration system’s compressor is driven by an electric motor all or at least part of the time. eTRUs can be powered by a plug-in electrical connection from electrical grid power (commonly referred to as shore power) while parked or being loaded. eTRUs may be powered by a battery pack for shorter distances or a diesel-powered TRU generator set for longer distances while operating on the road. Integral diesel generators, engine-mounted or transmission power-take-off generators or other range extenders may also be used to provide electrical power to the unit when in transit.

Refrigerated shipping containers typically employ all-electric TRUs which are powered by ocean-going ship electric power, dock-side shore power, or TRU generator sets for travelling shorter distances. Often, insulated trailers with shore powered all-electric

TRUs are used for stationary operations to increase holiday and summer season cold storage capacity at grocery stores.

Hybrid Electric TRU

In a hybrid electric TRU (also called a hybrid plug-in eTRU), the refrigerator's compressor is driven solely by an electric motor. When over-the-road, electric power is supplied by an integral diesel genset located within the TRU housing; when stationary (e.g., loading at a distribution center), the hybrid electric TRU plugs-in to available electric grid shore power.

Standby Electric TRU

In a standby electric TRU (also called a standby plug-in eTRU), the refrigerator's compressor is both mechanically driven by an integral diesel engine and electrically driven by an integral electric motor. When over-the-road, the unit is powered by the diesel engine; when stationary, the electric standby feature allows the TRU to be plugged into electrical power and the diesel engine to be turned off.

What is a TRU generator set (genset)?

A TRU genset provides electric power to an all-electric TRU when the unit is not plugged into ocean-going ship electric power or dock-side shore power.

- “Pin-on” TRU gensets are pinned onto the front of refrigerated shipping containers, just above the container's built in all-electric refrigeration system.
- “Under-slung,” or “belly mount” TRU gensets are clamped to the frame rails of intermodal trailer chassis.
- A “powerpack” TRU genset consists of several diesel generators installed into a shipping container, which then provides electric power to multiple refrigerated shipping containers and are generally limited to railcar use and longer periods of transport.

What types of TRU projects are eligible under DERA?

Diesel powered TRUs and TRU gensets are eligible as nonroad equipment under DERA if the existing engines meet the ownership, usage, and remaining life criteria defined in the program specific Notice of Funding Opportunity (NOFO). Additional project eligibility criteria is defined in the NOFO and summarized below.

Replacement Projects:

- Removing the old, diesel-powered TRU from the truck or trailer, scrapping it, and installing a new TRU, electric standby TRU, hybrid electric TRU, or all-electric TRU. EPA will fund up to 25% of the cost of an eligible piece of equipment powered by an engine certified to EPA emission standards. EPA will fund up to 45% of the cost of an eligible zero tailpipe emission piece of equipment. Please note that the 45% EPA funding is only eligible if the new unit will operate solely on grid, battery, or other zero emission power sources. eTRUs that will be powered by diesel engines or diesel gensets are only eligible for the 25% EPA funding;

- Scrapping the entire TRU-equipped trailer or shipping container and purchasing a new trailer or shipping container with new, eligible TRU, eTRU, electric standby TRU or hybrid electric TRU technology installed. New trailers can gain additional efficiencies and fuel savings. EPA will fund up to 25% of the cost of an eligible piece of equipment powered by an engine certified to EPA emission standards. EPA will fund up to 45% of the cost of an eligible zero tailpipe emission piece of equipment. Please note that the 45% EPA funding is only eligible if the new unit will operate solely on grid, battery, or other zero emission power sources. eTRUs that will be powered by diesel engines or diesel gensets are only eligible for the 25% EPA funding; or
- Scrapping a TRU genset and installing a new TRU genset. EPA will fund up to 25% of the cost of an eligible TRU gen set powered by an engine certified to EPA emission standards.

Eligible costs for eTRUs replacement projects which operate solely on battery electric power can include the purchase price of one charging unit per eTRU, including the unit and charging cable, mount and/or pedestal. EPA will fund up to 45% of these eligible costs. Ineligible costs include power distribution to the pedestal, electrical panels and their installation, upgrades to existing electrical panels or electrical service, transformers and their installation, wiring/conduit and its installation, electricity, operation and maintenance, stationary energy storage systems that power the equipment (e.g., batteries) and their installation, and on-site power generation systems that power the equipment (e.g., solar and wind power generation equipment) and their installation.

Stationary TRU Replacement Projects:

- Scrapping TRU gen sets and running grid power to the refrigeration unit. Eligible costs for grid electric powered equipment replacement projects can include the purchase and installation of certain equipment required for power delivery directly related to the new equipment. Eligible costs include design and engineering, electrical panels, upgrades to existing electrical panels or electrical service, transformers, wiring/conduit, and installation. EPA will fund up to 45% of these eligible costs. Ineligible costs include power distribution to the property line, electricity, operation and maintenance, stationary energy storage systems that power the equipment (e.g., batteries) and their installation, and on-site power generation systems that power the equipment (e.g., solar and wind power generation equipment) and their installation; or
- Scrapping a TRU, installing a new eTRU, and running grid power to the eTRU. Eligible costs include the eTRU and the purchase and installation of certain equipment required for power delivery directly related to the new equipment. Eligible costs include design and engineering, electrical panels, upgrades to existing electrical panels or electrical service, transformers, wiring/conduit, and installation. EPA will fund up to 45% of these eligible costs. Ineligible costs include power distribution to the property line, electricity, operation and maintenance, stationary energy storage systems that power the equipment (e.g., batteries) and their installation, and on-site power generation systems that power the equipment (e.g., solar and wind power generation equipment) and their installation.

Electrified Parking Space (EPS) or Truck Stop Electrification (TSE) Projects:

EPSs provide off-board electrical power to operate a plug-in capable refrigeration system that would otherwise be powered by an engine. Eligible costs include the purchase and installation of the EPS unit, mount and/or pedestal, and plug-in cable and certain equipment required for power delivery directly related to the new equipment. Eligible costs include design and engineering, design and engineering, electrical panels, upgrades to existing electrical panels or electrical service, transformers, wiring/conduit, and installation. EPA will fund up to 30% of these eligible costs. Ineligible costs include power distribution to the property line, electricity, operation and maintenance, stationary energy storage systems that power the equipment (e.g., batteries) and their installation, and on-site power generation systems that power the equipment (e.g., solar and wind power generation equipment) and their installation.

An EPS project may be implemented as a stand-alone project, as described above. Or, EPS may be implemented in combination with the replacement of TRUs with electric standby TRUs or hybrid electric TRUs. In this latter example, the EPS costs may be funded at 30% and the TRU costs may be funded at 25%.

Please note that although DERA grant funds and matching funds cannot be used for stationary energy storage systems that power the equipment (e.g., batteries) and their installation, and DERA grant funds and matching funds cannot be used for on-site power generation systems that power the equipment (e.g., solar and wind power generation equipment) and their installation, applicants and their partners may add these components at their own expense outside the scope of the grant.