

California Air Resources Board
Zero-Emission Transport Refrigerator Technologies¹ DRAFT: Last Updated 6-15-17

Technology Description	Company/Brand or Model/Web Address²	Contact Information
All-electric plug-in refrigeration system for 28' to 53' trailers, battery pack for on-road, solar panel range extender for 72 hours of run time. Single or multi-temperature cooling available	Advanced Energy Machines Solar Tech Model 48K-17 http://aem.green	Gary Cullen (832-771-0579 sales@aem.green
All-electric, plug-in refrigeration systems for stationary cold storage trailers.	Carrier Transicold, Vector 8100 www.trucktrailer.carrier.com	Contact Carrier Transicold dealer http://www.carrier.com/truck-trailer/en/north-america/
All-electric, plug-in refrigeration systems for stationary cold storage trailers. Conversions from conventional diesel TRUs.	Electric Reefer Solutions Models: ER-230, ER-460 http://www.electricreefersolutions.com/	Brian Lake (888) 696-2230 info@electricreefersolutions.com
All-electric, plug-in refrigeration system for straight truck cargo boxes and vans, with battery pack on-road power and solar panel range extender.	Volta Air Models: VAR 150STB, 300STB, and 450DTB www.voltaair.ca	Pete Johnston (778) 772-3108 pjohnston@voltaair.ca
All-electric refrigeration systems with cold plates for truck & trailer bodies from 12 to 38 feet. Plug in while stationary to freeze cold plates and charge batteries. Single or multi-temperature available. Battery-powered electric fans distribute cold air.	Johnson Truck Bodies Model: AE series www.johnsontruckbodies.com	Eduardo Navarro (310) 418-8905 enavarro@johnsontruckbodies.com
All-electric refrigeration systems with cold plates for truck & trailer bodies. Plug in while stationary to freeze cold plates. Uses natural convection to cool body while on routes up to 16 hours.	Kidron Manufacturing, Model: Cold Plate System www.kidron.com	Contact Bruce Summers (805) 937-8597 bsummers@vthackney.com
Industrial refrigerators utilizing cold plates to keep temperature while on route. Plug in to charging station to freeze plate and recharge on-board battery that runs on-board fan. Built in pallet for van or side-bay-style trucks and trailers.	Hackney Manufacturing, Model: ColdBev www.vthackney.com	Contact Richard Ball (252) 495-4066 rball@vthackney.com
Cryogenic refrigeration: Indirect injection ³ liquid carbon dioxide; battery-powered electric fans circulate air; for truck and trailer applications.	Thermo King Models: ST-CR 300 (truck), SB-III CR (trailer) www.thermoking.com/tk/index.asp	Contact Thermo King dealer http://www.na.thermoking.com/tk-innovation/global/en/locate-dealer/dealer-locator.html
Cryogenic refrigeration: Direct injection ⁴ liquid nitrogen; solar/battery-powered electric fans circulate air ventilate when cargo doors are opened; for trailer application.	Boreas Nitrogen Cooling Systems www.boreassystems.com	Joanne Bjick (616) 414-2490 joanne.bjick@jfeindustries.com
Cryogenic refrigeration: Indirect liquid nitrogen cooling with solar photovoltaic/battery-powered electric fans circulating air for trailer applications. Direct replacement for existing trailer TRU.	Reflect Scientific Cryometrix model AZE (Advances Zero Emissions) www.cryometrix.com/trucks.php	Sam Sampson (435) 705-4020 info@cryometrix.com

¹ Zero emission transport refrigerators must not be powered by an internal combustion engine in any way. Electric power for compressors, fans, and controls may come from on-board batteries, provided they are not re-charged by an alternator or generator that is driven by the vehicle engine or powertrain, trailer wheels, trailer axle/differential, or any other contrivance that adds to the vehicle engine load. Examples of zero emission TRs include, but are not limited to, TRs with refrigeration system and/or fans that are powered by batteries when on-road, and use battery chargers that are plugged into the grid while stationary or connected to on-board solar panels.

² Trade names mentioned herein do not imply ARB endorsement.

³ Indirect cryogenic refrigeration means cryogenic fluid flows through a heat exchanger and exhausts to ambient air, outside of the cargo space while fans blow air across the heat exchanger to cool the cargo space.

⁴ Direct injection cryogenic refrigeration means cryogenic fluid sprays inside cargo space. The cargo space must be ventilated before human entry to restore adequate oxygen level.