THERMAL ENERGY STORAGE BASED ELECTRIC REEFER TECHNOLOGY FOR TRANSPORT OF PERISHABLE PRODUCTS

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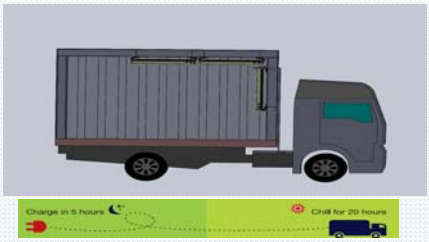
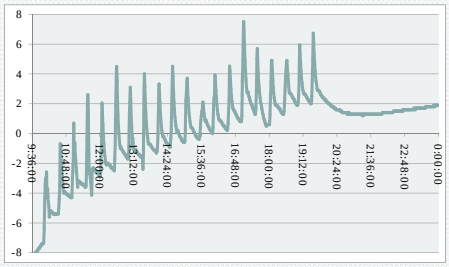
***Abstract*:**
An upcoming efficient with low operating cost (60 – 70 %) method of cooling a container body and thereby keeping perishable items at precise temperature is by use of **"Electric Reefer Technology"**. Which is a alternative to diesel driven refrigeration system to make refrigerated transport vehicles more effective and affordable. The solution is based on the principle of ***latent thermal energy storage*** which allows us to store the thermal energy over a span and use it for cooling during transportation. Thus, main objective of the presentation is to provide a robust and operating cost wise efficient refrigeration solution for refrigerated truck/reefer which will ensure that perishables product are in good conditions and thus ensuring food security for developing nations like INDIA.

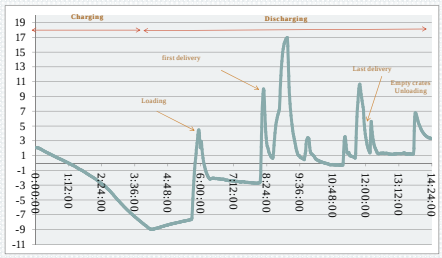
PLUGnCHILL FUEL FREE EUTECTIC REFRIGERATION SYSTEM



ATP Test for Stationary Eutectic Plates (0 to + 5 ^{0}C)



Product : Fresh Chicken



Parameters	Diesel Operated Refrigeration System	Electric Refrigeration System
Operating Cost	High	60% lower due to efficiency
Operating Period	Better for long runs (more than 24 hrs)	Better for daily runs with period of 6 to 24 hrs
Initial Cost	Moderate	Moderate
Life Cycle Cost	Higher	Lower
Temperature response	Good response to temperature Change	Slow response to temperature change
Complexity	High due to diesel engine and related moving parts	Simple without engine
Down time	Limited to precooling, loading and refuelling	System down time in the range of 5 to 8 hrs
Reliability	Good	Excellent
Maintenance	after 2 months by highly skilled person	Few maintenance by low skilled personnel
Flexibility	Good	Optimum for multiple delivery
Environmental Friendly	Discharges flue gas , high noise level	no emission system
Life	5 years with proper service	equivalent to vehicle life
Sound	noisy due to use of engine	Silent

Demo Vehicle for Chilled Application

Controller

No Fuel Consumption during product delivery

APPLICATION for both Chilled & Frozen Products

- ✓ *Dairy*
- ✓ *Fruits & Vegetables*
- ✓ *Fishery*
- ✓ *Fresh Chicken*
- ✓ *Cakes*
- ✓ *Horticulture Product like Flowers*

COST BENEFIT ANALYSIS

	Diesel Operated Reefer	PLUGnCHILL
Hours of operation (300 days)	3600	3600
Fuel consumption/Power	1 liter/hour	2kW/hour (12 hour run)
Annual Fuel/Electric use	3600 liters	7200 kWh
Fuel/Unit cost	55 INR/liter	7INR/kWh
Annual Fuel/Electric cost	INR 1,98,000	INR 50,400
Fuel Savings per truck per annum = INR 1,47,600		