



# AERFRIGOR

## *gempacs*

On Shore & On Board Cold Storage Systems

Version 1.4



# Cold Storage Reefers by AERFRIGOR



TYPE of Machine	Price			
20' Cooling System 5kW	\$5'000			
40' Cooling System 6kW	\$6'000			
20' & 40' Cooling System 10 kW	\$10'000			
Type of Reefer	Price MIN	Price MAX	Price MIN	Price MAX
20' AERFRIGOR Reefer Container	\$8'500	\$10'000	\$6'600	\$7'500
40' AERFRIGOR Reefer Container	\$9'000	\$11'000	\$6'750	\$8'000
20' AERFRIGOR High Cube Reefer Container	\$10'000	\$11'500	\$7'800	\$8'800
40' AERFRIGOR High Cube Reefer Container	\$10'500	\$12'500	\$8'000	\$9'500

Cold Storage Reefers for On-Shore usage of fishing catches in remote areas, can be easily assembled in Indonesia by recycling & refurbishing used ISO Containers and provide higher quality products.

# Standard vs High Cube Containers & Reefers Comparison



HIGH CUBE

STANDARD

30 cm

REFERENCE PRICES

Container Type	New (USD)	Used (USD)	Capacity	Tare	Payload	Dimensions (LWH)
20' Standard ISO Container	\$3,500 - \$5,000	\$1,600 - \$2,500	33,2 m3	2.400 kg	26.280 kg	6,058 m/2,438 m/2,591 m
40' Standard ISO Container	\$4,000 - \$6,000	\$1,750 - \$3,000	67,5 m3	4.000 kg	26.480 kg	12,192 m/2,438 m/2,591 m
20' High Cube ISO Container	\$4,000 - \$5,500	\$1,800 - \$2,800	37,8 m3	2.500 kg	27.870 kg	6,058 m/2,438 m/2,896 m
40' High Cube ISO Container	\$4,500 - \$6,500	\$2,000 - \$3,500	76.4 m3	4.200 kg	28.080 kg	12,192 m/2,438 m / 2,896 m
20' Standard Reefer Container	\$7,250 - \$9,500	\$4,200 - \$6,000	30,2 m3	2.910 kg	26.280 kg	6,058 m/2,438 m/2,591 m
40' Standard Reefer Container	\$8,850 - \$13,000	\$5,000 - \$7,500	61,5 m3	4.520 kg	26.480 kg	12,192 m/2,438 m/2,591 m

REEFER CONTAINER



	20 Feet	40 Feet
Load Capacity (m³)	28.2	67.5
Container Weight (kg)	2,910	4,520
Max. Load Weight (kg)	27,570	29,480



DRY VAN



REEFER



TANK o CISTERNA



FLEXITANK



OPEN SIDE



OPEN TOP

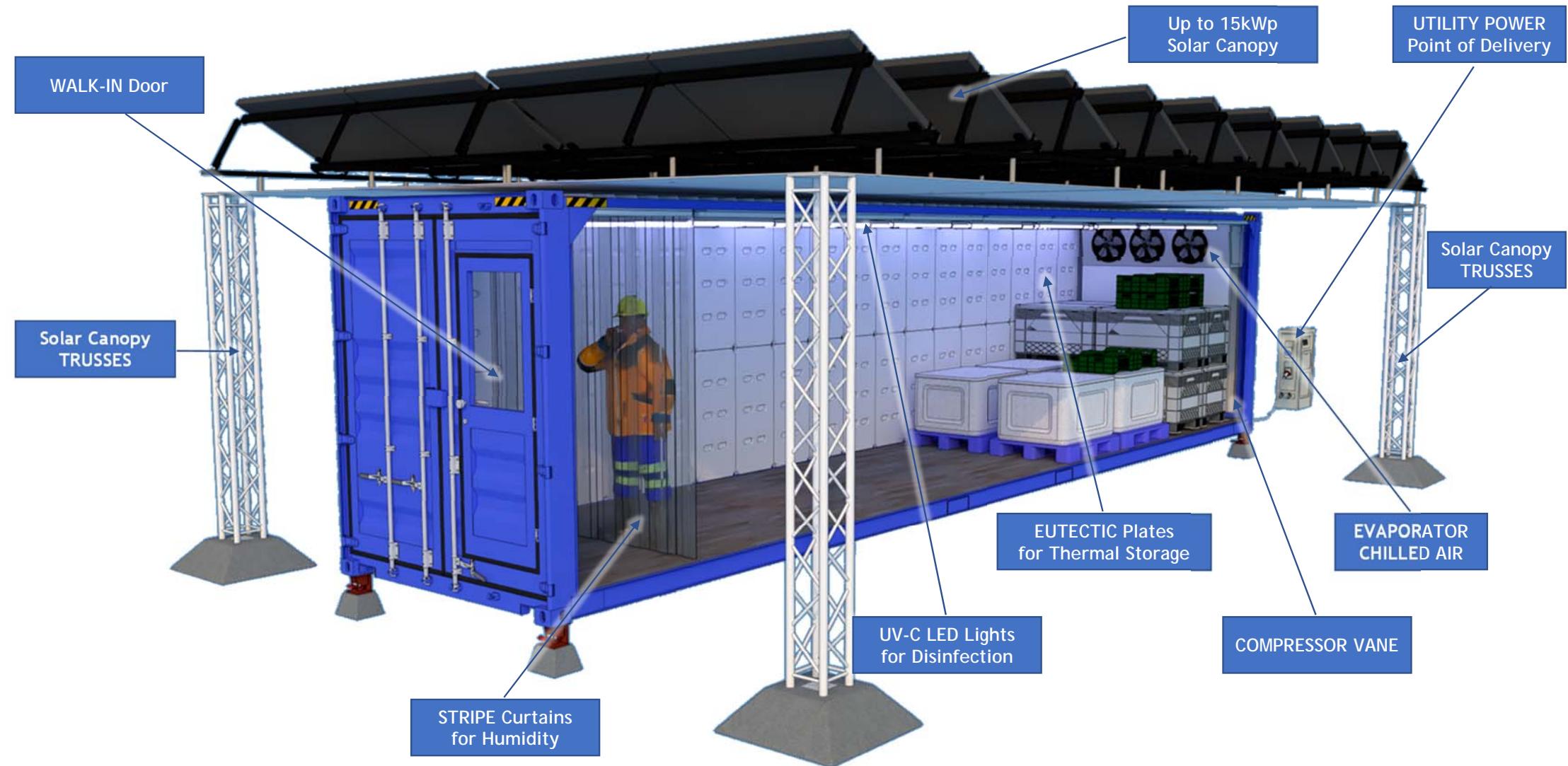


FLAT RACK

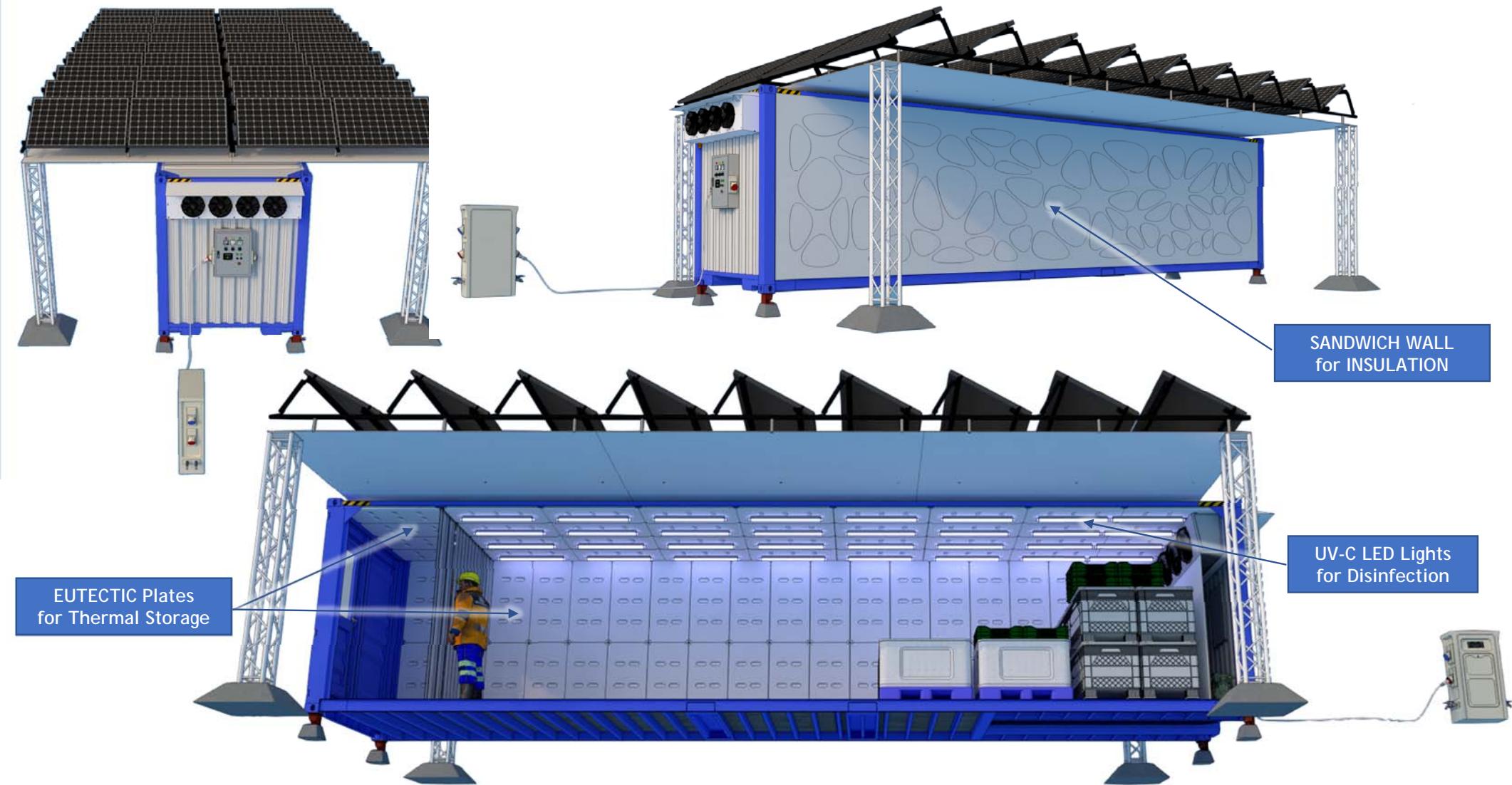
# Solar Powered Cold Storage Concept & Elements 1



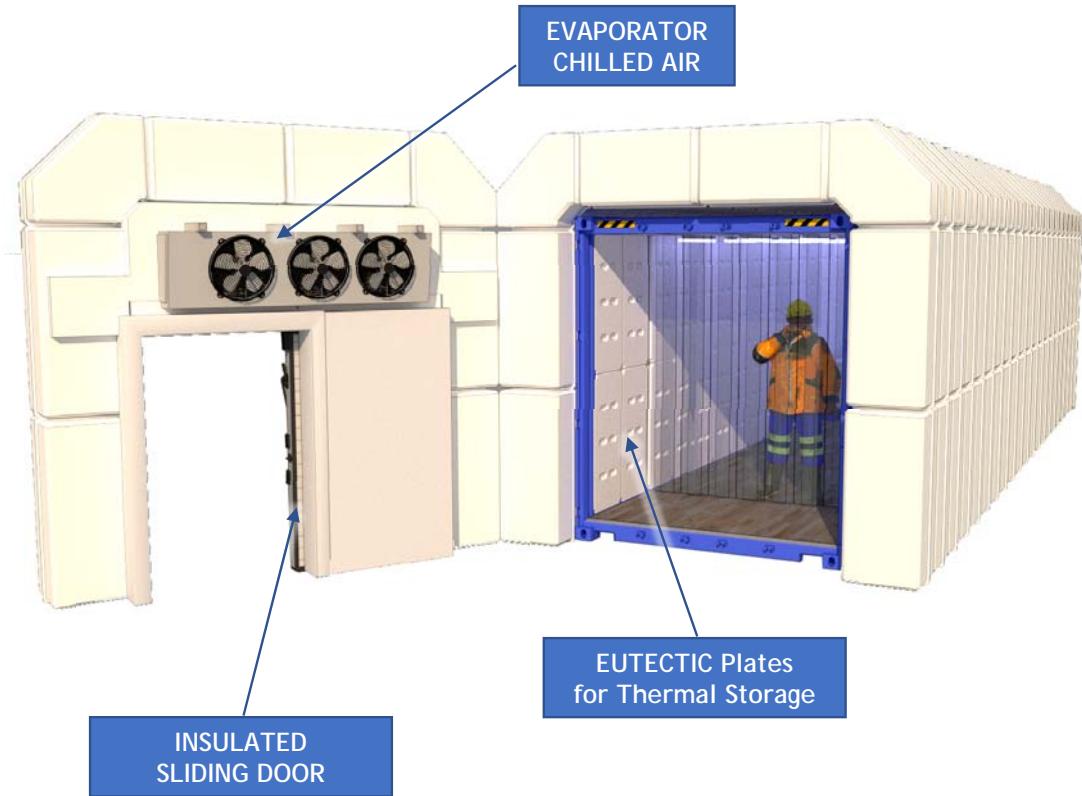
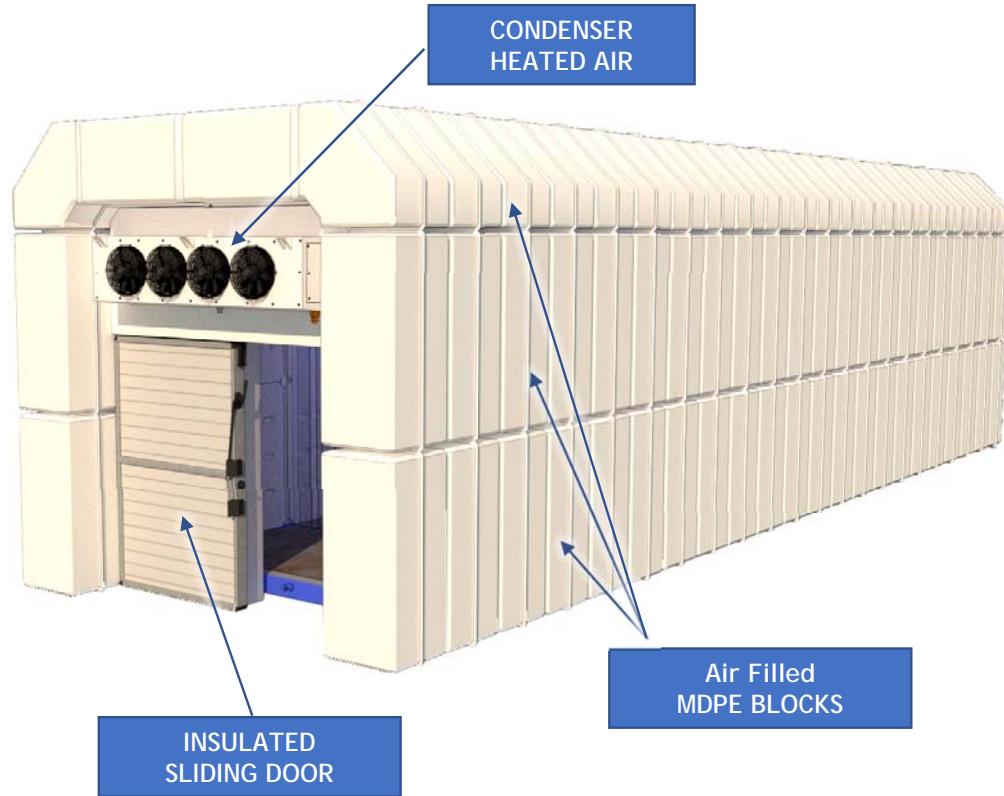
# Solar Powered Cold Storage Concept & Elements 2



# Solar Powered Cold Storage Concept & Elements 3

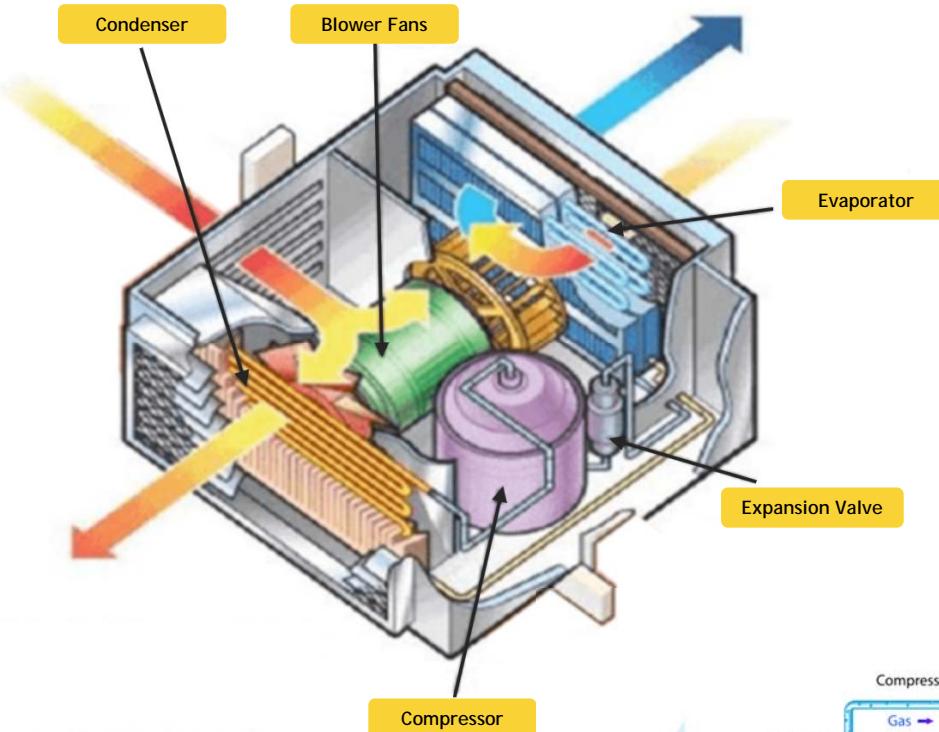


# Thermal Insulation & Refrigeration of an Entire Container

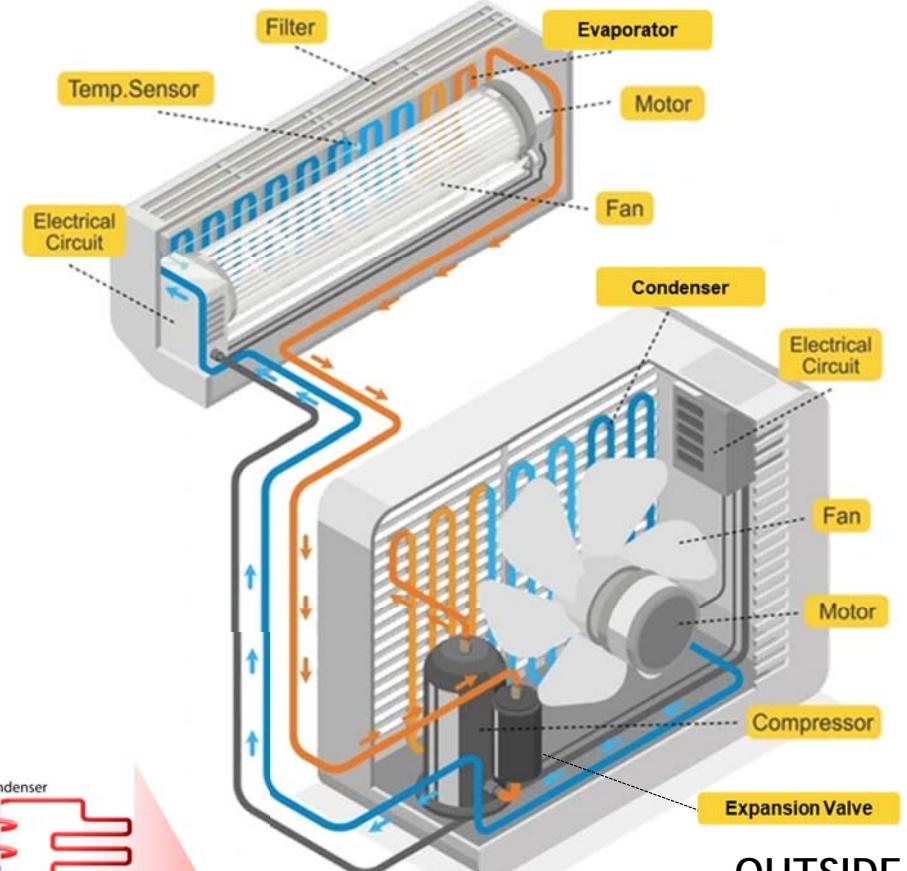


- Medium Density Polyethylene (MDPE) can be used to cast Air Filled Block, assembled together to create a thermal shield around the entire 20 or 40 feet ISO Container (including high cube).
- Equipped with two single block cooling systems of 5 - 7kW each, it can be powered by Solar Panels
- Using Eutectic Plates as internal lining of the Container, the temperature can be maintained without power for up to 12 hours.

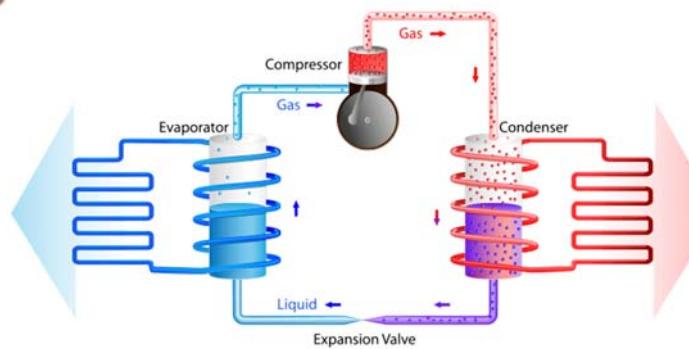
# Single Block Unit vs. Split Unit



INSIDE

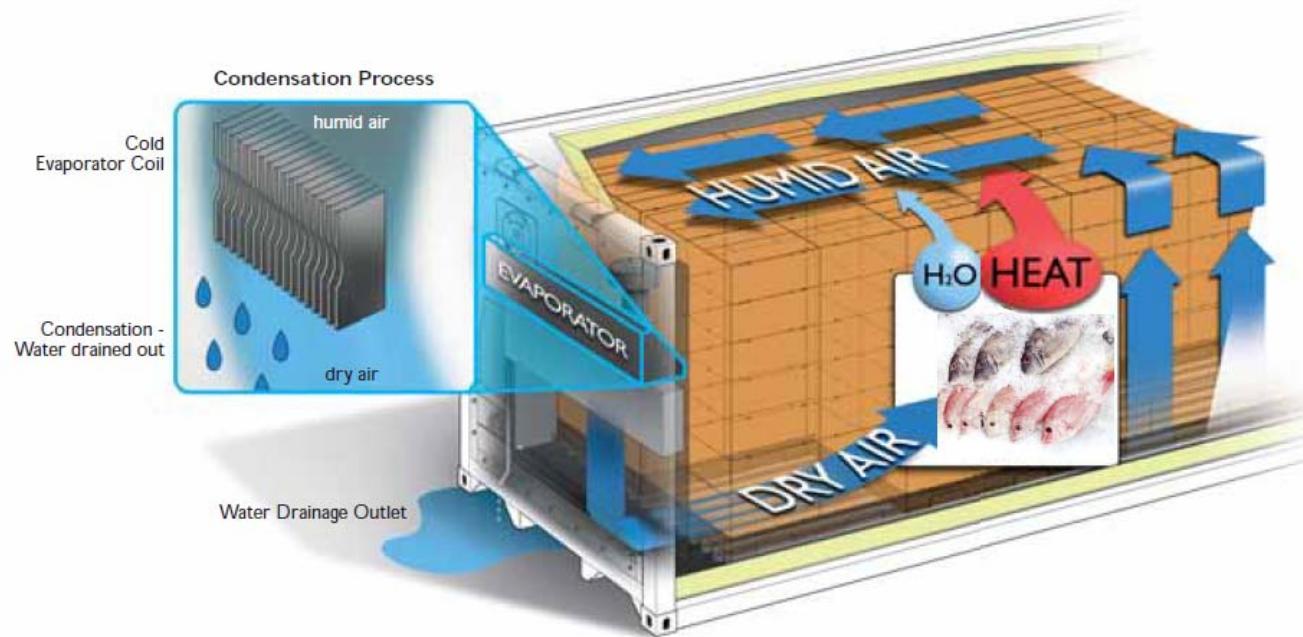


OUTSIDE



OUTSIDE

# Humidity & Condensation Management



**Uneven Temperatures:** Uneven distribution of moisture can lead to pockets of warm, humid air within the reefer. This can create temperature variations and affect the overall effectiveness of the refrigeration system.

**Mold Growth:** As mentioned earlier, high humidity promotes mold growth, which can not only damage cargo but also create a health hazard.

**Packaging Damage:** Cardboard boxes, labels, and other packaging materials can become soggy and lose their integrity in high humidity.

**Corrosion:** Metal parts of machinery or other cargo can corrode due to prolonged exposure to moisture.

Managing humidity and condensation inside reefer containers is crucial for several reasons:

**Moisture Damage:** Excessive humidity can damage cargo stored in reefers.

**Condensation Buildup:** High humidity can lead to condensation on the walls and ceiling of the reefer. This can drip onto cargo, causing damage and potentially affecting temperature control.

**Reduced Cooling Efficiency:** Condensation buildup on the evaporator coils of the refrigeration unit can reduce their efficiency, requiring the system to work harder to maintain the desired temperature. This can increase energy consumption and operating costs.

# Internal Curtains

## Temperature Control

**Minimizing Heat Transfer:** The primary function of the curtain is to act as a barrier, minimizing heat transfer between the cold interior of the reefer and the warmer outside environment whenever the doors are opened. This helps maintain the desired low temperature within the container, reducing the workload on the refrigeration unit and saving energy.

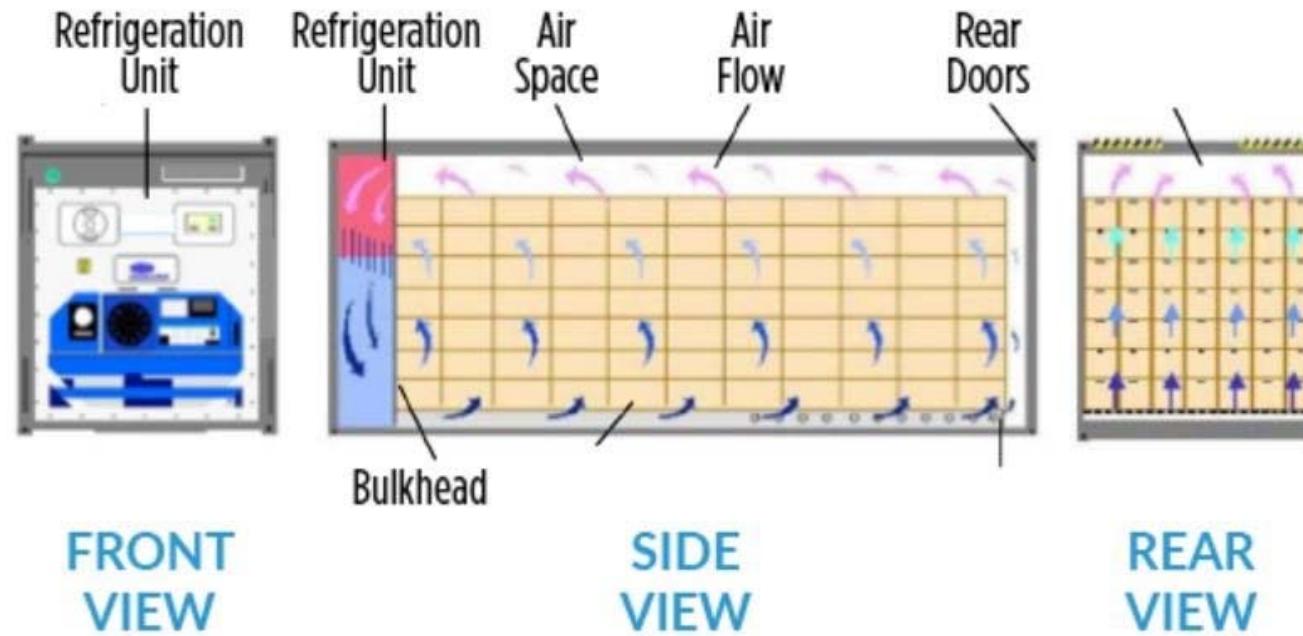
## Protecting Cargo

**Airflow Barrier:** The curtain helps prevent drafts of warm air from entering the reefer when the doors are opened. This is crucial for protecting temperature-sensitive cargo from sudden temperature fluctuations that could affect quality or lead to spoilage.

**Physical Barrier:** The curtain provides a physical barrier that helps prevent dust, debris, insects, or even small animals from entering the reefer when the doors are open. This is especially important when loading or unloading cargo in potentially dirty or uncontrolled environments.



# Reefer's Air Flow is Crucial



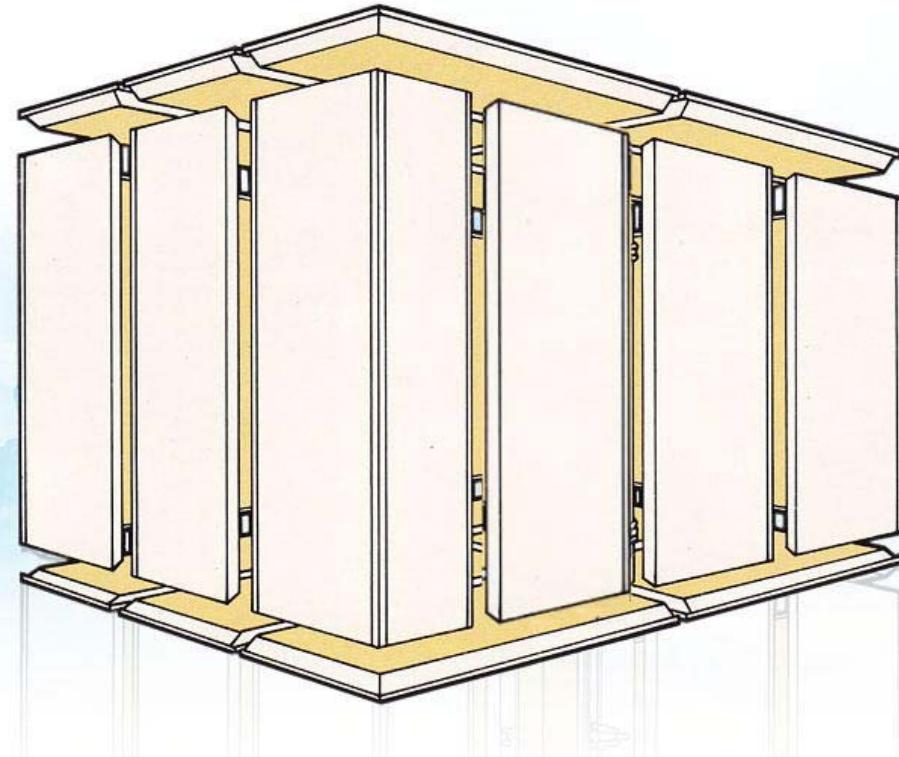
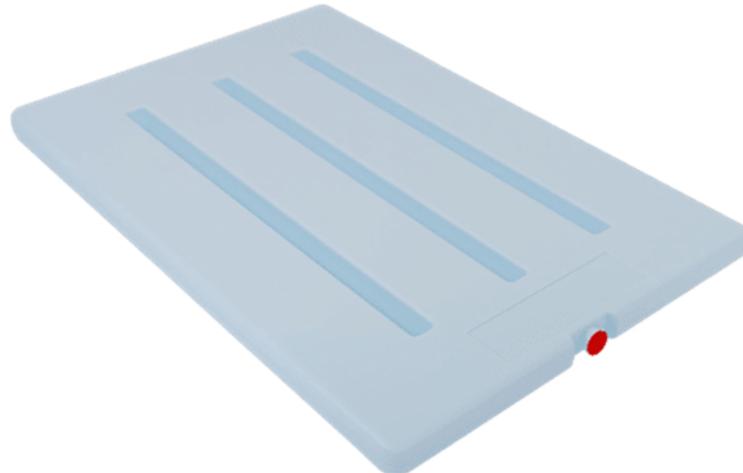
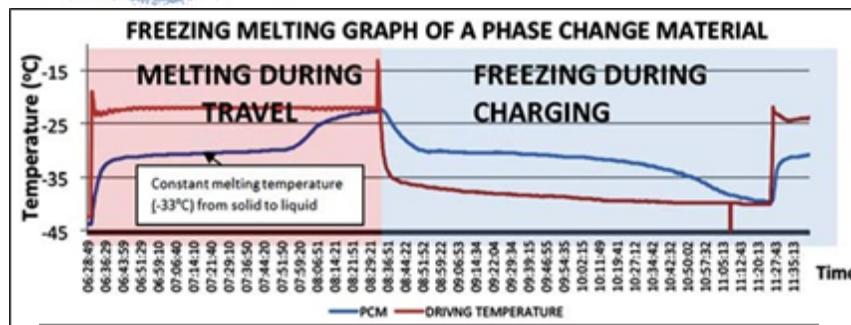
Airflow is the lifeblood of a reefer container.

**Uniform Cooling:** Proper airflow ensures that the cold air generated by the refrigeration unit circulates throughout the entire reefer container. This creates a uniform temperature distribution, preventing pockets of warm air that could spoil cargo.

**Heat Removal:** Airflow helps remove heat generated by the cargo itself (fruits and vegetables continue to respire even under refrigeration) and any heat that might leak in through the walls of the reefer. Without proper circulation, this heat can build up, causing the temperature to rise and compromise the quality of the cargo.

**Moisture Control:** Airflow helps regulate humidity levels within the reefer. This is crucial for maintaining the quality of certain cargo. For example, some fruits and vegetables can lose freshness and become limp if the air is too humid, while others can dry out excessively if the air is too dry.

# Internal Lining with Eutectic Plates (PCM)



## Phase Change Mixtures (PCM)

- Salts and Brines: Sodium chloride (table salt) or Calcium chloride combined with water to form brines.
- Alcohols: Ethanol (ethyl alcohol)
- Glycols: Ethylene glycol or propylene glycol

# Reefer's Disinfection & Sanitation



## UVC Disinfection

**Process:** High-intensity Ultraviolet C light (wavelength: 200-280 nanometers) is used to irradiate the reefer's interior. UVC light disrupts the DNA or RNA of microorganisms (bacteria, viruses, mold), rendering them inactive and unable to reproduce.



## Ozone Sanitation

**Process:** Ozone gas ( $O_3$ ) is introduced into the reefer to kill bacteria, viruses, and mold. Ozone decomposes back to oxygen ( $O_2$ ) after use, leaving no harmful residues.



## Chemical Disinfection

**Process:** Approved disinfecting chemicals are sprayed or fogged inside the reefer. These chemicals target and kill bacteria, viruses, and fungi.

# Solar Powered Reefers Examples



# On Board Cold Storage with PCM

