

Green, Sustainable, Energy Efficient, Cost-Effective Refrigerated Storage Facilities

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A green, sustainable, energy efficient, cost-effective refrigerated storage facility is defined as a structure that maintains a safe and appropriate environment for the storage of perishable food items while limiting its impact on the Earth's natural resources including both energy and water. Where possible, such a facility will employ elegant, simple, passive design and engineering solutions to achieve this end.

The annual refrigeration loads of a green, sustainable, energy efficient, cost-effective refrigerated storage facility will be reduced to the minimum needed to maintain a safe and appropriate environment for the storage of perishable food items. The equipment which removes these loads will be designed and constructed to be robust, reliable, maintainable with minimal effort and flexible with respect to changes in facility function and future improvements in technology. These characteristics will be measured by the system's annual cost of maintenance and its years of service life. The equipment will operate at high energy efficiency, as measured by its annual energy consumption.

A green, sustainable, energy efficient, cost-effective refrigerated storage facility will be constructed of sustainable materials, as measured by their toxicity, their recycled content and their cost of recycling after they no longer serve their original purposes. The facility's refrigerant will be environmentally friendly with low ozone depletion potential and low global warming potential as compared to other refrigerants which can perform the same function with the same annual energy consumption.

The design, construction, retrofit and operation of a green refrigerated storage facility requires knowledge and understanding of a wide range of complex issues. Therefore, the goal of this project is to realize increased energy conservation and environmental stewardship in refrigerated warehouse industry through the development of a comprehensive best practices 'GreenGuide' to provide engineers, contractors, owners and operators with practical information that will facilitate the design, construction, retrofit and operation of green, sustainable, energy efficient, cost-effective refrigerated facilities for the storage of perishable food items. The GreenGuide will provide guidance on how to participate effectively on teams charged with designing, constructing and/or retrofitting green storage facilities and will provide an understanding of the technical issues regarding high-performance integrated systems design and operation. Retrofitting existing cold storage facilities to become more energy efficient and sustainable enterprises is a large market segment and will provide an additional significant sustainability and energy efficiency benefit.

The GreenGuide for refrigerated storage facilities will emphasize the following broad topics: Sustainable Structure Design; Refrigeration System Design and Use of Natural Refrigerants; Detailed, Comprehensive, Time-Dependent Load Calculations; and Energy Use and Facility Management. The GreenGuide will highlight elegant, simple, passive design and engineering solutions.

An outreach program will be developed to disseminate the information contained in the GreenGuide to engineers, owners and operators. Short courses and seminars will be developed that will facilitate the design, construction, retrofit and operation of green, sustainable, energy efficient, cost-effective refrigerated storage facilities.