

How Continuous Energy Improvement Reduces Costs and Improves System Performance

Industrial Efficiency Alliance
Leadership for better energy use.

Industrial Refrigeration

Addressing the rising price of energy is a high priority for any company that utilizes an industrial refrigeration system. The Industrial Efficiency Alliance is committed to helping Northwest food processing companies and cold storage facilities realize the greatest energy and non-energy benefits possible through enhanced refrigeration system performance. With a Continuous Energy Improvement Program, participating companies can:

- Reduce energy costs
- Reduce operations and maintenance costs
- Improve productivity
- Improve system reliability
- Improve safety

All of these benefits are a win-win for your business because a dollar saved on energy, maintenance, or production is equivalent to \$17 in sales income (assume a 6% gross margin). And that's just plain good for business.

How a Continuous Energy Improvement Program Works

Companies realize benefits through a series of activities that – when combined – lead to continuous energy improvement. These activities involve:

1. Assigning a refrigeration system “Champion”
2. Identifying and managing Key Performance Indicators (KPIs)
3. Conducting a comprehensive assessment which includes addressing the supply and demand sides of the system
4. Training and educating staff
5. Working with qualified vendors and contractors to optimize refrigeration systems

continued

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Continuous Energy Improvement Pays Dividends

1 Assigning a Refrigeration System Champion

A refrigeration system Champion ensures that the design, operation and maintenance of the refrigeration system is optimized relative to the business objectives (production, safety and energy) of the company. A refrigeration system Champion helps management determine the ways in which commissioning, operation and maintenance practices can be enhanced to contribute to the optimal long-term performance (energy and productivity) of the refrigeration system. Specifically, the refrigeration system Champion:

- Minimizes life-cycle cost and maximizes the business objectives of the system through an understanding and advocacy for the proper design, use, operation and maintenance of the refrigeration system
- Understands the details associated with the supply and demand sides of the refrigeration system
- Uses his/her knowledge to implement design, operation, maintenance and commissioning requirements in the safest, most cost effective way possible
- Works with management to establish, track and manage the system to meet KPIs
- Communicates performance (energy, productivity and safety) issues and recommends necessary changes to the refrigeration system management team

It Pays to Have a System Champion!

A refrigeration system Champion can help ensure bottom line results. Here is an example:

A power reduction of 135 hp (100kW) in a process that runs continuously brings an energy cost reduction of at least \$40,000 per year at an energy price of \$0.05/kWh. Benefits are often doubled when maintenance saving are included. System optimization is one of the most cost effective opportunities for reducing energy and maintenance costs, while also increasing reliability and product quality.

Plants with industrial ammonia refrigeration systems can often save up to 30% of electric energy use by focusing on improving system efficiency and proper management. Plus, there are other cost savings that can be obtained through resulting non-energy benefits, including increased system safety, reduced maintenance and improved production.

2 Identifying and Managing Key Performance Indicators (KPIs)

KPIs for the supply and demand side for refrigeration systems are important to ensure optimal performance of the systems. For example, refrigeration systems are often benchmarked on power (kW) required to produce a ton of refrigeration (TR), referred to as kW/TR. Minimizing refrigeration system kW/TR is an excellent goal for improving refrigeration system efficiency. Another way to measure KPIs would be to evaluate such measurements as kWh per product unit, or kWh/cubic/foot/month, as do some high performance cold storage companies in the Northwest region. The latter measures the need for demand side improvements.

3 Comprehensive Assessment

Energy is the single largest cost of ownership of an industrial refrigeration system. It is in the fundamental best interest of the company and the refrigeration system Champion to evaluate the life-cycle cost of the refrigeration system before installing new equipment or carrying out a major overhaul. Life-cycle costing helps identify the lowest total cost of ownership options available. The refrigeration Champion should use life-cycle cost analysis to evaluate various life-cycle cost elements, such as:

- Initial costs
- Installation and commissioning costs
- Energy costs
- Operation costs
- Maintenance and repair costs
- Down time costs
- Environmental costs
- Decommissioning and disposal costs

In addition, a comprehensive assessment of refrigeration at an industrial facility will help identify other areas for potential cost savings. A refrigeration system assessment normally includes, but is not limited to:

- Operations and maintenance personnel interviews
- System design and operation relative to process requirements
- Equipment performance
- Energy consumption data
- Control strategies and algorithms
- System demand versus capacity

After the system has been examined, strategies for improvement are laid out, including:

- Improving compressor, condenser and evaporator part load efficiency – often through the application of variable frequency drives (VFDs)
- Lower system discharge pressure
- Upgrading equipment
- Improving system design
- Reducing refrigeration loads
- Improving control capabilities

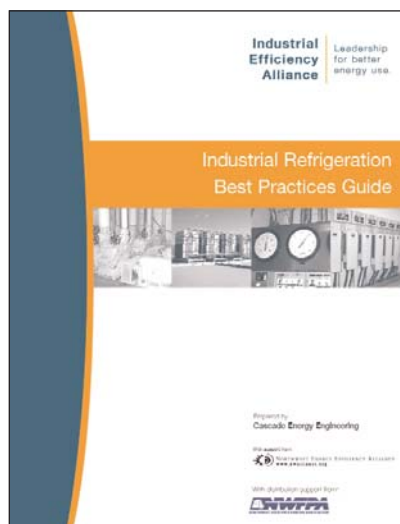
4 Training and Educating Staff

Training and education for all staff (operations, maintenance and management) is essential to understanding how operations and maintenance can impact the KPIs and overall efficiency of the system.

The Industrial Efficiency Alliance, with help from supporting utilities and the BPA, has developed a number of training courses designed to meet the specific needs of operators and engineers who work with refrigeration systems. An updated schedule for refrigeration training courses can be obtained on the training page located at www.industrialefficiencyalliance.org/training.html.

The training section features the regional training calendar which aggregates industrial training from a variety of sources throughout the region.

The refrigeration training courses are designed to equip attendees with the knowledge and tools to reduce energy usage and operating costs, and improve the reliability of refrigeration systems. Additionally, the Refrigerating Engineers and Technicians Association (RETA) workshop prepares attendees to take the RETA Certification examination.



The Industrial Efficiency Alliance has published the *Industrial Refrigeration Best Practices Guide*, a roadmap for making industrial refrigeration systems both energy efficient and productive. To order, visit: www.industrialefficiencyalliance.org.

For Training Course Information:

PHONE:
888-720-6823

EMAIL:
TrainingCenter@ecosconsulting.com

5 Working with qualified vendors and contractors to optimize refrigeration systems

The Industrial Efficiency Alliance recommends that industrial companies seek vendors that understand and embrace Continuous Energy Improvement Programs and life-cycle cost principles. Vendors should be willing and able to assist companies by performing comprehensive refrigeration system assessments (including the supply and demand side) and serving as a “solutions provider.” The qualified vendor’s primary objective should always be to help customers save money through fully optimized systems.

The Benefits of A Continuous Energy Improvement Program For Refrigeration Systems

If you are...	You should care because ...	And you should...
An Industrial Company	The payoff can be enormous. Refrigeration system optimization often leads to large savings in energy and maintenance costs – benefits that provide attractive opportunities for companies interested in saving money and improving total system performance. Additional benefits include increased safety and reliability, which lead to higher production and better product quality.	<ul style="list-style-type: none"> • Assign a refrigeration Champion who has the training and authority to manage the refrigeration system KPIs and help management make good system decisions. • Engage qualified vendors, contractors and engineering firms that have the capability to assess your refrigeration system and make improvement recommendations. • Contact your utility representative regarding its energy management programs.
A Trade Ally	Assisting customers in implementing Continuous Energy Improvement Programs helps build a stronger customer relationship and helps your customers purchase the lowest life-cycle cost option, as opposed to the lowest first cost option. With your support, customers are better educated and, in turn, have the ability to devote more maintenance dollars to refrigeration optimization services.	<ul style="list-style-type: none"> • Participate in demonstration projects with the Industrial Efficiency Alliance. Funding is available for projects that develop energy efficient products and services or innovations in energy management. • Build Continuous Energy Improvement Program messaging into your sales and marketing material.
A Utility	Well-conceived refrigeration energy efficiency projects deliver not only significant ongoing energy savings, but also profound non-energy benefits that help add to the bottom line. This approach helps keep companies profitable and able to maintain staffing levels, while simultaneously strengthening the regional economy.	<ul style="list-style-type: none"> • Encourage customers to adopt Continuous Energy Improvement Program practices and implement energy efficiency projects that save electrical energy. • Encourage customers to commission systems not only during start up, but also on an ongoing basis. • Work collaboratively with all energy efficiency resources in the marketplace to build a coordinated customer strategy.

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About the Industrial Efficiency Alliance

The Industrial Efficiency Alliance helps Northwest industry gain a competitive advantage via the adoption of energy efficient business practices. The organization provides expert support, resources and services to give companies tools and training to make energy efficiency a core business value. In exchange, participants are asked to commit to a Continuous Energy Improvement Program, which has the potential to increase production capacity, improve equipment reliability, and reduce operating costs and energy use by 5% to 20%. For more information, contact the Industrial Efficiency Alliance at 888-720-6823 or www.industrialefficiencyalliance.org.

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