



THE COLD FRONT

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IRC Staff

Director

Doug Reindl 608/265-3010
or 608/262-6381

Jim Elleson 608/262-6940
Todd Jekel 608/265-3008
Dan Dettmers 608/262-8221

Phone 608/262-8220

Toll-free 1-866-635-4721

FAX 608/262-6209

Mail

949 East Washington Ave
Suite #2
Madison, WI 53703-2937

e-mail info@irc.wisc.edu

Website www.irc.wisc.edu

Energy Efficiency ...more than talk

New awareness of energy efficiency

The changing landscape in the electric utility industry and the resulting cost impacts on the industrial sector have created a new awareness of energy efficiency. Rising energy costs are moving utility bills onto plant managers' radar screens as areas of opportunity to reduce plant operating costs. This new awareness has left many managers asking: Are we efficient? How do we know? Can we improve our energy efficiency, and if so, at what cost? And finally, is it worth it?

The IRC is helping refrigeration users answer these questions in several ways, including a new educational program, conducting field energy audits of refrigeration systems, and preparing an **Industrial Refrigeration Energy-Efficiency Guidebook**. These efforts support the technology-transfer mission of the IRC by putting energy-saving information in the hands of industry.

Energy-Efficiency Basics

The first step in improving the energy efficiency of any plant or process is to determine the current energy cost of that plant or process. In many food plants, refrigeration tends to be a significant energy consumer. Because refrigeration is one of many energy consumers in most facilities, establishing the current refrigeration-related energy costs is easier said than done. The IRC has been developing and refining strategies for benchmarking refrigeration energy consumption and costs. These techniques will help plant managers characterize their energy use and determine their relative efficiency level.

Once the baseline energy costs are determined, the next step is to identify specific opportunities that will lead to reductions in energy use, and assess the associated cost savings. Over the past several years, IRC staff have observed a number of common energy-saving

opportunities in the facilities we have audited. Through the process, we have developed tools for estimating the savings associated with these specific measures and we have recently had the opportunity to share that experience in several arenas.

Teaching Energy Efficiency

February 2002 marked the first offering of “**Uncovering Opportunities for Energy Efficiency Improvements**,” the latest course in the Ammonia Refrigeration Course Series offered at the University of Wisconsin by the IRC and the Engineering Professional Development Department.

The class was taught by a team that included industry representatives and IRC staff. Topics covered included:

- Determination of refrigeration energy use
 - Benchmarking concepts
 - Separation of non-refrigeration energy use
 - Utility rates
- High-side energy conservation concepts
 - Floating head pressure
 - Limits
 - Compressor sequencing during part-load
 - Heat recovery
- Low-side energy conservation concepts
 - Suction line pressure drop impacts
 - Raising suction pressure
- Load reduction
 - Freezer doors
 - Defrost
- Special topics
 - Warehouse dock conditioning
 - Passive thermal storage in warehouses
 - Optimum two-stage pressure

Attendee comments from the course:

“Always wanted to attend [a] course of this nature for this industry; this information will be very valuable for many years.”

“This course was the best yet. It brought everything together for me. My goals for this year include a reduction in electric usage. This course will allow me to meet my goals.”

“I will be able to save the cost of this course in one month.”

The course was well-attended and lively. Overall, attendees rated the course highly and offered favorable comments (see sidebar).

Putting it into practice

IRC member [Xcel Energy](#) is making industrial refrigeration system energy efficiency improvements a priority. State of Minnesota-mandated programs for utility energy-efficiency assistance have traditionally ignored industrial refrigeration due to the complexity and diversity of the systems. Therefore, Xcel Energy asked the IRC to help them uncover energy-efficiency opportunities within their Minnesota customer base.

The first phase of this effort involved half-day “pre-qualifying” visits to review existing refrigeration system design, layout and operation. The goal of the pre-qualifying visit is to assess potential refrigeration-related energy savings. The result is a written report with recommendations for improving energy efficiency. To date we have visited 13 sites.



Noteworthy



- March 25 marked the beginning of the [Kraft Operator Training Program](#) delivered via the web!
- [Wells' Dairy](#) announces the building of a new facility in St. George, UT.
- Send items of note for next newsletter to [Todd Jekel, tbjekel@facstaff.wisc.edu](mailto:ToddJekel@facstaff.wisc.edu)

Facilities with large potential savings and a clear intention to implement our recommendations move on to the second phase of the program. This phase involves on-site data-gathering, and a detailed feasibility study.

The goal of this program is not only to find energy savings on paper, but also to implement them in the field. To this end, contractors and designers play a key role in the success of the program.

The IRC has also undertaken a similar series of audits at Wisconsin facilities for the Wisconsin Focus on Energy program.

Energy-Efficiency Guidebook

To further emphasize energy efficiency and leverage our current activities, IRC member companies have commissioned the IRC to develop an "Industrial Refrigeration Energy Efficiency Guidebook". We are committed to making this document the definitive resource for assessing energy efficiency opportunities.

The report will be available exclusively to IRC members.

Upcoming Ammonia Refrigeration Courses

Ammonia Refrigeration System Safety
April 15-17, 2002 Madison, WI

Introduction to Ammonia Refrigeration Systems
May 14-16, 2002 Seattle, WA
October 7-9, 2002 Madison, WI

Overview of Ammonia Refrigeration Webcourse
August 14-30, 2002 Anywhere

Ammonia Refrigeration Piping
October 28-30, 2002 Madison, WI

Intermediate Ammonia Refrigeration Systems
December 4-6, 2002 Madison, WI

Visit www.engr.wisc.edu/epd/ for more information.



Webcourse Dates Set



The 2nd annual webcourse, Overview of Ammonia Refrigeration, is scheduled for August 14-30, 2002. The course is designed for refrigeration personnel who want to increase their understanding of ammonia refrigeration systems.

The online format allows participants to build ammonia refrigeration knowledge while remaining productive within their plants.

With a total of 14 hours over a 2-½ week period, the course will cover properties of ammonia as a refrigerant, condensers, evaporators, valves and metering devices, compressors, vessels and purgers. Safety-related issues and system design options and troubleshooting conclude the training period.

First priority for enrollments is offered to IRC members. Non-members can enroll on a space-available basis at a fee of \$995 per attendee.

If you want to learn more, call us toll-free at 1-866-635-4721.

R&T Forum and Annual Advisory Meeting Wrap-up

On [January 23rd and 24th, 2002](#), the Industrial Refrigeration Consortium (IRC) hosted the 2002 Research and Technology Forum and Annual Advisory Meeting on the University of Wisconsin-Madison campus. The pair of meetings showcased research performed by the IRC during 2001 along with significant efforts among IRC member companies to advance the state of industrial refrigeration.

[R&T Forum](#)

The first two presentations of the R&T Forum featured IRC staff members Todd Jekel and Jim Elleson reporting on the status of IRC-sponsored research projects, **Ammonia Sensors Overview** and **Benchmarking Ammonia Refrigeration Systems**. Todd provided the results of the IRC's investigation of the industry's options for ammonia detection systems. IRC staff polled manufacturers on their detectors' operating ranges, reliability, sensitivity, and temperature sensitivity. An IRC member-company will perform a side-by-side performance test of a several ammonia detector models later this year.

Jim displayed the methodology IRC staff has developed for collecting and documenting benchmark information on industrial refrigeration systems. He also provided sample data collected for refrigerated warehouses and ammonia storage terminals.

Don Stroud of Kraft Foods next presented Kraft's **Operator Education Program**. Building on the success of the IRC's refrigeration courses and web-based training capabilities, Kraft is using the web to deliver a common and consistent ammonia refrigeration curriculum to its refrigeration operators at all of their U.S. plants. IRC staff will provide the instruction for this three-tiered program.

Jim Elleson and Todd Jekel again took to the stage to inform attendees about IRC member Xcel Energy's efforts to reduce electrical consumption by industrial refrigeration systems. Xcel Energy's goal is to help refrigeration users in their territory save 6,000,000 kWh per year through a series of audits by IRC staff.

(See related article beginning on p. 1.)

IRC Director Doug Reindl concluded the session with two presentations. In his presentation **Relief Valves, An Overview of ASHRAE 15 Changes**, Doug discussed recent changes in ASHRAE Standard 15 that pertain to relief valves and associated piping. He also demonstrated a sizing calculator developed by the IRC.

Doug wrapped up with a demonstration of the IRC's capabilities to deliver [web-based](#) training. This presentation included a review of the sold-out *Overview of Ammonia Refrigeration Systems* course that was offered exclusively to IRC members. Over forty course participants at 19 sites in 10 states interacted with the instructional staff as they delivered their course material using their web browsers and a standard teleconference bridge. The course was conducted for two hours a day, three times a week over a three-week period, allowing participants to maintain their regular work schedules. (See sidebar on p. 3 for information on the 2002 offering.)

[Annual Advisory Meeting](#)

On the second day, representatives from IRC member companies reviewed the IRC's progress during 2001 and set research, education and membership growth goals for 2002.

IRC Director, Doug Reindl, moderated a discussion of industry needs by IRC members and industry stakeholders, which included representatives from International Institute of Ammonia Refrigeration (IIAR), International Dairy Foods Association (IDFA), Wisconsin Focus on Energy, manufacturers, engineering firms, contractors and end-users. Input from the group helped shape the IRC research agenda for 2002.

The meeting attendees also discussed how the IRC could best meet the education and training needs of the industrial refrigeration industry. IRC members and industry stakeholders agreed that a standardized operator-training curriculum, and training in regulatory issues, are high priorities for the industry. Based on these discussions, the

IRC developed their educational agenda for 2002.

Consortium members challenged IRC staff to continue growing the IRC's membership, and promised to assist them in this endeavor. Consortium members emphasized the need to successfully recruit more end-users to more effectively deliver education, conduct research, and directly serve member needs.

If you are considering IRC membership and would like a presentation on the benefits of the IRC please contact us and we will set up a conference call and a web-based presentation.

Copies of the notebook from the [2002 Research & Technology Forum](#) are available. If you would like one, or need additional information on these meetings e-mail us at info@irc.wisc.edu or toll-free, 866-635-4721.

IRC Research Goals for 2002

- Complete the Ammonia Sensors Overview research
- Continue to investigate methods for benchmarking ammonia refrigeration systems and collect information on systems as opportunities arise
- Investigate standards and protocols for testing the mechanical integrity of ammonia refrigeration piping and vessels
- Develop an Industrial Refrigeration Energy Efficiency Guidebook

IRC Educational Agenda for 2002

- Deliver the web-based course: *Overview of Ammonia Refrigeration Systems*
- Organize a national workshop on Ammonia Refrigeration Operator Certification standards

Ammonia Operator Training and Certification Retreat

June 5-6, 2002 in Madison, WI

Background:

Ammonia refrigeration operators play an important role in the safe, efficient, reliable, and productive operation of industrial refrigeration systems. OSHA's Process Safety Management (29 CFR 1910.110) regulations require employers to train those involved (operators and supervisory staff) in the operation of covered processes, including large ammonia refrigeration systems. In addition, the PSM standard requires that those involved in the operation of a covered process be qualified. The issue of training is further clouded by local jurisdictional requirements for operators of industrial refrigeration systems.

Many industrial refrigeration end-users have been challenged at defining the appropriate training requirements, effective training approaches, and methods for validation/qualification of their ammonia refrigeration operators. Several end-users have also expressed their interest and desire for a national-level certification program that would establish a recognized credential for ammonia refrigeration operators.

Workshop Goals:

The IRC is planning a retreat to address the topic of ammonia refrigeration operator training. This workshop will allow attendees to come together and share information on approaches for training and qualifying ammonia refrigeration operators.

The goals of the workshop are to:

- Disseminate information on the operator training requirements and qualifications based on workshop participant-companies.
- Look at the development of training and certification efforts being undertaken organizations around the country.
- Review the range of operator requirements based on a range of local jurisdictions.
- Discuss the need for a national certification effort.
 - if there is a general consensus supporting the need for a national certification, develop specific recommendations for an organization to pursue that certification effort.

Contact the IRC if you have questions.