THE HOT AIR DIFFUSER

Idaho ASHRAE Chapter Newsletter

FEBRUARY 2012 **Volume 18 Issue 4**

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PRESIDENT'S MESSAGE

The 2011-2012 ASHRAE year is going by fast and our committee chairs are working hard to achieve chapter goals. There are a couple of things that we as chapter members could do to make their jobs a little bit easier:

- If anyone has hired a college student as an intern this year, please let either Carl Marcum or I know so we can document the placement. We are able to capture PAOE points when companies in our chapter provide students exposure to our field.
- Don't forget to bring your camera to our chapter meetings and capture candid shots of our events. The pictures can be sent to our Chapter Historian, Steve Hardy, to be saved for eternity. This will help tremendously in documenting chapter events so we have them for future reference.
- Please join me in welcoming Ben Seitz as our Chapter Publicity Chair. Anyone that has ideas about publicizing news and upcoming events for the Idaho ASHRAE Chapter, please get in touch with him. Also, please let us know if anyone has contacts we can use to get our meetings and events in local papers, magazines, or other media avenues.

The Idaho Chapter has started a Facebook page and has posted pictures from our events on the site. Those of you who have a Facebook account, take a look at our site and become a friend of the Idaho ASHRAE page.

I hope to see all of you on Wednesday the 8th.

Cory Law
President—Idaho ASHRAE Chapter

FEBRUARY PROGRAM*

This month's chapter meeting will be a presentation of "Variable Frequency Drives and Harmonics" by Jon Axtman from the Idaho Power Company.

Speaker Bio:
Jon has worked in the Power Quality department for the past six years. He has performed over 200 harmonic evaluations and has conducted multiple investigations into harmonic related problems originating both on the power distribution system as well as within customer facilities. He is a licensed engineer in the state of Idaho and a graduate of Boise State University.

When: **WEDNESDAY, Feb. 8 (11:45AM-1:00PM)**

Where: **Idaho Power Building 1221 W. Idaho Street Boise, Idaho**

***Please RSVP at www.idahoashrae.com**

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ASHRAE, founded in 1894, is an international organization of some 50,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education.

IMPORTANT DATES

FEBRUARY 8, 2012—ASHRAE MONTHLY MEETING

MARCH 11, 2012—DAYLIGHT SAVINGS BEGINS

MARCH 14, 2012—ASHRAE MONTHLY MEETING

APRIL 8, 2012—EASTER

APRIL 11, 2012—ASHRAE MONTHLY MEETING

HISTORY LESSON

Five Years Ago

The chapter president was Arden Davis. The meeting was held on Friday, February 9, 2007, at the Idaho Power Building. Tad Duby, One Point LLC, gave an overview of the LEED-H pilot program and some of the requirements to get certified.

Ten Years Ago

The chapter president was Greg Hobbs. The meeting was held on Friday, February 8, 2002, at the Doubletree Riverside. Dave Curtis, Executive Director of the Idaho Board of Professional Engineers and Professional Land Surveyors, discussed the current activities of the Board including recent changes to the statutes and examination formats.

Fifteen Years Ago

The chapter president was Chuck Keene. The meeting was held on Friday, February 14, 1997, at the Red Lion Riverside. Ken Baker, Conservation Bureau Chief of Idaho Department of Water Resources, discussed the status of the Idaho Energy Code – where it's heading and how it will affect our industry.

Twenty Years Ago

The chapter president was Ken Tewksbury. The meeting was held on Friday, February 14, 1992 at the King's Table Restaurant. Peter Sterns, manager of the snow making equipment at Sun Valley, presented how snow is made at the area ski resorts.

Twenty Five Years Ago

The chapter president was Adrian Fannin. The meeting was held on Friday, February 13, 1987, at the Kings Table Restaurant. Jim Goodell, an insurance company executive, shard his views on the attitude "Whatever loss or injury I suffer must be someone else's fault, and he should be made to pay".

NEWS FROM THE HOME OFFICE

Alternative to ASHRAE Standard 62.1 Ventilation Rate Procedure Proposed

ATLANTA – Public comment is being sought on the proposed allowance of an additional default value to the ventilation rate procedure in ASHRAE's indoor air quality standard.

ANSI/ASHRAE Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality, sets minimum ventilation rates and other requirements for commercial and institutional buildings. The ventilation rate procedure provides a prescriptive method for determining minimum ventilation requirements. It accounts for pollutant sources from both the building and its occupants, and allows the designer to account for the efficiency of different ventilation systems when delivering outdoor air to the breathing zone.

Some users of Standard 62.1 believe that the ventilation rate procedure is "too complicated," according to Standard 62.1 chair Roger Hedrick. "While the 62.1 committee disagrees with this in most cases – the basics of the VRP are quite straightforward – the committee agrees that application of the multiple-zone recirculating system equations described in Section 6.2.5 and Appendix A can be complex."

Proposed addendum f, open for public review until Oct. 16, provides an additional default value for Vpz.

"Difficulty determining an appropriate value for Vpz seems to be a frequent issue with users of the multiple space equations," he said. "The committee decided that supplying a default value would simplify application. However, the default value is necessarily conservative. In a large number of applications, determining the 'lowest zone primary airflow value expected at the design condition analyzed' will result in a value for Vpz that is higher than the default, resulting in a reduced outdoor air intake requirement."

Addendum f is open for public review until Oct. 16, 2011, along with proposed addendum h. Also, proposed addendum g to the standard is open for public review until Oct. 31, 2011. For more information, visit www.ashrae.org/publicreviews. The other addenda open for public review are:

- addendum h (until Oct. 16). Table 6.1 in the standard includes ventilation rates for "Sports arena (play area)" and "Gym, stadium (play area)." Both space types have ventilation rates based on floor area only, with a per person rate of zero. Users of the standard have expressed interest in applying demand controlled ventilation to these space types, which is effectively prohibited by the lack of a per person component to the ventilation rate. This proposed addendum replaces both of these space types with "Gym, Sports Arena (play area)," with Rp = 20 cfm/person and Ra = 0.06 cfm/ft². In most cases, the overall ventilation rate for these spaces is expected to decrease, possibly significantly, according to Hedrick.
One concern about allowing CO2-based demand controlled ventilation in these spaces is that the volume per person in these spaces is typically large, which means that CO2 concentration changes will have longer than usual lag times behind occupancy changes, he noted.

- Addendum g (open until Oct. 31). Currently users are directed that for space types that are not listed in Table 6-1 they should select the space type from the table that is most similar to the space being designed. However, some space types are actually ventilated using the exhaust ventilation requirements of Section 6.5 and Table 6-4. This proposed addendum adds language directing the user to select the space type that is most similar to the space in question from either Table 6-1 or 6-4, and to design the ventilation for the space according to the Section 6.2 or 6.5, as appropriate

ASHRAE Introduces New Liquid Cooled Datacom Environmental Classes

ATLANTA – A new whitepaper that serves as the first vendor neutral thermal guideline for liquid cooled data processing environments is available for free download from ASHRAE.

"2011 Thermal Guidelines for Liquid Cooled Data Processing Environments" creates data center classes for liquid cooling that can enable fulltime economizers for a number of applications in many climates, according to according to Don Beaty, chair of the Publications Subcommittee of ASHRAE's Technical Committee (TC) 9.9, Mission Critical Facilities, Technology Spaces and Electronic Equipment.

"2011 Thermal Guidelines for Liquid Cooled Data Processing Environments" can be downloaded for free from the ASHRAE TC9.9 website at www.tc99.ashraetcs.org.

The increasing heat density of modern electronics is stretching the ability of air to adequately cool the electronic components within servers as well as the data center facilities that house these servers. To meet this challenge, the use of direct water or refrigerant cooling at the rack or

board level is now being deployed. This trend of increasing heat densities combined with the interest in energy and waste heat recovery created the need for liquid cooling guidelines to help bridge the gap between IT equipment design and data center facility design, according to Beaty.

Five liquid cooling classes have been created:

- W1 – Facility Water Supply Temperature of 2 to 17 C
- W2 – Facility Water Supply Temperature of 2 to 27 C
- W3 – Facility Water Supply Temperature of 2 to 32 C
- W4 – Facility Water Supply Temperature of 2 to 45 C
- W5 – Facility Water Supply Temperature of > 45 C

In addition to the classes, the whitepaper provides insight into other considerations for liquid cooling including condensation, operation, water flow rates, pressure, velocity and quality as well as information on interface connections and infrastructure heat rejection devices.

This whitepaper follows an earlier whitepaper released in May 2011, "2011 Thermal Guidelines for Data Processing Environments – Expanded Data Center Classes and Usage Guidance," which addresses air cooling in data centers and created new data center environmental classes which expanded the opportunity for chiller-less data centers (fulltime economizers).

New Guidance Released to Help Schools Earn Top Marks in Energy Efficiency

ATLANTA—Inefficient lighting, uncontrolled plug loads and poorly insulated roofs are just few of the factors that can contribute to a failing grade in energy consumption for K-12 school buildings.

Fortunately, guidance is available to help design teams constructing K-12 school buildings cut annual energy use by 50 percent or more using off-the-shelf technology.

To help ensure schools receive an A+ in energy efficiency; owners, engineers, designers, architects and others on the building team are encouraged to download the free Advanced Energy Design Guide for K-12 School Buildings: Achieving 50% Energy Savings Toward a Net Zero Energy Building. The guide is the second to be released in a series which provides recommendations to achieve 50 percent energy savings when compared with the minimum code requirements of ANSI/ASHRAE/IESNA Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential Buildings.

Advanced Energy Design Guides, or AEDGs, allow owners, contractors, consulting engineers, architects and designers to easily achieve advanced levels of energy savings without detailed energy modeling or analyses. Written in partnership with ASHRAE, the American Institute of Architects, the Illuminating Engineering Society of North America, the U.S. Green Building Council and the U.S. Department of Energy, the guides are available for free in electronic form at www.ashrae.org/freeaedg.

"Significant research demonstrates that the quality of the physical environment affects student performance," Shanti Pless, chair of the steering committee, said. "An environment that includes appropriate lighting, sound, temperature, humidity, cleanliness, color and air quality can help students learn better. In many cases, improving these attributes can also reduce energy use."

The new guide features easy-to-follow recommendations for various climate zones and how to implement tips via a series of real-life school construction case studies. Also included is information on integrated design, including best practices, as a necessary component in achieving 50% energy, and the inclusion of a performance path; specifically, offering guidance for early stage energy modeling and annual energy use targets to help with goal setting

Additional design tips include:

•High performance building envelope that is better than Standard 90.1-2004.

•Different ways to daylight 100 percent of the floor area of classrooms, resource rooms, cafeterias, gymnasiums and multipurpose rooms for two thirds of school hours.

•Methods to achieve space-by-space interior lighting power densities that are, on average, 40 percent better than Standard 90.1-2004.

•Ways to reduced exterior (façade, walkway, parking lot and drive) lighting energy consumption.

•Recommendations for computers, vending machines, kitchen cooking equipment, walk-in refrigeration equipment, kitchen exhaust hoods and service water heating.

•Three different HVAC system types that achieve significant energy savings over a typical system.

•Recommendations for commissioning and measurement and verification to ensure that energy savings potentials are realized.

The AEDG also addresses the notion that energy efficient buildings are more expensive.

"Owners should not expect energy-efficient schools to cost more; they can cost more, but they shouldn't have to. The tips, guidelines and tables included in the newest AEDG for K-12 schools can set building owners on their way to more energy efficient, productive schools in a cost efficient manner," Pless said.

The 50% Advanced Energy Design Guide series follows an earlier six-book series that provided guidance to achieve 30 percent savings. The ultimate goal is to provide guidance to achieve net zero energy buildings; that is, buildings that, on an annual basis, produce more energy than they consume.

ASHRAE, AIA, IES, DOE and USGBC are currently developing the third guide in the 50 percent series, which will focus on medium/big box retail. Publication is targeted for winter of 2012, followed by large hospitals in the spring of that year.
Advanced Energy Design Guide for K-12 School Buildings: Achieving 50% Energy Savings Toward a Net Zero Energy Building is available as a free download at www.ashrae.org/freeaedg.

ASHRAE and Penn State Partner on Building Efficiency Hub

Philadelphia – A newly signed memorandum of understanding brings together ASHRAE and Pennsylvania State University (Penn State) to improve energy efficiency and reduce the environmental impact of buildings through the Greater Philadelphia Innovation Cluster (GPIC) for Energy -Efficient Buildings.

ASHRAE and Penn State signed the memorandum today to pursue common objectives related to GPIC. GPIC is a 24-member consortium, being led by Penn State, which has been designated as an Energy Innovation Hub of the U.S. Department of Energy and is located at the Navy Yard in Philadelphia, Pa. The goals of GPIC are to transform the building retrofit industry from serial fragmentation to integrated systems methods, to improve design tools, building systems, public policies, market incentives and workforce skills needed to achieve a 50 percent reduction of energy use in buildings, and to stimulate private investment and quality job creation in Greater Philadelphia and beyond.

"ASHRAE is looking forward to working closely with Penn State and other GPIC members on improving energy efficiency and reducing carbon emissions," Ron Jarnagin, ASHRAE president, said. "GPIC represents an exciting step forward in finding ways to increase energy efficiency. ASHRAE is happy to bring the knowledge and technical expertise of its volunteer members to the table to help create a broader knowledge of energy efficient and sustainable building practices."

"ASHRAE brings a tremendous amount of technical knowledge and experience that will be very useful to the GPIC as we strive toward solving one of the nation's most serious energy problems by dramatically reducing energy consumption in commercial buildings. Together, we can create quality jobs in the region and boost the building industry," Henry Foley, executive director of the GPIC and vice president for research for Penn State, said.

ASHRAE will assist in the GPIC effort in several areas, including research, education, certification, standards and guidelines and by applying the society's Building Energy Quotient (bEQ) program to buildings at the Navy Yard. ASHRAE may also help obtain As-Designed and In-Operation bEQ ratings for buildings in Greater Philadelphia and can ensure that GPIC considers use of ASHRAE certifications to support its objectives.

DOE Updates National Reference Standard for Commercial Buildings to 90.1-2010

ATLANTA – Following preliminary analysis that ASHRAE/IES's 2010 energy efficiency standard contains significant energy savings over the 2007 standard – 18.2 percent source energy savings and 18.5 site energy savings – the U.S. Department of Energy (DOE) has issued a ruling that establishes the 2010 standard as the commercial building reference standard for state building energy codes.

In an announcement in the Oct. 19 edition of The Federal Register, DOE attributes the greater energy savings to improvements in ANSI/ASHRAE/IESNA Standard 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential Buildings, related to better lighting, daylighting, controls and building envelope and better mechanical systems and application to more systems.

With the Oct. 19 ruling, Standard 90.1-2010 serves as the commercial building reference standard for state building energy codes under the federal Energy Conservation and Production Act. As a result, states are required to certify by Oct. 18, 2013, that they have updated the provisions of their commercial building code regarding energy efficiency to meet or exceed 90.1-2010.

"The foundation of energy efficient buildings continues to grow stronger with the news that DOE is now referencing the 2010 standard," Ron Jarnagin, ASHRAE president, said. "ASHRAE hopes to make that foundation even stronger through our current work with IES developing the 2013 standard."

"The DOE has determined that the quantitative analysis of the energy consumption of buildings built to Standard 90.1-2010, as compared to buildings built to Standard 90.1-2007, indicates national source energy savings of approximately 18.2 percent of commercial building consumption," according to DOE. "Additionally, DOE has determined site energy savings are estimated to be approximately 18.5 percent."

The DOE noted that the newer version of the standard contains 19 positive impacts on energy efficiency. These impacts included changes made through the public review process in which users of the standard comment and offer guidance on proposed requirements. Specifically, the

positive impacts include:

- Requirements for daylighting controls under skylights and commissioning of daylighting controls; increased use of heat recovery; cool roofs in hot climates; lower illuminance in certain exterior zones; skylights and daylighting in some building types; reduced ventilation energy; supply air temperature reset for non-peak conditions; efficiency requirements for data centers; lower lighting power densities; control of exterior lighting; occupancy sensor for many specific applications; daylighting control requirements for side-lighted spaces; and daylighting controls in more spaces.
- Updated chiller efficiency requirements.
- Extension of VAV fan control requirements.
- Expansion of new lighting power densities to more retrofits and automatic damper requirements and use of economizers
- Minimizes exceptions to switched receptacle requirement.

The ruling comes on the heels of a July announcement that established the 2007 standard as the as the commercial building reference standard for state building energy codes. The DOE noted that because the 2010 determination was published prior to the two-year deadline states have to demonstrate that their energy code meets or exceeds the stringency of the 2007 standard, states are allowed to file just one certification to address both determinations.

Since being developed in response to the energy crisis in the 1970s, Standard 90.1 now influences building designs worldwide. It has become the basis for building codes, and the standard for building design and construction throughout the United States. ASHRAE and IES publish a revised version of the standard every three years.

ASHRAE Provides Guidance on the "How-To's" of Energy Audits

ATLANTA—Seeking to promote best practices and offer a "how-to" approach, ASHRAE has released updated guidance on building energy audits.

While energy audits are a commonly used component of the industry, there is great diversity in the services delivered to customers, and little industry standardization. The second edition of "Procedures for Commercial Building Energy Audits" promotes best practices, provides "how-to's" and fills a void in available information for engineers, building owners, managers and government entities. The new publication includes time-saving tips for energy auditors, how to hire an auditor, what to ask for in a comprehensive audit report and how to build a successful energy efficiency retrofit team.

"As we work to reduce energy consumption in our commercial buildings, we want to ensure that recommendations are cost effective, technically feasible, maintain safety and comfort and result in significant energy savings" Jim Kelsey, a member of Technical Committee 7.6, Building Energy Performance, and who oversaw the writing of the updated publication, said. "This volume focuses on how to improve energy audit best practices. Providing the best audits that we can will help move the industry forward to net zero buildings."

Additionally, the publication addresses how to build a successful team, analytical methods, successful approaches to site visits, incorporating on-site measurements, economic evaluation of measures and how to organize an energy audit report that promotes action on the part of building owners and managers. It includes many tips for conducting energy audits and reviewing results prepared by others. For example, the top things to check for in when reviewing an audit report include verifying that:

- proposed measures are feasible and appropriate for the building;
- proposed measures meet applicable building codes;
- data are internally consistent;
- savings estimate methods follow established principles and methods;
- estimates of potential energy savings are reasonable compared to quick estimates and historical energy use;
- proposed cost estimates are reasonable relative to field experience;
- interactions between EEMs are identified and addressed;
- recommendations and report meet the project scope, goals and client's needs;
- any financial discussion includes current and viable mechanisms available per the tax structure, location, and motivations of the client.

Another benefit of the new publication is a greatly expanded section of forms and template analyses, including "live" Excel spreadsheets, checklists and equipment-specific forms suitable for field collection of detailed commercial building data, to name just a few.

"Procedures for Commercial Building Energy Audits, Second Edition" is available in the ASHRAE bookstore, www.ashrae.org/bookstore, for $99 ($84, ASHRAE members). Or, contact ASHRAE Customer Service at 1-800-527-4723 (United States and Canada) or 404-636-8400 (worldwide), fax 404-321-5478, to order.

ASHRAE Announces Energy Modeling Conference, Call for Presenters

ATLANTA – An upcoming ASHRAE specialty conference seeks to advance the industry's ability to more accurately model and simulate a building's energy use.

ASHRAE's Energy Modeling Conference – Tools for Designing High Performance Buildings is slated for Oct. 1-3, 2012 in Atlanta. The conference will guide building design professionals about what does and does not work when using currently available modeling tools to design and analyze buildings and their energy using systems.

"The conference will provide the design professional with 'workarounds' that may be applied to improve the results of their modeling results when their modeling tool of choice may not be capable of modeling some of the more unique or hybrid buildings or energy using systems being used in high performance buildings today," Dennis Knight, conference chair, said.

With a focus on case studies and real world examples, the conference will allow an exchange of ideas among design professionals and software developers to facilitate understanding of current modeling tools and their capabilities and limitations and identify the need for new tools and improvements to existing modeling and simulation tools. The conference will guide design professionals toward developing in-house modeling checklists and quality control procedures to improve their competence and confidence in making decisions and recommendations based on modeling in their day-to-day practices.

Building on the successful Energy Modeling Conference format in April 2011, this conference will begin with an interactive session with modeling software developers presenting common modeling scenarios on how their specific software can model a scenario, whether there are any limitations and what might be the best work around and exceptional modeling practices to obtain acceptable results when the tool cannot model the scenario out-of-the-box.

Call for Presenters
ASHRAE seeks presentations on case studies and actual projects and how they were analyzed and designed using modeling tools as well as integrated and interoperable modeling tools to best optimize buildings and energy-using systems. Presentation abstracts are requested on the following topics:

- HVAC load analysis
- Energy modeling
- Side-by-side software provider presentations on their ability to address specific modeling system types and applications and energy simulation programs
- Code and standards compliance issues
- ENERGY STAR, LEED® and other high performance building guidelines' impacts on models
- Innovative system modeling: chilled beams, water source heat pumps, renewables, variable refrigerant flow, cogeneration, labyrinths, electronically commutated motors
- Integration of analytic modeling tools with building information modeling
- Exceptional modeling techniques for when tools just do not work
- Simplified and rapid modeling techniques that may be applied for early analysis.
- Integration of daylighting, computational fluid dynamics and other exceptional modeling techniques and results into HVAC simulations
- Life cycle cost analysis

To submit a presentation application, visit www.ashrae.org/EMC2012. Information required for the submission are a 300-500 word abstract, 100 word "promotion" abstract and other information.

Presenters will give an oral presentation, have their presentations posted online for conference attendees and receive a substantially-reduced conference registration rate.

Presentation Schedule:
Full Page Abstracts due: Feb. 15, 2012
Notification of abstract decisions: March 15, 2012 Accepted speaker forms due: April 15, 2012 Presentations due: Sept. 1, 2012
Conference: October 2012

For more information, go to www.ashrae.org/EMC2012.

ASHRAE Technology Awards Highlight Outstanding Building Projects

ATLANTA – Designers of systems for a university building, a cancer center, an ice rink and other commercial building are recognized by ASHRAE for incorporating elements of innovative building design.
The ASHRAE Technology Awards recognize outstanding achievements by members who have successfully applied innovative building design. Their designs incorporate ASHRAE standards for effective energy management and indoor air quality. The awards communicate innovative systems design to other ASHRAE members and highlight technological achievements of ASHRAE to others around the world. Winning projects are selected from entries earning regional awards.
"Every year, the judging panel looks forward to the reviewing the outstanding projects submitting by our membership," Nathan Hart, chair of the judging panel said. "Being a consulting engineer myself, I appreciate the effort involved in submitting an entry to Society-level competition. I enjoy seeing what fellow ASHRAE members are doing to strive for more energy efficient, well ventilated maintenance friendly building designs. Many of the entries this year incorporated innovations and technologies that took advantage of their specific geographical locations to provide more energy efficient systems—helping to highlight that one size does not fit all and that a more

energy efficient design solution may be available when considering the project as a whole."

Following are summaries of the winning projects.

Mountain Equipment Co-op

Roland Charneux, P.Eng., ASHRAE Fellow, ASHRAE Certified Healthcare Facility Design Professional, Pageau Morel & Associates, Montreal, Quebec, Canada, receives first place in the new commercial buildings category for the Mountain Equipment Co-op store, Longueuil, Quebec, Canada. The building is owned by the Mountain Equipment Co-op.

The Mountain Equipment Co-op store, a 2,600 sq. ft. single story retail sporting goods outlet, was designed and built so as to have a minimal impact on the environment. Traditionally, artificial lighting contributes to a large part of the total energy consumption in commercial retail stores. It was thus decided to maximize day lighting through a series of clerestory with a saw tooth shape roof. Also, light sensors were integrated in the design to partially or completely shut down the artificial lighting when natural lighting is sufficient. Occupancy sensors were integrated in small spaces to completely shut off lighting when not in use.

Optimization of the envelope resulted in an envelope insulated near twice the recommendations of the Model National Energy Code for Buildings, thus reducing the overall energy needs for the building. Structural Insulated Panels (SIP) were used for their efficiency, tightness and minimal construction time. Energy simulations showed a measured annual energy saving of 54 percent and cost savings of 57 percent.

Taking into consideration new, unpacked products that retail stores carry—which bring pollutants into the occupied zone—and racking which impedes good air distribution if supplied from the ceiling, air is supplied via underground air distribution with displacement ventilation diffusers at floor level. Additionally, the building utilizes active solid thermal energy storage in its concrete slab; an underground cistern to collect rain water and to feed the water closet, as well as waterless urinals; and natural/hybrid ventilation with leeward vents at roof level, to name just a few innovations. Overall, the new store consumes 57 percent less than the recommendations provided by the Canadian Energy Model Code.

IKEA Brossard Distribution Center

Ken Sonmor, Ecovision Consulting, Montreal, Quebec, Canada, receives first place in the existing commercial buildings category for the IKEA Brossard Distribution Center, Quebec, Canada. The building is owned by the IKEA Distribution Services, CA LP.

The extensive distribution center (79,750 sq. m.) belonging to one of the largest furniture retailers in the world consists of a warehouse, where goods are received, stored and then shipped, along with adjoining office spaces.

On the lighting front, nearly 700 T12 high output (HO) lighting fixtures were replaced with a combination of T8 and T5 HO lights. An additional 510 high-intensity discharge fixtures were replaced with T5 HOs fixtures with custom made reflectors to bring the light where needed. Motion sensors were installed throughout the entire facility shedding 250kW of lighting power. Luminosity sensors near windows in the office areas turn off lighting when not required thus harvesting daylight.

A 160T geothermal system is now the principal source of heat for the building. To attain the greatest possible efficiency, a dual maglev frictionless compressor heat pump was chosen. A greater number of wells than average maintain a very close approach with the ground temperature of 50 F. This higher temperature permits the reduction of glycol concentration which benefits the efficiency of the heat pump, the heat transfer through the vertical geothermal wells and lower pumping power. These improvements allow for a coefficient of performance of 5-7 in heating—representing a 50 percent improvement over a traditional geothermal layout. During a typical winter, the geothermal system is capable of supplying 70 percent of required heat.

The overall project thus provides greater human comfort, with never-before cooling in the warehouse while realizing greater than 50 percent dollar energy savings.

Université de Sherbrooke

René Dansereau, Dessau, Longueuil, Quebec, Canada, receives first place in the educational facilities category for the design of the Université de Sherbrooke—Campus de Longueuil, Quebec, Canada. The building is owned by the Université de Sherbrooke.

With its 16-story glass tower built in the heart of Longueuil's downtown area, the Université de Sherbrooke's new campus building is one of the tallest structures on Montreal's South Shore. The 650,000 sq. ft. campus includes classrooms, offices and labs for nine faculties under a single roof. Its architectural design focuses on open spaces and gathering areas, such as a green roof "oasis," to enhance a sense of community within the campus.

Determined to create an eco-friendly building, Dansereau and his firm took a unique approach to engineer the heating, ventilation, and air-conditioning systems: Right from the start, designers chose an integrated design approach to the project. Though geothermal energy is rarely used in urban settings, designers connected a chiller to a geothermal system consisting of 37 vertical boreholes. The 165-ton screw chiller acts essentially like a heat pump and provides about 25 percent of the building's heating and cooling capacity.

With average winter temperatures falling significantly below freezing in the Montreal area, fresh air treatment can be quite costly. To enhance energy savings, three enthalpy wheels were installed on new ventilation units. These wheels recover latent and sensible heat that is usually lost

in exhaust air. With an efficiency rate of 76 percent, the wheels help reduce annual heating, cooling and humidity demands.

Along with several other energy efficient innovations, energy consumption was reduced by 46 percent, consequently saving over $250,000 a year on energy invoices. Including subsidies, the return on investment for energy-saving equipment is approximately two and a half years.

Abbotsford Regional Hospital and Cancer Centre

Paul Marmion, Stantec Consulting, Vancouver, British Columbia, Canada, receives first place in the new health care facilities category for the design of the Abbotsford Regional Hospital and Cancer Centre, British Columbia, Canada. The building is a Public Private Partnership (P3) sponsored and operated by Laing Investments Management Services (Canada). The building is owned by the hospital.

The Abbotsford Regional Hospital and Cancer Centre (ARHCC) is an acute care hospital built in the province of British Columbia. The hospital is a technologically advanced, 63,000 sq. m., $355 million, 300 bed acute care hospital with nine operating theatres, pediatric and maternity services, inpatient isolation rooms, medical imaging and radiation cancer treatment facilities.

Marmion and his team were responsible for the design of the HVAC, plumbing and fire protection systems of the hospital, helping to successfully complete the fast tracked health care facility on time and on budget. The building incorporates several features to conserve energy, one of which is two 900 ton chillers which are piped in a counter-flow configuration with chilled water temperature reset control to optimize energy efficiency, consuming a maximum of .5 Kw/ton of cooling. There was no incremental capital cost of adding the courter-flow configuration, resulting in an annual energy saving of $3,400, providing in instant payback. Additionally, the water use in the hospital has been reduced by 20.6 percent through the innovative use of dual flush toilets, even in the inpatient rooms, low flow lavatory and kitchen sinks and low flow showers.

The ARHCC is running 56 percent below the Environmental Protection Agency's energy benchmark, using just 153 kBtu/ft2 compared to the typical 350 kBtu/ft2 for a similar building. It has also been determined that the hospital is producing 3140 metric tons of CO2, compared to an equivalent facility which produced 8470 metric tons of CO2. Ultimately, the savings in CO2 emissions is equivalent to taking 1,400 cars off the road.

Thermal Energy Corporation—Thermal Energy Storage

Blake Ellis, P.E., Burns & McDonnell, Kansas City, Mo., receives first place in the new industrial facilities or processes category for Thermal Energy Storage at the Texas Medical Center, Houston, Texas. The owner is Thermal Energy Corporation, Houston, Texas.

In 2007, master planning determined that the cooling load of the 80,000 ton chilled water system that served the Texas Medical Center would double over the next two decades. With that in mind, the owner sought the most cost effective way to provide the increased quantity of chilled water to the campus while maintaining the high level of reliability to serve the critical needs of the medical center.

It was determined that thermal energy storage (TES) in a load leveling scheme was the most cost effective first step to meet the increased chilled water demand. This resulted in the selection of an 8.8 million gallon stratified chilled water storage tank; with a height of 150 ft., it is the tallest stratified chilled water storage tank in the world. Connecting such a tall tank that is open to the atmosphere to a closed chilled water system creates 65 psig of pressure at the bottom of the tank on both the chilled water supply and return lines connected to the tank. A traditional single direction pumping scheme could no longer be utilized and a unique simultaneous dual direction pumping scheme was created.

Conventional wisdom would indicate that a TES system uses more energy than an equivalent non-TES system. However, TES systems use slightly less energy (BTUs or kW-hr) by shifting chilled water production from the middle of the afternoon when the highest wet-bulb temperatures of the day are experienced to the evening when wet-bulb temperatures are lower. The lower wet-bulb temperatures yield lower condenser water temperatures, which allow the chillers to operate more efficiently during the night hours when the tank is charged.

Energy savings during the first year were 7-9 percent in the summer and approximately 5 percent aggregated over the entire year. Energy costs were dramatically reduced due to the real time pricing in Houston, Texas. During the first 23 days of August 2011, the owner saved over $500,000 in electrical energy cost due to very high ($3,000+/MW-hr) electric costs.

Arena Marcel Dutil

Luc Simard, Compressor Systems Control (CSC), Les Coteaux, Quebec, Canada, receives first place in the existing industrial facilities or processes category for the renovation of Arena Marcel-Dutil, St-Gédéon-de-Beauce, Quebec, Canada. The building is owned by the Municipalite St-Gédéon-de-Beauce.

In 2010, the arena was equipped with the first 100 percent CO2 based refrigeration system for ice rinks in the world. The existing R22 chiller was removed, as well as the existing ice mat, and the concrete slab was retrofitted to install the new system. The system uses R744 as both a primary and secondary working fluid, a natural, non-toxic, non-corrosive and highly efficient refrigerant listed A1 in the B52 code. Because there is no secondary fluid, the evaporating temperature of the CO2 can be set at -7 C while keeping the ice sheet at -5 C. The result is an evaporating temperature higher than all other standard ice rink refrigeration systems.

The refrigeration system has a 3kW variable speed CO2

pump that reduces the power needed for circulating the cold fluid by 90 percent compared to secondary fluid installations. For a typical ice rink facility, the savings can be up to 125,000 kWh per year. The arena was also compared to similar projects in the area and was found to have a 25 percent reduction in total energy costs. Also, when comparing the new system with the old chiller using R22, and considering an annual leak rate of 15 percent for the old system, the total greenhouse gas reduction associated with the new 100 percent CO2 refrigeration system is up to 100 tons per year.

New Book Offers Guidance on Implementing Energy Savings Plan

ATLANTA – Guidance on increasing energy efficiency in existing buildings through measuring and tracking efficiency and implementing an efficiency plan is featured in a new book from leading built environment organizations.

"Energy Efficiency Guide for Existing Commercial Buildings: Technical Implementation" provides clear and easily understood technical guidance for energy upgrades, retrofits and renovations by which building engineers and managers can achieve at least a 30 percent improvement in energy performance relative to a range of benchmark energy utilization indexes. It features practical means and methods for planning, executing and monitoring an effective program, based on widely available techniques and technologies.

"Energy efficiency improvement in buildings is one of the greatest means to increase resource efficiency, improve environmental stewardship and save operating funds," George Jackins, who chaired the committee overseeing the book, said. "More importantly, energy efficient improvement should happen because it makes good business sense. Good planning and on-going commitment is essential to maximizing investments in energy efficiency."

Improving energy in an existing building is an iterative process, but first you have to know where you are starting from, according to Jackins. The book recommends some tips on how to begin the energy savings process:

1. Calculate energy use and cost
2. Set energy performance goals
3. Measure and analyze current energy use 4. Select and implement energy efficiency measures 5. Measure and report improvements 6. Continue to track performance and reassess goals

"Energy Efficiency Guide for Existing Commercial Buildings: Technical Implementation" is the second energy efficient guide for existing commercial buildings developed by the same group developing at the Advanced Energy Design

Guide series for new buildings – ASHRAE, the American Institute of Architects, the Illuminating Engineering Society of North America and the U.S. Green Building Council and supported by the U.S. Department of Energy. In addition, the Building Owners and Managers Association and the U.S. General Services Administration were involved in its development. The first, "Energy Efficiency Guide for Existing Commercial Buildings: The Business Case for Building Owners and Managers," provides the rationale for making economic decisions related to improving and sustaining energy efficiency in existing buildings.

The cost of "Energy Efficiency Guide for Existing Commercial Buildings – Technical Implementation" is $75 ($64, ASHRAE members). To order, contact ASHRAE Customer Contact Center at 1-800-527-4723 (United States and Canada) or 404-636-8400 (worldwide), fax 404-321-5478, or visit www.ashrae.org/bookstore.

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