American Society of Heating , Refrigerating, and Air-Conditioning Engineers

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QUAKER CITY CLIMATE

INSIDE THIS ISSUE:

The Union League
140 South Broad Street
Philadelphia, PA 19102
(215) 563-6500

For Directions : Click Here
For Registration: Click Here.

Fees:
ASHRAE Member—Non Chapter Member : $40

Non-ASHRAE Member: $40

Phila. Chapter Member: $30

Student Member: $10

Young Engineers in ASHRAE: $25

TRENDS IN BUILDINGS AND ENERGY SIMULATION

Our next meeting is scheduled for **Thursday** December 9, 2010 at The Union League. It will be a Breakfast meeting. The event schedule is as follows :

- Registration Begins: 7:00am
- Breakfast Begins: 7:30am
- Presentation: 8:00am-9:00am

Please review The Union League's Website for their Dress Code

Trends in Buildings and Energy Simulation

The buildings industry faces many challenges and opportunities over the next few decades. The buildings touted today as 'most energy-efficient' or 'green' would not be possible without energy simulation—but no single simulation tool can model all aspects of our buildings today. Over the next ten years, changes in building technology—particularly wireless controls and solid-state lighting—will profoundly alter how our buildings are designed, built, and operated. This presentation provides an overview of trends and drivers affecting the building industry as well as the simulation tools of tomorrow.

Presenter's Biography

DRURY B. CRAWLEY, PH.D.
Director, Building Performance Products
Bentley Systems, Inc.

Dr. Crawley leads the development of software for building performance and sustainability at Bentley Systems. Prior to joining Bentley Systems in 2010, he lead the U.S. Department of Energy's team working to achieve cost-effective net-zero energy commercial buildings by 2025 and was responsible for managing the DOE's building energy software tools development activities including EnergyPlus and the Open Studio plugin for Google SketchUp.

With more than 30 years of experience in buildings energy efficiency, renewable energy, and sustainability, he has worked in government research and standards development organizations, as well as building software, design and consulting companies. A registered architect, he also has a PhD in Mechanical Engineering on the topic of building simulation as a policy tool from the University of Strathclyde in Glasgow, Scotland.

He is active in ASHRAE (Chair of Standard 169 *Weather Data for Building Design Standards*, member of SSPC 189.1 *Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings*, member of SSPC 140 *Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs*, member of the Technical Activities Committee, former member of the Research Administration Committee, and former chair of TCs 2.8, 4.2, 4.7, and 7.1). He was made an ASHRAE Fellow in 2009, received an ASHRAE Distinguished Service award in 2003 and a 1999 Symposium Best Paper Award for "Which Weather Data Should You Use for Energy Simulations of Commercial Buildings?"

He is also active in AIA, IBPSA, USGBC (former member of the Research Committee and the Energy & Atmosphere TAG), and serves on the editorial boards of three international Journals. He has written more than 100 papers and articles and made more than 300 presentations on energy efficiency, sustainability, and renewable energy topics throughout the world.

PRESIDENTS MESSAGE:

I hope to see many of you at our December 9th breakfast meeting at the Union League. Our speaker is one of four ASHRAE Distinguished Lecturers we have on the calendar for the year. As a recent head of the DOE's energy simulation programs, Drury Crawley will be able to offer some great insights into the future development of energy simulation software.

Just after the first of the year we will have a social event a Flyer's game. This was very popular last year and we expect tickets will go fast this year as well so watch for the invitation when it comes out in late December.

As the calendar year draws to a close, it is a good time to take stock of progress toward personal and professional goals. For those of you with a Professional Engineering license or other credential requiring PDHs for renewal, have you checked how you are progressing towards gaining the necessary hours for renewal? ASHRAE both at the Society and local level have a number of opportunities to help you catch up if you are behind where you would like to be. The ASHRAE Winter Conference is on January 29 through February 2 and will offer many hours of technical content. Locally, the Philadelphia Chapter will be offering 3 hour afternoon technical seminars prior to our dinner meetings in April and May. Of course we also provide certificates of attendance at all of our dinner meetings which feature a technical topic.

Best Regards,

John Pardekooper
215-436-5802
c21@ashrae.net

Optimization of Data Center Chilled Water Systems

Introduction

This paper will explore data center chilled water system design and control integration in today's best-in-class variable-speed chilled water systems. By using a different approach to system design and a more direct control strategy using power-based relational control, variable-speed components can be sequenced and operated to not only substantially reduce energy use, but also to improve performance.

System Design and Selection

Data center chilled water systems design can take a modular approach of sizing for gradual buildup to match the data center buildup in stages or it can be designed for the full-load that the data center will see when fully utilized. Regardless of the approach, the chilled water system will be oversized in order to future-proof and account for the rapid rate that technology is advancing, causing equipment heat load densities to increase. These increasing heat load densities result in shorter life cycles of the data center processing and storage equipment, subsequently requiring equipment upgrades every three to five years to utilize existing floor space with more processing power and/or storage capacity. However, the cooling system will have a useful life of over twenty years, so it must be designed to accommodate these equipment changes over its operating life. When the data center cooling system is properly controlled and components selected to work in harmony with each other as part of an integrated system, the functional life of the electrical and mechanical subsystems can be extended.

Since a data center cooling system will be required to operate over a greater operating design envelope at varying loads, reliability and efficiency will be mainly required at part-load operation. The most effective method to satisfy the continuously varying and critical demands for data center cooling is to utilize all variable-speed components -- chillers, pumps and fans -- and a control strategy specific to the unique operating characteristic of variable-speed devices. There are no exceptions to this, because constant-speed devices cannot solve the challenges of a varying application such as data center cooling effectively and efficiently.

Variable-speed chillers offer greater part-load efficiencies than constant-speed chillers. This is because constant-speed chillers only achieve their highest efficiencies at full-load, and remain relatively unchanged when operating anywhere below 100 percent full-load. As a result, constant-speed chillers are selected based on full-load efficiencies even though they will spend most of their time operating at part-load. Therefore, any control strategy is forced to operate constant-speed chillers and related devices (including chilled water pumps, condenser water pumps, and cooling tower fans) -- that are normally sequenced with the chillers -- at full capacity also. This means that in a multiple chiller cooling system, the control strategy most commonly used is capacity-based sequencing. This method uses on/off cycling to ensure that chillers are first operating at full-load capacity -- their most efficient operating level -- before the next chiller in sequence is turned on as the load increases. This capacity-based sequencing has many negative impacts. Reduced equipment life and energy efficiency are two of these negative impacts.

(continued on the next page)

Optimization of Data Center Chilled Water Systems *(Cont.)*

Equipment life is shortened due to the on/off cycling that is employed to stage equipment to match the cooling system output capacity to the demand. Motor life is shortened each time a motor is started because of the large amounts of stress the motor windings experience from the inrush current upon each motor start.

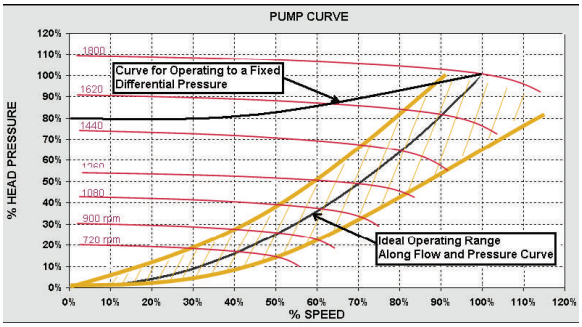
Energy efficiency is not realized with constant-speed devices operating at full speeds during part-load operation exactly where a data center will spend most of its operating time. When constant-speed equipment is used in place of variable-speed, mechanical flow controls are used to restrict flow in order to unload devices to reduce output capacity to meet demand during part-load operation. These bandage solutions that remain widely in use today to unload constant-speed devices operating at full speeds during part-load operation can be compared to driving a car with one foot on the gas pedal and the other on the break pedal to control the speed of the car -- not a very effective or efficient control strategy.

Integrated Control Strategy

A new, integrated control method is needed to replace capacity-based sequencing of on/off staging. Variable speed offers the most effective, reliable energy-saving solution to respond and operate efficiently across a broader operating design envelope to match the continuously varying heat load in data centers. In a variable-speed cooling system, the speed of rotating devices will decrease as the load decreases (as opposed to decreasing output with mechanical flow controls as with constant speed devices operating at full-speed during part-load operation). When a variable frequency drive (VFD) is added to a compressor, pump or fan to improve part-load efficiency, the energy savings potential is huge due to the pump fan laws which state: power is proportional to rotary speed cubed.

In order for these devices to operate at their highest efficiencies, they require the freedom to maintain the relationship between flow and pressure for all load conditions and to be allowed to operate along their ideal operating curve, as illustrated in *Figure 1 Natural Curve for Pump Operation*, below. Traditional control practices restrict the relationship between pressure and rotary speed, by maintaining a fixed or minimum differential pressure (DP) across the pump supply and return headers. The pump will operate along the fixed differential pressure curve, as seen in *Figure 1*. This means that the pump will require much more power then necessary to maintain the DP set point and will not have the freedom to operate along its natural curve. Ideally, the pressure differential sensor should be placed at the CRAC unit where the pressure is more critical, allowing the pump to follow and maintain the ideal flow and pressure relationship at varying speeds/flows and head pressures to match the demand.

Using Natural Curve Sequencing will sequence variable-speed chillers to operate along their natural curve for all load conditions. There is an ideal point on a chiller s loading curve for a specific chilled water supply and entering condenser water temperature where that chiller will be operating at its optimum efficiency. The natural curve for a chiller is developed by finding these ideal points for the four entering condenser water temperatures for a specific supply chilled water temperature. This point will be the lowest point (lowest kw/ton) on each of the four condenser water temperature curves. The natural curve is then developed by drawing a line that intersects the four points as illustrated in *Figure 2 Natural Curve for Chiller Operation*, below. The chiller will be sequenced to operate only along its Natural Curve for all operating scenarios, ensuring optimum efficiency at all loads.



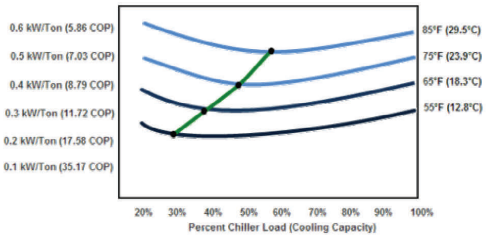
When the operation of variable-speed chillers, pumps, and cooling tower fans are harmonized with the operation of chilled water CRAC units with EC fan technology, the cooling system efficiency is dramatically improved. Present-day data center chilled water cooling systems are operated as four sub-systems, each with their own standalone feedback loop:

CRAC Units,

chillers,

condenser water distribution systems, and

cooling tower fans.



Each of these four sub-systems operates efficiently on its own. However, this same independence means that the plant, as a whole, does not operate at peak efficiency because the sub-systems are not working in harmony with each other. Integrating these four subsystems with network-based relational control allows for complete optimization of all components and causes them to function as a unit.

Power-based speed control and power-based sequencing are used to optimize data center chilled water cooling systems. Power-based speed control uses a control methodology called Equal Marginal Performance Principal to calculate and determine the best power relationship between the chiller, condenser pump and tower fan. This control methodology trades off load and efficiency between the three subsystems to achieve the best net system efficiency. Power-based sequencing replaces the traditional, inefficient capacity-based sequencing of running devices at full speeds before the next one is sequenced either on or off to match the varying data center load. Power-based sequencing will sequence components to operate at peak efficiency during part-load operation along their natural curves. Operating loads are satisfied by determining the best net system efficiency and trading off power efficiencies among the system components in relationship to one another. This trade-off may operate a greater number of devices at lower speeds to take advantage of the affinity laws. This results in cubed power savings and utilizes a much larger heat transfer area that is created by operating either two devices at 50 percent, or three devices at 33 percent. This is in contrast to conventional capacity-based sequencing when the load would normally be satisfied by one device operating at 100 percent full speed, which consumes more power unnecessarily.

Philadelphia Future City Competition

The mission of the National Engineers Week Future City Competition is to provide a fun and exciting educational engineering program for middle school students that combines a stimulating enginering challenge with a "hands-on" application to present their vision of a city of the future. The Future City Competition, a school based program for middle school students, is held from September through February every year. The National Future City Competition is sponsored in part by the National Engineers Week Foundation, a consortium of professional and technical societies and major U.S. corporations. Major funding comes from Bentley Systems, Incorporated, Ford Motor Company and Shell. The National Engineers Week Foundation, a formal coalition of more than 100 professional societies, major corporations and government agencies, is dedicated to ensuring a diverse and well-educated future engineering workforce by increasing understanding of and interest in engineering and technology careers among young students and by promoting pre-college literacy in math and science. Engineers Week also raises public understanding and appreciation of engineers' contributions to society. Founded in 1951, it is among the oldest of America's professional outreach efforts. The competition is made possible through the efforts of a large number of dedicated volunteers. If you want a rewarding experience and would like to help, please use our on-line sign up Volunteer Opportunities

Competition Overview

Delaware Valley Engineers Week annually hosts the Philadelphia Regional Future City Competition as part of the Engineers Week activities. The program is a 501.c.3 educational outreach program of National Engineers week. It is one of 40 Regional programs conducted throughout the country with the goal to introduce middle school students to the engineering profession. The Future City Program was recently added to the National Association of Secondary School Principals' National Advisory List of Student Contests and Activities.

For more information visit Here

Volunteers are still needed. Click here for registration information

Chapter Technology Award Competition 2011

The Technology Award Program recognizes members for innovative designs, communicate that technology to other members, and highlight achievements to other professionals.
The Chapter Technology Transfer Committee will be accepting applications for the Chapter Level competition in March 2011 in the following categories:

- Commercial Buildings, New and Existing
- Institutional Buildings, New and Existing
- Health Care Facilities, New and Existing
- Industrial Facilities or Processes, New and Existing
- Public Assembly Facilities, New and Existing
- Residential Buildings, New and Existing (Single Family and Multi-Family)

Alternative or Renewable Energy Use
Entries will be judged on energy efficiency, indoor air quality and thermal comfort, innovation, operation and maintenance, cost effectiveness, environmental impact and quality of presentation.
The process for the ASHRAE Technology Awards starts right here at the Chapter level. Chapter Competition winners will be judged in the Regional Technology Award Competition. Regional winners will then submit a long form application for the Society Technology Award Competition. Winners of the Society Competition will also be featured in the ASHRAE Journal.
More information on the Technology Award Program will be coming soon.

Mark M. Maguire, PE
Chapter Chair – Technology Transfer
c021bog4@ashrae.net

ASHRAE Learning Institute

Seminars & Courses at ASHRAE's Winter Conference in Las Vegas, NV

2 WAYS TO REGISTER

Internet: www.ashrae.org/lasvegascourses
Phone: Call 1-800-527-4723 (US and Canada) or 404-636-8400 (worldwide)

ASHRAE LEARNING INSTITUTE

Full Day Professional Development Seminar

$485/$395 ASHRAE Member -- Earn 6 PDH/.6 CEU or 6 AIA LU credits

The Commissioning Process in New & Existing Buildings
Saturday, Jan 29 – 8:00 a.m. to 3:00 p.m.

Implementing Energy Management in New and Existing Buildings: A Sustainable Activity
Saturday, Jan 29 – 8:00 a.m. to 3:00 p.m.

Healthcare Facilities: Best Practice Design and Application
Saturday, Jan 29 – 8:00 a.m. to 3:00 p.m.

Integrated Building Design
Saturday, Jan 29 – 8:00 a.m. to 3:00 p.m.

Complying with ASHRAE/IES Standard 90.1-2010
Saturday, Jan 29 – 8:00 a.m. to 3:00 p.m. NEW

Energy Modeling Best Practices and Applications: HVAC/Thermal
Tuesday, Feb 1 – 9:00 a.m. - Noon, 2:00 p.m. - 5:00 p.m.

Half Day Short Courses

$159/$119 ASHRAE Member -- Earn 3 PDH/.3 CEU or 3 AIA LU credits

Fundamental Requirements of ASHRAE Standard 62.1-2010 NEW
Saturday, Jan 29 – 8:00 a.m. to 11:00 a.m.

Application of Standard 62.1-2010: Multiple Spaces Equations & Spreadsheet Calculation NEW
Saturday, Jan 29 – Noon to 3:00 p.m.

Understanding Air-to-Air Energy Recovery Technologies and Applications
Sunday, Jan 30 – 2:00 p.m. to 5:00 p.m.

Chilled Beam Technology for Excellent Indoor Climate in an Energy Efficient Manner
Sunday, Jan 30 – 2:00 p.m. to 5:00 p.m.

Using Standard 90.1 to Meet LEED Requirements
Sunday, Jan 30 – 2:00 p.m. to 5:00 p.m.

The Commissioning Process & Guideline 0
Monday, Jan 31 – 2:30 p.m. to 5:30 p.m.

Determining Energy Savings from Performance Contracting and LEED Projects: M&V
Monday, Jan 31 – 2:30 p.m. to 5:30 p.m.

Understanding Standard 189.1-2009 for High-Performance Green Buildings
Monday, Jan 31 – 2:30 p.m. to 5:30 p.m.

Understanding & Designing Dedicated Outdoor Air Systems (DOAS)
Tuesday, Feb 1 – 9:00 a.m. to Noon

Low Temperature Radiant Heating & High Temperature Radiant Cooling Systems
Tuesday, Feb 1 – 9:00 a.m. to Noon

Successful Solar Applications for Commercial & Industrial Facilities
Tuesday, Feb 1 – 9:00 a.m. to Noon

Avoiding IAQ Problems: Using ASHRAE's New IAQ Guide
Tuesday, Feb 1 – 2:00 p.m. to 5:00 p.m.

District Cooling & Heating Systems: Central Plants
Tuesday, Feb 1 – 2:00 p.m. to 5:00 p.m.

Designing Toward Net Zero Energy Commercial Buildings
Tuesday, Feb 1 – 2:00 p.m. to 5:00 p.m.

New Publications from ASHRAE

- ❑ *Standard 189.1-2009: Standard for the Design of High-Performance Green Buildings* (A Jurisdictional Compliance Option of the IGCC)
- ❑ *Standard 189.1-2009 User's Manual* (A Jurisdictional Compliance Option of the IGCC)
- ❑ *ASHRAE GreenGuide* 3rd Edition – *The Design Construction, and Operations of Sustainable Buildings*
- ❑ *ASHRAE Standard 90.1-2010: Energy Standard for Buildings Except Low-Rise Residential Buildings*
- ❑ *ANSI/ASHRAE 55-2010 – Thermal Environmental Conditions for Human Occupancy*
- ❑ *ANSI/ASHRAE 62.2-2010 – Ventilation for Acceptable Indoor Air Quality in Low-Rise Residential Buildings*
- ❑ *ANSI/ASHRAE 62.1-2010 – Ventilation for Acceptable Indoor Air Quality*

Package:

- ❑ *ANSI/ASHRAE 15-2010 – Safety Standard for Refrigeration Systems*
- ❑ *ANSI/ASHRAE 34-2010 – Designation and Classification of Refrigerants*

Visit www.ashrae.org/bookstore to order

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ASHRAE Certification Programs

Take advantage of ASHRAE's special pencil & paper administration of our certification examinations on Wednesday Feb. 2, 2011, in conjunction with the 2011 ASHRAE Winter Conference.

- Building Energy Assessment Professional (BEAP) NEW
- Building Energy Modeling Professional (BEMP)
- Commissioning Process Management Professional (CPMP)
- Healthcare Facility Design Professional (HFDP)
- High-Performance Building Design Professional (HBDP)
- Operations & Performance Management Professional (OPMP)

For more info, visit www.ashrae.org/lasvegascertification

Chapter Technology Transfer Committee

ASHRAE Milton W. Garland Award

ASHRAE offers two competition-based awards encouraging the design of innovative refrigeration systems. The Milton W. Garland Commemorative Refrigeration Award for Project Excellence recognizes non-comfort refrigeration systems. The Refrigeration Comfort Cooling Award for Project Excellence is oriented toward comfort refrigeration systems.

The Philadelphia Chapter Technology Transfer Committee is currently accepting applications for both competitions for 2011.

The Garland Award competition is open for the design of mechanical refrigeration machinery for applications other than human comfort: e.g., food processing/preservation, industrial/manufacturing processes, life support in extreme environments, recreational facilities.

The Refrigeration Comfort Cooling Award competition is open for the design of mechanical refrigeration machinery for human comfort applications.

Both submissions must be made within 36 months of the initial operating date of the system, and will be judged on the following criteria:

- Complexity of Problem
- Solution Concept
- Architectural Integration
- Originality
- Achievement of Performance Criteria
- Energy Effectiveness
- Budget Compliance

Ease of Maintenance

Additional information can be obtained from Mark Maguire, Chapter Transfer Technology Chair (c021bog4@ashrae.net).

Humidity Control Seminar

The ASHRAE Philadelphia chapter held a half-day workshop on November 4 on humidity control. Lew Harriman, an ASHRAE Fellow and member of two ASHRAE technical committees related to humidity control, presented on overall principles, psychrometrics, moisture loads in buildings and economical design solutions.

Watch for other educational opportunities from the Chapter Technology Transfer Committee in the spring.

Thanks to our sponsors: Associated Steam Specialty Company, H.C. Nye Company and IIS Group LLC.

ASHRAE Offers Certification as Building Energy Modeling Professional

ASHRAE's Building Energy Modeling Professional certification program was developed in collaboration with the U.S. affiliate of the International Building Performance Simulation Association (IBPSA-USA) and the Illuminating Engineering Society of North America (IESNA). The purpose of this program is to certify individuals' ability to evaluate, choose, use, calibrate, and interpret the results of energy modeling software when applied to building and systems energy performance and economics and to certify individuals' competence to model new and existing buildings and systems with their full range of physics.

After filing an eligibility request and being approved by ASHRAE, a candidate takes an electronically-administered exam at an Applied Measurement Professionals (AMP) testing center. After passing the 2 to 2½ hour test, the candidate can then claim to be ASHRAE-certified in that area.

- ASHRAE also offers other professional certification programs:
- Building Energy Assessment (coming in February 2011);
- Commissioning Process Management
- Healthcare Facility Design;
- Operations and Performance Management;
- High-Performance Building Design;

ASHRAE offers a recertification process, including an ethics statement and a continuing education requirement. Additional information, including a candidate guidebook, is at ashrae.org/certification or email the Philadelphia Chapter Technology Transfer Committee chair (Mark Maguire, c021bog4@ashrae.net).

Philadelphia Chapter Programs Calendar 2010-2011

Date	Location	Topic	Theme	Joint Meeting
10/6/2010	Penn's Landing Caterers	Fan Wall Technology		SMCA
11/1/2010 - 11/2/2010	Pennsylvania Convention Center	Engineered Plumbing Exposition 2010		
11/4/2010	Downtown Club	Communicating Technical Ideas with Levity	Research Promotion	CMAA, ASCE, Engineers Club
12/9/2010 Breakfast	Union League	Energy Simulation Programs, presented by ASHRAE Distinguished Lecturer Drury Crawley, PhD		
1/20/2010	Wells Fargo Center	Flyers VS Ottawa Social		
2/10/2010	Dave & Buster's	Noise & Vibration	Membership/YEA/Student Night	
3/10/2011	Fisher's Tudor House	Design Build for Green Buildings	Trade Show	SMCA
4/13/2011	Holiday Inn (4th & Arch)	VAV System Design by ASHRAE Past President & Distinguished Lecturer Bill Coad, PE	Student Night	
5/12/2011	Holiday Inn (4th & Arch)	Variable Primary Flow Chilled Water Systems, presented by ASHRAE Vice President and Distiguished Lecturer William Bahnfleth, PhD, PE	Past President's Night	
TBD	NVCC	Golf Outing		
TBD	TBD	2011-2012 Planning Meeting		

*** Program calendar is subject to change. Please refer to ASHRAE Philadelphia Website for up to date information.*

Young Engineer in ASHRAE Social Night

Villanova VS University of Pennsylvania

Come join us for the Villanova vs. University of Pennsylvania basketball game at the Palestra! On Wednesday, December 8, we'll meet over at New Deck Tavern starting at 5:30 for a pre-game snack, then at 6:30 we will head over to the Palestra for the game! Watch your email later this week for the Cvent invitation. Contact Ashley Lester for more details or with any questions.

Ashley Lester

YEA Chair

c021sec@ashrae.net

The Philadelphia Chapter of the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

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ASHRAE Philadelphia Website

 Any member with material to submit for inclusion in the *Climate* can send the information to:

Matthew Trinsey
Clive Samuels & Associates, Inc.
1 Independence Way
Princeton, NJ 08540
(P) 609-627-7983
c021ne@ashrae.net

Material can include letters to the editor, member news, upcoming events, comments on chapter programs or issues, etc.

MEMBERSHIP PROMOTION

What is the Affiliate Membership Grade?

Affiliate Membership is for young professionals who are age 30 or younger and are brand new to ASHRAE.
Affiliate Members can take advantage of discounted dues for their first three years of membership for a total savings of $330.

- First Year - $50
- Second Year - $70
- Third Year - $90

At the end of year three Affiliate Members are converted to full dues paying Associate Members.
Affiliate Membership includes all Member benefits except for the ASHRAE Handbook and the opportunity to vote in the Society annual ballot.
Though Affiliate Members can't hold positions in the Chapter or Society, they can serve on local Chapter committees such as Membership Promotion and Technology Transfer to learn the volunteer role.
Click Here to register as an affiliate Member today. Please note you must enter your date of birth in order to receive the Affiliate option.
If you know a young professional 30 years of age or younger please share this information with them and encourage them to take advantage of what ASHRAE has to offer.

James Piscopo
Membership Promotion Chair

NEW MEMBERS

I would like to encourage all members to go online and verify that the contact information in their bio is up to date. The primary email and mailing addresses listed in your bio at www.ashrae.org are what we use to contact you with invitations to all monthly meetings and special events.

Please do not hesitate to contact me if you have any questions about updating your contact information or your membership in general.

Lastly please join me in welcoming the following new members to our chapter:

Phillip Greco - Affiliate Member

Hasnaat Quraishi - Associate Member

Mark Haley - Associate Member

Rocco Piccirilli - Member

Robert Charles Kroh, Jr. - Member

John Koba - Student Member

Thomas Patrick Mitch - Student Member

Kyle Courtney - Student Member

Michel Dean - Student Member

A note to new members: Philadelphia Chapter dues are waived for your first year of membership, however you will still receive all of the benefits of being a local dues paying member, including reduced fees for seminars monthly meetings.

James Piscopo, PE

Vice President

Membership Promotion Chair

Online Membership Application