THE LONG ISLAND SOUNDER

December 2008

ASHRAE Long Island Chapter, Region 1...*Founded in 1957*

www.ashraeli.org

SEASON'S GREETINGS

Inside this issue:

President's Message

I would like to wish everyone a very happy upcoming holiday and hope that you're Thanksgiving was joyous. Despite the latest crisis in our countries economy, we should be thankful for the most part, that we are healthy and able to enjoy family and friends and to support each other during hard times. The board of governors would like you, our members, to come join us on December 16th for some holiday cheer, good food and drink and celebrate the continued success of the Long Island Chapter of Ashrae. Without your support and attendance, this would not be possible.

November's meeting was very successful as we had the pleasure of Distinguished Lecturer Dr. Tom Lawrence, PhD, PE, LEED AP. Dr. Lawrence spoke at our meeting on the proposed new standard for Ashrae 189.1, combining LEED requirements with Ashrae standards. After Dr. Lawrence finished this exciting lecture, there were quite a few questions as this is a fairly new entity and sure to be a powerful tool as it is further developed. The Ashrae standard LEED requirements are still being developed and we look forward to the finished product. Many thanks to Dr. Lawrence for visiting and enlightening us with this valuable information.

Once again, we had a strong showing from our Long Island Chapter past presidents and thank them for their continued support. They are: (1978) Evans Lizardos, P.E , (1993) Ron Kilcarr, P.E, (1994) Jerry Grilliches, (1996) Joe Marino, (1998) Alan Georke, P.E (2001) Ray Schmidt, (2006) John Nally and (2007) Peter Gerazounis, P.E, LEED AP. Further Evans Lizardos volunteered his time this past month to speak at Hofstra University to the graduating engineering students at their convocational awards lunch-eon. We thank him once again for tireless efforts in the engineering community.

We recently received confirmation for the visit of our next Distinguished Lecturer Mitch Swann P.E in February on the Design Build Applications of LEED. This for sure will also be a very infor-mative lecture and is also our joint meeting with SMACNA Long Island. Thanks to Steve Giammona for pursuing this, we

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CHAPTER MONTHLY MEETING

DATE:	**Tuesday, December 16, 2008** **ASHRAE Holiday Party**
TIME:	6:00 PM - 8:00 PM
LOCATION:	Westbury Manor South Side of Jericho Tpke. 25 Westbury, NY 11590
FEES: Members - Students -	**No Fee**

Reservations requested, but not required.
Call (516) 333-7117

Long Island Chapter Officers & Committees

ASHRAE 2008/2009 OFFICERS

POSITION	NAME	PHONE	FAX	EMAIL
President	**Steven Friedman, HFDP**	212.695.1000	212.695.1299	sfriedman@lilker.com
President-Elect	**Steven Giammona, P.E.**	516.827.4900	516.827.4920	srg@cameronengineering.com
Vice President	**Nancy Román**	516.568.6509	516.568.6586	nroman@adehvac.com
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Treasurer	**Brian Simkins**	203.261.8100	203.261.1981	bsimkins@accuspecinc.com
Secretary	**Andrew Manos, LEED AP**	631.592.2660	631.630.8883	andym22@optonline.net
Board of Governors	**Janeth Costa**	631.242.8787	631.242.7084	jcosta@apollohvac.com
Board of Governors	**Peter Gerazounis, P.E. LEED AP**	212.643.9055	212.643.0503	peter.gerazounis@mgepc.net

ASHRAE 2008/2009 COMMITTEES

COMMITTEE	NAME	PHONE	FAX	EMAIL
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Chapter Technology Transfer (CTTC)	**Andrew Manos, LEED AP**	631.592.2660	631.630.8883	andym22@optonline.net
Newsletter Editor	**Liset Peña**	212.643.9055	212.643.0503	liset.pena@mgepc.net
Resource Promotion	**Janeth Costa** **Andrew Braum, P.E. LEED AP**	631.242.8787 516.785.9000	631.242.7084	jcosta@apollohvac.com asb@frigidyne.com
Historian	**John Nally**	631.331.0215	631.928.4625	jn@atiofny.com
Student Activities	**Brian Simkins** **Carolyn Cammalleri**	203.261.8100 212.695.1000	203.261.1981 212.695.1299	bsimkins@accuspecinc.com ccammalleri@lilker.com
Webmaster	**Nancy Román**	516.568.6509	516.568.6586	nroman@adehvac.com
Nominating	**Michael Gerazounis, P.E.**	212.643.9055	212.643.0503	michael.gerazounis@mgepc.net
Reception & Attendance	**Robert Fuchs**	718.599.1336		rfuchs@alnikmechanical.com
PR & Engineering Joint Council of LI	**Peter Gerazounis, P.E. LEED AP**	212.643.9055	212.643.0503	peter.gerazounis@mgepc.net
Golf Outing	**Peter Gerazounis, P.E., LEED AP** **Steven Friedman, HFDP**	212.643.9055 212.695.1000	212.643.0503 212.695.1299	peter.gerazounis@mgepc.net sfriedman@lilker.com

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President's Message (Cont'd from Page 1)

tried to have Mitch join us last year but he was booked in September for the entire Ashrae season.

If you are looking for any further information with regards to our chapter, please visit our website at www.ashraeli.org.

I look forward to seeing all at our holiday party and thank you again for your continued support of the Long Island Chapter of Ashrae.

Steven Friedman, HFDP
President - Long Island Chapter

Chapter Monthly Meeting - Program for 2008/2009

September 9, 2008 * At Westbury Manor - **1 PDH** Dinner Presentation - DDC Controls **MEMBERSHIP PROMOTION NIGHT**	**February 2009** **NATIONAL ENGINEERS WEEK DINNER**
October 14, 2008 * *At Westbury Manor* - **1 PDH** Dinner Presentation - Condensing Boiler Design **STUDENT ACTIVITIES NIGHT**	**March 10, 2009** * *At Westbury Manor* - **1 PDH** Dinner Presentation - Dedicated Outdoor Air Systems/ Energy Recovery **RESOURCE PROMOTION NIGHT**
November 18, 2008 * *At Westbury Manor* - **1 PDH** Dinner Presentation - Design/Build of LEED Projects **ASHRAE DISTINGUISHED LECTURER** **DR. TOM LAWRENCE, PH.D., P.E., LEED-AP**	**April 14, 2009** **FIELD TRIP - Blue Point Brewery**
December 16, 2008 Holiday Party - Westbury Manor	**May 4, 2009** * *Cherry Valley Club, Garden City, NY* **ANNUAL GOLF OUTING**
January 13, 2009 * *At Westbury Manor* - **1 PDH** Dinner Presentation - Mission Critical HVAC & Electrical Design **MEMBERSHIP PROMOTION NIGHT**	**May 12, 2009** Dinner Presentation - TBD **REFRIGERATION NIGHT**
January 24-28, 2009 ASHRAE Winter Meeting - Chicago, IL	**June 9, 2009** * *At Westbury Manor* **PAST PRESIDENTS & OFFICER INSTALLATION**
February 10, 2009 * *At Westbury Manor* **JOINT MEETING WITH SMACNA** Dinner Presentation - TBD **ASHRAE DISTINGUISHED LECTURER** **E. MITCHELL SWANN, P.E., LEED AP** **STUDENT ACTIVITIES NIGHT**	**June 2009 - TBD** ASHRAE Annual Meeting
August 2009 - Chapter Regional Conference Region I	

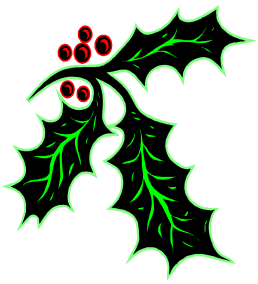
PAOE POINTS FOR 2008/2009

Chapter Members	Membership Promotion	Student Activities	Research Promotion	History	Chapter Operations	CTTC	Chapter PAOE Totals
297	325	655	490	350	840	325	2,985

ASHRAE Holiday Party 2008

ASHRAE
Long Island Chapter's
2008 Holiday Party

"Member Appreciation Night"



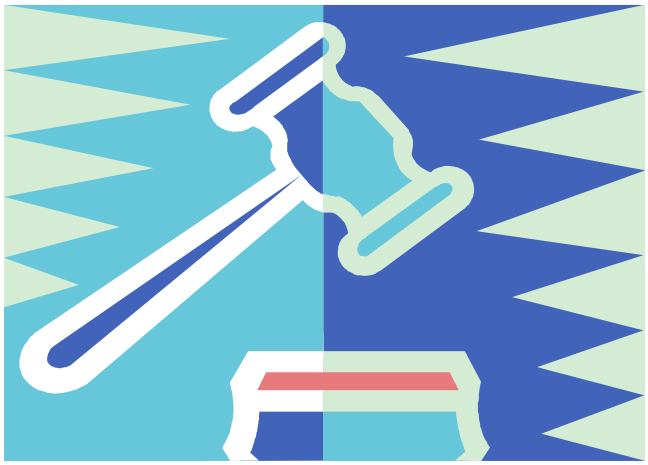
DATE:	**Tuesday, December 16, 2008**
TIME:	6:00 pm to 8:00 pm
LOCATION:	WESTBURY MANOR, Jericho Tpke. 25, Westbury (516) 333-7117
MENU:	Hot and Cold Buffet, Coffee, Dessert and *"Open Bar"*
FEE:	Complimentary Admission for ASHRAE Members & Students (FREE)!
RSVP:	**By Tuesday, December 9, 2008 *(REQUIRED).*** **Send your Name & Phone# to srg@cameronengineering.com**

Program *"Sneak Peek"* for January 2009

DATE:	**Tuesday, January 13, 2009**
TIME:	6:00 pm Cocktails 7:00 pm Dinner Presentation 8:45 pm Conclusion
LOCATION:	WESTBURY MANOR, Jericho Tpke. 25, Westbury (516) 333-7117
LECTURE:	**Cooling High Density Heat Loads in Data Centers**
PRESENTER:	Kenneth Sewell , Sales Training Manager, Emerson Network Power/Liebert

All attendees shall receive 1 PDH. More details to follow in January Newsletter.

Board of Governors Meeting Minutes



A meeting of the Board of Governors was held on Tuesday November 18, 2008 at the Westbury Manor. Present at the meeting were Steven Friedman, Steven Giammona, John Nally, Peter Gerazounis, Carolyn Arote, Brian Simkins, Janeth Costa and Andrew Manos. President Steven Friedman called the meeting into session at 5:02:

Programs- Steven Giammona discussed future programs are all lined up for the year. February will be the joint meeting with SMACNA, and there will be another Distinguished Lecturer. We discussed the Blue Point Brewery still need to be confirmed as the field trip location.

Resource Promotion- Janeth Costa has a total of 490 PAOE points already and is more than half way to the goal. We also have a total of $1,145 collected towards our year end goal. She has Andy Braum on her committee and they have started making phone calls. All member of the board have given their $100 so that we can get "Full Circle" credit.

Historian- John Nally is trying to do new things for his article in the newsletter. The crossword puzzle was considered a good idea by all. He has a total of 350 PAOE points so far for the year.

Webmaster- Nancy Roman discussed how the person who updates the website is not keeping it up to date. Brian Simkins mentioned that he has someone who would look at it and see if he would be willing to take on the task. The board agreed this would be a good idea, as there is no room to be several weeks late on updates.

Treasurer- Brian Simkins said we have been paid in full for last years ads in the newsletter. He has to invoice now for this year's ads so that we can be paid before the year is over. We had a lapse in billing 1 year and we are trying to get back on schedule, where the invoicing and payment is due before September starts.

Membership – Carolyn Arote stated that she has 250 PAOE points so far this year. She does a monthly e-mail/phone call campaign for all the delinquents members to catch up on their dues.

Student Activities- Brian Simkins is talking with Tom Fields of Stony brook about the Mentoring Program. There is a Student Design Competition in 2009 at Hofstra, Brian is also looking into.

Chapter Technology Transfer (CTTC)- Andrew Manos reported all is on track and all the appropriate paper work is being done.

There being no further business to come before the meeting, the meeting was adjourned at 5:52.

Andy Manos, LEED AP
Chapter Secretary

Long Island Chapter - Past Presidents

1958	H. Campbell, Jr. PE	1983	Leon Taub, PE
1959	Clyde Alston, PE	1984	Raymond Combs
1960	Sidney Walzer, PE	1985	Edward W. Hoffmann
1961	Sidney Gayle	1986	Jerome T. Norris, PE
1962	William Kane	1987	Abe Rubenstein, PE
1963	Louis Bloom	1988	Michael O'Rouke
1964	Milton Maxwell	1989	Mel Deimel
1965	Will Reichenback	1990	Robert Rabell
1966	Joseph Minton, PE	1991	Gerald Berman
1967	Irwin Miller	1992	Donald Stahl
1968	Walter Gilroy	1993	Ronald Kilcarr
1969	Charles Henry	1994	Jerald Griliches
1970	William Wright	1995	Walter Stark
1971	Louis Lenz	1996	Joe Marino
1972	Ronald Levine	1997	Norm Maxwell, PE
1973	Henry Schulman	1998	Alan Goerke, PE
1974	Myron Goldberg	1999	Frank Morgigno
1975	John N. Haarhaus	2000	Michael Gerazounis, PE
1976	Richard K. Ennis	2001	Ray Schmitt
1977	Kenneth A. Graff	2002	Steven M. Stein, PE
1978	Evans Lizardos, PE	2003	Andrew Braum, PE
1979	Albert Edelstein	2004	Claudio Darras, P.E.
1980	Ralph Butler	2005	Craig D. Marshall, P.E.
1981	Robert Rose, PE	2006	John Nally
1982	Timothy Murphy, PE	2007	Peter Gerazounis, P.E.

Membership

I would like to take this time to wish everyone Happy, Healthy and Safe Holidays. This month we are having a Holiday Party instead of a technical or learning type session. This is a great time to bring down potential new members, as they will have time to meet with and talk to many people throughout the evening. Please bring a guest and if they sign up for Ashrae that night, their meal will be free. As always if you are already a member your dinner for the Party will be free. Our membership has been growing steadily in the last few years, but as with anything some people retire and move on, so we need to keep our membership strong! Remember each and every person counts…

One again I would like to thank everyone for all their help in the years past, and their continued support.

Carolyn Arote
Membership Chairman

History - 51 Years Ago

It was a cold night on December 3rd 1957, as the newly formed ASHRAE L.I. Chapter Board of Governors meet for the first time at the Lowell Ave. home of Mr. H.J. Campbell Jr., the new chapter's president. There was excitement in the air and an agenda to be discussed. Let's travel back to that night and take look at the minutes of this first historic meeting.

" The Board of Governors meeting was held on December 3rd, 1957 at the home of H.J. Campbell Jr. President, 1033 Lowell St., New Hyde Park, NY at 8:00 PM.

Present:

H.J. Campbell Jr., President
Sydney Walzer, Treasurer
William Kane, Board of Governors
Clyde Alston, Vice President (arrived at 10:45 PM)
James L. Page, Secretary
William Hoops, Board of Governors
William Cleland, Board of Governors

The following resolutions were approved and passed by the Board:

- An account is to be opened immediately at Hempstead Bank, Main and Fulton Streets. Hempstead L.I. by S.M. Walzer. One signature is to be required for checks of the organization but either the Treasurer or the President may sign. No bond shall be required for the Treasurer or President.
- The fiscal year shall begin March 1st and the dues shall become payable on this date. The first year's dues shall carry through to March 1st, 1959.

It was suggested the Secretary write a letter to the Society as to their recommendations about incorporating the L.I. Chapter. The Secretary is to be responsible for the mailing out dues notices, receipt of dues, dues invoices being printed and mailed out. Stationary is to be ordered form Society in 1000 lots as per Golden Gate Chapter sample. Check on envelop supply or whether to purchase elsewhere. Charter members must pay dues by March 1st, 1958 or relinquish charter membership. Committee chairmen shall be invited to the Board of Governors meetings only when and if necessary.

William Cleland shall be Chairman of the Membership Committee. The Membership Committee shall be responsible for dues collection after two months past due date. Announcement shall be made to the general membership concerning the guarantee made on dinner reservations and resultant loss to chapter if reservations are made and not kept.

Clyde Alston shall be Program Chairman with Hugo Basch and Syd Gayle serving on the Committee. The Attendance Committee shall be part of the Membership Committee. The first general meeting shall be held about the middle of January 1958 at Hempstead, Mineola or Westbury. The cost of the dinner shall be $ 3.00. Double-faced postal cards shall be sent out indicating the time and place of the meeting with detachable reply card for reservation. Speakers at the general meetings shall be selected on the basis of general knowledge and interest. A program shall be presented at every meeting until June unless otherwise decided by the Board of Governors.

John Frye shall be Chairman of the By Laws Committee with the original committee to stand as is. The following chairmen were selected:

Educational Committee: William G. Kane
Building Codes Committee: William Hoops
Publicity Committee: Barry Screbnick

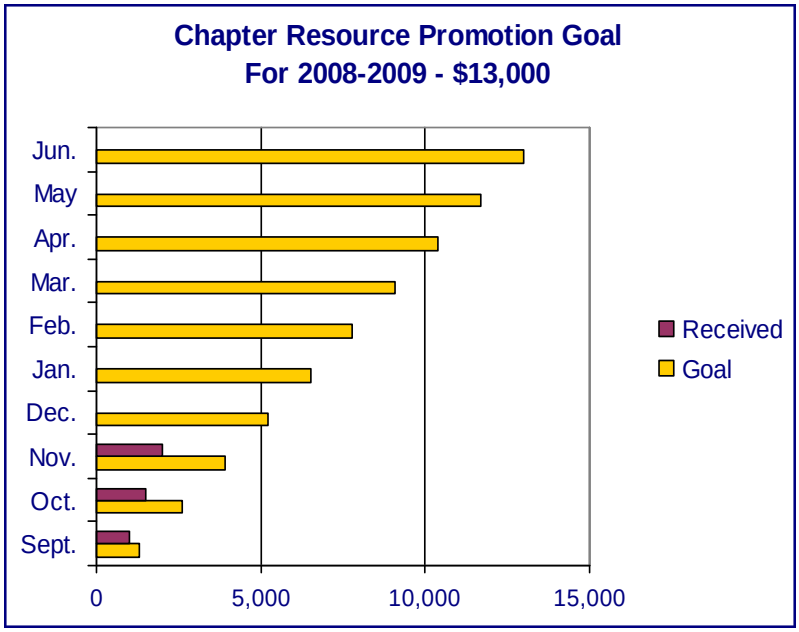
The Secretary shall send meeting notices to local newspapers, etc. together with short resume of meetings held previously. A Special Events Committee shall be selected at a later date. Respectfully submitted: James L. Page – Secretary "

So it was that December night. Imagine $ 3.00 for dinner. That and another $ 3.00 now days will get you a beer.

John Nally, Chapter Historian

Research Promotion

Thank you again to all of you who have contributed already. To date, we have raised less than 15% towards our chapter goal of $13,000.00. Please help support Ashrae in anyway you can today.



Contributions can be made in three ways:

1) You can mail your checks, made out to Ashrae Resource Promotion, to:

Janeth Costa
Ashrae Research Promotion Chair
c/o Apollo HVAC Corp.
225 North Fehr Way
Bay Shore, NY 11706

2) You can bring your check to any of the meetings and give it to me. I will mail it for you.

3) You can contribute directly on-line. www.ashrae.org

**** Please make sure your accredit your contribution to the LONG ISLAND CHAPTER 006 ****

Thank you again for all your past support!

HAPPY HOLIDAYS!!!!

Janeth Costa
Resource Promotion Chair

Student Activities

Calling All Students

Happy Holidays to everyone. Just a reminder, the next Student Activities night will be in February please help make this a successful event by inviting any engineering students you know. We are having an ASHRAE distinguished lecturer along with a joint meeting with SMACNA and there is always an interesting topic so don't miss it.

This month is our Holiday Party so please come and enjoy a social evening with your friends and colleagues.

Students Guide to the 2009 ASHRAE Winter Conference

Chicago, with one of the most recognizable skylines in the United States, has long-standing status as a livable urban center.

That the city has stood the test of time makes it the perfect backdrop for this year's Winter Conference theme of Sustainable Urban Design: Engineering Tomorrow…Today.
See what we have in store for students.
To register online visit: www.ashrae.org/chicago

Grant Funding Available

The *ASHRAE Senior Undergraduate Project Grant Program* provides grants to engineering, technical and architectural schools worldwide with the goal of increasing student knowledge, learning and awareness of the HVAC&R industry through the design and construction of senior projects. The grant is made to the university/college solely for the support of the material required for the project in an amount not to exceed $5,000 (U.S.). **The electronic submission must be received at ASHRAE Headquarters by December 15, 2008.**

2009 ASHRAE Student Design Competition

The 2009 ASHRAE Student Design Competition lets students apply their knowledge to a 15,650ft² Office Building in the Nashville, Tennessee area. This competition recognizes outstanding student design projects, promotes teamwork, and encourages undergraduate students to apply their knowledge of practical design and to become involved in the dynamic HVAC&R profession. The Student Design Project Competition teams may compete and be evaluated in one of the following categories:

- HVAC System Design
- HVAC System Selection
- Architectural Design/Integrated Sustainable Building Design

Deadline: Friday May 9, 2009

Please visit: http://www.ashrae.org/students/ for all Submission Deadlines and Applications as well as additional ASHRAE Student opportunities.

Brian Simkins - Student Activities Committee

Carolyn Cammalleri - Vice Chair

CTTC

Liquid Desiccant Air Conditioners

Liquid desiccant air conditioners are an approach to ef-fectively manage humidity under challenging conditions such as buildings with high outdoor air (OA) requirements located in humid regions. They remove moisture and latent heat (and, possibly, sensible heat) from process air via a liquid desic-cant material, such as lithium chloride (LiCl) or halide salts.

Liquid desiccant AC has two essential components, an ab-sorber and a regenerator. In a basic configuration, strong (i.e., concentrated) and cooled liquid desiccant flows into the absorber and down through a packed bed of granular particles (or other enhanced mass transfer surface or packing). Counterflowing return air passes up through the bed, transferring both moisture and heat to the liquid desiccant. The water absorbed from the air dilutes the liquid desiccant leaving the bottom of the packed bed, and flows into the regenerator. In the regenerator, a heat source (gas- or oil-fired, waste heat, solar, etc.) heats the weak liquid desiccant solution, increasing the vapor pressure of the water. When the weak desic-cant is sprayed on another packed bed, the absorbed moisture migrates to a counterflowing scav-enger air stream to regenerate a concentrated liquid desiccant solution. Subsequently, the return feed from the regenerator passes through a cooling tower or chiller to remove the heat input from the regenerator. Finally, the cooled liquid desiccant solution re-turns to the absorber to complete the cycle.

Designs usually include a counterflow heat exchanger between the flow exiting the absorber and that exiting the regen-erator to reduce the amount of external heating and cooling required. Alternatively, at least one product has used a heat pump system instead of a heat exchanger to increase the quantity of heat transferred.

Some liquid desiccant AC units include a cooling coil downstream of the absorber to provide (primarily) sensible cooling.

Both integrated and distributed systems exist. Integrated systems house the absorber and regenerator in a single unit. In contrast, a distributed system comprises multiple absorbers (typically integrated with air-handling units) and a single, central regenerator, with piping to transfer strong and weak desiccant between the absorbers and the regenerator. For buildings with multiple OA intakes, this facilitates centralized production and storage of strong desiccant.

A desiccant system integrated with a combined heat and power system could generate strong desiccant during off-peak times when excess waste heat is available and store strong desiccant to provide cooling capacity during periods of peak electric demand.

Overall, several thousand liquid desiccant units are sold in the U.S. each year. Industrial units for deep drying and appli-cations requiring precise humidity control account for most of the liquid desiccant market. Although they have a small portion of the overall commercial buildings space conditioning market, they are used more frequently in applications with requirements for lower humidity, such as ice rinks and the refrigerated and frozen food aisles of supermarkets.

Energy-Savings Potential

Three issues limit the efficiencies of most units to levels below those of interest for HVAC applications. First, heat (the latent heat of vaporization of the absorbed moisture) accumulates in the absorber, reducing its net sensible and latent cooling capac-ity. Second, many systems use low liquid desiccant concentration gradients that increase the system mass flow significantly relative to higher concentration systems. This increases parasitic energy consumption, both liquid desiccant pumping power and the fan power to drive the air through the packed bed. Third, a single-effect system only uses the regeneration heat input once, inherently limit-ing the coefficient of performance (COP) to less than one.

Existing liquid desiccant dehumidification systems have ther-mal COPs of around 0.5 to 0.6, with systems in develop-ment approaching 0.7 to 0.8. Since these values do not include the electric energy the units consume, the actual primary energy efficiency is lower.

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CTTC (Cont'd. from Page 10)

Developers and manufacturers have produced several modi-fications to the basic liquid desiccant system to increase its efficiency, including:

- Multiple effect regenerators;
- High-desiccant concentration gradient designs; and
- Evaporatively cooled absorbers.

Multiple-effect regenerators use each unit of heat input to remove two or more units of latent heat from the desiccant solution in the regenerator, increasing the potential COP to more than one. Over the last decade, researchers have worked to develop advanced liquid desiccant air-conditioning systems that would use multiple-effect boilers to achieve thermal COPs in excess of unity.

High-concentration gradient systems can greatly decrease pump and blower parasitic energy losses by reducing the liq-uid desiccant mass flow required to remove a given quantity of moisture. For example, one group uses extended plastic surfaces for the heat exchanger in both the regenerator and conditioner. Its surface has a thin wick that achieves high mass transfer (of moisture) rates with the air, increasing the change in the desic-cant concentration in the cycle. This, in turn, enables a dramatic (20- to 30-fold) reduction in the system's desiccant-to-air mass flow ratio relative to conventional liquid desiccant systems, achieving ap-proximately a ten-fold decrease in pump power. In addition, the array of plastic surfaces has an appreciably lower pres-sure drop than conventional packed beds, reducing fan power draw. In total, the developers project parasitic electricity consumption of just under 0.3kW/ton.

An evaporatively cooled absorber lowers the humidity below the desired indoor level to a level sufficient to man-age in-ternal moisture loads. The dry-bulb temperature of the OA would approach 10℉ above the wet-bulb tem-p erature and provides moderate sensible cooling of the air. Although at typical design conditions the system provides no sensible cooling to the building, at lower wet bulb temperatures, the air delivery temperature decreases and also provides some sensible cooling.

Overall, unless they use waste or solar heat or triple-effect regeneration, cur-rent liquid desiccant AC units offer little na-tional primary energy-savings potential as a wholesale replacement for vapor compression systems.

In humid environments, however, they can save energy, notably when used as part of a dedicated outdoor air system (DOAS), primarily to dehumidify the OA. Because the liquid desiccant DOAS handles main latent source/load, this elimi-nates the need to overcool ventilation air to remove humidity and decreases reheat energy consumption. Furthermore, because the indoor AC system needs only to address indoor moisture sources, it requires very limited latent capacity. This allows it to operate at a higher evaporating tempera-ture, which improves the COP relative to a conventional chiller by about 20%.

When used as part of a DOAS for warm and humid OA conditions (dry bulb temperature=86℉, wet-bulb temp era-ture=78℉, an advanced liquid desiccant system with a COP of 1.2 could achieve appreciable en-ergy cost savings rela-tive to conventional systems using both conventional reheat and heat pipes (approximately 30% and 5% respectively). Primary energy savings would tend to be more modest relative to reheat (~15%) and negligible relative to heat pipes.

The superior dehumidification perfor-mance of desiccant systems at moderate ambient, high humidity conditions also has the potential to save energy by increasing the indoor temperature setpoint, typically by 2℉ to 5° F. In some in-stances, occupants respond to the poor dehumidification performance of conventional systems by de-creasing the indoor temperature set point to ensure that the unit runs long enough to dehumidify the space. This, in turn, increases the sen-sible loads because it increases the temperature difference between the outdoor and indoor air. Furthermore, under this con-dition, the conventional unit provides negligible sensible cooling and very inefficient latent cooling, e.g., EERs of ap-proximately 3 to 4. As a result, desiccant systems can realize significant savings under these conditions.

Cont'd on Page 12

CTTC (Cont'd. from Page 11)

Liquid desiccant systems can also use lower-temperature waste heat from distributed generation (microturbines, internal combus-tion engines, fuel cells, etc.) sources, district heating systems, and solar thermal energy to regenerate the desic-cant. If this heat is of sufficient quality, e.g., single-effect systems require temperatures of approximately 160℉ – 180℉ for single-effect and 245℉ – 320℉ for double-effe ct, it can dramatically improve the economics and energy savings of liquid desiccant AC.

Conversely, using the waste heat to drive a single- or double-effect absorption chiller usually enables significantly greater use of waste heat than desiccant regeneration alone, because absorption systems can meet both latent and sen-sible loads. Furthermore, some sources of waste heat, such as microturbines, provide waste heat at temperatures that are too high for direct desiccant regeneration. In this case, the higher-quality heat sources require dilution to drive the desiccant system. In practice, its higher quality heat could often be more productively used to drive an absorption cooling cycle.

Market Factors

Liquid desiccant systems can improve humidity management relative to conventional systems. Because the liquid desic-cant re-moves moisture without cooling the air to saturation, the supply air relative humidity falls below 70%. This keeps supply ducts dry and helps avoid mold and bacterial growth. In addition, the scavenging action of liquid desiccant sys-tems could improve indoor air quality by removing airborne contaminants.

To date, liquid desiccant systems have achieved limited use in commercial buildings due to their higher energy costs (discussed earlier) and first cost, as well as corrosion and liquid carryover challenges. The cost premium of liquid desic-cant AC units remains signifi-cant. For example, one group working on advanced liquid desic-cant systems projects that a liquid desiccant-based DOAS will cost approximately 65% more than a DOAS using conventional vapor-compression technology. Although the liquid desiccant system might be more attractive in applications with abundant, low-cost waste heat, such a sizeable first-cost premium would likely severely limit its market penetration.

Many developmental and deployed systems use LiCl, which corrodes most metals and, thus, requires design modifica-tions to avoid corrosion. In addition, some of desiccant can carry over, i.e., the process air can entrain liquid-desiccant aerosols as it passes through the packed bed and desiccant spray. This can corrode system components downstream of the absorber such as ducts and coils, and, potentially, cause health concerns.

Both challenges have been—and remain—the focus of ap-preciable development efforts. Developers have worked on and manufacturers have commercialized products that use plastic (and, in at least one instance, cellulose) components that resist LiCl cor-rosion. One solution is to use microporous membranes that allow the migration of water but prevent the migration of the desiccant into the airflow. Another is to use special surfaces designed to form a thin film of desiccant that directly contacts the supply and regeneration airflows. By ensuring that the system operates in a regime where the desiccant and airflows do not form droplets, the developers claim to eliminate desiccant carryover. Several researchers have investigated using solar thermal energy to regenerate desiccants systems. Liquid desiccants can be regenerated by heat at temperatures achieved by flat-plate solar collectors under peak insolation conditions (i.e., around 317 Btu/h·ft2·℉). At this peak condition, the flat-plate collectors have an efficiency of about 50% to 60% and cooling systems have thermal COPs (i.e., not including parasitics) of about 0.8. Both cooling capacity and efficiency will decrease as in-solation decreases, however, necessitating a backup heat source to supplement and replace the solar thermal energy source. If solar energy supplies a large fraction of the regeneration energy and the parasitics are not excessive, solar thermal-powered liquid desiccant AC can realize large primary energy savings, particularly in humid climates.

The cost of solar thermal collectors is a major barrier to the use of solar thermal-powered desiccants. One group that analyzed the cost of a solar thermal-powered liquid-desiccant system estimated that flat-plate solar collectors would have an installed cost of approximately $25/ft2 – 40/ft2. Assuming a peak thermal COP of 0.44 and an installed cost of $32.50/ft2, the solar thermal collectors alone would cost about $2,650 per peak ton of cooling capacity. For com-parison, new commercial unitary products in the 10-ton range have an installed cost of about $1,000 per ton. Widespread deploy-ment of low-cost, lower temperature solar-thermal collectors, e.g., for solar water heating, would reduce the installed cost of solar thermal collectors and improve the economics of solar thermal-powered liquid desiccant AC.

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