March 2022

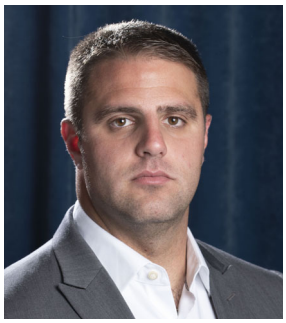
THE LONG ISLAND SOUNDER

ASHRAE Long Island Chapter, Region I...*Founded in 1957* www.ashraeli.com

American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

Inside this issue:

President's Message



Hello everyone and welcome to ASHRAE LI March meeting. Spring is right around the corner!

We are maintaining the **IN-PERSON** meetings at our usual spot, the Westbury Manor.

This month's topic is "Guidelines to HVAC Noise Control". Many of us have been in a situation where equipment is proposed (or already installed) directly over a living space or workspace. Come learn how to deal with this and much more with Dan LaForgia from Swegon on Tuesday March 8th.

Thank you to all who attended our YEA/membership social event at the Great South bay Brewery. It was a great time and I hope everyone learned something from the Brew Meister! Keep an eye out for more social events and the field trip coming up in the next few months.

We are in the middle of our Membership Battle! See details below in our membership promotion segment and help the chapter by promoting membership in your company. Membership has been struggling the last few years in ASHRAE as a whole – although our chapter has been doing quite well despite the last few years difficulties. Please keep your membership up to date and remind your peers to do the same.

ASHRAE LI has started an Instagram account, @ASHRAE_LI! Please follow us on all social media platforms (Facebook, Instagram, and LinkedIn) as well as the website, www.ashraeli.com , for the most up to date information on monthly presentations, upcoming events, etc.

If anyone is interested in joining a committee, please reach out to anyone on the board of governors. We are always looking for volunteers!

Regards,

Matthew Vitrano
President - Long Island Chapter

CHAPTER MONTHLY MEETING

DATE:	**Tuesday, March 8, 2022**
TIME:	6:00 PM - Cocktails/Dinner 7:00 PM - Dinner Presentation 8:45 PM - Conclusion
LOCATION:	Westbury Manor 1100 Jericho Tpke. Westbury, NY 11590
FEES:	
Members -	$50.00
Guest -	$60.00
Student -	$15.00

Check the ASHRAE Website for Society news and to join/renew membership!
http://www.ashraeli.com

Long Island Chapter Officers & Committees

ASHRAE 2020/2021 OFFICERS

POSITION	NAME	PHONE	EMAIL
President	Matthew Vitrano	516.319.9325	c006@ashrae.net
President-Elect	Murat Bayramoglu	631.312.8818	c006pe@ashrae.net
Vice President	Michael Nigro	212.643.9055	c006vp@ashrae.net
Treasurer	Elizabeth Jedrlinic	516.490.1621	c006tr@ashrae.net
Secretary	Matthew Catan	407.489.6684	c006sec@ashrae.net
Board of Governors	Michael Razzano	516.805.3084	c006bog1@ashrae.net
Board of Governors	Zhigang Xu		c006bog2@ashrae.net
Board of Governors	Rich Smith		c006bog3@ashrae.net
Board of Governors	Michael S. Gerazounis	212.643.9055	c006bog4@ashrae.net
Board of Governors	James Hanna	718.269.3768	c006bog5@ashrae.net

ASHRAE 2020/2021 COMMITTEES

COMMITTEE	NAME	PHONE	EMAIL
Programs & Special Events	Murat Bayramoglu	631.312.8818	c006pe@ashrae.net
Membership (MP)	Michael Razzano	516.805.3084	c006mep@ashrae.net
Refrigeration	Andrew Dubel		c006ref@ashrae.net
Chapter Technology Transfer (CTTC)	Murat Bayramoglu	631.312.8818	c006cttc@ashrae.net
Grassroots Government Activities (GGAC)	James Hanna	718.269.3768	c006ggac@ashrae.net
Newsletter Editor	Liset Cordero	212.643.9055	c006ne@ashrae.net
Research Promotion (RP)	Michael Nigro	212.643.9055	c006rp@ashrae.net
Historian	Elizabeth Jedrlinic	516.490.1621	c006his@ashrae.net
Student Activities (SA)	Matthew Catan	407.489.6684	c006sa@ashrae.net
Young Engineers in ASHRAE (YEA)	Michael S. Gerazounis	212.643.9055	c006yea@ashrae.net
Webmaster	Frank Paradiso	631.632.2792	c006web@ashrae.net
Nominating	Michael Gerazounis, PE, LEED AP	212.643.9055	nominating@ashraeli.org
Reception & Attendance	Zhigang Xu / Matt Catan / Michael S. Gerazuonis		reception@ashraeli.org
PR & Engineering Joint Council of LI (EJCLI) Liaison	Andrew Manos, LEED AP	631.632.2792	pr@ashraeli.org
Golf Outing	Peter Gerazounis, PE LEED AP	212.643.9055	golf@ashraeli.org
Awards	Brian Simkins	203.261.8100	c006ha@ashrae.net
ASHRAE LI, P.O. Box 79, Commack, NY 11725			

Chapter Monthly Meeting - Program for 2021/2022

September 14, 2021 * At Westbury Manor Dinner Presentation – Fan Fundamentals Presenter: Andy Siegelson **1 PDH** **Refrigeration Night**	**March 8, 2022** * *At Westbury Manor* Dinner Presentation— HVAC Noise Control Presenter: Dan LaForgia **1 PDH** **Student Activities Night** **YEA Night**
October 12, 2021 * *At Westbury Manor* Dinner Presentation — PPRCT Pipe and Fitting Systems for HVAC Water Distribution and Compressed Air Distribution Presenter: Jordan Stern **1 PDH**	**April 12, 2022** Dinner Presentation— TBD Presenter: TBD **1 PDH**
November 9, 2021 * *At Westbury Manor* Dinner Presentation— Critical Environment Air Distribution Applications Presenter: Larry Scholl, CEM, LEED AP BD+C **1 PDH** **Membership Promotion** **Student Activities Night and YEA Night** **Resource Promotion Night**	**May 2, 2022** * *Cherry Valley Club, Garden City, NY* **ANNUAL GOLF OUTING**
December 14, 2021 * *At Westbury Manor* Dinner Presentation— Eliminating the High Cost of Over Pumping Presenter: Rick Smith **1 PDH**	**May 10, 2022** **Annual Field Trip**
January 11, 2022 * *At Westbury Manor* Dinner Presentation— Duct System Acoustics Presenter: Patrick J. Brooks, MBA, P.E. **ASHRAE DISTINGUISHED LECTURER** **1 PDH**	**June 14, 2022** * *At Westbury Manor* **Free Buffet Dinner for Members** **PAST PRESIDENTS NIGHT & OFFICER INSTALLATION** **STUDENT SCHOLARSHIPS TO BE AWARDED** **ASHRAE History Quiz and prize Give-A-Ways**
January 29 - February 2, 2022 ASHRAE Winter Conference	**June 2022 - TBD (4pm-8pm)** * *Dixie II @ Captree State Park Boat Basin, NY* **ANNUAL FISHING TRIP**
February 8, 2022 * *At Westbury Manor* Dinner Presentation— Optimizing IAQ and Energy Efficiency Presenter: Joe Maser **1 PDH** **Membership Promotion Night** **Resource Promotion Night**	**August 2022** **CHAPTERS' REGIONAL CONFERENCE (CRC) REGION I** **GRANIT STATE**
February 20-26, 2022 **NATIONAL ENGINEERS WEEK**	

Meeting Program

Dinner Presentation

Guidelines to HVAC Noise Control

Presented by

Dan LaForgia
Key Accounts Sales Manager
Swegon North America/Vibro-Acoustics, by Swegon

Attendees Will Earn 1 PDH!

DATE:	**TUESDAY, MARCH 8, 2022**		
Time:	6:00 PM - Cocktails and Hors D'ouevres 7:00 PM - Dinner Presentations 8:45 PM - Conclusion	**Fee:**	**Members - $50 pp** **Guests - $60 pp** **Students - $15 pp**
Location:	**WESTBURY MANOR** (516) 333-7117 1100 Jericho Tpke., Westbury, NY 11590 **Directions are posted at @ www.ashraeli.org**		
Presentation:	Noise Control is a major part of the NY HVAC market. There are many projects with acoustical consultants on board that require acoustical recommendations for the building owners, architects, and developers. One of those recommendations is noise related to mechanical systems inside and outside of the building. Vibro-Acoustics is the leader in HVAC and Industrial Noise control throughout North America. HVAC noise control is applied to equipment such as AHU's, fans, VAZV boxes, generators, cooling towers and air cooled chillers just to name a few. The focus is always maximum acoustical performance with minimum pressure drop impact. **All attendees will receive 1 PDH.**		
About our Speaker:	Dan LaForgia is the Key Accounts Sales Manager for Vibro-Acoustics. Dan has been with the company for 8 years and previously worked for 2 other acoustical manufacturing companies. Dan graduated from the University of Hartford in 2005 with a degree in Mechanical Engineering and Acoustics. Before working on the manufacturing side, Dan spend a few years in NYC working for a well-known acoustical consulting firm. Dan also is a past chair of ASHRAE's TC 2.6 Sound and Vibration committee and has over 15 years' experience in HVAC and industrial noise control.		

CHAPTER MAY NOT ACT FOR SOCIETY

An International Organization

The Long Island Chapter is looking for presenters for the remainder of the year. Please contact us if you are interested in presenting to our membership.

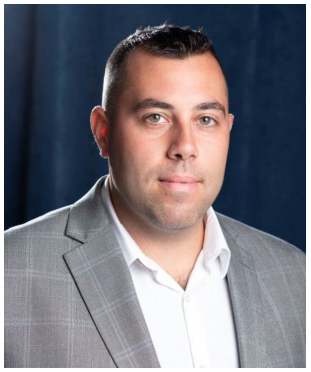
Long Island Chapter - Past Presidents

1958	H. Campbell, Jr. PE	1990	Robert Rabell
1959	Clyde Alston, PE	1991	Gerald Berman
1960	Sidney Walzer, PE	1992	Donald Stahl
1961	Sidney Gayle	1993	Ronald Kilcarr
1962	William Kane	1994	Jerald Griliches
1963	Louis Bloom	1995	Walter Stark
1964	Milton Maxwell	1996	Joe Marino
1965	Will Reichenback	1997	Norm Maxwell, PE
1966	Joseph Minton, PE	1998	Alan Goerke, PE
1967	Irwin Miller	1999	Frank Morgigno
1968	Walter Gilroy	2000	Michael Gerazounis, PE, LEED AP
1969	Charles Henry	2001	Ray Schmitt
1970	William Wright	2002	Steven M. Stein, PE
1971	Louis Lenz	2003	Andrew Braum, PE
1972	Ronald Levine	2004	Claudio Darras, P.E.
1973	Henry Schulman	2005	Craig D. Marshall, P.E.
1974	Myron Goldberg	2006	John Nally
1975	John N. Haarhaus	2007	Peter Gerazounis, PE, LEED AP
1976	Richard K. Ennis	2008	Steven Friedman, PE, HFDP, LEED AP
1977	Kenneth A. Graff	2009	Steven Giammona, P.E., LEED AP
1978	Evans Lizardos, PE, LEED AP	2010	Nancy Román
1979	Albert Edelstein	2011	Carolyn Arote
1980	Ralph Butler	2012	Brian Simkins, LEED AP
1981	Robert Rose, PE	2013	Andrew Manos, LEED AP BD+C
1982	Timothy Murphy, PE	2014	Richard L. Rosner, P.E.
1983	Leon Taub, PE	2015	Thomas J. Fields, P.E., LEED AP
1984	Raymond Combs	2016	Donald Kane, P.E.
1985	Edward W. Hoffmann	2017	Andrew Dubel, P.E., LEED AP
1986	Jerome T. Norris, PE	2018	Richard Halley
1987	Abe Rubenstein, PE	2019	Frank Paradiso
1988	Michael O'Rourke	2020	James Hanna
1989	Mel Deimel		

PAOE POINTS FOR 2021/2022

Chapter Members	Chapter Operations	CTTC	Communi-cations	GGAC	History	Member-ship	Research Promotion	Student Activities	YEA	Chapter PAOE Totals
282	495	700	0	0	120	575	400	125	1,725	4,140

Research Promotion



"No research without action, no action without research"
– Kurt Lewin

I would like to thank the companies who have participated in the annual Product Directory of Manufacturers and their Representatives. The product Directory has been prepared as a service to all its members and as a service to the local HVAC industry. It will be made available to all ASHRAE and non-ASHRAE members at no-cost and can be obtained from our monthly meetings or directly from our website.

This year's overall research promotion goal is $2,593,341 with many research projects on board. Our chapter is expected to raise $20,400 towards the overall goal. I am hoping that I can count on the continued support of all our past contributors who have generously supported us over the years. I also look forward to gaining the support of new contributors this coming year. Last year we were successful in beating our goal by over $8,000 and am hopeful that this year we can continuously raise the bar.

Thank you to our contributors:

Individual

John D. Nally
Michael Gerazounis
Matthew K. Bendix
Elizabeth Jedrlinic
Andrew E. Manos
Matthew Vitrano
Michael Nigro
Murat Bayramoglu
Michael Steven Gerazounis
Richard W. Smith
Michael H. Razzano
James Hanna
Frank Paradiso
Matthew Catan
Donald Kane
John C. Cronin, Jr

Companies

H2M Architects + Engineers
Robert Half
Trane

CONTRIBUTIONS CAN BE MADE IN THE FOLLOWING WAYS:

1) You can mail your checks, made out to ASHRAE Research Promotion:
Michael Nigro
ASHRAE Research Promotion Chair
PO BOX 79
Commack, NY 11725
2) You can bring your check to any of the meetings and hand to myself or Elizabeth.
3) You can contribute via PayPal from the ASHRAE LONG ISLAND web site, just click on the donate button.
4) You can contribute directly on-line. **www.ashrae.org**

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

Thank you again for all of your support!

Michael Nigro
Research Promotion Chair

History

History of the College of Fellows

Begun in October 2003, the College of Fellows is a financially self-supporting ASHRAE Committee made up exclusively of Members who have been awarded the member grade of Fellow. While it has an official ASHRAE Staff Liaison and does a courtesy report to the ASHRAE Board ExCom, its programs are funded through the contributions from ASHRAE Fellows and other interested donors.

The mission of the College of Fellows of ASHRAE, Inc. is to serve as ambassadors to enhance ASHRAE's technical image internally and in the community at large through activities such as transferring ASHRAE-generated technology and knowledge; mentoring students, engineers and educators to increase their awareness of ASHRAE activities; sharing knowledge or experience with the grassroots organization, such as chapter presentations; communicating ASHRAE recommended practices to resolve current industry problems; and supporting ASHRAE governance in conducting special technical activities.

The College meets during each Annual and Winter Conference and the meetings are open to whoever is interested in learning more about the College activities or how to qualify to become a Fellow. Officers are elected each June during the Annual Conference.

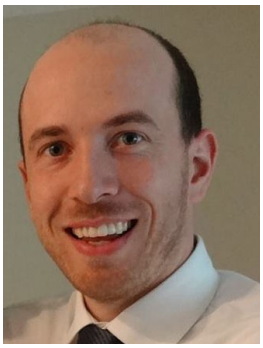
THE 2020-22 OFFICERS:

- President-Dennis Knight
- President Elect-Mike Pouchak
- Secretary-Tom Lawrence
- Past President/Nominating Chair/Development Committee Rep-Dave Branson

Elizabeth Jedrlinic
History Chair

Michael Razzano
History Co-Chair

Grassroots Government Activities Committee (GGAC)



The 2021 City Clean Energy Scorecard analyzes the efforts of 100 major U.S. cities to make buildings and transportation more energy efficient and scale up the use of renewable energy—and do so equitably. It provides a comprehensive national measuring stick for climate progress in cities, from the leaders to those with ample room for progress.

Moving forward, all cities can improve their scores by increasing their commitment to racial and social equity, adopting more mandatory policies designed to improve the energy performance of existing buildings, and setting and tracking progress toward stringent community-wide goals for reducing greenhouse gas emissions.

How does our city score?

Check out the following link.

https://www.aceee.org/city-clean-energy-scorecard

James Hanna
Membership Promotion Chair

Rich Smith
Membership Promotion Co-Chair

YEA

YEA Leadership Weekend (Spring 2022)

Atlanta, Georgia
March 25-27, 2022
Registration is now OPEN!!!

Registration for the spring leadership weekend closes this month on the 11th! This event will be held in Atlanta Georgia from March 25th through the 27th. Registration is $500 which includes meals and hotels for the event. Transportation to the event is not included with the registration cost. An additional technical tour of ASHRAE's new headquarters is available for $200 that will take place on Thursday the 24th . Registration for optional tour will include a hotel room and meals for the additional day. For more details, please look online at ASHRAE's YEA events and programs tab. Look forward to seeing you there!

https://www.ashrae.org/communities/young-engineers-in-ashrae-yea/yea-events-and-programs/yea-leadership-weekend

Michael S. Gerazounis
YEA Chair

Rich Smith
YEA Co-Chair

CTTC

We are excited to see all our chapter members **on March 8th, 2022, Tuesday 6:00 PM** at Westbury Manor. The presentation by Dan LaForgia, who serves as Key Accounts Sales Manager for Swegon North America/Vibro-Acoustics, by Swegon, is about " Guidelines to HVAC Noise Control.".

The following article from ASHRAE's "High Performance Building" journal, which gives free access for its members through the ASHRAE website, discusses Japan's Kyoto station. So many scientists and engineers worldwide issue their findings from their building science studies and experiments at this Journal. These studies can be an excellent source for engineers trying to solve any issues or find new ways to implement projects.

In the meantime, don't forget to follow upcoming events on Long Island Sounder Newsletter and social media link: https://www.linkedin.com/in/ashraeli/

Murat Bayramoglu
CTTC Chairman

Thomas DiBenedetto
CTTC Co-Chairman

Kyoto Station, Kyoto, Japan

July 7, 2020

Site Staff

Designed by visionary architect Hiroshi Hara, Kyoto Station opened in 1997, commemorating Kyoto's 1,200th anniversary. iStock.com/SeanPavonePhoto

By James Scott Brew, AIA; Tomoaki Ushio, P.E., Member ASHRAE

Kyoto, Japan, is world renowned for its historic architecture, rich cultural history and beauty. Kyoto Station is the gate-

CTTC

way to the city and was designed by visionary architect Hiroshi Hara in the early 1990s. The station opened in September 1997. Shortly thereafter, on December 11, 1997, at the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol was signed. Since then Kyoto has become synonymous with climate leadership.

In 2009, the Japanese government selected the city of Kyoto as an environmental model city. Thereafter, the Kyoto Station Building Development Co., Ltd., approached the city to discuss the city's environmental targets and their interest in working together to help reduce Kyoto Station's energy use—the single largest building energy user in Kyoto. At the time, typical HVAC system replacements might achieve 10% to 15% in whole-building, source energy savings, but the project owner wanted to dig deeper.

To describe Kyoto Station as a mixed-use, transportation-oriented development would be an understatement. With a gross area of over 235 942 m^2 (2,539,659 ft^2), nearly a dozen different occupancy types, and more than 77 million users each year, it is truly a city within a building complex. Occupancies include the train station, offices, a shopping mall, department store, a hotel, theater, many restaurants, a museum, specialty shops and various support spaces.

The chilled water plant requires six chillers, including redundant units for maintenance and backup. Four constant speed and two centrifugal chillers (one shown here) were chosen for central plant operation.
NIKKEN SEKKEI

To bring this building complex into compliance with the Kyoto emissions targets, the overarching design brief for this project was to achieve a 30% reduction in whole-building source energy use and a 60% reduction in annual plant energy use. The secret to achieving this comes as no surprise—teamwork.

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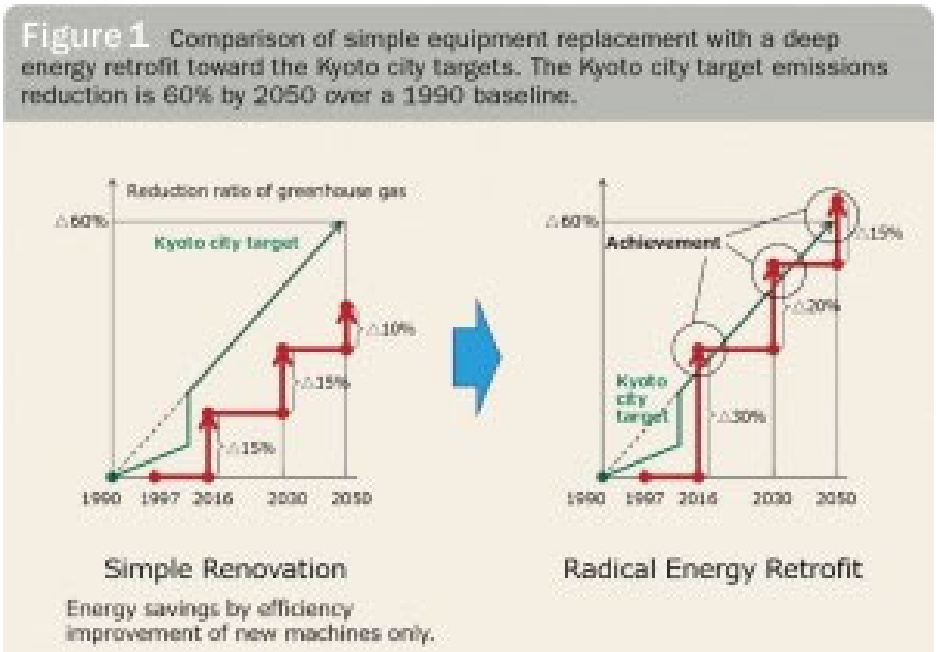

Figure 1 Comparison of simple equipment replacement with a deep energy retrofit toward the Kyoto city targets. The Kyoto city target emissions reduction is 60% by 2050 over a 1990 baseline.

Kyoto Station was the first project in Japan to apply a full life-cycle commissioning process—from the predesign phase, nearly continuously, through the operations phase and for three years thereafter. Commissioning meetings were held once or twice a month for 7.5 years. This life-cycle approach enhanced opportunities for interactive communication among the owner team, commissioning members and the design team during the predesign, concept design and final design phases. At the construction phase, the building operator and constructor were added to the meetings, and many new ideas for energy savings and staging of construction were captured. This integrated process led to the successful achievement of significant energy savings on this project. (Figure 2).

Rightsized Challenge

The original station building site was to be limited in allowable building height and area by Kyoto city rules. Therefore, the electrical service to the site was sized and installed based on this rule. After the original station design began in 1990, these height and area rules were relaxed, and the building complex was allowed to nearly double in height and area. Thus, in the original design, the electrical service was inadequate to use electric chillers, and a gas-fired steam system was chosen instead as the thermal energy source.

At the time of the renovation, the existing gas-fired steam system was very inefficient, so the energy retrofit team immediately focused on reducing the chiller plant size and increasing its efficiency. However, in renovations, central plant size reduction is often difficult as there is the possibility of undersizing it and having a shortage of cooling or heating capacity. This can be a considerable risk for the designer.
For this project, the annual trend of chilled water demand in the existing building was carefully researched before the design phase began.

Using actual energy consumption data for the prior three years, and energy savings calculations from reducing the outdoor air volume (while still satisfying sufficient air volume per person), it was determined that chiller plant size could be reduced by 20%, even with the inclusion of one backup chiller (Figure 3).
This chiller plant size reduction would offer the following advantages:

1. Highly efficient operation of the chiller plant. Each piece of chiller plant equipment is operated at high load, increasing its efficiency.
2. Electric peak load reduction. Reducing chiller plant size allows the use of more electrical heat pumps.
3. Creation of equipment replacement space. Heat source capacity reduction produces equipment replacement space. New chillers could be located in the machine room, and new air-source heat pumps on the roof, in place of old cooling towers.

Initial cost reduction. Chiller plant size reduction also contributes to reducing initial cost.

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With over 77 million visitors per year, Kyoto Station is the second largest station and one of the largest buildings in Japan.

iStock.com/bee32

Considering Options

A variety of central heating and cooling systems were carefully studied to better understand their initial cost, energy cost, operating cost, primary energy consumption and relative peak demand. These systems included a gas-fired steam system (which is the same as the existing system), an all-electric heat pump system and a gas-driven absorption chiller, among others (Figure 4). Altogether, 13 variations of central heating and cooling systems were compared.

The existing steam system had a lot of heat loss and was very low in efficiency. If this gas-fired steam system were changed to an electric chilled and hot water system, large energy savings could be realized. An electric chilled and hot water system, using variable speed centrifugal chillers and air-source heat pumps along with gas-driven cogeneration, was determined to be the most efficient. However, this system was the most expensive compared to the other options. To meet the budget, there was an initial cost reduction by leaving some of the existing steam system piping that serves the hotel and theater AHUs in place temporarily. This modified system was ultimately selected and used in the building (Figure 5).

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With nearly a dozen different building occupancy types, Kyoto Station operates 24 hours per day, every day, making a deep energy retrofit even more challenging.

iStock.com/vanbeets

Adding Value by Subtracting Energy

Several other systems were also used on this project to improve efficiency.

Heat Recovery Chiller

A heat recovery chiller was chosen for reheat for dehumidification in summer and simultaneous cooling and heating in winter. This chiller reclaims the heat produced as a byproduct of the cooling process and can produce hot water more efficiently than an air-source heat pump at low loads.

Heat Pump System Using Well Water

This site has an abundance of well water, which is used as drinking water, flushing water, makeup cooling water and as a heating energy source in the winter. The well water temperature is fairly constant throughout the year compared to the outdoor air temperature, which contributes to highly efficient operation of the heat pump system. The well uses a 530 kW well water pump system

CTTC

Reducing the size of the chiller plant created equipment replacement space. For instance, the new air-source heat pumps can be located on the roof.

NIKKEN SEKKEI

Solar Hot Water System

A 65 kW solar hot water system was added to supply hot water for the hotel.

Central Plant Operation

The chilled water plant requires six chillers, including redundant units for maintenance and backup. A variable speed centrifugal chiller is more efficient in partial loads than a constant speed. So the best option was to select six variable speed machines. But because of cost limitations, a combination of four constant speed and two variable speed machines was selected. To cover the partial-load efficiency, new control logic was developed by the commissioning team and it was adopted in the building energy management system (BEMS).

Pumping Energy Reduction

Pump head pressure was carefully studied based on as-built drawings. All new pumps were selected by cutting redundant head pressure. This, in turn, improved the efficiency of pumps. A variable water supply system was applied for chilled water, hot water and cooling water using estimated terminal head pressure.

Cloud-Based BEMS

The building energy management system (BEMS) for this complex has approximately 15,000 measurement points, which are gathered every one minute. Using the cloud, all BEMS data can be accessed by the internet, from anywhere. Gathering data faster than usual allows modification of heat source operation quickly for optimal energy savings.

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And the Beat Goes On

Much of Kyoto Station is operated 24 hours per day. Like many energy retrofit projects, this complex needed to maintain normal operation. Given the wide variety of building uses and varying occupancy levels, this was particularly challenging for this large-scale, complex project. There was added pressure to complete the project as fast as possible to both meet the Kyoto protocol and reduce energy costs and emissions. The construction phase was completed in just 18 months. Construction was staged, in part, with the changing seasons. For example, as chilled water demand declined with the winter approaching, the old chillers could be sequentially replaced. The ongoing commissioning process since construction completion has contributed to continued improvement in energy use reductions.

Results

Energy consumption of the central plant system was reduced from 455.0 TJ (431 257 MMBtu) to 182.7 TJ (173 170 MMBtu), when comparing 2009 (before renovation) and July 2018 to June 2019 (three years after renovation completion). The reduction ratio of the central plant system is 59.9%. The whole-building primary energy savings is 33.4% (Figures 6 and 7; Figures 8 and 9). The central plant system COP, based on primary energy consumption, improved from 0.73 to 1.64. Chilled water transportation energy was reduced by 80.4%. Annual water use was reduced by 13.4% because the makeup cooling water for a centrifugal chiller is much less than that of a steam-driven absorption chiller.

Cost-Benefit

Energy cost was reduced by $5.7 million dollars (USD) per year after this renovation.
The Kyoto Station building needed to renovate its existing central heating and cooling system to a new one because it was 20 years old and near the end of its useful life. The simple payback is 5.7 years by energy cost reduction alone (Figure 10).

Conclusion

As the targets for continuing to meet the Kyoto Protocol are increasingly aggressive, Kyoto Station ownership knows they have their work cut out for them. They are maintaining a close watch on energy use and are always seeking opportunities for improvement and fine-tuning of systems.

Future projects include changing the remaining steam system serving the hotel and theater to a hot water system, reducing air-handling unit volume to the minimum necessary in other areas, introducing high-efficiency fans and increasing free-cooling, where possible.

Kyoto Station has become a world-class energy retrofit example in a global environmental model city.

Bibliography

Yoshida, H., N. Matsushita, Ph.D. 2020. “Energy conservation in heat-source plants with renovation of a large complex station building introducing commissioning.” 2020 ASHRAE Conference Paper, Seminar 10. •

About the Authors

James Scott Brew, *AIA, is a senior associate architect with the Building Services Design Section, and* ***Tomoaki Ushio,*** *P.E., is a mechanical engineer with the Building Services Design Section at NIKKEN SEKKEI, Ltd., Japan.*

ASHRAE CERTIFICATIONS

Certification

ASHRAE Certified

ASHRAE, accredited by ANSI under ISO/IEC 17024 for the High-Performance Building Design Professional (HBDP) program, has certified more than 2,000 Built Environmental Professionals.

ASHRAE certification programs:

- Are developed by industry practitioners who understand the knowledge and experience that are expected for superior building design and system operation
- Assure employers and clients of subject mastery
- Serve as a springboard for continued professional development
- Offer an easy-to-apply process

FOR MORE INFORMATION GO TO - https://www.ashrae.org/education--certification/certification

Join ASHRAE on Social Media!

ASHRAE Social Media

Follow **ASHRAE on Twitter @ashraenews** for up-to-date news, events, and articles about HVAC&R. Search **#MyASHRAE** on Twitter to see member photos from around the world.

Follow us on Twitter

Most Popular Tweets

Does It Cost More To Build Green? Benefits include reduced operating costs & construction waste.

Online Thermal Comfort Compliance Tool Included In New ASHRAE User's Manual.

87% of households in the US have #AC, 5% do in India. India's tough choice on air-conditioning and climate.

The November issue of the Journal is tested for binding strength to see how many times a page can be turned before the binding would fail.

Harvard & SUNY Upstate Medical University find that workers are healthier and happier in certified green buildings.

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