AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR CONDITIONING ENGINEERS, INC.

ASHRAE Champlain Valley Chapter

THE CHAMP monthly newsletter

of the Champlain Valley Chapter of ASHRAE

JAN. 2016

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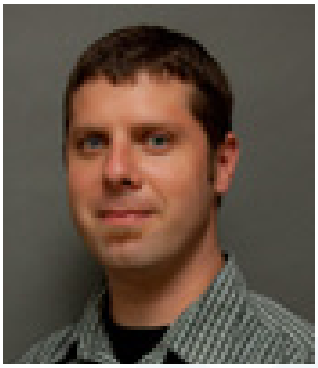
PRESIDENT'S MESSAGE



Our January 13th meeting featured a presentation on pumps. Bill Reed "The Pump Guy" joined us and gave a great presentation on pump laws.

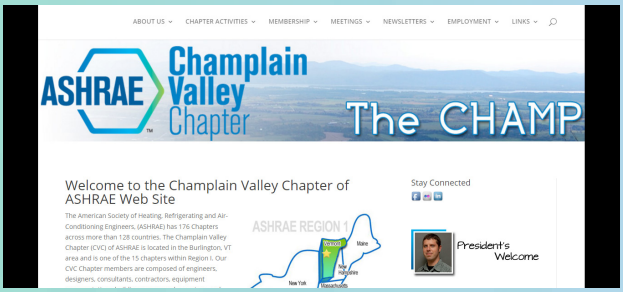
Coming up on February 12th we will have a lunchtime presentation put on by our very own Ray Hickey and Peter Bailey. They are going to discuss energy saving measures being implemented by the refrigeration industry.

Finally, thank you for your support and participation with our local Chapter. We look forward to seeing you at the next meeting.

Rob Ward
ASHRAE CVC President

ASHRAE CVC UPCOMING EVENTS

Visit us online at
www.ashraevt.org
for a list of upcoming events



IN THIS ISSUE:

ASHRAE CVC 2015-16 MEETING CALENDAR

MONTH	MONTHLY MEETINGS		LOCATION	TOPIC
	BOG	DINNER		
2015				
Aug.	8/6/15	8/6/15	VHV Office	
Sep.	9/9/15	9/9/15	Holiday Inn	Water Source Heat Pump Design
Oct.	10/7/15	10/7/15	Holiday Inn	DL Visit - BEQ Presentation
Nov.	11/4/15	11/4/15	Holiday Inn	Dust Collection Systems
Dec.	12/9/15	12/9/15	Holiday Inn	Biomass
2016				
Jan.	1/20/16	1/20/16	Holiday Inn	Presidential Visit
Feb.	2/3/16	2/3/16	Holiday Inn	TBD
Mar.	3/2/16	3/2/16	Holiday Inn	Chilled Beams
Apr.	4/6/16	4/6/16	Holiday Inn	Pump selection
May	5/4/16	5/4/16	Holiday Inn	Air and dirt elimination
Jun.	6/1/16	6/1/16	Holiday Inn	Tailgate Event

GRASSROOTS GOVERNMENT AFFAIRS COMMITTEE

Our State's legislators are now back in full session and one item that is still being discussed and/or debated is the establishment of a carbon pollution tax in the State of Vermont, otherwise referred in the legislation session as H.395 and H.412. Both of these bills were introduced during the 2015 legislation session. Their status on the State Legislation site is listed as having been referred to the Committee on Natural Resources & Energy for action.

Since the time of introduction there have been a number of public meetings and hearings relative to these bills with participants presenting various pros and cons. As the bills currently stand, if they are approved during the 2016 session, and they are signed into law by the governor, a tax would be initiated on heating and transportation fuels such as oil, natural gas, gasoline, propane, and coal. We will try to keep our members up to date with information on related to this bill as it becomes available.

The ASHRAE GGAC website indicates there may be some uncertainty on the future for the federal Energy Policy Modernization Act (EPMA). This bill (S.2012) is a comprehensive bipartisan bill that is supported by most members of the Senate Energy & Natural Resources Committee – including the Committee's top Republican and Democrat. The report website reports that if the EPMA is debated on the Senate Floor, it would most likely occur in the January-February time frame. The concern is that it the debate could halt progress on the bill with the possibility of shelving it until 2017. For a full description and history of the bill, please visit the following web address: http://www.energy.senate.gov/public/index.cfm?p=legislation&id=87D9E1CF-1B96-4815-9D05-387798EFAEA7

Dick Wilcox
ASHRAE CVC GGAC Chair

RESOURCE PROMOTION

Thank you to all the donors that have already made their ASHRAE RP donation this campaign year. We are off to a great start. We have achieved full circle plus status with all the chapter officers, BOG and committee chairs donating at least $100 to RP this campaign. 2015-16 Honor Roll Donors:

Blain Connor	Brent Weigel
Dave Anderson	Jeremiah Trombly, PE
Scott Alexander, PE	Nathan Mascolino, PE
Peter Tousley	Dick Wilcox
Rob Favali	Rob Ward
Shawn Labelle, PE	Tom Zoller, PE
Peter Bailey	Mike Cook
John Grout	Ray Spears
Rachael Mascolino	Rich Fredette
Martha Soule	

Congratulations to Ray Spears for winning the UVM hockey ticket raffle. Ray will be going to the UVM/ Boston College game at Gutterson in February.

We have raised $2,629 as of January 25, versus a goal of $5,300 for the year. We also have matching funds of over $900 already so we are about 70% of goal to date. We still need to raise at least $1,700 to meet our goal. So please donate today!

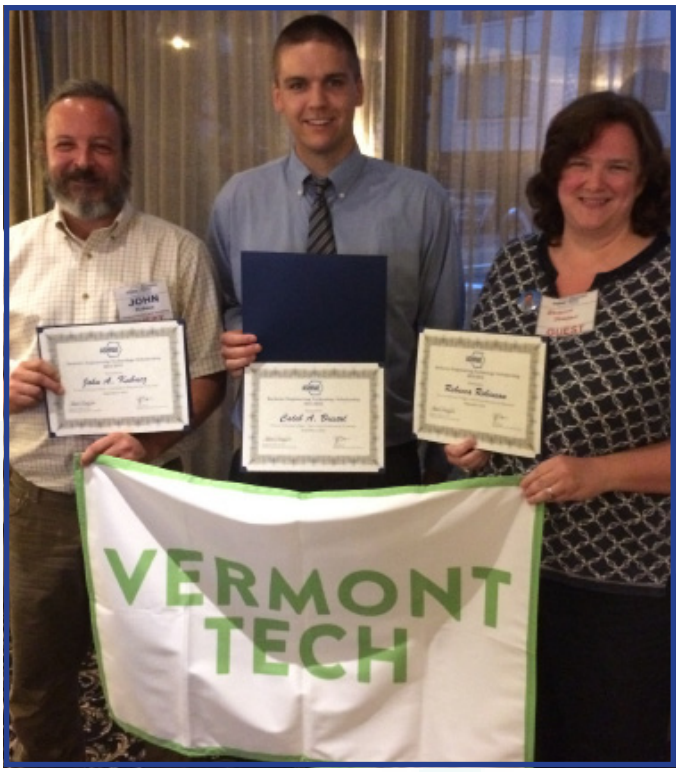
You can donate online at www.ashraerp.com. Click on the upper right "donate" icon and you will be taken to the donation page. All donations are 100% tax deductible and 100% of the donation goes to research.

As always, if you have any questions about ASHRAE Resource Promotion, contact me at tzoller@trane.com, or 383-6444.

THREE VTC STUDENTS RECEIVE ASHRAE SCHOLARSHIPS

The Champlain Valley Chapter of ASHRAE would like to acknowledge and congratulate three VTC students for being awarded Society's 2015-2016 Bachelor of Engineering Technology Scholarships. The three students were selected to receive a one-year $5,000 scholarship award each at the 2015 Annual Conference in Atlanta. These scholarship awards are based on the student's outstanding scholastic and leadership ability, character, potential service to the HVAC&R profession and financial need.

The recipients of the scholarship awards are Caleb Bristol, Rebecca Robinson and John Kubacz.
All three students are Bachelor of Science in Architectural Engineering Technology majors expecting to graduate in May 2016. The students were presented with their ASHRAE scholarship certificates by outgoing CVC President Rob Favali and 2015-2016 CVC President Rob Ward, III on September 9, 2015.



VTC Students with their scholarship certificates from ASHRAE presented on the September 9, 2015 meeting of the Champlain Valley Chapter. (Pictured l to r: John Kubacz, Caleb Bristol and Rebecca Robinson) photo courtesy of Scott A. Sabol, PE, Professor Architectural & Building Technology – VTC

Michael R. Cook
ASHRAE CVC Chapter Historian

BOG OCTOBER MEETING MINUTES

Date: 12-02-2015
Location: Lake View House Restaurant, South Burlington VT
Called to Order: 4:10pm
Called to Order By: Rob Ward
Minutes Recorded By: Martha Holden

ATTENDANCE:

Name	Title	Organization	Present
Rob Ward	President	VHV Company	x
Blaine Conner	President-Elect Program Chair	Vermont Mechanical Inc	
Brent Weigel	Vice President	Cx Associates	x
Jeremiah Trombly	Treasurer	Mountain Air Systems	x
Martha Holden	Secretary	VHV Company	x
Rob Favali	BOG Member	Dubois & King	
Nathan Mascolino	BOG Member	VHV Company	x
Dick Wilcox	BOG Member Grassroots Gov	VHV Company	
Mike Cook	BOG Member History Chair	ARC Mechanical	
Rachel Mascolino	BOG Member	VEIC	
Shawn Labelle	BOG Member	Vermont Mechanical Inc	x
Tom Zoller	Research & Promotion Chair	Trane Inc.	
Peter Bailey	Refrigeration Chair	DEI Controls	

OFFICER'S REPORT

1. **Secretary – Martha Soule Holden**
   a. Shawn L motioned to approve the November meeting minutes, Nathan M Second, motion carried.

2. **Treasurer's Report – Jeremiah Trombly**
   a. Last recorded deposit 10-22-2015.
   b. Current Balance: $17219.12
   c. Tried to meet with Pete B, but had to reschedule.

3. **Chapter Programs – Blaine Conner**
    a. Blaine C absent from tonight's meeting.
    b. No new business.

4. **Resource Promotion - Tom Zoller**
    a. Tom Z absent from tonight's meeting.
    b. Rob W offered the following information:
    Donations $3305 with Goal $5300 that's 62% towards goal.
    c. No new business.

5. **Membership – Martha Soule Holden**
    a. Working on delinquent members and noted that the members do not have the same anniversary dates for renewing membership status. Again, affirming the need to contact members on monthly basis to encourage renewals.
    b. Asked the committee to explain a report I noticed while on the ASHRAE site called Ashrae Chapter Dues Utility? It was explained that when renewing your annual membership you also need to include paying for annual Chapter Dues of $25.00 which is a common error by members.

6. **Student Chapter – Brent Weigel**
    a. VTC has a conference budget of $6,575 for 12 students and Chris Reilly. After receipt of monies from the VTC Student Council and chapter members, the VTC Chapter has a remaining balance fundraising goal of $3,175.
    b. Discussed how CV Chapter would help in achieving their goals. These amounts were suggested: $2175, $2000, or $1800. Due to the healthy chapter funds this year, Nathan motioned to donate $2000, Shawn L. second, the motion was carried.
    c. Chris Reilly was to be at this evening's meeting and the intent was to let inform him of the Chapter's donation amount this year reflecting the Chapter's interest in the students involvement and interest with ASHRAE CVC.

7. **Grassroots Government – Dick Wilcox**
    a. Dick W. absent from tonight's meeting. No change.

8. **History – Mike Cook**
    a. Mike C. absent from tonight's meeting. No change.

9. **Refrigeration – Peter Bailey**
    a. Peter B. absent from tonight's meeting. No change.

GENERAL / NEW CHAPTER BUSINESS

1. Rob Ward announced the formation of the Chapter Nominating Committee to be addressed at our next meeting.
2. Plan to speak with Charlie Carpenter about this year and next.
3. Newsletter write-ups due December 14, 2015.
4. Martha H. acknowledging it's tradition for the BOG Secretary is responsible for all banners including transporting, assembling, and disassembling. Martha motioned to revisit that responsibility and suggested enlisting co-members from the same office to assist with this task by sharing the responsibility. We discussed the actual banners

necessary at each meeting and selected only the pertinent ones. We didn't actually vote on this item, but agreed to distribute the bags amongst the attendees from our VHV office.

5. Next meeting January 13, 2016.

MOTION TO ADJORN

a. Martha H. motioned to adjourn the meeting and Nathan M. second, motion was carried. The meeting adjourned at 5:00 pm

msh

These minutes are the writers understanding of the discussions involved. If there are any exceptions taken, or omissions, please notify the writer immediately.

ASHRAE CVC CHAPTER AWARD WINNERS

OVERALL CHAPTER AWARDS

Champlain Valley Endowment Chevron
Champlain Valley Full Circle Chevron
Champlain Valley Bronze Treasury Ribbon

INDIVIDUAL CHAPTER AWARDS

Presidential Award of Excellence – Star Award Special Citation:
Robert J. Favali

Research Promotion Goal, High Five, and Challenge Goal:
Tom Zoller

Outstanding Performance Grass Roots Governmental Advocacy Committee Honorable Mention: Richard Wilcox

Gold Ribbon for History Award:
Michael Cook

Green Ribbon Award – Membership Committee:
Joshua Chiappone

Chapter Service Award:
Steve Poole

Black Ink Award - Honorable Mention:
Rachael Mascolino

Student Activities Best Student Design Competition Participation HVAC Design:
Vermont Technical College
2013-2014 & 2014-2015

Awardees: Bachelor Engineering Technology Scholarship 2015-16
Caleb Bristol
John Kubacz
Rebecca Robinson

ASHRAE Learning Institute

Seminars & Courses at ASHRAE's Winter Conference in Orlando, FL

2 WAYS TO REGISTER

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

Full-Day Professional Development Seminars

$485/$395 ASHRAE Member -- Earn 6 PDHs/AIA LUs or .6 CEUs

Commercial Building Energy Audits
Saturday, January 23, 2016 – 8:00 a.m. to 3:00 p.m.

Commissioning Process in New & Existing Buildings
Saturday, January 23, 2016 – 8:00 a.m. to 3:00 p.m.

Designing HVAC Systems to Control Noise & Vibrations
Saturday, January 23, 2016 – 8:00 a.m. to 3:00 p.m.

Energy Modeling Best Practices and Applications
Tuesday, January 26, 2016 – 9:00 a.m. to 4:00 p.m.

Operations & Maintenance of High-Performance Buildings
Tuesday, January 26, 2016 – 9:00 a.m. to 4:00 p.m.

Half-Day Short Courses

$159/$119 ASHRAE Member -- Earn 3 PDHs/AIA LUs or .3 CEUs

Laboratory Design: The Basics and Beyond
Sunday, January 24, 2016 – 3:30 p.m. to 6:30 p.m.

Troubleshooting Humidity Control Problems
Sunday, January 24, 2016 – 3:30 p.m. to 6:30 p.m.

Understanding & Designing Dedicated Outdoor Air Systems
Sunday, January 24, 2016 – 3:30 p.m. to 6:30 p.m.

Variable Refrigerant Flow System Design & Applications NEW!
Sunday, January 24, 2016 – 3:30 p.m. to 6:30 p.m.

Air-to-Air Energy Recovery Applications: Best Practices
Monday, January 25, 2016 – 8:30 a.m. to 11:30 a.m.

Applications of Standard 62.1-2013
Monday, January 25, 2016 – 8:30 a.m. to 11:30 a.m.

Building Demand Response & the Coming Smart Grid
Monday, January 25, 2016 – 8:30 a.m. to 11:30 a.m.

Energy Management Best Practices
Monday, January 25, 2016 – 8:30 a.m. to 11:30 a.m.

Advoiding IAQ Problems
Monday, January 25, 2016 – 2:45 p.m. to 5:45 p.m.

Commissioning Process & ASHRAE Standard 202
Monday, January 25, 2016 – 2:45 p.m. to 5:45 p.m.

Complying with Standard 90.1-2013: HVAC/Mechanical
Monday, January 25, 2016 – 2:45 p.m. to 5:45 p.m.

Evaluation and Control of Legionella in Building Water Systems NEW!
Monday, January 25, 2016 – 2:45 p.m. to 5:45 p.m.

Exceeding Standard 90.1-2013 to Meet LEED Requirements
Monday, January 26, 2016 – 9:00 a.m. to 12:00 p.m.

IT Equipment Design Evolution & Data Center Operation Optimization
Monday, January 26, 2016 – 9:00 a.m. to 12:00 p.m.

Designing High-Performance Healthcare HVAC
Monday, January 26, 2016 – 1:00 p.m. to 4:00 p.m.

ASHRAE HVAC Design Training

2 Courses, 5 Days of Intense Instruction

Atlanta • Halifax • Hong Kong • Houston

Kuala Lumpur • Miami • Minneapolis • Vancouver

HVAC Design: Level I – Essentials - Registration is $1,264 ($1,009 ASHRAE Member)

Gain practical skills and knowledge in designing and maintaining HVAC systems that can be put to immediate use. The training provides real-world examples of HVAC systems, including calculations of heating and cooling loads, ventilation and diffuser selection using the newly renovated ASHRAE Headquarters building as a living lab.

HVAC Design: Level II – Applications - Registration is $854 ($699 ASHRAE Member)

HVAC Design: Level II — Applications provides instruction on HVAC system design for experienced HVAC designers and those who complete the HVAC Design: Level I – Essentials training. The training provides information that allows practicing engineers and designers an opportunity to expand their exposure to HVAC systems design procedures for a better understanding of system options to save energy.

Visit www.ashrae.org/hvactraining to register.

PROPOSED ASHRAE/ACCA STANDARD FOR ENERGY AUDITS OPEN FOR PUBLIC COMMENT

Contact: Jodi Scott
Public Relations
678-539-1140
jscott@ashrae.org

Proposed ASHRAE/ACCA Standard for Energy Audits Open for Public Comment
ATLANTA – While energy audits are vital to ensuring energy efficient buildings, the audit industry has been largely unstructured. Work products that are labeled energy audits vary greatly in scope, rigor and quality.

A proposed standard from ASHRAE and the Air Conditioning Contractors of America (ACCA) would bring order to the "Wild West" of the energy audit industry.

ASHRAE/ACCA Standard 211P, Standard for Commercial Building Energy Audits, is open for public comment until Jan. 4, 2016. To comment or learn more, visit www.ashrae.org/publicreviews.

Standard 211P will establish consistent practices for conducting and reporting energy audits for commercial buildings.

"The standard has the potential to make a huge impact on completing energy saving projects in existing buildings," Jim Kelsey, chair of the Standard 211P Committee, said. "Currently there is no standard that defines what constitutes an energy audit. Most practitioners in the energy audit industry are trying to do the right thing for their clients by finding projects and quantifying energy and cost savings in energy audits. However, without a consistent standard, we have seen the quality and approach to energy auditing vary widely throughout the industry. Without standardization, it's been the Wild West out there – anyone who carries a clipboard and a camera can call themselves an energy auditor and their report an energy audit. What we hope to accomplish with this standard is to set appropriate minimum criteria for what approaches are expected, what information should be in an audit, and how that information is communicated to the end client."

The standard will define the procedures required to perform Energy Audits Levels 1, 2 and 3; provide a common scope of work for these audit levels for use by building owners and others; establish standardized industry practices ; and establish minimum reporting requirements for the results.

"One new area that I'm excited about in the standard is electronic data exchange for audit results," Kelsey said. "In this version, we've adopted standardized reporting formats that are consistent with new tools to make it easy to transmit results to cities and agencies. This approach has several benefits to the energy world. First, consistent reporting enables energy auditors to

streamline their processes. Currently, it is common for different customers to require different reporting formats which leads to a lot of customization for each job. Secondly, standard formats allow us to convert audit results to common data formats (such as BuildingSync XML). This makes it easier for cities, for example, to import audit results to a common database, rather than each agency requiring auditors to manually enter their results in the city's platform.

ASHRAE first addressed audits in 2004 with its publication Procedures for Commercial Building Energy Audits (1st Ed), which introduced the concept of ASHRAE Energy Audit Levels 1, 2 and 3 as a shorthand for designating the depth of an energy audit. That concept is now commonly used in the commercial building sector. In 2011, a second edition, which added guidelines for best practices in energy audits, was published.

These books have been widely adopted, cited by rating programs and in cities like New York and San Francisco where local ordinances require energy audits for certain buildings.

"However, the books were written as guides, not in code-enforceable, standard language," Kelsey said. "With the new standard, we will hone the clarity of those audit level definitions and make enforcement clearer, and potentially broaden the adoption of the ASHRAE audit levels."

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 54,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today. More information can be found at www.ashrae.org/news.

U.S. HOUSE OF REPRESENTATIVES MISSES OPPORTUNITY TO SUPPORT ENERGY EFFICIENCY

Contact: Jodi Scott
Public Relations
678-539-1140
jscott@ashrae.org

U.S. House of Representatives Misses Opportunity to Support Energy Efficiency

ATLANTA – This week, the U.S. House of Representatives had the chance to stand with the private sector, professional and nonprofit stakeholder organizations to reaffirm its strong commitment to support the development, adoption and implementation of private sector-led, consensus-based model building energy codes. Instead, the House chose to pass the North American Energy Security and Infrastructure Act of 2015 (H.R. 8), which includes language that threatens to reduce understanding of the

potential full impacts of the model building energy codes by likely limiting the technical assistance that the U.S. Department of Energy currently provides, upon request, to ASHRAE, the International Code Council, States and Indian tribes for the development, adoption and implementation of these model codes.

"While ASHRAE is disappointed with the passage of this language, we applaud the efforts of Representative Peter Welch (D-VT-At Large) in seeking an amendment to H.R. 8 that would have replaced the harmful building energy codes language with language from the bipartisan Energy Savings and Industrial Competitiveness Act of 2015 (H.R. 2177)," ASHRAE President David Underwood said.

Previously introduced by Representatives Welch and David McKinley (R-WV-1), H.R. 2177, is widely supported and has been carefully negotiated over a number of years, embodying the collective wisdom of many.

"ASHRAE remains hopeful that Congress will ultimately demonstrate its support for market-driven energy efficiency by enacting legislation that protects the development, adoption and implementation of private sector-led, consensus-based model building energy codes," added Underwood.

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Do You Know Your ASHRAE REGION I Chapters?

ASHRAE has 14 Regions that reach virtually into the entire world. Vermont is in Region I which has 15 chapters from Maine to New Jersey.

Boston	Boston, MA
Rhode Island	Providence, RI
Connecticut	Hartford, CT
Long Island	Garden City, NY
New Jersey	Newark, NJ
New York	New York, NY
Northeast	Albany, NY
Central New York	Syracuse, NY
Rochester	Rochester, NY
Niagara Frontier	Buffalo, NY
Champlain Valley	Burlington, VT
Maine	Lewiston, ME
Twin Tiers	Owego, NY
Bi-State	White Plains, NY
Granite State	Manchester, NH

REFLECTIONS ON 45 YEARS OF ASHRAE CVC

On January 15, 2015 our chapter invited all past presidents of the Champlain Valley Chapter of ASHRAE to recognize our 45th year as an ASHRAE chapter. Of the 45 past presidents, 22 were able to attend this event along with 51 people including wives, friends, and members to reflect on this milestone and reacquaint with old friends and current members of the chapter.

"Twenty-two past CVC Presidents pose with ASHRAE President Tom Phoenix and Region 1 DRC Joe Furman, on January 15, 2015, in recognition of the 45th anniversary of the Champlain Valley Chapter."

We learned from William "Bill" Lotz that the Champlain Valley Chapter (CVC) was born from a group discussion of individuals who as ASHRAE members discussed alternative means to participate in ASHRAE without making the 3-1/2 drive to Boston, our designated chapter at the time. Why not start our own local chapter?

Bill Lotz was the first president of ASHRAE CVC for the 1969-1970 calendar year, when much of the organizational planning was accomplished. On October 2, 1970 the Champlain Valley Chapter of ASHRAE was chartered with ASHRAE National President W. Hole, Montreal Chapter President P. Gaudette and over 150 people in attendance. Forty-five years later it remains an active and relevant group committed to serving Vermont's ASHRAE membership.

We were delighted and privileged to be joined by current Society President Tom Phoenix, PE and Region 1 Director and Chair, Joe Thurman to celebrate this milestone event.

ASHRAE CVC: Membership and Volunteerism Strength

Tom graciously volunteered (don't we all) to be our featured speaker for the evening presenting his presidential theme for the year. Tom's presidential theme focused on three areas of ensuring ASHRAE's success: People, Passion and Performance, which was well suited for this occasion.

People – Key Factor #1: ASHRAE's greatest assets are the volunteers who have the biggest impact. Of the 54,000 members worldwide, those

who invest their time, energy, and talent make ASHRAE a premier engineering organization. Volunteers will continue to build the Society into a more viable and innovative organization into the future. As it pertains to the success of ASHRAE, both nationally and internationally, the success of local chapters like Champlain Valley will be determined by the continued engagement and growth of the engineers, design professionals, facility personnel, contractors, manufacturers and vendor representatives that make up our membership (currently 130 strong) and serve the Vermont community. Most importantly the volunteers who actively contribute and serve as officers, board members and chairs determine the continued existence of the chapter planning the monthly educational and technical programs of speakers, presenters and social events contributing to future success and accomplishments for CVC. We are grateful to have a committed group of employers and vendor companies that actively support their employees who participate in the operation of the Champlain Valley Chapter of ASHRAE in terms of time commitment and willingness to provide financial support for the chapter and its fund-raising activities.

Passion – Key Factor #2: Individuals throughout society commit their time and energy to causes and organizations they perceive to be valuable and worthwhile. It is this belief to actively contribute and participate we call 'passion", a motivating factor to persevere through issues which initially may seem daunting or unsolvable yet some inner energy of purpose keeps small groups of people working together to accomplish a goal or mission. Borrowing a statement from businessman, motivational speaker and president of High Point University, Dr. Nido Qubein, "Passion ignites energy. Energy ignites a purpose. Having a purpose leads to success. But nothing happens unless there is passion." (ASHRAE Journal August 2014)

I would venture to say there was not a past CVC president who did not experience this "passion" of group purpose and energy at some point during their tenure. Whether planning a roster of topics and presenters to engage membership to attend our monthly meetings or an educational seminar, soliciting funds for chapter events, planning a CRC, funding our two scholarship funds or ASHRAE Research Promotion, passion was evident. My experience shows this passion is built from a comradery developed among our volunteers where everyone is willing to help each other because as volunteers we recognize our time is limited. I suspect our membership has experienced this "passion" in their professional, family or community life whether as a member of a building design team working through the process of sorting through the many options and alternatives for selecting an HVAC system, maintaining a budget and time constraints that a construction team muddles through towards providing a client with the most energy efficient, aesthetic, healthy and quality building. In the end a well-deserved feeling of accomplishment and satisfaction is felt from all our efforts.

Performance – Key Factor #3: Measurement either quantified or qualified, or extent of achievement towards accomplishing a goal, mission or outcome. Per Tom's discussion ASHRAE performance has many meanings: the performance of our volunteers and staff to meet members' expectations; the performance of

the buildings we design, construct and operate to meet our clients' expectations; and the performance of our Society. Tom indicated the Society had recently adopted a new strategic plan defining what we want and hope to accomplish going forward. Building performance will remain as one of the top driving forces in the HVAC industry and has been and will continue to be one of ASHRAE's priorities for many years. Our existing standards and guidelines are regularly updated as research and new information is provided and acted upon as well as the development of new standards for the industry as new challenges and needs surface or are identified.

Given that the Champlain Valley Chapter has remained relevant is an indication that the performance of our past presidents and volunteers over the past 45 years is a testament to outstanding performance.

A Historical Backdrop of the Energy Challenge Through the Chapter's Existence

So let's take a look back over the previous 45 years as we initiate our third generation of local ASHRAE leaders of the Champlain Valley Chapter. Following is a reflection of what has been established and accomplished by the chapter and where we have been and where we are going. When CVC was chartered in March 1970, Richard M. Nixon was President of the United States, and the nation was deeply involved in the Vietnam War, the country was experiencing political tensions and stress at home through racial issues, an anti-war movement and a point of national pride, the NASA space program landed the first humans on the moon.

A 45 Year Timeline (1969-2014) History of Alternative Energy and Fossil Fuels

Jan. 1969	Santa Barbara Oil Spill Draws National Attention
1970s	Solar Cells Begin to Lower in Price & Become Cost Effective for Use on Land ($100/W to $20/w)
1970	Oil Production Peaks in Lower 48 states (9.4 million bbl/day)
1973	OPEC Oil Embargo Against the US Causes Gas Shortages and Rationing
Nov. 1973	Trans-Alaska Pipeline Authorization Act of 1973 Passed to Increase Domestic Oil Supplies in Wake of Oil Embargo
1975	Corporate Average Fuel Economy (CAFÉ) Standards Set by the Energy Policy Conservation Act
Dec. 1975	Formation of the Strategic Petroleum Reserve; President Ford Signs into Law the Energy Policy & Conservation Act
1977	Formation of the Solar Energy Research Institute (SERI)
Apr. 1977	President Carter Delivers Famous Energy Speech Arguing for Conservation and Alternative Fuels
Aug. 1977	Department of Energy Organization Act is Signed, creating the US Department of Energy
1978	World's First Solar-Powered Village; Tohono O'odham Reservation, Arizona
Nov. 1978	Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978
Mar. 1979	Three Mile Island Nuclear Accident in Pennsylvania Creates Widespread Public Opposition to Nuclear Power
Dec. 1980	World's First Wind Farm Built in New Hampshire; 20 Turbines Rated 30KW each at Crotched Mountain (It Failed)
1981	Solar One: First Large Scale Solar -Thermal Power Plant Begins Operation in Dagett, California (produced 10 MW of Electricity from 1982-1986)
1981	Construction Begins on the World's Largest Wind Farm in California's Altamont Pass; Bird Deaths from Wind Turbines (~4,700 Bird Deaths/Yr.); 4800 Small Turbines w/Capacity of 576MW, Generating About 1.1 Terawatt-hrs of Electricity;
1982	First Complete Decontamination and Decommissioning of a Nuclear Reactor in the US (Shippingport)
Apr. 1986	Largest Nuclear Accident Ever Takes Place at Chernobyl in the Former Soviet Union
Mar. 1989	Exxon Valdez Disaster in Alaska Becomes the Largest Oil Spill in US Waters (11 million Gallons Released into Environment)
Jan. 1990	Congress Passes Act to Stimulate Development of Hydrogen Power
1994	US Begins Importing More Petroleum Than It Produces
Apr. 1996	Solar Two Plant (10MW) Demonstrates Low Cost Method of Storing Solar Energy - Built On Site of Its Predecessor Solar One
1997	EV1 Electric Car is Made Available to the Public For Lease; Lease Program EV1 Later Dismantled by GM; About 1000 Produced Before Plug Pulled Due to Insufficient Demand
Feb. 2003	President Bush Unveils the Hydrogen Fuel Initiative to Promote Hydrogen Fuel Cell Development

The one dominating and persistent theme since the inception of our chapter and the following 45 years as well as ASHRAE as a whole could be termed the "Era of Energy Consciousness" and the challenge to address this dominant issue. To the left is a timeline of energy-related events which have occurred since CVC became an ASHRAE chapter. It illustrates a story of progress, setbacks, disasters and optimism highlighting that the journey is never a straight forward experience and the great challenges nations undertake should have tempered expectations of the speed which accomplishment can be achieved.

In 1973, the Organization of the Petroleum Exporting Countries (OPEC) implemented an oil embargo in retaliation for a US decision to re-supply the Israeli military during the 1973 Arab-Israeli War to gain leverage to the post war peace negotiations. Our re-supply actions were in response to Soviet Union sending arms to Egypt and Syria. The embargo banned petroleum exports to targeted nations including the US and cut oil production. The United States post WWII economy and its prosperity had thrived on cheap energy (mainly oil) at that time oil prices were declining as world oil production was increasing. However our consumption was out pacing national production so we were becoming more reliant on foreign oil. The 1973 embargo severely strained the US economy. Due to the increased dependence on foreign supplies of oil began a rapid trajectory increase in oil prices leading to a national oil shortage. The 1973 oil embargo brought attention to America's energy demand and vulnerability to supply disruptions. This shortage was illustrated in Photographs of the time of motorists lined up at gas stations to

Timeline Continued

Feb. 2003	Plans Announced to Build FutureGen, the World's First Zero Emissions Coal Power Plant
Nov. 2005	US House Prevents Drilling for Oil in the Arctic National Wildlife Refuge
Nov. 2007	IPCC Report Concludes Climate Change is Happening and is Mostly Human Caused
Feb. 2008	First Commercial Cellulosic Ethanol Plant Goes into Production in Wyoming
Oct. 2008	National Biofuel Action Plan Unveiled; Goal to Cut US Gasoline Consumption by 20% Over the Next 10 Years
Feb. 2009	American Recovery and Reinvestment Act of 2009 Contains Billions of Dollars for Renewable Energy and Energy Efficiency Developments
Apr. 2009	First Framework for Wind Energy Development on the US Outer Continental Shelf Announced
May 2009	US Announces $467 Million in Recovery Act Funding for Solar Energy and Geothermal Energy Development
Oct. 2009	US Invests $3.4 Billion to Modernize Energy Grid (to be Matched by Industry for a Total Public-Private Investment Over $8 Billion)
Oct. 2010	BP Oil Rig Explodes & Causes Largest Oil Spill in US History (Estimates of 30 Million Gallons Released; Surpasses Exxon Valdez by 3 Times)
Mar. 2011	Earthquake Off Coast of Japan Damages Six Power Plants at Fukushima Dai-ichi: Nuclear Crisis Eventually Reaches Level 7, the Highest Level Possible
Sept. 2011	Solar Power Company Solyndra Declares Bankruptcy After Receiving $528 Million in Federal Loan Guarantees (also $1 Billion in Private Capital)
Feb. 2012	US Nuclear Regulatory Commission (NRC) Approves New Nuclear Power Plants for First Time Since 1978; Two Reactors to be Built in Georgia
Mar. 2012	EPA Announces First Clean Air Act Standard for Carbon Pollution from New Power Plants (New Rule Proposes all New Fossil Fuel Plants Meet Output-Based Standard of 1,000 lbs of CO2 Per Megawatt Hr.)
Apr. 2012	EPA Issues First Ever Clean Air Rules for Natural Gas Produced by Fracking
June 2013	President Obama Releases His Climate Change Action Plan Including Increased Use of Renewable Energy and Carbon Pollution Restrictions for Power Plants
Sept. 2013	EPA Issues New Proposed Rules to Cut Greenhouse Emissions from Power Plants
Feb. 2014	Ivanpah, the World's Largest Concentrated Solar Power Generation Plant, Goes Online; Mojave Desert, CA., 392MW
June 2014	EPA Proposes First Ever Rules to Reduce Carbon Emissions from Existing Power Plants (Goal to Cut CO2 Emissions by 30% by 2030, Compared to 2005)
Sept. 2014	Rockefellers and Over 800 Global Investors Announce Fossil Fuel Divestment (Investors Have Pledged to Withdraw a Total of $50 Billion from Fossil Fuel Investments Over the Next Five Years)

ProCon.org (2013, June 13). Historical Timeline. Annotated from http://alternativeenergy.procon.org/view.timeline.php?timelineID=000015

buy gasoline. The average car mileage in 1970 was only 13.5 mpg and one gallon of gas at the pump was less than a quarter.

This began new US policy measures towards energy conservation and efficiency in concert with development of domestic energy sources. Early responses were focused on boosting production and voluntary measures to promote energy conservation. Faced with price hikes increasing from $3 to $12 per barrel practically overnight; national leaders called for measures to conserve energy by imposing gas rationing and closing gas stations on Sunday. Lasting impacts of these policy measures include price controls (regulation), national speed limits, creation of strategic petroleum reserve, Energy Policy and Conservation Act of 1975, creation of the Department of Energy (1977) and many government funded projects and research in alternative fuel development, alternative sources of power like wind, solar and nuclear in addition to energy conservation.

Historical trends converged in the 1970's can be seen as a turning point towards an ongoing transition from fossil fuels. We have made gains in some areas but have experienced no gains in other areas. Today, roughly 50% of electrical generation is still dominated by coal, oil still drives transportation and both coal and oil remain lower in price compared to alternatives. An ongoing battle in policy decision making of competing interests between public ownership of resources and the regulated commerce of these resources by private interests which were given the right to extract, process into products and services for profit. Our mix of energy resources changes over time slowly as we have to wait for technological breakthroughs, innovation, entrepreneurial vision and consumer demand to change the marketplace. However this political clash in determining the level of private/public control over energy resources results in a political gridlock in sound decision making at a time when it is needed most.

In his book, Collapse, How Societies Choose to Fail or Succeed, Jared Diamond claims a society's response to its problems depends on its political, economic and social institutions and cultural values and are significant factors affecting whether that society solves (or attempts to solve) its problems. We have to ask ourselves: Are we ready to acknowledge the seriousness of the environmental problems facing us? If the answer is "yes" it will require the courage to practice long term thinking and make courageous and anticipatory decisions to address the problems before they reach crisis proportions.

An unanticipated benefit of the energy crisis and ensuing energy conservation movement was the birth of environmental awareness as US citizens and the world began to think about energy differently including energy conservation, carbon footprint and public health (pollution, smog, CO2 build-up) that are still be related and forthright in our thinking today. The energy crisis has allowed the developed countries the benefit of getting a head start addressing climate change by decreasing carbon emissions as a result of energy conservation and efficiency measures undertaken. Prior to 1973 US carbon emissions were growing at 4.5% annually, since then only at O.4% annually, a significant reduction. It goes without saying that current emissions are still unsustainably high and need drastic reductions to avoid the long term serious effects of climate

change.

Reflecting back on the last 45 years should provide us optimism that technological solutions to global environmental problems can be a factor in addressing climate change, that government research support can yield payoffs, bipartisan action on national/global environmental problems can be achieved when directed at people's economic decision making.

Over the last 45 years, accounting for over 400 CVC sponsored presentations, workshops, seminars and building tours, topics other than energy conservation and efficiency measures included indoor air quality concerns due to tighter buildings, the phase-out of CFC based refrigerants towards more environmental friendly and natural refrigerants to address the depletion of the ozone layer as examples. Our Engineers and designers have had to become familiar with, adopt, comply with and utilize energy codes and standards which were developed for the industry by ASHRAE and others in response to the challenges of energy awareness. Many programs presented topics introducing new technologies like air and water source heat pumps, air to air heat exchangers, heat recovery equipment, condensing boilers, economizers, evolution of ATC controls from pneumatics to DDC and energy management systems. We have recently seen an emphasis on higher insulated building envelopes and high efficiency windows in response to high performance and net zero building trends. We have experienced the emergence of variable speed drives for pumps and fans, the application of systems like VAV, DOAS, radiant heating and cooling, and VRF as common practice. The introduction and application of the next generation of renewable energy systems such as solar, wind and biomass is becoming accepted and applied within the industry. The implementation of building and HVAC and lighting systems commissioning to align design intent with ensuring operational performance and maintainability during and upon completion of construction is becoming standard practice for most of the larger commercial and institutional buildings. Recently building labeling, benchmarking of energy performance and energy utilization has become a focus of ASHRAE. Again this illustrates over the entire spectrum of monthly topics the primary focus of ASHRAE CVC has been in response to the energy challenge and accompanying environmental awareness evolving from the 1973 oil embargo.

A Non-Inclusive List of Topics That We Can Look Forward To Keep Our Attention

- Buildings account for 40% of the nation's CO2 emissions per the US Department of Energy. To reduce the building sector's impact on climate will require bringing current building practices up to the level of best practices for significant energy and cost savings in particular applying to the nations' existing building stock. Best practices should be applied to existing buildings when significant upgrades, additions and renovations are planned. Specific focus should be on space heating, ventilation, air conditioning, lighting and domestic water heating as well as building envelope and windows as opportunities arise. Bringing the existing building stock up to best practices will be a challenging

and long term process as our economic system does not account or plan for obsolescence very well but represents a significant market to address reducing CO2 emissions and impact of climate change. It has been reported that new building construction will only account for about 10% of the nation's building stock between now and 2050 showing that 90% of the nation's building stock is already in place and operating inefficiently in terms of energy use.

- An integrated and holistic design approach between engineering and architecture taking into account of building operations, green building concepts, durable, sustainable, efficient and recyclable materials and equipment manufactured locally when available. To introduce and apply alternative energy systems. This process involves all building professionals, and interested parties to share their experience and bringing their knowledge to the table in the development of a building design and to justify the multiple choices of equipment, systems and product selections. Decisions need to be sound in principle and appropriate to the application under consideration utilizing modern software tools like energy modeling and energy savings analysis programs.

- Increased application of on-site power generation using renewable energy sources interfaced with the electric grid preferably using local, sustainable and obtainable energy sources.

- Alternative urban design, land use planning and utilization (compactness and mixed use) to accomplish the following: (1) reduce vehicle miles traveled (2) reduced space conditioning thru the use of integrated design approaches and district heating and cooling systems (3) reduce municipal infrastructure requirements.

- Increased awareness on the efficient use of natural resources, waste reduction, energy supplies, energy efficient appliances Indoor air quality (IAQ), water conservation, occupant health and productivity.

- Development and usage of energy labeling and rating programs as well as building energy use metrics will continue to evolve and be refined to provide a necessary performance data collection and documentation procedure to create a usable database for benchmarking purposes (like ASHRAE BeQ).

- Continue the trend to incorporate smart self- learning ATC and the measurement of performance relative to building type/ classification, occupancy and weather conditions with the goal of minimizing energy consumption and wear and tear on equipment. Other features emerging from DDC based controllers are self- diagnostic programs, fault conditions, remote access for diagnosis and control functionality checkouts and wireless technology.

- Sustainability has been recently introduced and will continue to dominate the conversation which requires an

understanding and awareness of the availability of our natural resources such as water, air, energy, minerals, forests, fisheries etc. so as to provide for the needs of the present without compromising the ability of future generations to fulfill their needs.

- The LEED process has allowed us to explore optimum solutions in terms of cost of energy and materials, functionality, and which technologies are considered and appropriate for specific applications (building types and occupancy). Recently constructed LEED high performance and emerging net zero buildings are giving us an abundance of examples to showcase the benefits and features of sustainable design to the public while reinforcing and rewarding the creativity of the design professional.

ASHRAE as a professional society will continue to share its knowledge, contributing to the knowledge base and literature of the HVAC field, be active in supporting and conducting HVAC research, writing new and updating existing industry standards, and encouraging and supporting students to pursue engineering.

Professional development and education on timely subjects and the sharing of knowledge amongst ourselves and the monthly social comradery will remain the main objective of chapter activities. ASHRAE will continue to be the foremost technical resource and purveyor of educational information for the professional growth of its members to assist in their daily professional activities. The Champlain Valley

ASHRAE Champlain Valley Chapter

ACHIEVEMENTS 1969 - 2015

Chartered as an ASHRAE Chapter on October 2, 1970

Champlain Valley Chapter hosted four Chapter Regional Conferences (CRC's):

- Stowe – September 20 – 21, 1973
- Burlington – August 14 – 16, 1986
- Burlington – August 10 – 12, 2000
- Burlington – August 15 – 17, 2013

Individual ASHRAE Recognitions of Note

- Joe Canavan became the first CVC Chapter member to become an ASHRAE Life Member, November 1973
- Gordon W. Root, Sr., PE awarded ASHRAE grade of Fellow at 1994 Winter Meeting in New Orleans
- Gus Mastro was elected and serves as Region 1 Director and Chair (DRC) from 1996-2000
- Region 1 Golden Gavel Award Winners
- Edward E. Pearson, PE, CVC President 1990-1991
- Michael Rose, CVC President 1997-1998
- Tom Zoller, PE, CVC President 2004-2005
- Bill Atkinson, PE, CVC President 2005-2006
- Thomas F. Dacres, Jr., CVC President 2012-2013

Accomplishments of Note

More women work in HVAC engineering and affiliated professions and three women have served as CVC Chapter President.

- Lois Root , CVC President 1986-1987
- Amy (Cota) Patenaude, PE, CVC President 2002-2003
- Heather (Condon) Smith, CVC President 2008-2009

Vermont Technical College Student Chapter formed 1995-1996

It should be noted that several VTC Student Chapter members later joined the CVC and served as Presidents. These are:

- Russ Pratt , CVC President 2001-2002
- Amy (Cota) Patenaude, PE, CVC President 2002-2003
- David Anderson, CVC President 2003-2004

VTC students have regularly participated in the annual ASHRAE Student Design Competition against other US colleges and universities. VTC has been awarded Region 1 Best Student Design several times.

CVC Newsletter "The Champ" was first published September 1988 to keep members informed of news and events. Coincidentally the newsletter won its first Region 1 Black Ink award its first year thanks to the efforts of the Roots'. The newsletter has been published electronically for the last decade and continues to be recognized and awarded Black Ink awards.

PAOE Accomplishments

Individuals throughout the years have been recognized and awarded for their PAOE accomplishments while serving as Chapter Chairs of various functions of operations.

Chapter is committed to offer programs that are relevant, timely and educational to keep our membership engaged, informed and involved.

If the last 45 years was the era of energy consciousness and addressing the challenge through energy conservation measures; hopefully the next 40 to 50 years of continued ASHRAE leadership and involvement will not only continue a transition from fossil fuels to renewables but aspire us to transform how we design, construct and operate (maintain) our built environment especially as applied to building energy systems. If the past is any indication I believe that ASHRAE and the Champlain Valley Chapter will be enthusiastic, engaged and informed participants.

The Champlain Valley Chapter will continue to support the *"ASHRAE mission is to advance the arts and sciences of heating, ventilation, air conditioning, and refrigeration to serve humanity and promote a sustainable world."*

The foundation of this article is a compilation of material gathered from Champlain Valley Chapter, end of year summaries and ASHRAE Society publications including the ASHRAE Journal and other sources where necessary for historical perspective and the personal observations of the author of this article.

Submitted by
Michael R. Cook
CVC Historian, 2015

... advertising/sponsors continued on page 32

ASHRAE CHAMPLAIN VALLEY CHAPTER PAST PRESIDENTS RECOGNITION PAGE

Order	Society Year Served	Name	Order	Society Year Served	Name
1	1969-70	William Lotz, PE	25	1993-94	Jon A. Soter, PE
2	1970-71	Robert Miller	26	1994-95	Leo Ioannou
3	1971-72	Richard Bowler Jr., PE	27	1995-96	Michael A. Gallo, PE
4	1972-73	Robert Coughlin	28	1996-97	Steve Poole
5	1973-74	Don Johnson	29	1997-98	Michael Rose
6	1974-75	Gordon W. Root, Sr., PE	30	1998-99	Leo Ioannou
7	1975-76	Jack Couture, PE	31	1999-2000	Ken Couture
8	1976-77	Giustino N. Mastro, PE	32	2000-01	Peter Tousley
9	1977-78	Neil Vallencourt, PE	33	2001-02	Russ Pratt, PE
10	1978-79	William Moore, PE	34	2002-03	Amy (Cota) Patenaude. PE
11	1979-80	Oscar Blatchly, PE	35	2003-04	David Anderson
12	1980-81	Stuart N. King	36	2004-05	Tom Zoller, PE
13	1981-82	Andrew Rudin, PE	37	2005-06	Bill Atkinson, PE
14	1982-83	Ted Meade, PE	38	2006-07	Jay Pilliod
15	1983-84	William A. Fyfe, PE	39	2007-08	Jerry Chabot, PE
16	1984-85	Edward Seraydarin	40	2008-09	Heather Condon
17	1985-86	Roger M. Kerr	41	2009-10	Peter F. Bailey
18	1986-87	Lois Root	42	2010-11	Shawn LaBelle, PE
19	1987-88	Mike Poirer	43	2011-12	Michael R. Cook
20	1988-89	Thomas Wolfstitch	44	2012-13	Thomas F. Dacres, Jr.
21	1989-90	Bernard J. Young	45	2013-14	Nathan Mascolino, PE
22	1990-91	Edward E. Pearson, PE	46	2014-15	Robert J. Favali
23	1991-92	Gordon W. Root, Jr., PE	47	2015-16	Rob Ward
24	1992-93	Richard J. Wilcox			

Chapter Past Presidents with Tom Phoenix & Joe Furman

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Mission Statement

ASHRAE will advance the arts and sciences of heating, ventilation, air conditioning, refrigeration and related human factors to serve the evolving needs of the public and ASHRAE members.

Vision Statement

ASHRAE

~ Will be the global leader in the arts and sciences of heading, ventilation, air conditioning & refrigeration.

~ Will be the foremost, authoritative, timely and responsive source of technical and educational information, standards and guidelines.

~ Will be the primary provider of opportunity for professional growth, recognizing and adapting to changing demographics, and embracing diversity.

PRESIDENTIAL AWARD OF EXCELLENCE TOTALS

Presidential Award of Excellence (PAOE) is the point system ASHRAE Region and Society use to help track the Chapter's activities. The chapter gets points in the below categories for activities that we do throughout the year. The awards banner that you see at the meetings represents CVC's accomplishments over the years. Below are definitions of what some of those awards are. If you want to know more about PAOE check out the www.ashrae.org website and do a search for the PAOE newsletter.

End of Year Awards Available to the Chapter:

PAOE: Minimum in five of the six categories

Special Citation: Minimum in 5 of the 6 categories with a minimum total of 4600 points

STAR: PAR in all categories

Honor Roll: PAOE for at least 4 consecutive years

High Honor Roll: STAR for at least 4 consecutive years

Premier: PAOE every year since the chapter's inception or since 1970; minimum of 4 years; chapter's first year is excluded

Sustainability Activities Award: A Chapter Sustainability Award in the form of a certificate is available for each chapter that obtains a total of at least 200 points from the items listed under Sustainability Activities in the Chapter Operations category of PAOE. The Chapter with the highest PAOE Sustainability point total will receive a Regional award in the form of a glass plaque and a certificate.Level 1 = less than 100 members; Level 2 = 100-249, Level 3 = 250-449, Level 4 = 500 or more.

Category	PAR	2015 - 2016
Membership Promotion	800	0
Student Activities	500	0
Technology Transfer	1050	0
Research & Promotion	1050	0
History	300	0
Grassroots Government Activities	650	0
Chapter Operations	1050	0
Chapter TOTAL	**5400**	**0**

GENERAL MEETING

2015-2016 BOARD OF GOVERNORS	
Richard Wilcox, LEED AP T: (802) 655-8805 x 181 dwilcox@vhv.com	Shawn LaBelle T: 802-857-5011shawn. ShawnL@amivt.com
Rachael Mascolino T: 802-540-7846 rmascolino@veic.org	Robert J. Favali, LEED Green Associate T: 802- 764-2704 rfavali@dubois-king.com
Nathan Mascolino T: 802-861-6148 nathanm@vhv.com	

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President	Robert Ward III, LEED AP 802-861- 6194 | robw@vhv.com
President-Elect	Blaine Connor 802-264-1134 | blaine.conner@vtmechanical.com
Vice President	Brent Weigel phone# | email
Secretary	Martha Soule (802) 655-8805 | email
Treasurer	Jeremiah Trombly 802-862-6199 | jtrombly@masvt.com

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Student Activities	Brent Weigel
Membership	Martha Soule (802) 655-8805 | email
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Grassroots Gov't Activities	Richard Wilcox, LEED AP T: (802) 655-8805 x 181 | dwilcox@vhv.com
Honors and Awards	Thomas Dacres, Jr., LEED AP BD+C T: (802) 861-6152 | tomd@vhv.com

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