

Capitalaire

The National Capital Chapter of the American Society of Heating, Refrigerating, and Air Conditioning Engineers

Monthly Newsletter



Developing Leaders thru Mentoring

2011 – 2012 National Capital Chapter of ASHRAE

Officers			
President	Dunstan Macauley	301-789-1618	president@nccashrae.org
President-Elect	Stephanie Mages	202-912-8218	President-elect@nccashrae.org
Vice President	Cindy Cogil	202- 842-2100	vice_president@nccashrae.org
Treasurer	Scott Houghton	410-980-8538	treasurer@nccashrae.org
Secretary	Andy Rhodes	571-233-6346	secretary@nccashrae.org
Board of Governors			
Sr. Governor	Tansu Sengezener	703-253-1785	senior_governor@nccashrae.org
Governor #1	Laura Petrillo	703-600-0335	governor1@nccashrae.org
Governor #2	Marty Moran	301-545-5100	governor2@nccashrae.org
Governor #3	Jeff Colby	703-652-2337	governor3@nccashrae.org
Committee Chairs			
CTTC	Cindy Cogil	202- 842-2100	CTTC@nccashrae.org
Research Promotion	Jeff Colby	703-652-2337	ResearchPromotion@nccashrae.org
Student Activities	Omar Hawit	202-296-4344	StudentActivities@nccashrae.org
Finance	Cindy Cogil	202- 842-2100	Finance@nccashrae.org
Membership	Laura Petrillo	703-600-0335	Membership@nccashrae.org
	Alec Groh	703-682-4900	
Reception	Dan Rossi	908-310-6428	Reception@nccashrae.org
	Joe Trusty	240-306-3237	
Programs	Marty Moran	301-545-5100	Programs@nccashrae.org
Newsletter/Website	Stephen Niez	703-489-7272	Capitalaire@nccashrae.org
Directory	Joe Coratolo	571-344-3910	Directory@nccashrae.org
	Richard Kewer	443-832-1682	
Golf Outing	Andy Tech	703-834-2412	GolfOuting@nccashrae.org
TEGA	MK Leftwich	301-509-8935	TEGA@nccashrae.org
Winter Party	Amy Boyce	202-552-1367	WinterParty@nccashrae.org
YEA	Stephen Niez	703-489-7272	YEA@nccashrae.org
	MK Leftwich	301-509-8935	
Sustainability	Roger Chang	202-296-4344	sustainability@nccashrae.org
Historian	David Cunningham	240-393-2199	Historian@nccashrae.org
Honors & Awards	Tansu Sengezener	703-253-1785	HonorsandAwards@nccashrae.org
Charles Kannapell Memorial Scholarship	Kevin Smith	703-652-2333	CMKScholarship@nccashrae.org
E-Week	Saunders Smith		E-Week@nccashrae.org
Refrigeration	Ramzi Namek	410-423-7442	Refrigeration@nccashrae.org
Government Activities	Kinga Porst	202-570-1198	GovernmentActivities@nccashrae.org
UMCP Student Chapter Advisor	Michael Ohadi	301-405-5263	ohadi@eng.umd.edu
NOVA Student Chapter Advisor	John Hurley	703-787-5626	jhurley@nvcc.edu

Capitalaire is the publication of the National Capital Chapter of ASHRAE. Capitalaire welcomes input from its readers. Please send all communications to:

Stephen Niez, Tel: 703-489-7272
email: Capitalaire@nccashrae.org

President's Corner

The holiday season is once again upon us I would like to take the opportunity to wish everyone a very happy holiday and a prosperous New Year. We are now at the mid-point of the ASHRAE year and would like to thank our members for a successful year thus far. We have had great turnout for our September, October, and December chapter meetings and the annual joint MCA Trade Show.

We also have a great second half of the year planned. The Winter Party planning committee is in the process of planning the 6th annual Winter Party on the 28th of January. As in years past, this festive event will be at the Hotel Monaco in Alexandria. The chapter is also planning to host a Texas Hold 'Em tournament in the spring, as well as our annual Golf Tournament. We also have some great programs in the second half of the year, including programs on Dedicated Outdoor Air Systems (DOAS), Variable Refrigerant Systems (VRF), and BIM.

In the second half of the year, our sustainability chair is looking for the chapter to take a more active role in promoting the society's sustainability goals. One of the programs the chapter is looking into is collaborating with other local organizations, such as Hands on DC to promote sustainable community events. Please check the website for more information or contact Roger Chang at sustainability@nccashrae.org.

The ASHRAE Annual Conference and the joint AHR Expo will be held from January 20th thru the 25th in Chicago. In addition to the committee meetings, a full slate of technical programs and seminars have been planned including programs on current industry trends such as Standard 189, High Performance Building Design, Standard 90.1 and Standard 62. In the event that it is not possible to attend the Chicago Conference, a virtual registration is now available. Registration for the virtual conference allows the attendee to view the day's seminars, which will be posted the same day as the presentation. For the two week period following the presentation the presenters will be available via email to respond to any questions. The virtual conference allows participation in the

technical program in the event you cannot be in attendance.

We would also like to thank and encourage everyone to continue to make reservations by the deadline. As a commitment to our members who make their reservations online, we will be holding a drawing for an I-Pad at the April 2012 meeting. Chapter members who register and make an online payment by the meeting registration deadline, which is the Friday prior to the monthly meeting, and will receive one entry for each month into the drawing for the I-Pad.

Thank you again for your commitment and support to at the National Capital Chapter.

Best Regards,
Dunstan L. Macauley, III
President – National Capital Chapter
2011 – 2012

New Members

The National Capital Chapter of ASHRAE would like to welcome the following new members to ASHRAE and the National Capital Chapter:

- ❖ Mr. Pankaj Hoogan
- ❖ Mr. Anthony Franks
- ❖ Mr. Martin O'Connell
- ❖ Mr. Matthew FitzGerald
- ❖ Mr. Jonathan Crittenden
- ❖ Mr. Derek Victor
- ❖ Mr. Dennis Nasuta
- ❖ Mr. David Kaiser
- ❖ Mr. Sean Parrott
- ❖ Dr. Mohammad Paryavi
- ❖ Mr. Benjamin Curwin
- ❖ Mr. Aykut Yilmaz
- ❖ Mr. Eric Dixon
- ❖ Mr. Javier Villarroel
- ❖ Mr. Daniel Rakes
- ❖ Mr. Rajiv Chainani
- ❖ Mr. Christopher Rodgers
- ❖ Mr. Alok Kumar
- ❖ Mr. Kevin Fahey

ASHRAE Announces Energy Modeling Conference, Call for Presenters

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

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

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

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

Call for Presenters

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

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

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

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

Presentation Schedule:

Full Page Abstracts due: Feb. 15, 2012

Notification of abstract decisions: March 15, 2012

Accepted speaker forms due: April 15, 2012

Presentations due: Sept. 1, 2012

Conference: October 2012

ASHRAE Technology Awards Highlight Outstanding Building Projects

ATLANTA – Designers of systems for a university building, a cancer center, an ice rink and other commercial building are recognized by ASHRAE for incorporating elements of innovative building design.

The ASHRAE Technology Awards recognize outstanding achievements by members who have successfully applied innovative building design. Their designs incorporate ASHRAE standards for effective energy management and indoor air quality. The awards communicate innovative systems design to other ASHRAE members and highlight technological achievements of ASHRAE to others around the world. Winning projects are selected from entries earning regional awards.

"Every year, the judging panel looks forward to the reviewing the outstanding projects submitting by our membership," Nathan Hart, chair of the judging panel said. "Being a consulting engineer myself, I appreciate the effort involved in submitting an entry to Society-level competition. I enjoy seeing what fellow ASHRAE members are doing to strive for more energy efficient, well ventilated maintenance friendly building designs. Many of the entries this year incorporated innovations and technologies that took advantage of their specific geographical locations to provide more energy efficient systems—helping to highlight that one size does not fit all and that a more energy efficient design solution may be available when considering the project as a whole."

Following are summaries of the winning projects.

Mountain Equipment Co-op

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

The Mountain Equipment Co-op store, a 22,600 sq. ft. single story retail sporting goods outlet, was designed and built so as to have a minimal impact on the environment. Traditionally, artificial lighting contributes to a large part of the total energy consumption in commercial retail stores. It was thus decided to maximize day lighting through a series of clerestory with a saw tooth shape roof. Also, light sensors were integrated in the design to partially or completely shut down the artificial lighting when natural lighting is sufficient. Occupancy sensors were integrated in small spaces to completely shut off lighting when not in use.

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

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

IKEA Brossard Distribution Center

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

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

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

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

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

Université de Sherbrooke

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

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

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

With average winter temperatures falling significantly below freezing in the Montreal area, fresh air treatment can be quite costly. To enhance energy savings, three enthalpy wheels were installed on new ventilation units. These wheels recover latent and sensible heat that is usually lost in exhaust air. With an efficiency rate of 76 percent, the wheels help reduce annual heating, cooling and humidity demands.

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

Abbotsford Regional Hospital and Cancer Centre

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

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

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

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

Thermal Energy Corporation—Thermal Energy Storage

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

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

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

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

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

Arena Marcel Dutil

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

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

The refrigeration system has a 3kW variable speed CO₂ pump that reduces the power needed for circulating the cold fluid by 90 percent compared to secondary fluid installations. For a typical ice rink facility, the savings can be up to 125,000 kWh per year. The arena was also compared to similar projects in the area and was found to have a 25 percent reduction in total energy costs. Also, when comparing the new system with the old chiller using R22, and considering an annual leak rate of 15 percent for the old system, the total greenhouse gas reduction associated with the new 100 percent CO₂ refrigeration system is up to 100 tons per year.

O&M Mini-Conference Featured in ASHRAE 2012 Winter Conference Tech Program

ATLANTA—With low and zero energy buildings becoming more prevalent, there are many issues that arise with installation, startup, commissioning and operations and maintenance. To help ensure that the design intent of these more complicated systems is understood, an O&M “mini-conference” is being offered as part of ASHRAE’s 2012 Winter Conference, Jan. 21-25.

The mini-conference takes place Jan. 22-23 and is held in conjunction with the Technical Program of the ASHRAE Winter Conference, Palmer House Hilton, Chicago, Ill. The mini-conference kicks off with a debate on building operations and several sessions addressing current practices and tools.

“The mini-conference offers an opportunity to have an in-depth conversation for interested professionals in an abbreviated period of time,” Sarah Maston, Technical Program track chair of Operations & Maintenance, said.

The mini-conference addresses lessons learned, improvement of process and team communications and effort to improve the installation, startup, O&M of HVAC systems.

In particular, the importance of test procedures for HVAC systems for is addressed on Monday, Jan. 23, in “Air-Handling System Leakage: Benefits and Costs of Field Tests.” Such procedures are necessary because as much as one third of a system’s airflow can leach through the air distribution system, which can lead to loss of comfort and heating or cooling capacity; increase air conditioning and heating bills; and contribute to indoor air quality problems. The session highlights the benefits and costs of performing system leakage tests from the perspective of a testing, adjusting and balancing contractor, an association of sheet metal contractors and researchers, as well as an upcoming standard from ASHRAE and the Sheet Metal and Air Conditioning Contractors’ National Association (SMACNA) pertaining to testing procedures and requirements for total HVAC system air leakage in commercial buildings. The session is held 8 a.m.-9:30 p.m. at the Palmer House Hilton.

Additional sessions include:

- "What is the Right Degree of Automation in Building Operations: A Debate and Discussion"
- "Has Your TRAINing Left the Station?"
- "Fault Detection and Energy Audits"
- "Energy Savings and Performance Improvements through O&M"
- "Maximizing the Benefits of Commissioning: Incorporating Design Reviews and the Building Envelope into the Commissioning Scope"
- "Vibration Induced Noise and Mechanical Equipment Vibration Isolation, Balance and Predictive Maintenance"
- "YEA for Air Cleaning!"
- "Approaching Net-Zero and Maintaining Your Course: O&M Tools to Maintain Building Performance"
- "The New Age of Water Treatment for Mixed Metal Systems and High Efficiency Aluminum Boilers" – a free session to be held at the AHR Expo, McCormick Place

Additionally, the Chicago Virtual Conference is included with a paid Conference registration—comp and single day registration excluded—and includes on-demand access to all speakers’ audio presentations synced to their presentations. Attendees and speakers can post comments on the presentations for a two-week period following the completion of the Conference. Those not attending the Chicago Winter Conference in person may register for the Virtual Conference only.

Register at www.ashrae.org/chicagovirtual.

For more information on the ASHRAE Conference, Jan. 21-25, or the Tech Program visit www.ashrae.org/chicago.



National Capital Chapter of ASHRAE

2011 – 2012 Meeting Schedule



Dates	Theme	PES Program	Dinner Program	Location
Tuesday Sept. 13	YEA / Membership (Joint Meeting with IEEE)	Net Zero Energy Building Design	Emissions Trading	Hilton Arlington
Wednesday Oct. 19	Awards / Research	Designing Building Automated Controls – Part I	Thermal Storage Systems	Hilton Arlington
Wednesday Nov. 9	Trade Show (Joint Meeting with MCA)	Trade Show		Bethesda Marriott
Wednesday Dec. 7	President's / Membership	Designing Building Automated Controls – Part II	Combined Heating & Power Systems	Hilton Arlington
Saturday Jan. 28	Holiday Party	Holiday Party		TBD
Wednesday Feb. 8	Sustainability (Joint Meeting with USGBC)	Panel Discussion – Building Energy Monitoring	Energy Modeling Case Study	Hilton Arlington
Wednesday Mar. 14	Students / Refrigeration	Radiant Cooling and Dedicated Outdoor Air Systems (DOAS)	BIM	Hilton Arlington
Wednesday Apr. 18	Research / YEA	Variable Refrigerant System Design	Air Side Energy Recovery Systems	Hilton Arlington
May (TBA)	Tour	Technical Tour		TBD



Future City Judging

Home or Office:

Virtual City Designs (5-6 hours, February 3rd-10th)

City Narratives (2 hours, February 3rd-10th)

Research Essays (3 hours, February 3rd-10th)

Finals Judge: Hyatt Regency Crystal City

Models and Presentations (Monday, February 20th, 7:30am- 2:30pm)

<http://www.futurecity.org/signup/judge>

Please see Omar Hawit to sign up!

ohawit@wrldesign.com





NCCASHRAE.ORG

NATIONAL BUILDING MUSEUM **FAMILY FESTIVAL**

DISCOVER ENGINEERING FAMILY DAY

Be an Engineer for a Day!

SATURDAY, FEBRUARY 18, 2012 / 10:00 AM - 4:30 PM
NATIONAL BUILDING MUSEUM

RAIN OR SHINE

Volunteer with ASHRAE





Discover Engineering Family Day
Saturday, February 18th, 2012

National Building Museum
We will need 8-10 volunteers
for each timeslot from 9:45-4:45
Projects: Hot Snakes,
Parachutes, and Balloon-Pull

Please see Omar Hawit to sign up!
ohawit@wrldesign.com

