

ASHRAE Ottawa Valley Chapter

Chapter Meeting #3 – 21 November 2017

Meeting Date:	21 November 2017
Location:	Centurion Conference & Event Center, 170 Colonnade Road South
Attendance:	Total: 65
	Members: 50 Guests: 13 Students: 2
Theme:	Research Promotion
Tour:	None
Tech Session:	None
Table Top:	HTS and Alscott
Program:	Biomass Heating System
Speakers:	Andreas Wintzer, Viessmann Manufacturing Company Inc.
Prepared by:	Aaron Dobson

Social (17:30 – 18:28)

Business Session (18:28 – 19:03)

- President Adam Graham welcome message, call to order.
- President Adam Graham introduced the Board of Governors and the Executive.
- Secretary Aaron Dobson introduced the 13 guests.
- Membership Promotion Chair Celine Baribeau introduced the 7 new members since last meeting and mentioned of 1 chapter member advancement from associate to member.
- In absence of Joe-Della Valle YEA chair, President Adam Graham talked about the YEA Leadership Weekend on March 23-25th, 2018. Region 2 has a contest to send 1 member to the Leadership Weekend. Details provided in the email blast to submit an application.
- Andrew Brown on behalf of Adam Moons gave a reminder of the ASHRAE Bowling Event tomorrow at 6:30pm. Runs until 9pm.
- Rod Lancefield from HTS talked about the Viessmann boiler product line including condensing boilers and Peter Shaw-Wood from Alscott with Branislav Pajic from Riello talked about the line from Riello for boiler burners.
- President Adam Graham invited President-Elect Dan Redmond to talk about this month's theme - Research. It is also the month where the donors are recognized. President-Elect Dan Redmond talked about Research Promotion, what it means to ASHRAE, what it means to us and why it is a good cause. ASHRAE Research is used to update and improve the Handbook Series. Fundamentals, HVAC Applications, Refrigeration and Systems and Equipment. ASHRAE Research is used to support ASHRAE Standards, support our Advanced Energy Design Guides and needed to support ASHRAE's Vision 2020 and the development of Net Zero Energy Buildings. ASHRAE has 100 technical committees divided into ten sections each specializing in one area of HVAC and R. Over 1500 individuals involved – all volunteers. Dan talked about how research goes from an idea to funded project by going through the different groups (Technology Council, Research Administrative Committee, Research Activities

Subcommittee, Technical Committees and Task Groups)

- Dan Redmond talked about last year's results and recognized 57 donors (Companies and Individuals) from last year. 2016-2017 Campaign Results were \$31,151 out of a goal of \$29,000 (not including the \$30,000 set aside for the ASHRAE OVC scholarship). Last year's research promotion chair Adam Graham was congratulated on a successful campaign. 2017-2018 Campaign goal is \$30,100. So far \$9,452.54 has been raised which meets ASHRAE's 30% target for Dec 31st which was achieved by November 1st.
- President-Elect Dan Redmond provided ASHRAE Research Promotion "did you know" facts. 100% of donated funds goes to research. Research money raised stays within Canada. ASHRAE region 2 is the only all Canadian region. Almost 3x the amount of money raised is spent on research. Almost \$1M of research funding going on in our region. Dan provided a list of research projects currently going on.
- President-Elect Dan Redmond thanked the supporters again for the research money raised.
- President Adam Graham thanking donors as well. Adam mentioned that Ottawa is a good research chapter per capita which ranks us up there with larger cities such as Toronto and Montreal.
- President-Elect Dan Redmond added one point from centralized meeting. Bigger chapters are looking to us for advice on raising money for research. Ottawa is not as big as other chapters, but we provide a lot of ASHRAE research funds.
- President Adam Graham thanking again for research donations and reminded that Dan Redmond is raffling 2 Ottawa Senators hockey tickets and parking pass donated by Walmar.

Business Session Finished at 7:03pm

Dinner (18:45 – 19:46)

- Dinner served at 6:45pm
- Dinner was Garden Salad for starter. Roast beef with mash potatoes, carrots and tomato for main and chocolate cake for dessert

Evening Program (19:46- 21:05)

- Evening program started at 7:46pm
- Raffle draw by guest speaker Andreas Wintzer. Winner was Stephane Charbonneau. \$535 was raised for research promotion thanks to Walmar.
- President Adam Graham going through program description and welcoming speaker – Andreas Wintzer, Viessmann commercial biomass manager for Canada.
- Andreas is from Germany, now living in Canada for the last 9 years.
- Andreas gave an overview of the topics to be discussed for Biomass heating systems. Topics are;
 - Wood heating fundamentals
 - Fuel types and considerations
 - Fuel delivery and storage systems
 - Biomass boiler technology
 - Sizing and design criteria
- Wood heating fundamentals
 - The possibilities in Canada to use wood fuels for heating applications are vast
 - Generally, wood as a solid fuel is categorized into the following groups

- Logwood
 - Pellets
 - Wood chips
 - Shavings
- Ontario Wood Resources
 - Ontario's Forests cover 1,076,364 km² (66% on Ontario is forest)
- Germany Biomass heat is 6.6% of total energy usage in Germany (2016)
- Ontario's Forest are 2% of the World's forests and 17% of Canada's forests. The most common tree is black spruce.
- Forest management activities are defined in the Crown Forest Sustainability Act (CFSA)
- 7 systems with biomass heat without agriculture have been installed in the last 5 years.
- Andreas mentioned that biomass is CO₂ neutral since the burning wood releases the same amount of CO₂ as it absorbed for its growth, and as it would release if it would be left to rot. Burning a tree release more CO₂ than natural gas.
- Biomass supports regional sustainability since the biomass fuel is usually harvested near the boiler plants which creates jobs and is a direct investment into the local economy.
- Less expensive to operate boiler plant for wood chips at \$9.07 per 1 MMBTU or Pellets at \$12.50 vs \$17.58 for oil, \$22.71 for propane, \$32.23 for Electricity
- Pricing of natural gas is similar to wood pellets pricing
- PWGSC Government considers biomass as carbon neutral
- Initial cost more expensive than traditional boiler plant
- Useable fuels for biomass boilers are forest wood, compressed wood/pellets, bark/tree cuttings, remnants from derived timber and used wood.
- You can go into woods and cut trees to burn in boiler
- Bark is not recommended as there is too much ash in bark
- Biomass plants use construction lumber. Used wood is dry (moisture of 6%) has good heating value. Make sure to remove nails.
- Wood pellets are the best quality with the highest energy fuel (good BTU value). Wood pellets are transported in vacuum trucks (2 in Ontario). Vacuum truck is 24 metric tons of material.
- Andreas talked about pellets and mentioned that good quality pellets should have a smooth surface and uniform in size. Pellets should sink like stone when dropped in water. There should be no air bubbles visible. If air comes out and falls like leaf, you have a bad pellet.
- Ask for certificate of what is in pellets to know how much ash is in it
- Wood chips are mechanically crushed wood in various sizes from 1 mm to 100 mm
- Mill residue chips are the best quality but are the highest price
- Bolewood chips are a quality/cost compromise between whole tree & mill residue chips but have more bark/dirt (ash) than mill residue chips.
- Whole tree chips are lowest cost of material but are inconsistent in quality/size
- Wood chips are local but at a higher price than pellets which are further away.
- Pellets are more efficient than wood chips
- Comparing the thermal value of wood fuels, the wood pellets have the least amount of water content, the best thermal value compared to forest wood chips (dry or wet)
- Water content of wood chips with air drying decreases from 50% water content to less than 20% over a 2 year period.

- Wet fuels decrease efficiency as water does not burn. Wet fuels need heavy duty extraction methods which makes the system more expensive and requires a bigger storage facility.
- Ash content and sintering point varies from different energy sources. 1000kg of pellets burned you have 5 kg of ash
- Clinker formation if ash is heated above it's sintering point, it changes the state of aggregation and turns doughy or viscous. When cooled turns solid again and sticks to refractory and grate elements.
- Andreas mentioned the fuel type and quality determine the heating value, boiler efficiency, economics, fuel storage requirements, the amount of ash and life expectancy of the boiler
- Typically: <500kW – pellets are used, >500kW – wood chips are used
- Reviewing the different fuel storage and extraction systems of a biomass heating system
 - Spring operated extraction system
 - Funnel extraction system
 - Walking floor extraction system (most common system as it is easy to deliver)
 - Drive on walking floor
 - Extraction auger for pellets
 - Vacuum blower truck for pellets (silo)
- Reviewing the different biomass heating boiler systems
 - Typical biomass heating with back-up
 - Biomass heating system
 - Rotary combustion boiler (smaller boilers, only works for dry fuels less than 35% moisture content, ash is automatically extracted, pneumatic cleaning system of 12 psi in each firing tube to clean residue to extend maintenance cleaning schedule)
 - Underfeed combustion boiler (wood fuels with a moisture content of <50%, need to ensure everything is burned before boiler is shutdown, bring in fresh air for turbulence for clean boiler)
- Andreas reviewed the emission control requirements. Particulate matter is a “weakness” of solid fuels.
- Mandatory emission control technology
 - flue gas cyclone - filters out large particles, captures sparks and must be used on all installations in Ontario
 - electrostatic participator – proven technology with wood boilers, high availability, low remaining particle content, very high in initial cost, cost prohibitive for small boilers >500kW
- Design guidelines – customer expectations of a biomass plant
 - Efficient system operation
 - Equipment safety
 - Low maintenance
 - Low emissions
- System design – efficient system design practices
 - Do not oversize the boiler.
 - Avoid boiler short cycling (biomass boilers take longer to adjust output to heat demands, igniting wood takes longer than igniting gas or oil, once a pile of wood chips burn you cannot simply turn the fire off.

- System design – thermal tanks
 - Advantages of a hot water storage tank
 - Boosts heat availability
 - Covers brief peak demand requirements
 - Absorbs excess heat when boiler shuts off
 - Allows optimal connection of other means of heating (solar and redundancy boilers)
 - Recommended size: minimum 10 liters per 1kW of burner output
- System design - reducing maintenance costs
 - Good quality, dry fuel
 - Automatic de-ashing
 - Pneumatic cleaning system
 - Auto ignition
 - Biomass requires regular cleaning and maintenance
- System design -safety systems
 - Biomass systems are extremely safe
 - Burnback preventer over slide gate
 - Automatic fire-extinguishing system (water reservoir)
 - CSA certified control systems
 - ASME certified pressure vessel
- System design – fuel bunker requirements
 - Size of fuel storage is determined by: yearly fuel requirement, supply situation, truck load capacity
 - Do not oversize the storage facilities (ensure availability of fuel, storage should hold multiple trucks, capacity for 5-7 days of operation plus one trailer load)
- Andreas concluded the system design with the following;
 - Cover the base load with biomass to get the maximum possible run times
 - Cover the peak load with fossil fuel boilers to dramatically reduce the boiler size needed by a biomass boiler
 - 10 liter thermal storage per kW boiler output
 - Biomass should have oil or propane backup, or 2 biomass boilers sized 75% to ensure a backup if primary boiler fails. Always need a backup.
 - Biomass systems are extremely safe
 - Less maintenance if you have better wood chips
 - In an event of a power outage, the fuel still burns. A metal disconnect – mechanical sensor opens to disable boiler – next startup you need to clean boiler
 - Cover the base load with biomass to get the maximum possible run times
 - Cover the peak load with fossil fuel boilers to dramatically reduce the boiler size needed by a biomass boiler
- Andreas talked about the typical scope of supply biomass boiler. He mentioned that it is important the biomass supplier supply all components to ensure responsibility from one supplier. The scope of supply is;
 - Fuel transport systems and security equipment CSA approved
 - ASME construction with 30 / 60 psi
 - Control panel for biomass system with integration of communications to BMS system
 - Control panel with controlling backup boiler possible

- Mixing valve and pump for the biomass boiler as protection of return temperature
- Delivery to job site
- Startup always included
- Andreas went through various sample biomass projects that were completed. These were;
 - Kalamalka Forest Research Station
 - Our Lady of Mercy School
 - La Cite Verte
 - Biomass district heating Enderby, BC
- Questions – 4 questions asked
- President Adam Graham thanking speaker and presenting gift (commemorative coin) to Andreas Wintzer from ASHRAE Ottawa Valley Chapter
- President Adam Graham reminding members and guest to fill out evaluation form
- President Adam Graham saying thank you and reminding that next meeting is January 16th, 2018 at the Centurion Conference Centre.

Meeting adjourned 21:05