

ASHRAE Ottawa Valley Chapter

Chapter Meeting #5 – 18 February 2020

Meeting Date:	18 February 2020		
Location:	Centurion Conference & Event Center, 170 Colonnade Rd, Ottawa, ON		
Attendance:	Total: 52		
	Members: 30	Guests: 12	Students: 10
Theme:	CTTC		
Tour:	None		
Tech Session:	Psychrometrics by Joel Primeau		
Table Top:	None		
Program:	Wastewater Energy Transfer		
Speakers:	Stephen Condie		
Prepared by:	Ryan Dickinson		

Tech Session (16:30 – 17:30)

Social (17:30 – 18:30)

Business Session (18:30 – 18:43)

- President Aaron Dobson called the meeting to order.
- Aaron introduced the Executive and Board of Governors.
- Secretary Ryan Dickinson introduced the guests for the evening and welcomed two new members to the Chapter.
- Adrienne Mitani, Chapter Treasurer, talked about the upcoming Women in ASHRAE social event, sponsored by Lar-Mex, taking place at the Clocktower Brew Pub on March 4th. The upcoming ASHRAE Student Career Fair will be taking place at Carleton University in Fenn Lounge on March 10th. There are currently 16 booths registered.
- Trevor Thomson, CTTC Chair, talked about the Chapter Technology Transfer Committee, the Distinguished Lecturer (DL) program, the ASHRAE Technology Awards and the ASHRAE Tech Hour. The chapter deadline for the Technology Awards is March 31st, and May 22nd is the deadline for regional submissions. Our last DL for the year will be Past Society President Tom Phoenix on April 21st.
- Adam Moons, President-Elect and Research Promotion Chair, mentioned that the Chapter has presently raised over \$17,000 towards Research Promotion and the campaign committee will be reaching out to past donors and organizations to help us reach our annual goal.
- President Aaron Dobson spoke about upcoming events including the OCA Trade Show, the YEA Learn to Curl event, and the Curling Bonspiel.

Business Session Finished at 18:43.

Dinner (18:45 – 19:30)

- Dinner was served at 18:45.
- Dinner was spinach salad with strawberries and feta cheese, roast top sirloin of beef with mushroom brandy sauce, mashed potatoes and seasonal vegetables, and tuxedo mousse cake served for dessert.

Evening Program (19:30- 20:08)

- Evening program started at 19:30.
- Raffle tickets were sold to win two tickets to the upcoming Ottawa Senators vs Winnipeg Jets game on February 20th, donated by JL Richards. A total of \$500 was raised for ASHRAE research. John Naef was the lucky winner of the tickets.
- President Aaron Dobson announced the program topic for the evening, Wastewater Energy Transfer, and introduced the speaker, Stephen Condie, Chief Technology Officer at Noventa Energy.
- Buildings are one of the largest contributors to global warming accounting for almost 30% of all CO₂ emissions in North America. Most governments and policies are moving towards a zero carbon strategy. Wastewater Energy Transfer can reduce CO₂ emissions by extracting heat from sewers for heating, or rejecting heat to sewers for cooling.
- There are 168 billion liters of waste water each day being dumped down the drain. If you increase or decrease that by 1 degree, that translates to 350 billion kWh of thermal energy. That's enough energy to supply the U.S. for 1.5 months.
- Typical building systems with a chiller and cooling tower will have a design temperature of 40°C/104°F, as the temperature climbs it affects the COP (typically 3.8-4.2). Other costs are water, chemicals, and maintenance (open loop system). When waste water energy transfer is integrated, it removes the cooling tower component (assuming taking on 100% of the building load), and ties into the sewer to replace cooling tower. On the heating side, a boiler burning natural gas will produce high CO₂ emissions with 75-80% boiler efficiency. When using waste water energy transfer using a heat pump (replacing the chiller), the wastewater system can now do both heating and cooling. Sanitary temperatures are typically between 18-22°C/64-72°F year round. Sanitary sewers are preferred over combined and storm due to the uniform and consistent water temperatures found in sanitary. Storm temperatures vary due to rain water and snow melt run off and have intermittent flow, while sanitary is constant and predictable. Sanitary trunks (2.5-5ft diameter) and interceptors (5-15ft diameter that take wastewater to treatment plants) are better for wastewater energy transfer compared to local sewers and mains.
- Benefits of wastewater energy transfer include ideal sewer temperatures, reduced lift requirements for heat pumps, improved system performance that pushes COP from 4 up to 6-7, predictable flow rates, GHG emissions reductions from offsetting burning of natural gas.
- One of the main challenges is solids handling that clog up any sort of pump in the system. When dealing with larger pipes, (trunks and interceptors), there is much larger debris such as bricks, 2x4's, that are very detrimental to pumps. The other challenge is biofouling that grows on heat exchanger. For a plate-frame heat exchanger, a 1mm thick biofilm will reduce energy transfer by over 45%.
- Newer technology uses a wet well down the side of the sewer with a gravity feed and a screen basket. Solids retained by the screen are transported up by an auger and then

returned to the sewer. Brown water is then pumped through the shell and tube heat exchanger. Pump life expectancy is 10 years compared to 3-5 years without filtering the solids first. Condenser water flows through the tubes, while the brown water is outside of the tubes. The system is similar to an open loop geo-exchange system, but replacing the aquifer with a sewer line.

- Stephen reviewed a case study from Germany scaled to Ontario weather data with 350,000SF of floor area, 1,830 full load hours of cooling, and 1,800 full load hours of heating. With a typical building system consisting of gas-fired heating and a chiller and cooling tower, the annual energy use would be approximately 7 million kWh or 1,000 tonnes of CO₂, with the cooling tower losing 18,000 cubic meters of water to evaporation. With a wastewater heat transfer systems, the annual energy use is reduced to 2.6 million kWh and 124 tonnes of CO₂, and less than 100 cubic meters of water needed to top up the condenser loop between the heat exchanger and heat pump. That represents a 62% reduction in electricity and gas use, 88% reduction in GHG emissions, and 100% reduction in water consumption.
- President Aaron Dobson thanked Stephen Condie and reminded attendees of the survey which will be emailed. The next meeting is scheduled for Tuesday March 24th at the Centurion Conference and Event Center.

Meeting adjourned 20:08.