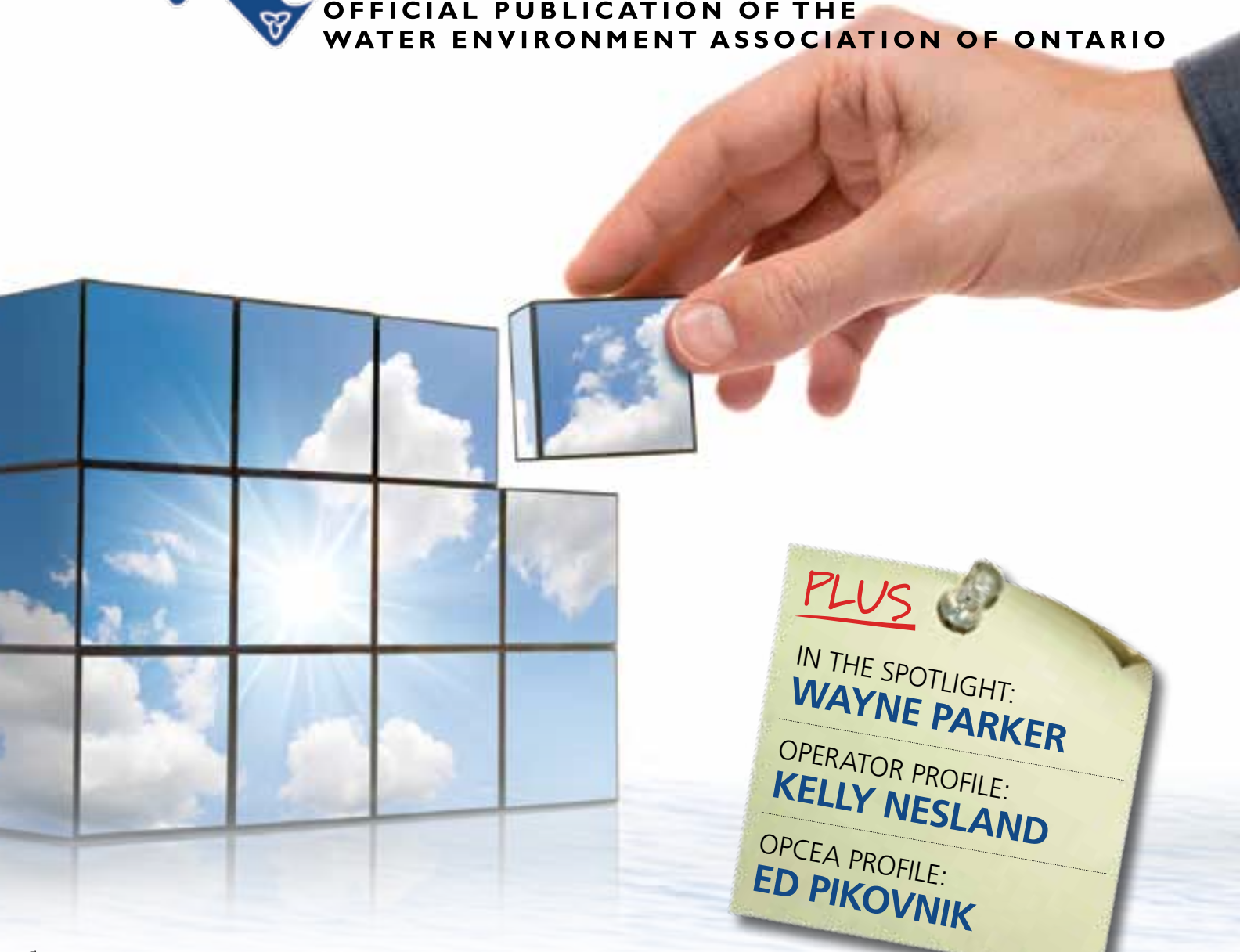
FALL 2011 • VOLUME 6

INFLUENTS

OFFICIAL PUBLICATION OF THE
WATER ENVIRONMENT ASSOCIATION OF ONTARIO



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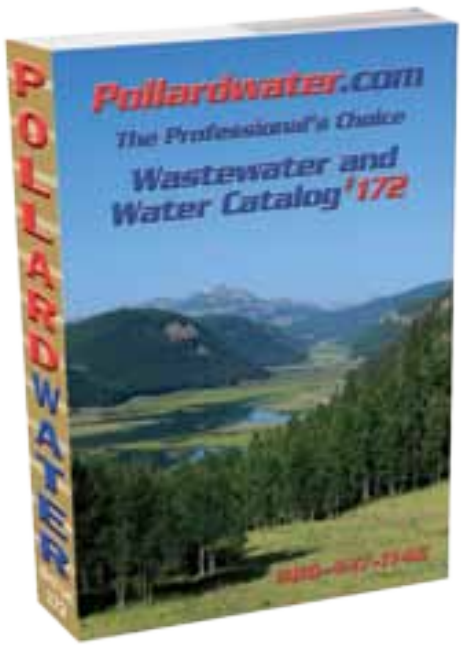

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SERVICING THE NEEDS OF OUR MEMBERS

Rosanna DiLabio, M.Sc., P.Eng.

I had the pleasure of attending the WEFMAX meeting in Vancouver this past May. For those of you who are not familiar with the term WEFMAX, it is the acronym for Water Environment Federation (WEF) Member Association (MA) Exchange (X). Annually, WEF holds four WEFMAX meetings, usually in various locations around the US. This year, the British Columbia Water and Wastewater Association (BCWWA) volunteered to host a meeting in Vancouver, May 19 and 20. In tandem with WEFMAX, the following events were also held:

- WEF House of Delegates Meeting and Strategic Planning Session on May 19;
- first Canadian Young Professionals (YPs) Summit on May 19; and
- the WEF Canadian Affairs Council meeting on May 20.

Although I would like to have attended the WEF House of Delegates Meeting, I wanted to see what the Canadian YPs were up to. I was impressed with the program that had been organized by WEAO's Vanessa Chau, currently incoming WEAO Board WEF Delegate. After a welcome and introduction from Daisy Foster BCWWA's CEO, WEAO's Cordell Samuels (WEF Vice-President) and Mike Nolan (BC AWWA Director) gave some great presentations to the YPs about careers in the water and wastewater field. Joyce Chang of CH2M Hill presented on 'Sustainability: A YP's perspective on the challenges and benefits of incorporating sustainable features on water and wastewater projects.' Vanessa presented on what WEF resources were available to start a student chapter and the WEF Student Young Professional Committee (SYPC).

This was followed by a panel discussion in which Vanessa managed to convince me to join Cordell and Mike at the front of the room to answer various questions. The responses to most of the questions followed these themes:

- get involved by volunteering in a professional association related to your field;
- learn as much as possible from those seasoned professionals around you; and
- go to work with a positive attitude.

Some of the feedback received from the YPs indicated that they are not sure of all the associations they can join, sometimes they find it intimidating to network in associations with many seasoned professionals, and their needs from an association include obtaining information and contacts on a global level. Unfortunately, because I had to join the WEFMAX delegates for the start of that program, I could not stay for the afternoon session that included YP reports from various representatives of Canadian MAs and a tour of Metro Vancouver's Seymour-Capilano Filtration Plant.

After lunch with the WEFMAX delegates, I took part in a WEF MA Leader Strategic Planning Session. The purpose of the session was to identify the needs of MAs and to obtain MA feedback on how WEF can better service them. What I find most interesting about these types of meetings is that it becomes evident very quickly that most other MAs have the same or similar issues that WEAO is currently experiencing. These include how to increase membership, how to better attract younger members, how to best serve current members, how to better use WEF resources, and many more. From my conversations with WEF staff at the meeting, these are the same concerns that were raised at all 2011 WEFMAX meetings and the same concerns that WEF and AWWA currently have.

My favourite part of the meeting was the Great Ideas Exchange, which took place on both days. This is where MAs share one or more of their successes with other MAs and is a great way to bring new ideas back to your own MA. Some

Vancouver Harbour Front

NOTICE:

INFLUENTS magazine summer edition (Volume 6): Clarification in the article *'Process Optimization of Chemical Phosphorus Removal in Wastewater Treatment Facilities'*

On page 75, in Table 4, the removal efficiency (tenth column) is calculated using the difference between the raw TP concentration and the CofA limit as a point of comparison for selected plants in Ontario. Since the measured effluent TP concentration is normally lower than the stipulated CofA limit, this removal efficiency should have been denoted as 'stipulated minimum removal efficiency.' While the Welland WWTP has a lower stipulated minimum removal efficiency, the plant's actual TP removal efficiency is comparable to the other plants listed. The author apologizes for the confusion. Thanks to Jason Oatley of the Regional Municipality of Niagara for noticing this error.

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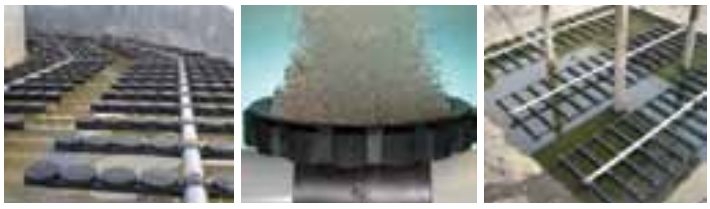

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interesting information captured from these presentations included:

- Atlantic Canada Water and Wastewater Association (ACWWA) is partnering with BCWWA to offer online operator training;
- California Water Environment Association has been offering optional technical operator certification since 1937, but debuted its online offerings in 2009, and now offers the training to three other states;
- Indiana Water Environment Association has created an electronic method of collecting abstracts for its annual conference at a very low cost;
- Nebraska Water Environment Association is implementing the online WEFHELP Pilot Operator Training Program;
- New England Water Environment Association regularly holds breakfast meetings and legislative briefings with government officials, and a topic of the most recent strategic planning session was to engage the growing stormwater community; and
- Pacific Northwest Clean Water Association put together a great public education tool called 'Lesson Plan in a Box.'

Interestingly enough, other associations are looking into the same ideas as the WEAO Board. I urge you to visit *http://www.wef.org/Members/page.aspx?id=201&ekmensel=c57dfa7b_95_0_201_4* for more information on these and other great ideas for your committees. Do not hesitate to contact the presenters of these MAs to ask questions.

Vince Nazareth, Tim Constantine – WEAO WEF Directors, Jeremy Kraemer, WEAO Director exchanging ideas over dinner with other WEFMAX attendees.

Cordell's WEF briefing gave the attendees a good idea of what WEF is focusing on in 2011 and beyond. As you may be aware, WEF is moving ahead with its Operator Initiatives and recently held a summit on certification in Alexandria, VA. Cordell also spoke on the WEF and AWWA resolution to develop one voice for water and wastewater issues, to encourage collaboration between their members, to coordinate programs and services, and to develop consensus on major water policy issues.

Jeff Egar, WEF Executive Director, gave an excellent opening address to start the second day of the WEFMAX meetings. For those of you who were not aware, the Water Environment Federation (WEF) and the American Water Works Association (AWWA) recently joined together to speak with one voice on drinking water and wastewater issues on Capitol Hill. The 2011 Water Matters! Fly-In was attended by more than 160 people from every US state, representing a cross-section of the entire water community. The link *http://www.awwa.org/video.cfm?ItemNumber=56495* has a short video on the meeting. WEFMAX attendees were given a chance to ask Jeff questions and, since WEAO's focus for the near future is increasing membership, I asked Jeff for some of his suggestions on how WEF can help WEAO achieve this goal. He suggested that WEAO improve the quality and accessibility of programs that WEAO offers, find ways to recruit young members, and utilize WEF's resources to the fullest. After Jeff's address, BCWWA facilitated breakout sessions on MA collaboration, association collaboration, and media interaction. There is some great information on the results of these breakout sessions that can be found with the other WEFMAX presentations referenced above.

I want to thank Vanessa Chau for providing me with information to present during the exchange. I believe that WEAO has been quite successful with its student chapter members and I felt it was worth sharing with the other MAs. I also want to thank both the Board and the membership for supporting the attendance of WEAO representatives at the 2011 WEFMAX meetings. WEAO will be looking to mine the information available from these exchanges for ideas that can be implemented within our organization. I urge committees to do the same. By implementing new programs, we can better serve the needs of our existing and future members.

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EACH ONE REACH ONE

Catherine Jefferson

I am told that I can use the tag 'Each One Reach One,' since it began with WEAO some years ago. But, what do we mean by this phrase? I remember my first WEAO conference as Executive Director, and the challenge I issued for each member to bring another person into the fold. That is what I mean by 'Each One Reach One.'

Times are tough for a lot of organizations, as governments cut back and companies are faced with a bottom line that is shrinking much faster than mine. Demographics are changing to the point where we now have four different groups making up our work force (the traditionalists, the boomers, the X generation, and now the Y generation). Each of these four groups has different goals, life and work expectations, and work ethics. How do we continue to be important to those traditionalists who are retiring? How do we reach out to the boomers, and to the X and Y gen?

I believe that there are several ways in which we can accomplish this. One way was discussed at the Strategic Thinking session held earlier this year. We were focusing on goals and objectives from the WEAO Strategic Plan 2009-2013 that relate to membership retention and growth, and enhance business and growth for WEAO.

The result of this has been a plan to undertake market research studies for four key sectors on which WEAO would like to focus. These include professional wastewater operators (PWOs), managers from the municipal sector that influence PWO activities, those involved in stormwater management (whether industrial, residential, municipal, or government), and New Professionals (although this group is well on its way to bringing in new members, as long as they stay).

> "Times are tough for a lot of organizations, as governments cut back and companies are faced with a bottom line that is shrinking much faster than mine."

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WAYNE PARKER:
TOWARDS A NEW PARADIGM

Wayne Parker points out that energy and sustainability are becoming dominant issues in the wastewater industry. "I believe there will be a real change in paradigm when it comes to looking at waste streams," says the University of Waterloo researcher and professor. "Instead of looking at them as a problem where we expend energy for disposal, we will look at them as a resource from which we can recover energy and, perhaps, other value-added products."

He notes that, because it is so high in organic matter, the sludge produced in a wastewater treatment plant (WWTP) is an ideal substrate for producing biogas, an alternative fuel to natural gas for producing electricity and heat. Parker and his team in Waterloo's Department of Civil and Environmental Engineering have been exploring ways to increase the amount of biogas produced per unit of waste treated. Their current research revolves around the enhancement of anaerobic processes for the treatment of both wastewater and sludge.

"We are doing more work with membrane bioreactors in anaerobic applications," says Parker, noting that membrane bioreactors are already fairly common in aerobic processes where a membrane is used to filter out the bio-mass while producing high quality effluent for release.

For anaerobic processes, using a membrane enables the retention of active biomass in the system for longer periods of time. In digesters operated in a once-through mode, bacteria grown to break down the organics are released in the digested sludge. "In those systems, the amount of bacteria present in the system is a function of the rate that they are able to grow in the reactor," explains Parker. "However, if you retain the biomass in the system, but let the liquid through, then you are holding a higher concentration of biomass that can more effectively break down the solids when they come into the digester."

Using membrane bioreactors can increase throughputs and improve efficiency. One challenge of anaerobic digestion is the long residence time required for the waste in the system. Typically, sludge digesters have a residence time of 20-30 days. "The current process requires very large heated tanks," Parker points out. "Retaining biomass and releasing the effluent makes these processes more compact by allowing us to increase the throughput while maintaining a higher level of bacteria in the system."

More bacteria translate into better digestion and more biogas per unit of waste treated by the system. He points out that, nonetheless, there is a cost associated with the membrane technology and a certain amount of energy is required to push water through the membrane. "But, if you can reduce the overall scale of the digester for a given plant, that might more than offset the cost of the membranes," notes Parker.

To further maximize the effectiveness and efficiency of biogas production, the research team is conducting complementary research related to sludge pre-treatment. There is growing interest in trying to make the sludge streams more biodegradable by various means, including ultrasound, thermal/pressure and chemical/ozone methods. The goal is to take the organic material in the sludge and break it down into simpler compounds for more rapid and productive processing.

Other issues Parker and his graduate students are pursuing include odour and the production of organic sulphur compounds and hydrogen sulphide in anaerobic processes. "We are trying to better understand the processes leading to the generation of those substances that show up in the gas that comes off digesters," he explains. "Many of these compounds are also problematic for some advanced biogas utilization technologies, such as fuel cells that are used to convert biogas into electricity."

Pre-treating gas to remove compounds such as sulphur can be cost-prohibitive. Therefore, decisions related to producing energy from biogas at a WWTP require a good understanding of the composition of the gas. "The idea that you can get more out of a waste water treatment plant needs to evolve a bit," notes Parker.

Not that the challenges are insurmountable. "There are technologies out there right now that could be implemented and new technologies that are coming along," he adds. "They all can lead to energy neutrality and energy production." He points to a facility in Austria that produces enough energy from biogas to be either energy neutral or slightly energy positive. That should be the ultimate goal, he suggests.

However, many municipalities are not currently using their biogas because they are choosing not to make their capital investments in equipment that could turn this resource into energy. "That will take a very different mind-set for the utilities," says Parker, noting that the focus of many WWTPs is still limited to removing contaminants and producing good quality effluent. "I see that municipalities are not taking advantage of the opportunities out there as much as they might."

He notes that innovation, change and capital investment in new technology all require a certain amount of entrepreneurship. "There is potential for a partnership between utilities and the private sector," says Parker, "at least in the area of material recovery. I believe that at least a piece of the pie could be hived off and partnerships could become more productive in making changes to new technology." Combining energy production with the recovery of materials such as phosphorus and nitrogen could tip the scales on a business model that could provide lucrative benefits to both the private sector and municipalities.

"As we move forward and try to extract more materials out of the waste streams, the need for innovation will only increase," the scientist points out. "I tend to think the private sector is better at that than the public sector."

In the meantime, Parker and his team are continuing their work. In 2002, the researcher was recognized with a Province of Ontario's Premier's Research Excellence Award that helped the team further their research in modeling of enhanced anaerobic processes. Parker received the grant after many years of research and activity in biological wastewater treatment that started in earnest when he was completing his master's and doctoral degrees at Waterloo. During that time, he undertook research at Environment Canada's Wastewater Technology Centre in Burlington, a facility that, at the time, had more than 100 research engineers and scientists.

"It was an opportunity not only to do research that I probably would not have done at the university, but also to see other kinds of activity going on in the field at the time," recalls Parker. "It was also a significant networking opportunity. I still see a lot of these people at conferences or other events."

Like him, some of these colleagues are members of the WEAO, through which Parker continues to benefit from networking opportunities. "A lot of the research at the university is theoretical and the connection to practice is a little more distant," he notes. "It is interesting to see what people in the industry are doing and what challenges they are seeing. With a lot of our research, we try to have industry involvement. It is a good way to see if there are activities on which we can work together." Over the past two decades, Parker has chaired and co-chaired sessions on new technology and presently sits on the WEAO's Wastewater Treatment Technologies Committee. He is also a Program Committee member for the Research Symposium of the Water Environment Federation Annual Conference (WEFTEC). In the past, he has been a technical reviewer for the Federation of Canadian Municipalities Green Municipal Funds, and an expert reviewer for Sustainable Technology Development Canada.

2011 WEAO SCHOLARSHIP PROGRAM: CALL FOR APPLICANTS

Kelly Frensch, Stantec Consulting Ltd.

Purpose

The Water Environment Association of Ontario (WEAO) Scholarship Program was established in 2007 to promote student awareness of, and recognize outstanding students in, the water quality field in Ontario. The scholarships support promising students who are pursuing careers that protect water quality, including wastewater treatment and watershed management. Originally formed in 1933 as the Canadian Institute on Sewage and Sanitation, WEAO is a not-for-profit technical and educational organization with over 1500 members representing water quality professionals in Ontario.

Eligibility

Applicants must:

- be attending an Ontario college or university on a full-time basis,
- be a member of the Water Environment Federation (WEF) and/or WEAO, and
- have not have received the scholarship previously.

Entry requirements

Applicants **must** submit:

- a completed application form;
- two (2) completed reference forms, one from a current or previous professor **and** one from an employer in a relevant area; and
- an essay of up to 500 words, typed using word processing software, describing a technical issue related to wastewater treatment and/or water pollution control that, in the opinion of the applicant, is important for the protection of water quality in Ontario. The essay should make reference to relevant examples, where appropriate, and state how the applicant's chosen field of study and planned career path may help address the issue or problem. Cite all references (see FAQ for details).

Timeline for submission

Completed applications must be received no later than **October 31, 2011**. The recipient will be notified in December 2011 and will be publicly recognized in the Spring 2012 issue of *Influents* magazine and at the WEAO Annual Conference & OPCEA Exhibition held April 22-24, 2012 in Ottawa, Ontario.

Support provided

The 2011 scholarships will include four (4) awards. There will be one (1) award of $2,000 and three (3) awards of $1,000 each. One award is reserved for a college student and one award is reserved for a university student.

Selection criteria

A Scholarship Selection Committee will evaluate the applicants. Recipients will be selected based on the quality of the applicant's essay (60%) and reference forms from professor and employer (20% each). Winning applicants will be required to submit an official transcript from their academic institution before the award is presented. Recipients will be informed by email and telephone.

Submission and questions

The application and all required attachments should be emailed in a single PDF file (<10 MB) to *scholarship@weao.org*. Questions about the scholarship can be directed to the same email address. Answers to Frequently Asked Questions (FAQ) are posted on the scholarship website: *www.weao.org/scholarship/*.

CANADIAN YOUNG PROFESSIONALS SUMMIT: AN NP PERSPECTIVE

Johnathan Siamandouros, BEng

The first annual Young Professionals (YP) Summit was held in Vancouver, BC at the Hyatt Regency Vancouver, with a beautiful, sunny backdrop of the picture-perfect mountains through the large, bay windows. The Summit was a great way to connect YPs from the different provinces with the senior professionals (SPs). The majority of the conference involved learning about the value that SPs have for the YP involvement, as well as the importance of connecting with students and other YPs. There were over 20 YPs and another 5-6 SPs. The turnout was great.

The event started off with a brief introduction from Vanessa Chau, representing WEF YPs; Mike Homenuke, chair of the BCWWA YP division; Len Stein, president of BCWWA; and Daisy Foster, BCWWA CEO. The session was made interactive by having everyone in attendance stand up and talk about their companies or education, and what they wanted to be when they were kids. This was an interesting approach that allowed everyone in the room to learn about their fellow members. Some of the most notable dreams were astronauts, rock stars, and inventors.

Next, the meeting went straight into the main themes of the day, which were promoting youth involvement, sustainability, and the importance of passion in the YPs. Cordell Samuels, the new WEF VP, talked about the opportunity that young professionals have now that a large force of employees will be retiring in the next five years. Len Stein talked about the importance of passion in youth. He mentioned that there needs to be a great interest with the young employees because, in order for the field to survive, new and innovative ideas need to be brought to the table. Cordell also mentioned that knowledge transfer from SPs to YPs is priceless. Even though the YPs are learning very advanced material, there is great value in having good relationships and learning from the seniors. Mike Nolan, AWWA BC President, talked about the importance of associations like WEF and AWWA to bridge the gap between school and work, and the ability to have a network of friends in different cities. Joyce Chang, CH2M HILL – Vancouver, brought up the importance of sustainability and the need for a cyclical and resource recovery approach to projects. This way they

are not a burden for future generations. Vanessa spoke about the importance of promoting the industry to students, and expanding the student chapters. To close off the morning sessions, there was a panel discussion where Cordell Samuels, Fran Burlingham, Jack Bryden and Len Stein discussed their careers and the importance of committees like WEF that allowed them the networking and resources to get to where they are now. After an interesting morning session, it was time for a buffet style lunch in another conference room.

The lunch was combined with SPs from the WEFMAX Summit. In keeping with the interactive nature of the conference, there was another series of introductions, and you were able to get a sense of where the professionals were working, and how long they have been in the industry. There was a short film from the Seymour-Capilano filtration plant, and then back to the main conference room for presentations about the involvement from the different YP provincial associations. Next, there was a round table brainstorming session to come up with ideas to make the water and wastewater associations more popular to students. After a long and interesting seminar, it was time for the Seymour-Capilano plant tour.

The bus ride to the plant was filled with scenery, guided by the driver, and was a great way to chat with some of the YPs along the one-hour ride. The plant tour started with a description of the Seymour inlet water source and the pre-treatment building. There was also a discussion about the new tunnelling project, which will pump water from the Capilano Lake through an underground twin tunnel system, each 3.8m in diameter. When the water is treated, the return water will use gravity to recover energy (1.7MW). This will increase the amount of water treated from approximately 450 ML per day to 1.8 billion litres per day. The tunnels are expected to be completed by 2013. Next, the tour led to the flocculation tanks and we got to witness a filter backwash in progress. Also, we were able to see and touch a sample of the permeable membrane that allows the water to drain from the tanks. We then went on to see the rest of the plant, including the post treatment area. After the tour, it was back to the city to get ready for the evening social at the Rouge Kitchen & Wetbar.

The restaurant was great and the food was delicious. My favourite was a tossup between the deep fried lobster mac 'n cheese balls, and the wild mushroom encroute. It was a stand up passed-menu style, which allowed for more networking then a typical sit-down dinner. After some food and drinks, the night was done and it was time go back to the hotel, with the weight of the full day finally hitting me as soon as I hit the bed.

Overall, the Summit was a success, and I found value in knowing that SPs are looking forward to YPs continued growth in this industry. I met a lot of good contacts, and I am looking forward to the next Summit.

WEAO WINDSOR CHAPTER'S WATER TREATMENT PLANT TOUR

Jyoti Updhyaya, WEAO Windsor Student Chapter President

Organizing a treatment plant tour is not a new activity for many WEAO student chapters, however, the University of Windsor Chapter took a slightly different approach.

The WEAO Windsor Student Chapter organized a tour to the Lakeshore Water Treatment Plant on July 15, 2011. The treatment plant is located in Belle River, along the shore of Lake Saint Clair, about 35 km from the University of Windsor. The Lakeshore WTP is a newly-built plant with a capacity of 36.4 MLD. More information can be found on the plant's website *(http://www.lakeshore.ca/media/files/Brochure.pdf)*. The tour started at 1:00 pm and ended around 3:30 pm. Thanks to John and Nicole, who conducted the tour and answered every student's question.

The purpose of the tour was twofold: to provide learning opportunities for members, and to take the opportunity to promote our chapter to a larger base of students. The tour was planned in such a way that the participants would see the water treatment plant and later enjoy the view of the Lakeshore marina, which was closely located to the treatment plant. Although the location did not seem far, many of the interested students lived near campus and did not necessarily drive. As well, the public transportation was not very convenient. Therefore, the main challenge was to arrange transportation for the group. We decided to carpool among ourselves. We looked into possibility of getting additional funding from various sources. Thanks to the department of Civil and Environmental Engineering and the Graduate Student Society for their help.

After the tour, everybody gathered in the park near the marina and enjoyed pizza. A speech about the WEAO and the chapter, as well as the benefits of becoming a member was given to potential members. The informational flyer was sent out to the group on the next day. The event was a fun-filled learning experience. It also provided a sense of belonging among fellow students. Many have already applied for WEAO membership. The event was successful because of the innovative thinking of the executive members and the extraordinary team effort that was put in. These two things are a prerequisite for the success of any chapter, or any organization for that matter.

WEAO's UWindsor group in front of the Lakeshore Water Treatment Plant.

STUDENT CHAPTER LEADERS GATHER FOR LEADERSHIP FORUM

Alvin Pilobello, AECOM, WEAO Student Chapter Program Manager; and
Tom Woodcock, RV Anderson, OWWA Student Chapter Sub-Committee Chair

The 4th Annual Student Chapter Leadership Forum (SCLF) was held on Saturday, August 13, 2011, at the University of Waterloo campus. The SCLF is a joint effort between the WEAO New Professionals (NPs) Committee and the OWWA Young Professionals (YPs) Committee, and serves to guide existing and potential student chapter leaders with chapter fundamentals, structure, planning, and finances.

This year's SCLF was attended by 21 students representing nine WEAO and/or OWWA student chapters from colleges and universities across Ontario. In detail, each SCLF aims to bring together student chapter leaders to make connections, brainstorm and exchange ideas for potential chapter events, communications and strategies. The ultimate purpose is to promote the water and wastewater industry to students at the college and university levels through student chapter participation and membership in the WEAO and OWWA.

Rosanna DiLabio (WEAO President) and Lee Anne Jones (OWWA President) welcomed the attendees with a summary of the goals and functions of both organizations, along with stories of their own career paths. This was followed by an invigorating icebreaker, which aimed to simulate rapid networking though successive three-minute sessions of open-ended questions, proper topic transitions and active listening. This rapid networking would be similar to the '30-second elevator speech' concept, in which a person has a limited amount of time to make a genuine connection with another.

Cordell Samuels (WEF Vice-President) gave the keynote presentation to the students, encouraging their efforts in being actively involved in organizations such as WEAO and OWWA. Cordell recounted some stories from his successful career in the wastewater field to demonstrate the benefits of volunteering in career-relevant initiatives. His involvement with the WEAO and WEF provided some lessons and skills that could not necessarily be learned within the

Student chapter leaders and the Organizing Committee at the 2011 Student Chapter Leadership Forum held at the University of Waterloo campus.

workplace. He urged the students to keep an open mind, maintain a willingness to learn, and constantly pay respect to all colleagues, regardless of rank or years of experience. In his words, listen to and respect the people you work for, since "they know where the valves are!" Finally, Cordell encouraged the students to consider using incentives and awards to honour and appreciate chapter volunteers.

Alvin Pilobello and Tom Woodcock presented important details on the basics of the student chapters, including membership procedure and benefits, organizational structures and the resources that are available to each chapter. Kathleen Hum (WEAO NP Treasurer) and Nathan Pray (OWWA Student Chapter Expense Manager) explained the guidelines surrounding student chapter expenses, including the proper reimbursement procedures.

Students, guest speakers and the SCLF organizing committee sat in groups during lunch, where they had lots of fun enjoying stimulating conversations about their careers and schools, as well as a delicious lunch featuring chicken schnitzel, grilled vegetables and lasagna.

After lunch, Dale Jackson (Chair, WEAO NP Committee) and Dania Chehab (Chair, OWWA YP Committee) provided some interesting ideas on the kind of activities that student chapters can get involved in, ranging from technical sessions to socials. Chapters were also encouraged to share their stories by writing articles for *INFLUENTS* and *Pipeline*, the official publications of the WEAO and OWWA, respectively.

The Student Chapter Showcase featured the University of Waterloo OWWA Chapter, Queens University Joint Chapter, the University of Western Ontario Joint Chapter, and the University of Windsor WEAO Chapter. Each chapter presented on its experiences over the last year, summarized its chapter events in 2010-2011, and looked ahead to its upcoming year. This was a popular section among the students due to the multitude of ideas and lessons learned that their fellow leaders could take home and apply to their chapters. The chapters were given a breakout session to discuss how they planned to organize their year.

Kathleen and Alvin covered the topic of volunteer motivation and succession planning, providing the students with some food for thought regarding engaging potential and current student chapter volunteers, as well as continuing chapter momentum even through a changeover of chapter leadership. Everyone acknowledged that the turnover of leadership due to students leaving, going on co-op or internships, and graduations was an important topic.

Cynthia Doughty presented on her international development work through Water For People in the Dominican Republic and Malawi. She applied her hydrogeology background to water supply issues in her WFP assignments, including studying the important technical considerations to ensuring the continuity of well water supply to the various communities. The students were enlightened on the potential significance of her assignments and its recommendations on local people's quality of drinking water.

The SCLF Organizing Committee would like to thank Rosanna DiLabio, Cynthia Doughty, Lee Anne Jones and Cordell Samuels for their inspiring messages throughout the day. Special thanks are extended to the OWWA Waterloo Student Chapter team of Alex Chik, Shoeleh Shams and Kellie Superina for their support and hosting of this year's SCLF. We would like to acknowledge the members of this year's SCLF Organizing Committee, who donated much of their time and hard work to ensure that the Forum ran smoothly and inspired a new generation of chapter leaders: Dania Chehab, Kathleen Hum, Dale Jackson, Alvin Pilobello, Nathan Pray, Monique Waller, Bill White and Tom Woodcock. Finally, thank you to the students who attended the Forum. We wish them success with their respective chapters for the upcoming school year!

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BEHIND THE SPLASH: A TOUR OF CANADA'S WONDERLAND SPLASH WORKS WATER PARK

Leila Tootchi, New Professional

On Saturday June 18, about 15 of WEAO New Professionals (NPs) and OWWA Young Professionals (YPs) met at the entrance of Canada's Wonderland Splash Works Water Park and embarked on a tour of the facility. The tour mainly consisted of visits to the kiddie pool and wave pool water treatment facilities as well as the chemical storage area. Attendees walked through the mechanical system, while tour guide Lisa Dozois explained how the filtration, pumping and chemical control systems work.

There are three separate water systems in Canada's Wonderland Splash Works: the kiddie pool system, the Whitewater Bay system, and the main filter room system. The kiddie pool, with a water volume of 100,000 gallons, is crowded with children every day and has the highest water turnover rate compared to the other two water systems in the park. Water quality is constantly monitored using an automated control system. Manual checks are conducted every hour by the park's water technicians using the Taylor test kit. Generally, water quality is maintained by monitoring the level of chlorine, pH, hardness, total alkalinity and total dissolved solids. Carbon dioxide is used to lower the pH level. If needed, hydrochloric acid is applied to control pH level and total alkalinity. All water systems in the park use sodium hypochlorite as a sanitizer. In addition, an ultraviolet system contributes to disinfection of the kiddie pool water.

Whitewater Bay, a wave pool which resembles a white sandy beach, with a water volume of 1,000,000 gallons, is Canada's largest wave pool. This pool has its own separate water system as well. The waves are created using several blowers and a specially designed baffle system. In small groups, attendees put on hearing protection and ventured into the blower room; it was incredibly loud and the force of the blowers was visible as the door rattled and the room shook. Similar to kiddie pool, hydrochloric acid as well as carbon dioxide is used to control total alkalinity on an as need basis.

Aside from the two pool areas, all remaining water is treated in a main filter room that circulates 750,000 gallons of water. Employees were cleaning the filters as the group passed by and safe work procedures were clearly visible. Water is treated in the same way as the other two water systems in the park. The tour ended with a visit to the chemical storage area.

After the tour, all the participants enjoyed a buffet lunch before heading out to the rides, or, in our case, to the water park. While climbing up the stairways to the water slides, there were discussions about the infrastructure of thrill rides and roller coasters, as well as piping and optimum flow of water on the slides. The event turned out to be a memorable summer social for all of us.

We would like to thank Dale Jackson, WEAO NP Committee Chair, and Nancy Afonso, WEAO Seminars & Plant Tours Sub-Committee Lead, for organizing this exceptional tour and event. Special thanks go to Lisa Baker of the Group Sales Department and Lisa Dozois, the lead hand plumber at Canada's Wonderland.

WEAO NPs and OWWA YPs at the facility tour of Canada's Wonderland Splash Works.

Sustainability & Green Energy

CONTENTS

GrowingBlue: A New Website Focused on Water

Matt Demo, Communications Manager, Veolia Water North America

Those of us in the water industry understand the importance of water, not just for health, but for functioning economies. Now, a new website is sharing that knowledge with the public and is designed to give decision makers the tools and data to help them in their decisions related to water.

GrowingBlue.com is an interactive, data-driven website that provides credible, accurate information on water to help increase global awareness of the challenges we face and the need for thoughtful solutions. The site is intended to be a timely resource, given the increasing challenges facing the world's water managers and leaders. Urban, domestic, industrial and agricultural sectors worldwide are competing for increasingly limited water supplies, putting pressure on economic and population growth. Moreover, 2.5 billion people – 36% of the world's population – live in water-stressed regions, while more than 20% of the global GDP is produced in risky, water-scarce areas.

Launched by Veolia Water in collaboration with Global Water Intelligence and the Clean Water America Alliance, *GrowingBlue.com* uses animated maps, infographics, case studies and other tools to provide a visually compelling, user-friendly representation of the current state of water in 180 countries. In addition, the site includes water-availability scenarios in 2050 and demonstrates the intrinsic link between water and economic prosperity, societal stability and environmental sustainability. According to new data presented on the *GrowingBlue.com* site and developed by the International Food Policy Research Institute (IFPRI), almost half of the world's economy and 4.8 billion people, roughly half the world's expected population, could be located in regions facing water limitations by mid-century.

And that is only part of the issue. Already, in some communities, rivers have run dry, aquifers have become salty, and networks are leaky and unsafe. We need to mobilize our technical and infrastructure resources to address the problem.

"The best way to resolve our local and global water challenges is to raise public awareness of the importance of long-term planning and proper water resource management," explained Laurent Auguste, president and CEO of Veolia Water Americas. "Ensuring a prosperous future means increasing awareness of the important and critical work being done in water resource management and water productivity. That is why we are so excited about *GrowingBlue.com*, which examines these issues and offers real intelligence on managing this uniquely vital resource in a way that will be sustainable – and 'blue' – going forward."

The easy-to-navigate *GrowingBlue.com* site consists of four main sections, developed with input from industry representatives, scientists, academia and non-governmental organizations such as Clean Water America Alliance and IFPRI:

- **The GrowingBlue™ Tool** – This one-of-a-kind summary looks at the current state of water in 180 countries, 50 US states, and select major US cities. It translates complex data gathered from varied sources into a series of animated maps and benchmarks. Accompanying facts and figures provide analysis and rank the region's water stress, municipal, agricultural and industrial water use; and condition of the current

Figure 1: *GrowingBlue.com* is an interactive, data-driven website on water.

water-delivery infrastructure. The information, including all data in its original spreadsheet format, is packaged into a PDF that water management officials and government leaders can download and use as a resource (See Figure 2).

- **2050 Scenarios** – This section presents different economic, social and environmental scenarios that will be faced in 2030 and 2050. It also looks at the implementation of sustainable water-management practices as opposed to 'business as usual' approaches.
- **Implications for Growth** – This section offers a candid assessment of water's economic, environmental and social impact, including real-world examples of the costs, trade-offs and potential solutions to a range of water challenges.
- **Case Studies** – These include stories from around the world on what is being done to address water challenges and mitigate potential risks.

The site also features updated news on water-related issues, as well as white papers and other resource materials and links to other leading, water-focused websites. These include the Water Environment Federation, World Economic Forum Water Initiative, and the National Association of Water Companies, along with the Water Environment Association of Ontario.

The goal of *GrowingBlue.com* is to put the economic importance of water center stage and make the case for smart investment in the kind of infrastructure that will both protect the environment and support economic improvements in the long run. By telling the important story of how water is essential to our planet's economic and social wellbeing, *GrowingBlue.com* offers a path we can follow to ensure a sustainable future.

Read more at *www.growingblue.com* or follow updates on Twitter at *www.twitter.com/growingblue*.

Figure 2: The GrowingBlue Tool looks at the current state of water in 180 countries, 50 US states and select cities.

Optimising Anaerobic Digestion for Increased Performance and Biogas Production

Bill Barber, PhD, MCIWEM, MIChemE, C.WEM, CEng, CEnv, AECOM

Introduction

Anaerobic digestion has been exploited by the water industry for over 100 years. However, original facilities were generally designed to reduce the levels of harmful bacteria, odour, and quantity of sludge to enable it to be stored or recycled. The methane-enriched biogas emitted was a by-product and generally flared or wasted. However, in subsequent years, the importance of the biogas became apparent and facilities were often upgraded to include cogeneration to generate electricity and heat. In the UK, over 95% of all the anaerobic digestion plants in the water industry have cogeneration installed as standard (*Water UK, 2009*). As biogas energy is renewable, it attracts economic incentives, meaning that the electricity produced can be sold at a premium. Furthermore, electricity from biogas can reduce carbon footprint by offsetting fossil fuel power generation. Newer developments have seen the introduction of biogas upgrading technology, so that it could be used to displace gas on a network or compressed and used as a vehicle fuel. Both of these applications have full-scale examples in European sewage treatment facilities.

However, the vast majority of existing infrastructure has long asset life and replacing it with facilities designed to meet modern drivers may be neither viable nor economic. Fortunately, there are a number of things that can be looked at to optimize performance of these assets. A pre-treatment industry has evolved whereby a number of 'black-box' technologies improve the performance of municipal sludge digestion plants by conditioning sludge to make it more amenable to treatment. The technologies use a wide variety of mechanisms to improve performance including thermal, pressure, mechanical and acoustic systems, and they work especially well on improving the biodegradability of thickened waste activated sludge (TWAS). However, improvements in digestion performance can be made prior to the consideration of pre-treatment by adjusting a number of parameters during operation of an existing plant. This article presents some results of a model based on both actual plant performance and bacteriological kinetics in order to quantify the influence of a number of these parameters.

Baseline conditions

In order to determine the benefits of the variables, a baseline condition is required to provide a benchmark. For this study, the baseline conditions are summarised in Figure 1. A retention time of 16 days has been used, with a void (or dead space) of 20% for a plant operating at 35°C. The sludge type and composition has been based on typical figures and wastewater treatment configuration. It is assumed that the digestion facility has a co-generation plant that is available 85% of the time and that energy within the biogas is converted to electricity and heat at a rate of 33% and 45%, respectively. Under these conditions, 10,000 tonnes of dry solids per annum generate 0.76 MW (965 hp) of electricity.

Results

Figure 2 shows a summary graph indicating the impact of a number of parameters on energy generation compared to the baseline conditions. The data is presented as a generation ratio, which is simply a ratio of the energy generated for a given parameter compared to the energy generated under the baseline conditions shown in Figure 1. Therefore, a ratio above one indicates that the parameter increases energy generation compared to the baseline, while a figure below one shows a drop in performance compared to the benchmark.

As well as use of pre-treatment (advanced digestion) technologies, the three most influential parameters that this study has identified are dry solids, sludge type and availability/efficiency of co-generation.

Impact of dry solids

Sludge is generally thickened up to approximately 6% dry solids prior to digestion, as, above this, it becomes increasingly difficult to handle. If its rheology can be changed, the dry solids can be increased to approximately 10%. However, many facilities, without thickening or feeding dry solids outside the optimal design parameters, experience impacts in performance, as shown in Figure 3.

If solids are too thin, a higher volumetric throughput reduces the hydraulic retention time. As the organisms responsible for biogas production are generally slow growing, a reduction in retention time coincides with lower biogas production. Furthermore, if the sludge falls below a certain minimum dry solids, there is insufficient energy to generate heat required to maintain digester operating temperatures. The dry solids required to achieve minimum heat requirements are dependent on the type of sludge digested and, from this study, range from 3-7% dry solids for pure concentrations of primary and TWAS, respectively. Sludge fed below the minimum requirements will result in the digestion plant requiring auxiliary fuel to maintain operating temperature, or the digester will have to run at a

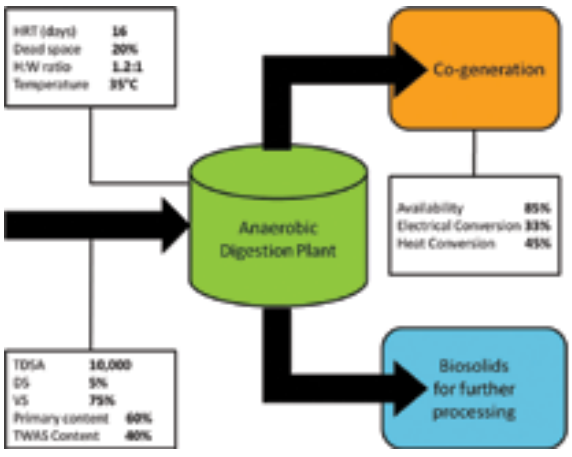

Figure 1: Baseline conditions used in study.
Abbreviations:
HRT = Hydraulic retention time
H:W = Height to Width Ratio
TDSA = Total dried solids per annum
DS = Dried solids
VS = Volatile solids as a percentage of total solids

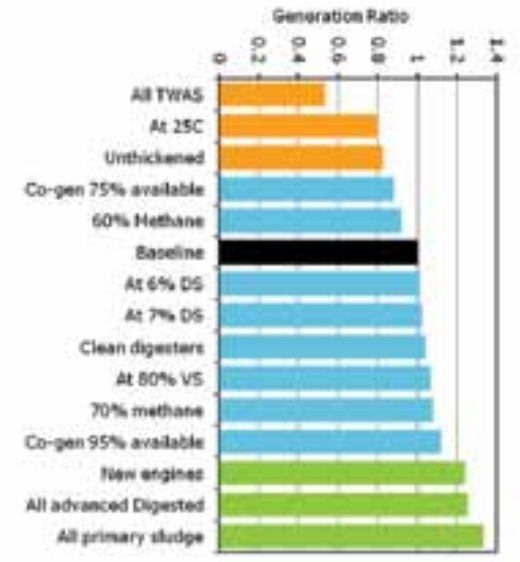

Figure 2: Generation ratio for various parameters surrounding anaerobic digestion of municipal sewage sludge. Green bars are parameters that increase energy generation above 20% and orange bars reduce generation by approximately 20%. The black bar is baseline.

lower temperature consistent with the reduced heat generation. If the latter is allowed to happen, digester performance decreases further, as bacterial activity drops with temperature according to the Arrhenius-van't Hoff rule.

In contrast, if the digesters are fed dry solids at an elevated rate, mechanical handling/mixing problems or issues caused by overloading may occur. Digester overloading may result in foaming, to which a common operational remedy is to decrease feeding rate. In this study, power generation was calculated at a range of dry solids from 2-7%.

The study showed that, with sufficient retention time (i.e., the digester was not close to being overloaded), there was insufficient benefit to thickening much above 5% dry solids for mixed sludge. However, if dry solids were much below 4% biogas production, energy generation showed a sharp decline. Therefore, the results imply that, if a plant is running dry solids below 4% (or un-thickened sludge), a thickening plant or upgrades to existing thickening should be the first choice of digestion pre-treatment. While there may be little additional benefit of thickening to 6-7% dry solids (assuming sufficient retention time), additional thickening may help if the plant is hydraulically limited or requires additional capacity. Otherwise, installation of a pre-treatment technology that can enable the digester to perform at higher loading rates may be beneficial. The most common way of achieving this is by the use of thermal hydrolysis that enables a doubling of dry solids to circa 10%, thereby enabling additional capacity. An example of where this has been done at large scale is in Manchester, England, where a thermal hydrolysis plant was installed to enable throughput to increase from 40,000 tonnes dry solids per year to 91,000 tonnes dry solids (*Barber, 2010*).

Impact of sludge type

This study has shown sludge type to be the single most fundamental influence on energy generation. From the model, 90% of the predicted biogas yield could be attained within five days for pure primary sludge, but requires over 35 days for TWAS. As the two sludge types are typically digested together, the primary sludge has ample retention time to generate biogas, but a great deal of the energy from the TWAS would not be available. Other results (not shown) imply that approximately twice the energy is extracted from 10,000 TDSA primary sludge (one MW = 1340 hp) compared with TWAS (0.5 MW = 670 hp). This is consistent with findings (*Winter and Pearce, 2010*) that determined gas yields for primary sludge in the region of 2-3 times those measured for secondary sludge. Ironically, increasingly strict wastewater drivers would encourage the production of more TWAS at the expense of primary. Ammonia removal via nitrification requires longer sludge ages during secondary treatment, which results in more secondary sludge that is increasingly difficult to biodegrade (*Batestone, 2011*), and encourages the growth of filamentous organisms which have been linked to downstream foaming problems.

In recent years, there has been a trend in mainland Europe to use the sludge as a carbon source for nutrient removal by bypassing primary treatment altogether and starting with aeration resulting in plants without primary sludge. This

practice has also become commonplace in Australia. Alternatively, some sludge can be purposely fermented to provide the carbon source. While potentially beneficial, the use of the sludge's energy in this way is offset by a reduction in biogas due to lower calorific value in the sludge and greater proportion of TWAS. As biogas is becoming increasingly economically attractive in Europe, some facilities bypassing primary treatment or using fermentation techniques to generate carbon are now being converted back with the carbon being purchased.

Impact of co-generation

This was determined by looking at both availability and efficiency of converting the energy in the biogas to electricity. In this context, availability refers to the percentage of the time that the plant is available for use. This is dependent on a number of operational parameters such as presence of contaminants, calorific value, engine quantity, availability of critical spares, and biogas holder volume. Here, a 1% increase in availability is worth approximately seven kW of electricity, compared with an increase of 23 kW per percentage point increase in electrical conversion. This data implies that a new engine would be more cost effective than improved maintenance on an older unit. Engine efficiencies have increased recently and can now convert over 40% of the energy in the biogas to electricity. However, it must be pointed out that this increased electricity consumption comes at the expense of heat and may not be suitable for plants with high quantities of TWAS or where dry solids are low and heat content becomes important.

Other influences

Other influences are becoming increasingly important due to growing interest in the co-digestion of different waste streams as well as stricter environmental standards. Wastes for co-digestion are varied and can produce biogas with differing methane content. In this study, each percentage of methane in the biogas was worth 12 kW of electricity. However, new high-efficiency engines have to be finetuned to optimize lean burning and fluctuations in methane content due to co-digestion have caused engines to trip, resulting in downtime. When volatile solids content was altered, each percentage was worth approximately 10 kW. The study highlights the importance of accuracy when measuring that parameter. It is likely that volatile solids content will drop due to increasing chemical removal of phosphorous from wastewater.

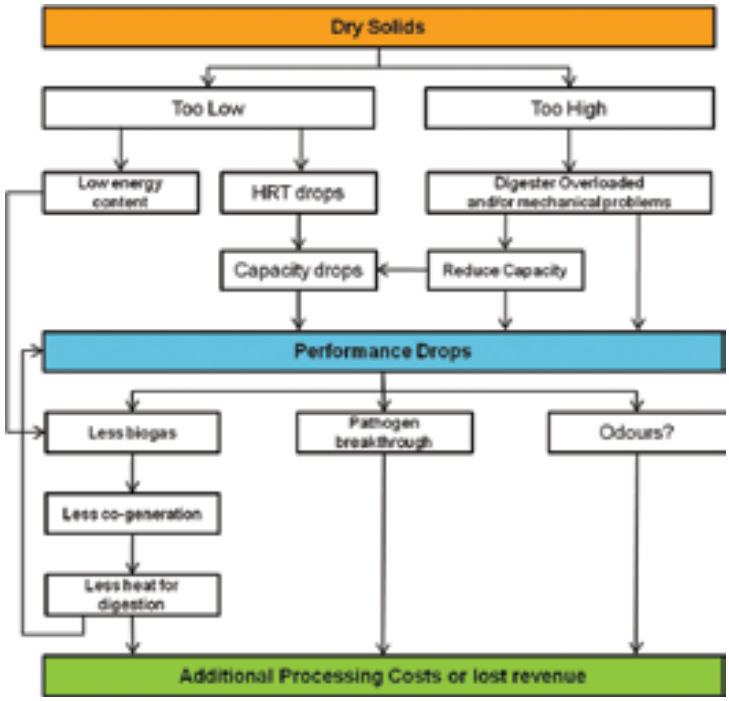

Figure 3: Impact of dry solids content on anaerobic digester performance.

Conclusions

While all plants are unique and have specific drivers, a number of parameters can be altered to improve performance at a digestion facility prior to the consideration of pre-treatment. Dry solids should be above a threshold figure to ensure heat demands and retention times are met to avoid performance loss. As well as dry solids, sludge type is of fundamental importance, with primary sludge being preferred to TWAS. However, increasingly strict environmental standards are requiring higher TWAS proportions to be treated by digestion, which would result in a fall in digestion performance in coming years. Regarding the use of co-generation, it may be more cost effective to invest in new equipment rather than maintain a plant with poor conversion capacity.

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A Green, Sustainable, Self-Sufficient Wastewater Treatment Plant: the Upcoming (R)evolution

George N. Abrahim & Erik Bundgaard, Veolia Water & Technologies Solutions

As municipalities and industries strive towards sustainable development, the wastewater treatment plant (WWTP) is on the verge of being entirely transformed.

Wastewater treatment technologies have been in a state of evolution ever since the late 19th century, when cities began to add chemical treatment and sedimentation facilities to their sewerage systems. Before that, sewage handling had been mainly focused on collection and conveyance to the sea or to surface water for raw wastewater disposal.

In the more recent past – the 1980s and early 1990s – increasingly stringent discharge requirements and regulatory enforcement were the primary drivers of wastewater treatment technology advancement. Then, in the mid-to-late 1990s and early 2000s, the rising costs associated with building and operating plants to meet these regulatory requirements had become the primary driver for technological advancements.

Striving towards sustainability

Now, sustainable development is becoming a permanent fixture in the conversation between all the stakeholders (cities, governments, industries, public, etc.). Not only must private and public owned treatment works meet increasingly stringent discharge standards and strive to lower costs, the owners and operators of these systems must also successfully establish themselves as responsible stewards for sustainable development.

As municipalities and industries strive towards sustainable development, the wastewater treatment plant is on the verge of being transformed into the wastewater refinery, providing water reuse, organic and mineral materials capture, energy production and biomaterials reclamation. Much like an oil refinery that extracts valuable materials out of crude oil, the wastewater refinery will be a place where valuable materials are recovered from wastewater.

At the wastewater refinery, energy will be generated, beneficial by-products manufactured, and reusable water produced. In the not-too-distant future, many wastewater treatment plants will be capable of producing enough power to be 100% energy self-sufficient, with a significantly reduced environmental footprint. Some plants will even be capable of sending excess power to the local electricity grid.

Figure 1

Paving the way are new breakthrough technologies, significant improvements to certain older technologies, and the changing perception of wastewater from a detriment to a rich resource. The wastewater treatment plant will become a 'refinery' that will treat wastewater as a resource, providing a lower environmental footprint, generating value-added by-products, reducing total life-cycle costs of ownership and operation, and complying with current and anticipated regulatory requirements (Figure 1).

The road ahead: the (r)evolution in your WWTP

To achieve sustainable development in wastewater treatment, system owners, researchers and technology developers are concentrating their efforts today in the following areas:

1. energy optimization,
2. advanced process control and instrumentation,
3. energy producing sludge management,
4. advanced anaerobic digestion, and
5. wastewater reuse and recycling.

Accomplishing these requires forging new approaches, incremental improvements,

Figure 1: The wastewater refinery.

and a broad spectrum of technological innovations.

1. Energy optimization

Power usage is the highest single expense in a conventional activated sludge plant. One current method for reducing energy consumption in conventional activated sludge plants is using improved tools for system design.

Computational fluid dynamics (CFD), a computer-based methodology that simulates the hydrodynamics of processes by evaluating flow patterns and local variables, is becoming increasingly utilized in wastewater treatment system design. Important recent advances in computational fluid dynamics are providing the basis for further insight into the dynamics of multiphase flows (Figure 2), allowing designers to solve problems and improve efficiencies. CFD modeling can provide a highly cost-effective approach because it enables experimentation with new equipment and system designs before committing to a final configuration.

2. Advanced process control and instrumentation

Another avenue for reducing energy use is adopting advanced process control and

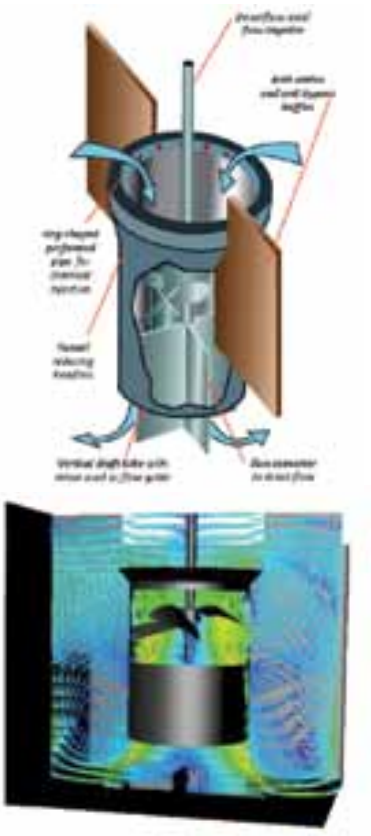


Figure 2: Computational fluid dynamics (CFD) is helping system designers to more effectively build better wastewater treatment systems.

operation technologies. In a conventional activated sludge process, residual dissolved oxygen (DO) is the key parameter to achieving optimum treatment performance and energy reduction. The development and implementation of advanced control strategies and decision support tools now provides an efficient means to efficiently adjust aeration parameters.

The use of the latest online analysis sensors for both the NO_3 (nitrates) and NH_4 (ammonia) parameters, coupled with robust automation and instrumentation design, allows operators to monitor the effluent quality in real time, while optimizing the energy consumption of the plant, thereby cutting energy consumption by about 15-20%.

3. Energy-neutral biosolids management

Thermal drying has emerged as one of the most sustainable methods for balancing economic advantages with environmental stewardship. Thermal drying of biosolids up to 90% dry solids can provide up to an 85% reduction in mass. An indirect convection belt dryer, like the BioCon® drying process, removes moisture from biosolids, leaving a Class A biosolids ready for land application or other beneficial uses. North American wastewater treatment plants are catching on to the idea of using dried biosolids to fuel the drying process, with the idea of rendering energy-neutral the whole biosolids management process. This procedure has long been prevalent in Europe, where fuel has historically been costly and, typically, less land is available for land application.

The BioCon Energy Recovery System (ERS) is the BioCon biosolids belt dryer added to an integrated biosolids energy recovery system that utilizes heat generated by the combustion of biosolids to dry the biosolids – a BioCon Biosolids Dryer and ERS were recently installed at the Buffalo, Minnesota Wastewater Treatment Plant. While having only 20% dry solids in the dewatered sludge cake, the ERS still provides over 80% of heat for the dryer from renewable fuels, and reduces the biosolids mass by 95%. This reduces operating costs by approximately 50%, compared to disposal of wet sludge. It also reduces the amount of material to be transported out of the plant, resulting in extremely low hauling costs.

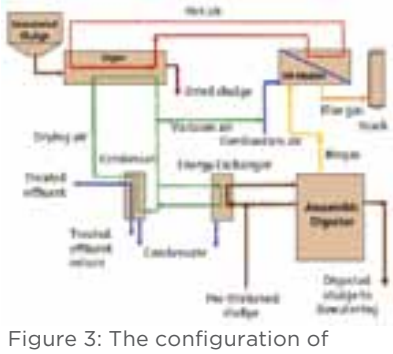


Figure 3: The configuration of the BIOCON® Energy Exchange System (BEES) maximizes the use of process energy by using the biogas for the dryer heating and lower energy waste heat from the dryer to maintain the digester temperature.

Taking ERS performance one step further has led to the development of the BioCon Energy Exchange System (BEES) for treatment plants with anaerobic digestion processes (Figure 3). The BEES makes it possible to utilize all biogas from the digester and uses it to generate the necessary heat for the drying process. The waste heat from the BioCon process is piped back to the anaerobic digester and used to maintain the temperature required to optimize the digester process.

4. Advanced anaerobic digestion of biosolids

Many WWTPs across Canada use anaerobic digestion to reduce their biosolids volume, while stabilizing sludge and destroying pathogens.

Anaerobic digestion produces biogas containing 60-70% methane. Many plants in Europe and Asia use this renewable energy to fuel generators. Although most plants in North America that use anaerobic digesters burn the gas for heat to maintain digester temperatures and to heat building space, unused gas has historically been flared off as waste.

This is changing, however, with the increasing focus on the economic and sustainability aspects of renewable energy production. More facilities are reassessing their operations, given the viability and cost effectiveness of cultivating and harvesting biogas and converting it into energy.

Furthermore, even though anaerobic digestion has been used to stabilize biosolids in treatment plants for almost 100 years, the final chapter in this evolution has not been written.

Thermal hydrolysis processes can significantly boost biogas production in digesters. The recently developed Exelys™ technology (Figure 4) increases the concentration of solids to be treated, thereby reducing the volume to be heated. It can reduce the quantity of sludge produced by 20-50% and increase the production of biogas by 20-50%, compared to standard digestion, contributing to rendering the whole WWTP energy-neutral.

Figure 4: The Exelys™ thermal hydrolysis process increases biomass concentration, thereby reducing the volume to be heated for anaerobic digestion.

Operating the Exelys system in a loop with a digestion, or by placing it between two digesters (Figure 5), it is possible to recover a maximum of a sludge's energy potential. This process configuration, called DLD (digestion – lysis – digestion), optimizes the anaerobic digestion process, which maximizes the production of renewable biogas energy, while minimizing sludge requiring disposal.

As a side note, the use of digesters also comes with its challenges. Following anaerobic digestion, most plants will dewater the sludge prior to disposal, thus generating a side stream of filtrate and wash water with a high concentration of ammonia-nitrogen. At most plants, this is recycled back to the head of the plant and treated in aeration basins. Typically, this represents an additional nitrogen loading of 20-30% and a significant energy cost for nitrogen treatment by aeration.

In order to address this issue, a recently developed process application, called ANITA™ Mox, enables nitrogen removal from the reject water with reduced aeration need. This small footprint process, based on moving bed biofilm technology, uses a bacterium that performs the task of nitrification without consuming carbon and requires 40% less oxygen than the conventional nitrification process that uses two types of bacteria, resulting in an overall 60% energy reduction.

5. Municipal wastewater recycling

Recycling and reuse of treated wastewater is playing an increasing role in integrated resource management and sustainable development. In some areas of Western Canada, like Alberta or Saskatchewan, for example, new sources of freshwater can no longer be developed to meet expanding demand. If demand is to be satisfied in a sustainable manner, it is crucial to manage existing resources efficiently and further develop alternative resources. Recycling wastewater is one way of securing the water.

California is often at the forefront of all reuse and recycle schemes, because of its arid climate. Canada has been relatively immune to this situation, but, as an example of what could be implemented if required, we can see what the Delta Diablo Sanitation District Facility has done. It generates water for use as cooling tower and process water make-up at two power plants and to irrigate approximately 20 acres of parks and landscaped areas. The recycled water facility processes secondary treated wastewater from three public utilities through a high-rate ballasted flocculation process and automatic backwash filters prior to a disinfection step. Settled water from the high rate sand-ballasted flocculation and clarification process is a key component at the largest industrial recycled water facility in California. The treated water meets stringent standards for disinfected tertiary water, as required for cooling water and irrigation use.

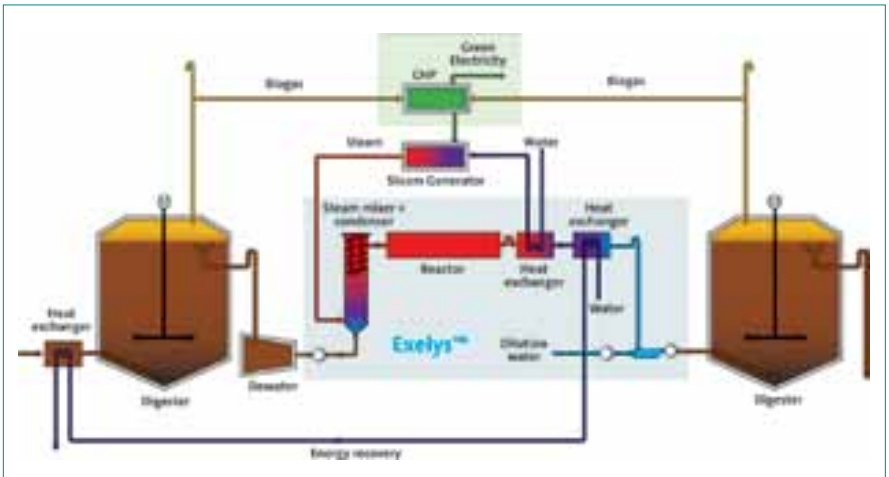


Figure 5: The DLD™ (digestion-lysis-digestion) process configuration uses the Exelys™ process to increase biogas production, maximize electricity production, and minimize the volume of sludge requiring disposal.

Reducing the environmental footprint

The environmental footprint, which encompasses energy, water, and waste, is also now being used as a metric to measure innovation made toward the development of clean water technologies. Viewing carbon and water together provides a more comprehensive picture of these challenges, especially in the water and wastewater industry. The introduction of the Western Climate Initiative (WCI) market in Canada will create a push toward the use of greener, more sustainable technologies.

One of the recently developed tools to encompass the complexity of the water cycle is the Water Impact Index (WII), the first indicator enabling a comprehensive assessment of the impact of human activity on water resources (Figure 6). The WII expands on existing volume-based water measurement tools by incorporating multiple factors such as volume, resource stress and water quality.

The WII incorporates the volume and quality of the water extracted and released back into the environment and adds the Water Stress Index (which accounts for the level of stress on the resource). This new index provides the water impact, and it includes indirect elements from the production chain such as energy, raw materials, chemicals, and waste generated. This new tool provides additional parameters needed to make informed choices about effective water management.

Figure 6: The Water Impact Index accounts for the impact of water resources generated by a human activity. It enables evaluation of how other water uses (both humans and ecosystems) could potentially be deprived of this resource, expressed in m^3-WII-equivalent.

Conclusions: the WWTP of the 21st century

In its current incarnation, the conventional WWTP scheme is about a century old. The current treatment plant is perceived as treating 'waste;' as being a cost center that consumes energy and produces sludge.

The WWTP of the 21st century, driven by sustainable development principles, will be entirely different: it will be self-sufficient in terms of energy, a producer of recoverable and marketable substances, and a generator of less waste.

This will require a paradigm shift and a change in the technological processes used. Instead of removing the pollutants in successive stages to obtain clean water, as we do today, we will have to extract the resources one after the other, starting with the water, to recycle it as clean water, followed by the energy and the organic and mineral matter. Then, we will treat the pollutants at the end of the process, after they have been concentrated.

This will represent a completely different economic balance and tomorrow's installations will be closer to a 'bio-refinery' than today's wastewater treatment plant. This is the upcoming (r)evolution that will be affecting wastewater treatment plants across Canada, and, indeed, the world, if we are to adhere to the principle of sustainable development.

George N. Abrahim is Vice President, Strategic Initiatives, and Erik Bundgaard is Director of Technology, Carbon Manager, for Veolia Water Solutions & Technologies.

Combined Heat and Power (CHP) Experience with Digester Gas

Joe van Schaick, Electric Power Market Manager – Gas Systems, Toromont Cat Power Systems

Wastewater digesters at Canada's treatment plants produce large volumes of gas as part of the normal process of breaking down and cleaning up wastewater. The gas is a combustible mixture of methane and carbon-dioxide which, if released to the atmosphere, not only would result in unacceptable odours, but also would be a potent greenhouse gas mixture contributing to climate change.

The conventional approach to dealing with digester gas is to combust it either in a flare or in boilers to heat the digester and other treatment plant facilities. The result is either a complete loss of the energy or the useful displacement of other fuel needed to fire boilers. Since digester gas is typically produced continuously throughout the year, most treatment plants are forced to flare off excess gas when heat is not required.

Using digester gas to fuel combined heat and power (CHP) systems is a practical solution that offers operators a year-round solution to gas utilization and can be a revenue generating opportunity. Typically, CHP systems offer energy utilization efficiencies ranging from 80-90%, thereby significantly reducing both wastewater treatment plants' energy needs, as well as reducing emissions.

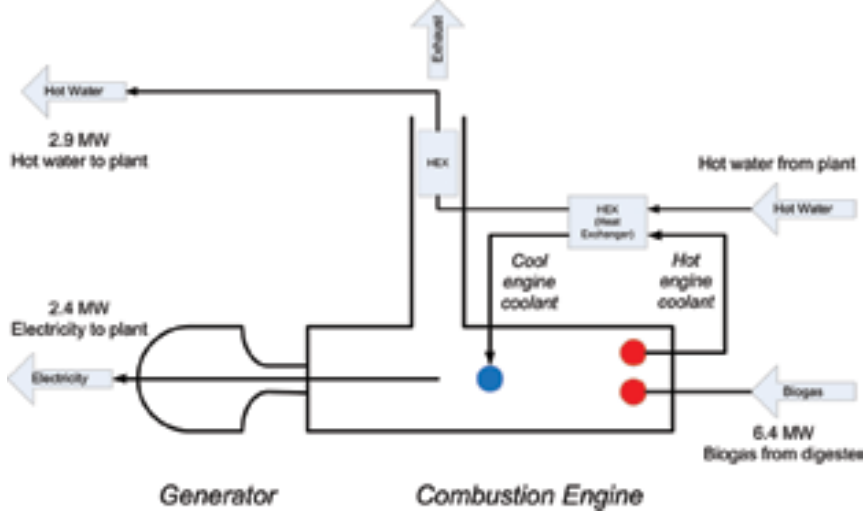
Consisting of internal-combustion engine-generator sets, gas turbine-generator sets, and even more exotic technologies like fuel cells, CHP systems have been installed with great success at many treatment plants throughout Canada. By far, the most common and successful technology to use has been purpose-built internal combustion engine-generator sets. A few installations in Ontario should be noted for their longevity and efficiency.

The Robert O. Pickard Environmental Centre (ROPEC) in Ottawa has operated its 2.4 MW digester gas-fuelled CHP plant continuously for more than 12 years. Given the nature of the fuel, known for its corrosive contaminants, the Caterpillar model G3516 low emission engine-generator sets have performed remarkably well, each with more than 100,000 running hours, and demonstrating the benefits of being purposefully designed to withstand corrosive attack, fluctuating fuel energy quality, and unattended operation.

The CHP system has provided ROPEC over 95% overall availability, with more than 83% energy efficiency. This performance not only compares very favourably with other renewable energy sources, it is also a superior track record to conventional utility-style central thermal plants.

In 2004, the City of Hamilton decided to respond to the Ontario Power Authority's (OPA) call for proposals for electricity generating projects using renewable fuels, and, thereby, make a positive contribution towards reducing the province's dependence on coal-fired electricity generating plants. The City created Hamilton Renewable Power Inc to develop a digester gas-fuelled CHP system at the Woodward Avenue Wastewater Treatment Plant. Hamilton evaluated its options and chose a 1.6 MW CHP plant designed and built on a turn-key basis by Toromont Energy. The CHP plant is a modular design, consisting of a Caterpillar® G3520C engine-generator, set in a self-contained housing, mounted outdoors for ease of installation and, if necessary, relocation.

The Woodward CHP system has operated in excess of 42,000 hours since start-up in late 2005 and has



Robert O. Pickard Environmental Centre Energy Balance.

produced in excess of 65 million kilowatt hours of electricity, displacing the equivalent of 300,000 GJ of natural gas. At over 95% availability, the plant runs unattended, while being remotely monitored by operations and maintenance staff at various locations across town. The benefits of the modular nature of its design will be realized when the system is relocated as part of a multi-million dollar expansion project currently underway at the treatment plant.

Digester gas contains harsh contaminants that can quickly damage expensive equipment such as engines. When done right, using purpose-built equipment, internal-combustion engine driven CHP systems at wastewater treatment plants are reliable, durable, and proven approaches to digester gas utilization and energy efficiency.

Hamilton Renewable Power Inc. (HPRI)

When the Ontario Ministry of Energy announced a renewable energy initiative in 2004, the City of Hamilton saw an opportunity. Anaerobic digesters at the City's Woodward Avenue Wastewater Treatment Plant produced six million cubic meters of biogas per year at 65% methane. The plant burned some of the gas in a boiler for heating, but flared the majority of it.

Seeing the gas as a source of renewable energy, the City responded to a Request for Proposals from the Ministry of Environment, with plans for a 1.6 MW cogeneration facility fuelled exclusively with digester methane. The project would also meet a need for increased backup generation at the treatment plant, as identified by a power study.

The Ministry selected the City's proposal through competitive bidding based on the price of energy per kilowatt-hour. It was one of 10 winning projects totalling 395 MW of renewable generating capacity. The City then turned back to Toromont Power Systems in Concord, ON, which had developed the project proposal, to build, operate and maintain the cogeneration plant.

To generate electricity, the City formed a corporate entity under the *Ontario Business Corporations Act* (*OBCA*) called Hamilton Renewable Power Inc. (HRPI), with the City

of Hamilton as the sole shareholder. Toromont Power Systems, which in 2002 had supplied the City with a 3.5 MW Cat® G3616 gas generator set for a district energy project in the downtown area, took turnkey responsibility for the renewable energy project. The local office of Conestoga Rovers & Associates provided engineering and project management support through construction.

Toromont delivered the complete cogeneration system in a stand-alone module with a sound-attenuated enclosure. At the heart of the system is a Cat G3520C gas engine, in a configuration designed to be durable and reliable in burning low-energy fuels without needing extensive fuel conditioning.

A specially-designed cooling system elevates jacket water to the optimum temperature to prevent condensation of fuel-borne sulfur compounds and the formation of sulphuric acid, which can damage engine components. A crankcase ventilation pump ejects potentially acidic blowby gases and draws in fresh, filtered air. In addition, aluminum and unprotected steel are eliminated from key components, including aftercooler cores and main and connecting rod bearings.

"Because we chose this engine, the digester fuel conditioning system requires only a moisture trap, followed by a coalescing filter to remove remaining moisture droplets and particulate," says Denis Gosselin, Technical Manager. "We made provisions to add other fuel conditioning steps in the future, but we do not expect them to be necessary."

The enclosure contains jacket water and first-stage aftercooler heat exchangers and an exhaust gas boiler. Heated water from the engine passes through a plate-and-frame heat exchanger connected to the treatment plant process heat loop. The package also includes 4,160V switchgear, utility interconnections, paralleling and synchronization controls, and protective relaying. A PLC-based control panel designed and built by Toromont regulates the heat recovery and gas delivery systems as well as the engine and generator.

Hamilton Renewable Power Inc.

The cogeneration facility was commissioned in July 2006. Under the City's contract with the Ministry of the Environment, it will supply renewable energy for 20 years, at a fixed price per kilowatt-hour, with escalators.

The facility operates continuously, fulfilling nearly all of the wastewater treatment plant heat load and 20% of its electrical load. Total cogeneration plant efficiency exceeds 80%. Projected simple payback on the cogeneration equipment is five years.

HRPI signed a long-term customer service agreement with Toromont at a fixed price per kilowatt-hour, covering all maintenance, service, overhauls and replacement parts. In addition, for at least the first year, Toromont will operate the facility.

A Toromont technician makes regular visits to the site, and critical engine and generator functions, shutdowns and alarms are monitored remotely from Toromont headquarters. The contract includes an availability guarantee.

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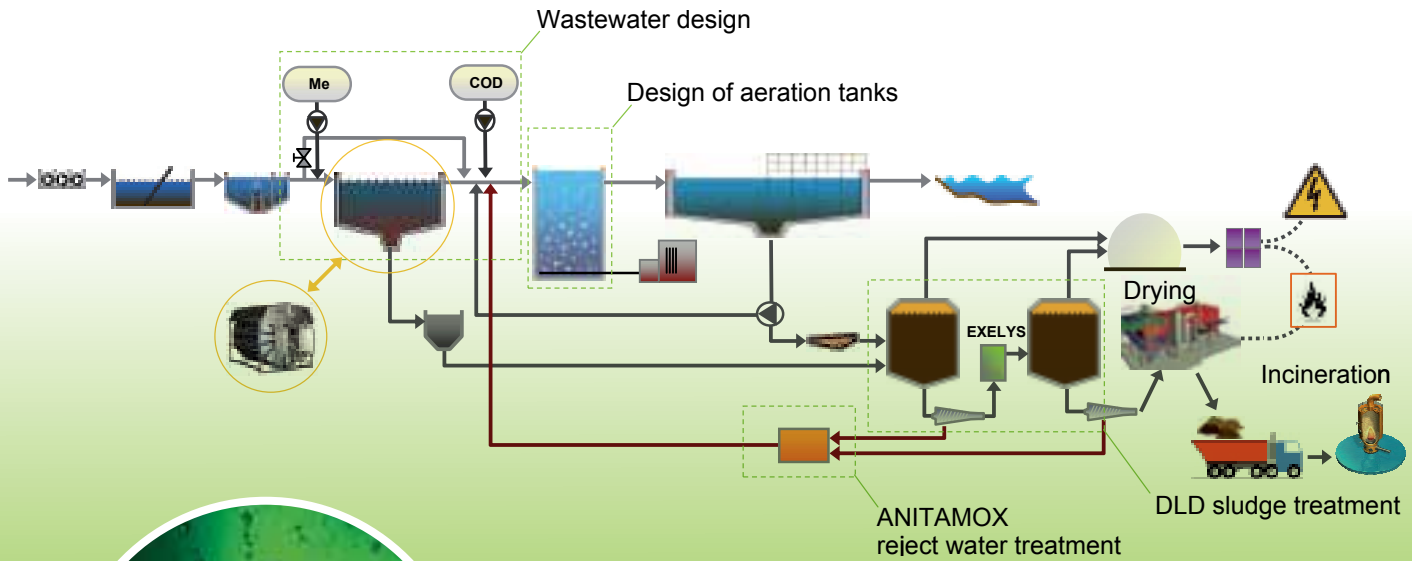

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Cogeneration: A Growing Trend for Biogas Utilization by Ontario Municipalities

Darrell Yong and Peter Burrowes, CH2M HILL

Biogas is produced by the biological breakdown of organic matter under anaerobic conditions (i.e., in the absence of oxygen). In the context of municipal wastewater treatment, biogas is generated through anaerobic digestion of wastewater sludge, and hence is also commonly known as 'digester gas.' Anaerobic digestion is one of the oldest sludge stabilization technologies.

Typically, biogas generated through municipal sludge contains approximately 60% methane, with the remainder being carbon dioxide and trace quantities of nitrogen, oxygen, sulphur compounds and siloxanes. This translates to approximately 22,500 kJ/m^3 on a higher heating value (HHV) basis. Table 1 summarizes typical characteristics of biogas.

Due to its high calorific value, biogas is considered a valuable source of energy. Most wastewater treatment plants that practice anaerobic digestion utilize their biogas to fire boilers for sludge or plant heating purposes. However, over the last two decades, many municipalities have become increasingly aware of the benefits of the alternative uses of biogas, that is, electricity and heat generation through cogeneration. This article showcases three wastewater treatment plants in Ontario that took the lead in utilizing the free fuel available in their plants for power and heat generation.

Cogeneration

Cogeneration (Cogen), also known as combined heat and power (CHP), is the simultaneous production of electrical and thermal energy from the combustion of a single fuel through a power generator and heat recovery unit. Generally, there are five mature cogeneration technologies available in the wastewater treatment market: steam turbines, gas turbines, reciprocating engines, microturbines and fuel cells (*Nyboer and Groves, 2010*).

Although industrial cogeneration systems are typically fired using natural gas, waste management facilities such as landfills and wastewater treatment plants can utilize their by-product, biogas, as a free fuel.

Over the last decade, few wastewater treatment facilities in Ontario have taken advantage of this free fuel for electricity generation, generally due to the historically low cost of purchased electricity in combination with the upfront capital investment required for cogen.

Reciprocating engines are the most common cogeneration technology used in Ontario. Table 2 lists the wastewater treatment facilities in Ontario that are utilizing biogas for cogeneration using reciprocating engines.

About 37% of the available energy in the fuel is converted to electricity, and about 48% to thermal energy. Hence, cogeneration achieves a total efficiency of approximately 85% that compares favourably to boilers that have efficiencies of about 80%. Heat is recovered for use in the plant heating loop by capturing heat lost from the engine in two ways:

- Heat from engine body: The engine is continuously cooled by a circulating coolant through cavities in the engine body. Excess heat from the combustion of the fuel raises the coolant temperature to approximately 120°C. The coolant flows to a heat exchanger that cools the coolant and, in turn, heats the plant heating loop.
- Heat from exhaust gas: The exhaust gas leaving the engine has temperatures as high as 450°C. Heat from the exhaust can be recovered by passing through a heat exchanger where the exhaust gas is cooled to about 150°C prior to discharging into the atmosphere.

HHV vs LHV

When reporting the heating value of a fuel, two different conventions are used. Higher heating value (HHV) refers to energy released in combustion when the water vapour resulting from combustion is condensed, thus releasing the latent value heat of evaporation. The lower heating value (LHV) reports energy released when the water vapour remains in the gaseous state. For historical reasons, the efficiency of power plants and combined heat and power plants in Europe is calculated based on the LHV, while, in North America, it is generally based on the HHV.

SOURCE: *http://en.wikipedia.org/wiki/Heat_of_combustion*

Table 1 Typical characteristics of biogas	
Methane composition	55 – 70% by volume
Carbon dioxide	30 – 40% by volume
Nitrogen	0-5% by volume
Hydrogen sulphide	0 – 5% by volume
Trace contaminants	Siloxanes, Mercaptans, Moisture (saturated @ 35°C)
Higher heating value	20,000 -25,000 kJ/m^3
Density	1-1.1 kg/m^3

Figure 1: Ariel view of Barrie WPCC.

Barrie Water Pollution Control Centre (WPCC)

The Barrie WPCC generates an average of 4,200 m^3/day of biogas through its anaerobic digestion process.

Primary sludge and thickened waste activated sludge (TWAS) are blended in two sludge blending tanks prior to feeding to three mesophilic primary digesters for stabilization, and are subsequently concentrated in one secondary digester. Stabilized sludge is then temporarily stored in an on-site sludge holding tank, ready for periodical off-site utilization or disposal.

The plant's biogas utilization facility consists of two F18 Waukesha cogeneration engines (250 kWe), one large boiler (980 kWt) and one small boiler (540 kWt). All engines and boilers are dual fuel units, capable of operating on biogas or natural gas.

The existing cogeneration facility has a 100% generation redundancy, i.e., the two cogeneration engines are designed to operate as one duty and one standby. Currently, the control system is configured such that only one engine can operate at a time. The biogas available could either be sent to the boilers for heat generation, or to the cogeneration engines for electricity generation. Although heat could also be recovered from the cogeneration engines, the amount recovered is half of that from the boiler. Nevertheless, the plant's operation philosophy is to do the latter, i.e., using biogas to generate electricity and heat.

Figure 2: Cogeneration facility at the Barrie WPCC.

City of Guelph Wastewater Treatment Plant

The City of Guelph Wastewater Treatment Plant (WWTP) currently serves a population of over 95,000 and treats approximately 55 million litres per day of wastewater. Treated effluent from the plant is discharged to the Speed River. The plant employs anaerobic digestion to treat waste sludge collected in the primary and secondary clarifiers and tertiary sand filters. The sludge is cothickened in the primary clarifiers prior to anaerobic digestion.

Biogas generated from the anaerobic digesters is then used for electricity and heat generation in the City's energy facility, which consists of a gas treatment system, cogeneration system and

Table 2 Summary of cogeneration facilities at sewage treatment facilities in Ontario using reciprocating engines					
Facilities	Location	Population equivalent	Start-up year	Manufacturer	Installed / operating capacity (kWe)
Barrie WPCC	Barrie	100,000	1993	Waukesha	500 / 250
Guelph WWTP	Guelph	106,000	1995	Waukesha	500 / 250
R.O. Pickard Environmental Centre	Ottawa	500,000	1997	Caterpillar	2,400 / 2,000
Clarkson WPCP	Mississauga	200,000	1999	Caterpillar	810 / 250
Humber STP	Toronto	540,000	2005	Caterpillar	4,700 / 2,000
Woodward Avenue WWTP	Hamilton	550,000	2006	Caterpillar	1,600 / 1,600
Atlantic Avenue WPCP	Thunder Bay	110,000	2009	Caterpillar	600 / 400

Figure 3: Aerial view of the City of Guelph Wastewater Treatment Plant.

Figure 5: Ariel view of ROPEC.

Figure 6: Cogeneration facility in Robert O.Pickard Environmental Centre.

Figure 4: Cogeneration facility in the energy centre at the Guelph WWTP.

boilers. Gas from the digesters enters a gas scrubber unit for hydrogen sulphide removal. Following the gas scrubber, the gas is compressed, cooled and conditioned in carbon towers to remove moisture and siloxanes, prior to entering the cogeneration system.

The cogeneration system consists of two Waukesha engines, complete with engine jacket water and exhaust gas heat recovery units. Each engine is connected to an electrical generator and is capable of generating 240 kW of electrical power and 300 kW of heat. The yearly production of some 2,940,000 kWh is fed directly into the plant's electrical grid to drive pumps, blowers and other motorized equipment. Generated heat is used to maintain the anaerobic digestion process by heating the sludge in the digesters to 35°C, and to provide building heat as required.

The two boilers in the facility serve two purposes: (1) to burn digester gas if the cogen units are off-line for maintenance; and (2) to supplement the hot water heating system by burning natural gas during times of high heating demand.

Robert O. Pickard Environmental Centre (ROPEC)

Each day, ROPEC treats approximately 450 million litres of wastewater and discharges treated effluent into the Ottawa River. The plant is a conventional activated sludge treatment facility, and practices anaerobic digestion to stabilize sludge settled out from both the primary and secondary clarifiers. On average, approximately 30,000 m^3 of biogas is produced by the digesters everyday and is fed to the cogeneration facility to fire the three 810 kWe Caterpillar engines. The engines are located in the blower building. Each engine/generator is equipped with an electronic control system, operated by a master control panel located in a control room within the blower building.

Heat generated from the cogeneration facility is recovered for digester heating and for plant heating in winter. The plant also has boilers to supplement heating during the winter months.

Biogas utilization considerations

When considering using biogas for cogeneration, owners and engineers may want to consider the following:

a. CGA B105 Code

The *Technical Standards & Safety Act 2000* requires all storage, transporting and gas handling equipment installations associated with digester gas to follow the Canadian Gas Association (CGA) B105 code, i.e. *CAN/CGA-B105-M93 (R2007) – Code for Digester Gas and Landfill Gas Installations*. In Ontario, the *Code* is administered and enforced by the Technical Standards and Safety Authority (TSSA). The *Act* requires all digester gas installations to be inspected and approved by TSSA prior to operation. Therefore, it is important to understand the *Code*, and engage preliminary consultation with TSSA at the early stages of biogas related projects to prevent unexpected non-compliance surprises during construction or after installation. Such due diligence steps, if not carried out during the early stage of the project, could result in major design changes down the road that significantly increases capital cost.

b. Know your biogas

Cogeneration engines were originally developed to be fuelled by natural gas or diesel, which contain few contaminants that pose any maintenance issues to engines. With the growing popularity of using by-product gas such as landfill and digester gas, manufacturers have learned that contaminants present in this type of gas, such as water and hydrogen sulphide, could damage the engines directly through acid corrosion to the engine parts and indirectly through contamination of the lubricating oil. Furthermore, a type of impurity, called siloxanes, may be present in digester gas, depending on the nature of wastewater treated. This impurity will react with oxygen during combustion to form silicate and silica deposits in the engine, which can damage the engine, increase levels of silica within the lubrication oils as well as damage the valves. Over the years, engine manufacturers have learned to include limits for H_2S and siloxanes in their engine specifications. Therefore, during the preliminary

design stage, the engineer and owner should conduct an analysis on the digester gas coming out of their treatment plant to determine if a gas conditioning system is required. For both Barrie WPCC and Guelph WWTP, operators found that the frequency of engine parts replacement dropped after implementing gas treatment prior to the cogeneration system.

c. ***Renewable energy incentives***

The Ontario Power Authority (OPA) implemented the Feed-In-Tariff (FIT) program in September 2009. The program encourages independent renewable energy generators to feed electricity to the grid by paying participants a premium electricity rate for every kilowatt generated. The contract provides a guaranteed pricing structure over a contract term of 20 years. Using digester gas for cogeneration falls under the biomass renewable fuel category. Under the contract, the participants have the flexibility to decide when to feed power back to the grid. For biomass fuel, depending on the scale of the generators, participants could receive 17.0-21.6 cents/kWh generated during peak hours, and 11.7-14.4 cents/kWh generated during off-peak hours. This price is typically higher than the current electricity purchase price paid by municipalities. Therefore, engineers and owners should consider this renewable energy incentive when conducting a cost benefit analysis for cogeneration.

A growing trend

Biogas produced from anaerobic sludge digesters at municipal wastewater treatment plants is a valuable source of energy. Historically, biogas has been used for digester and plant heating. However, with the increasing cost of electricity in Ontario and consideration of the greenhouse gas benefits, cogeneration to produce both electricity and heat is becoming more common. Approximately seven WWTPs in Ontario are currently employing cogeneration, including the cities of Guelph, Barrie, and Ottawa that were profiled here. The Ontario government's Feed-in-Tariff (FIT) program can significantly improve the economics associated with cogeneration systems, but engineers and owners should not forget the importance of the relevant codes associated with biogas systems and biogas pretreatment to ensure a reliable cogeneration operation.

Reference

Nyboer, J., Groves, S., (2010). A Review of Existing Cogeneration Facilities in Canada. *Canadian Industrial Energy End-Use Data and Analysis Center, Simon Fraser University*

Water Environment Research Foundation (WERF) – Recent Research

The Water Environment Research Foundation (WERF) has published a number of reports on the sustainability and green energy. *INFLUENTS* collected a summary of these reports and has presented them in this article. More information can be obtained on the WERF website (*www.werf.org*).

Title:

OWSO4R07f, Site demonstration of the life cycle assessment manager for energy recovery (LCAMER) tool

Description

This report presents two case studies on the application of the life cycle assessment manager for energy recovery (LCAMER) tool developed by the Water Environment Research Foundation (WERF) for the purpose of on-site energy recovery using biogas. Observations, comments and suggestions developed during each case study are provided, along with recommendations for improvements that could be implemented in a future version of LCAMER. WERF developed the LCAMER spreadsheet-based tool in 2006 to help utilities compare life cycle costs for energy recovery systems. This project focused on demonstrating the applicability, effectiveness and areas of improvement for the LCAMER tool, by evaluating proposed anaerobic digestion and biogas-to-energy improvements for two wastewater utilities. Published by WERF. 60 pages. (2011)

Title:

OWSO8C09, Electricity generation from anaerobic wastewater treatment in microbial fuel cells

Description

This project tested anaerobic microbial fuel cell (MFC) treatment of domestic wastewater at the pilot scale and produced sustainable electricity. The research team developed a novel MFC system in a multiple anode/cathode granular activated carbon MFC configuration (MAC-GAC-MFC), effectively integrating multiple MFCs into a single unit. The unique advantage of this configuration is that it can increase power generation at low cost in a smaller space, potentially beneficial when applied to wastewater treatment plants. In addition, a new, cost-effective catalyst, manganese dioxide (MnO2) was developed and, for the first time, applied in the pilot-scale MFC systems. The results showed that the MnO2 catalyst achieves the same power generation as the more costly platinum catalyst that has been used to date in other MFCs. This project was a collaborative effort between WERF and the New York State Energy Research and Development Authority (NYSERDA). 66 pages. (2011)

Title:

OWSO9C09, Energy efficiency in the water industry: a compendium of best practices and case studies – global report

Description

This report was compiled by the Global Water Research Coalition to look at best practices for energy management in the wastewater and water industry worldwide. It provides a detailed examination of current best practices and technologies and identifies promising new developments. This report supplements the WERF report *OWSO4R07e: Energy efficiency in wastewater treatment in North America*. Case studies and continental reports for Europe and Australasia and by Water Research Foundation are available on CD by request. Published by UKWIR in collaboration with WERF. 140 pages. (2011)

Title:

OWSO6R07a, Energy efficiency in value engineering: barriers and pathways

Description

This study provides examples of value engineering in wastewater treatment facility projects. It analyses the effectiveness of current value engineering studies in defining potential technology alternatives that increase energy efficiency during capital project planning. The study also explores energy efficiency-promoting concepts, such as requirements for VE which apply to large projects receiving government funding, as a way to increase wastewater treatment system energy efficiency. The study shows how value engineering analyses has identified cost savings opportunities for energy recovery and discusses the barriers to implementing VE analyses in the wastewater sector. Published by WERF. 36 pages. (2010)

Title:

OWSO4R07e, Energy efficiency in wastewater treatment in North America

Description

This report compiles North American best practices for energy-efficient operation of wastewater assets as part the Global Water Research Coalition's project entitled Energy Efficiency in the Water Industry: A Compendium of Best Practices and Case Studies, which looks at these best practices worldwide. It provides a comprehensive bibliographic resource of best efficiency practices, documents case studies of novel energy conservation and recovery techniques, and identifies implementation risks, obstacles and management strategies. It is intended to serve as a starting point for wastewater treatment facilities that want to implement energy conservation/recovery approaches and/or technologies, by providing details of successful implementation, including methodologies, techniques, strategies, and expected results. Published by WERF. 120 pages.(2010)

Title:

01-CTS-18UR, LCAMER, an assessment tool for managing cost-effective energy recovery from anaerobically digested wastewater solids

Description

The life cycle assessment manager for

energy recovery (LCAMER) is a spreadsheet-based tool which enables wastewater treatment plant owners and engineers to make informed decisions on the feasibility of recovering energy from anaerobic digestion of wastewater solids. Using a life cycle assessment approach, which incorporates factors such as equipment lifetime and the cost of borrowed money, users can compare the payback periods or internal rates of return for anaerobic digestion processes (mesophilic, thermophilic, temperature-phased); gas pretreatment processes (hydrogen sulfide, siloxanes and carbon dioxide); and energy recovery processes (boilers, engine-generators, turbines, fuel cells and direct drive engines).

Title:

OWSO3R07, State of science report: energy and resource recovery from sludge

Description

The goal of this report was to provide a summary of the current knowledge on energy and resources recovery from sewage sludge. Both established and emerging technologies are reviewed and examples of the most commonly used strategies are described and supported with international cases studies. The report focuses on energy and resource recovery from the residual solids and associated process streams. Because it is recognized that the recovery of energy and resource from municipal sludge will be dictated by drivers such as the market for the recovered products, by regulations that limit the options for recovery of material or energy, as well as by public perception and social awareness, these topics are included in the report. Published by WERF. 236 pages. (2008)

The Water Environment Research Foundation is currently investigating the following topics:

- Barriers to biogas utilization for renewable energy, OWSO11C10
- Bay area biosolids to energy (BAB2E) project peer review, OWSO12PR11
- Decision support system for sustainable energy management, OWSO7C07
- Demonstration of the WERF carbon heat energy assessment and plant evaluation tool (CHEApet), OWSO4R07g
- Full-plant deammonification for energy positive nitrogen removal, INFR6R11
- Green energy life cycle assessment tool (GELCAT), OWSO6R07c
- Optimization of wastewater lift stations for reduction of energy usage, INFR3R11
- Sustainable energy optimization tool – carbon heat energy assessment plant evaluation tool (CHEApet), OWSO4R07c
- Toolbox for water utility energy and GHG emission management: an international review, CC3C10

WHOLE WWTP MODELING: OVERVIEW, TOOLS & FUTURE NEEDS

Susan Hansler (Hatch Mott MacDonald), Sara Arabi (Conestoga Rovers & Associates), Mike Newbigging (Tetra Tech)

On June 23, 2011, the Wastewater Treatment and Technology Committee (WTTC) was pleased to present a WEAO specialty seminar entitled Whole WWTP Modeling: Overview, Tools & Future Needs. This interactive workshop provided an overview of whole WWTP modeling in terms of the capabilities, limitations, data needs and available tools. The seminar included a morning session consisting of presentations from modeling experts, and breakout sessions in the afternoon that allowed participants to discuss in greater detail selected topics of interest. The speakers at this seminar were recognized leaders in wastewater process modeling, including Mike Newbigging (Tetra Tech), Oliver Schraa (Hydromantis Environmental Software Solutions), Peter Dold (EnviroSim Associates Ltd), Pat Coleman (AECOM), John Copp (Primodal), and George Nakhla (University of Western Ontario).

The presentations covered a broad range of topics related to process modeling, including an overview of modeling tools, their evolution and their future. In addition to addressing some technical modeling aspects, presentations also addressed the practical issues associated with using models for design, including the risk, legal implications, and quality assurance requirements. Case studies were also presented that demonstrated the capabilities and limitations of process modeling. Throughout the morning sessions, a common theme that emerged from all presentations was the importance of obtaining representative data (both quantity and quality) to develop a sound model. In fact, wastewater characterization was identified as the area where effort should be focused to calibrate a model.

In the afternoon, participants selected subjects that were of interest to them from a long list of proposed topics, and separated into small breakout groups. The topics selected by the participants included model calibration, interpreting settling characteristics, hydraulic modeling, membranes, integrated fixed film processes, emerging contaminants, modeling trace contaminant removal during wastewater treatment, energy usage and reduction potential, and cost estimating. The breakout sessions allowed participants to discuss their selected topics in small groups, with input from the modeling experts. The groups explored the purpose, usefulness, requirements, and challenges of their modeling topics and reported their findings to the larger audience for further discussion. To round off the day, there was an open panel discussion for the modeling experts to allow participants the opportunity to discuss any further modeling issues or concepts. Finally, a follow-up seminar for hands-on modeling was discussed and the group endorsed this seminar for a future session.

Special thanks to the expert speakers, who participated in not only the presentations, but lead the breakout sessions and panel discussion. Special thanks are also extended to Exova for sponsoring the breaks and to Conestoga-Rovers & Associates for sponsoring the seminar lunch. Seminars that build on this meeting will be publicized through the WEAO website (*www.weao.org*) and the WEAO 'e-blast' (sign up for the e-blast on the WEAO website).

Breakout session chaired by Peter Dold (EnviroSim).

Mike Newbigging (Tetra Tech) introducing the seminar topics.

CANADA AND ONTARIO COLLABORATE TO IMPROVE WATER QUALITY FOR FIRST NATIONS

Indra Prashad P.Eng., Ministry of Environment, Drinking Water Management Division

Many First Nation communities in the Province of Ontario face challenges in providing safe drinking water and are looking for solutions.

As part of the **Canada – Ontario First Nations Pilot to Improve Drinking Water Quality,** Aboriginal Affairs and Northern Development Canada (AANDC) recently announced $5 million in funding for a small number of pilot projects in Ontario First Nation communities. Working closely with the Province of Ontario and the Ontario First Nations Technical Services Corporation (OFNTSC), the aim of this initiative is to explore new ways to address specific technical challenges First Nations face and to improve drinking water quality over the long-term.

This is a great opportunity for those in Ontario's water industry to work with First Nations and government to help find sustainable and cost-effective solutions to specific drinking water problems. Solutions from these projects could have broader applications in other communities that are facing similar challenges, both in Ontario and across Canada.

Funding from AANDC will cover the costs of capital infrastructure, operations and maintenance over the three-year project period. The First Nation communities selected for participation in this pilot project will be responsible for commissioning appropriate design and technology solutions for their communities through a Request for Proposals (RFP) process.

The Ontario Ministry of the Environment and OFNTSC will be providing technical support and training throughout the project. The Walkerton Clean Water Centre will also be available to provide additional support for the project, during the training and evaluation phases.

We encourage anyone who is interested in this project to contact Indra Prashad at *indra.prashad@ontario.ca* to be added to our mailing list for more details on information sessions and potential opportunities to participate.

SCADA SEMINAR: LEVERAGING SCADA FOR UTILITY PERFORMANCE IMPROVEMENT

Scott McKinney, Westin Engineering, Inc.

Do you have timely, accurate information to guide business and operation decisions? Does your SCADA/control system help you handle business challenges and improve performance?

Join the Water Environment Association of Ontario (WEAO) and the Ontario Water Works Association (OWWA) for a specialty seminar entitled **Leveraging SCADA for Utility Performance Improvement.** Learn how leading municipalities ensure that control systems support their business requirements. The full-day learning event will occur on October 6, 2011, at the Toronto Congress Centre.

Carl Yates, General Manager Halifax Regional Water Commission, will be the keynote speaker for the event. He will discuss how Halifax leverages its control system for making better decisions related to advanced water processes and managing water loss.

SCADA PERFORMANCE IMPROVEMENT SEMINAR 2011

The event will include both a management track and a technology track. Management-oriented sessions discuss the essential building blocks that enable utilities to use control systems for improved decisions and operational performance. During the technical track, participants will learn proven principles of network design, alarm management, security, and standards. A series of case studies will present practical examples from utilities including Hamilton, Durham, Ottawa, York, Halton and Peel.

The event registration fee is $250 for WEAO/OWWA members who sign up before September 22. Registration is available through WEAO. Lunch and coffee break is included.

The event is sponsored by WEAO, OWWA, Westin Engineering and Eramosa.

To pre-register, please visit *www.WEAO.org.*

> "Learn how leading municipalities ensure that control systems support their business requirements."

HEADING 'DOWN UNDER' FOR SOME INTERNATIONAL EXPERIENCE

By Erin Longworth, P.Eng., AECOM

As this issue of *INFLUENTS* goes to press, I am embarking on a new adventure 'down under' in Australia, where I will be working on an 18-month contract in AECOM's Melbourne office.

The idea initially came to me several months ago, when I was thinking about the many opportunities offered by a large international company such as AECOM. In addition to many exciting projects in Ontario, AECOM's global reach offers the opportunity to transfer to other countries to gain valuable and interesting international experience. For a young professional such as myself, with relatively few ties keeping me here, it is an ideal time to explore these opportunities.

I will certainly miss my family and friends, including the many I have made through WEAO, but I am looking forward to gaining experience with new projects in a very different regulatory environment. I am hopeful that I will bring back new ways of thinking about wastewater management from a country that puts more value on water recycling and reuse. In Melbourne, I will be primarily involved in the South East Recycled Water Alliance project, which teams the local municipality with AECOM and a contractor to implement upgrades at several wastewater treatment plants in order to recycle the effluent for reuse purposes. I am eager to see how things work 'down under.'

I look forward to maintaining the many contacts I have made through my involvement in WEAO and to seeing everyone again when I return in the spring of 2013. Please keep in touch (*Erin.Longworth@aecom.com*), and, remember, I am always open to visitors from home!

Erin Longworth poses beside Australian flag.

OPCEA NEWS, FALL 2011

Tonia Van Dyk, C & M Environmental Technologies Inc.

Annual OPCEA Golf Tournament

The annual OPCEA Golf Tournament was held at the Cardinal Golf Club outside of Newmarket on Wednesday, June 1, 2011. The weather cooperated this year and 276 attendees enjoyed a gorgeous, sunny day. Guests were treated to a BBQ lunch, followed by a round of golf and a delicious steak dinner. The VL Motion Systems Inc. team of John Carney, Trevor Tyndall, Steve Mackie and Kevin Farmer were the tournament winners, with a nine under par score of 62. All guests went home with prizes and a photograph of their golfing companions for the day. Special thanks go to Heinz Held, Ross Humphrey, Wayne Harrison and Mark Reeves for their work at the registration table and organizing the prizes. Extra thanks are also extended to Brian Allen for all his hard work in organizing the tournament.

Our thanks to the following companies for providing hole sponsorships on all 36 holes (longest drive, longest putt, closest to the pin and straightest drive):

Annual General Meeting

The next AGM will be held on February 7, 2011 at the Mississauga Grand Convention Centre, 35 Brunel Road in Mississauga. This is a great opportunity to find out what the OPCEA Board of Directors has been doing, as well as to ask any questions. Voting for new directors will also take place. As always, a dinner will follow. Two representatives from each OPCEA member company will be able to attend.

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ED PIKOVNIK: VALUE OVER PRICE

Experience has taught Ed Pikovnik that a thorough life cycle evaluation is necessary to assess the true cost of pollution control equipment. "Part of what we do is to educate the client that the lowest price is not always the best way to evaluate a product," explains the sales manager and president of ENV Treatment Systems Inc. "It is important to use good modeling and to include in the calculation costs of repairs, parts, down time and energy expenditure over time. Then you select the equipment with the highest rating rather than the lowest price."

The reward for Pikovnik's commitment to value over price has been an ever-expanding list of repeat customers. In the beginning, ENV represented only a handful of specialty screening and de-gritting equipment manufacturers. "Now more and more suppliers are knocking on our doors to ask if we can represent them," says Pikovnik. As a result, the company can now supply all the process equipment required by a Wastewater Treatment Plant.

"We deal with companies who share our work ethic," he continues. "Equipment must always be working and there must be local service. This is a small industry. The one thing you can't afford to lose is your reputation."

Pikovnik started to build that reputation not long after joining the environmental sector. Foregoing a career in Nuclear Physics after graduating with a Bachelor of Science in 1984, he went on to complete a degree in chemical engineering in 1987. After graduation, he joined manufacturer Hayward Gordon, rising to the position of sales manager within a year.

Two years later, Pikovnik joined OPCEA, eventually serving as president from 1994 to 1995. While he was still vice president, he represented the association in meetings with the provincial minister of the environment to discuss inter-provincial trade barriers with Quebec. As a result, OPCEA and WEAO helped create the "photocopy law" that established reciprocity of trade rules with other provinces. Shortly thereafter, Quebec dropped its protectionist policies and opened its market to Ontario's pollution control equipment suppliers.

At the time, Pikovnik was also working closely with OPCEA president John Coomey to organize OPCEA's first-ever golf tournament when Coomey unexpectedly passed away. It was the OPCEA Directors and Pikovnik who unanimously spearheaded the establishment of the John Coomey Memorial Trophy.

During his first decade in the industry, Pikovnik also took on a variety of positions with different firms. He recalls: "I tailored my career to follow jobs that would enhance my ability to relate with owners and consultants so that hopefully, one day, I could have my own business."

That dream became a reality in 1997 when Pikovnik and two partners launched ENV Treatment Systems Inc., as well as WTP Equipment Corp, a manufacturer of headworks equipment, including mechanical screens and aerated and vortex de-gritting systems. "We'll integrate the entire system," he says, "with professional engineering staff to ensure the system works. Then we work with owners and consultants to ensure the entire system works equally well in the field."

A complement of ENV service technicians in Brampton can arrive at a job site within 24 hours of a call and, in many cases, the same day. In contrast, servicing foreign-made equipment can take as long as a week or two, during which a WWTP can fall out of compliance and be subject to expensive fines. Pikovnik sees globalization as creating other challenges, including obtaining accurate information on equipment and parts increasingly made in South Korea or China instead of Canada, the U.S. or Europe. Manufacturing representatives play a more important role than ever, he notes.

Other challenges he sees facing the industry today include increasing energy efficiency, attracting young talent to the industry and keeping environmental priorities at the forefront for cash-strapped municipalities tempted to fall back on lowest bid tenders. Despite these concerns, he is optimistic about an industry based on science and engineering, both of which are constantly progressing.

He foresees the day when, thanks to new technology, WWTP's could be net producers of energy and enjoy increased efficiency through automation. Says Pikovnik: "Until we hit near 100% efficiency, we'll just keep moving forward."

> "It is important to use good modeling and to include in the calculation costs of repairs, parts, down time and energy expenditure over time."

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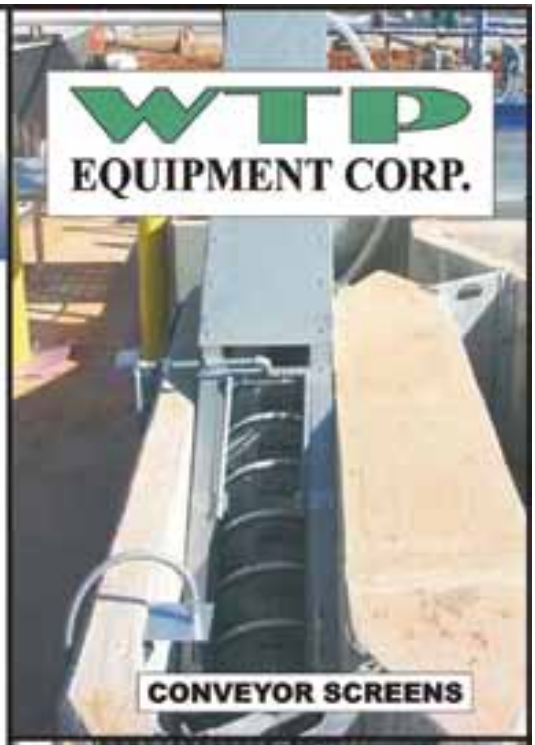

OPERATOR PROFILE: KELLY NESLAND

On August 31, Kelly Nesland celebrated her first anniversary with the Bradford West Gwillimbury Wastewater Treatment Plant. The Level I Operator describes her work as a "the best of both worlds," a perfect balance between spending active time outside performing hands-on tasks and quiet time indoors filling out paperwork. "There is a lot of variety here," she says. "The place is so large that, between the equipment maintenance and the lab work, you are doing something different every week."

Nesland is one of seven full-time operators at the Bradford WWTP, a facility that has a capacity of 17,400 m^3 and serves 22,000 people. "We are responsible for looking after all the processes that wastewater must go through to become clean water that goes back into the rivers system," she explains. This involves everything from looking after headworks to removing the right amount of solids and phosphorus, and everything in between.

When she registered for Durham College's Environmental Technology Advance Diploma program, Nesland never imagined that she would be working at a WWTP. Her intention was to get a job in wetland conservation.

It was the program's 100-hour field placement requirement that opened the door to other opportunities. "Our professors were promoting different jobs for which we could apply," recalls Nesland. The summer before her final year, she accepted a position at the Regional Municipality of York as a summer student. Although she worked mostly at the WWTP, she occasionally had the opportunity to work at some of the water pumping stations as well.

Thanks to her experience with the RM of York, Nesland decided to take advantage of the Operator in Training (OIT) certification in water and wastewater offered at Durham College. After graduating with her diploma from the Environmental Technology program, she accepted a position as an OIT with the Bradford West Gwillimbury WWTP.

Since then, she has continued her education in both wastewater treatment and collection. A few months ago, she received her Level I Operators licence in wastewater treatment and has recently applied for her Level I Collections licence. "Everyone helps everyone else here," she notes, adding that those who have more experience in the industry have been more than willing to show her the ropes. "It helps with learning new things."

Her biggest challenge has been learning to work with different tools. "There is still a lot of equipment that I have not used, so it is an ongoing process," says Nesland. Over the past year, she has become increasingly comfortable with selecting and sizing the tools to do her work.

She also had the opportunity to work on a gravity sewer that was punctured during construction. A vactor truck came in to keep up with incoming flow and an upstream manhole was plugged using the sewer plug. "We put in a sewer plug so the pipe could be replaced," she recalls. "Then, we had to take it out to let everything flow again."

Nesland is always happy to add to her knowledge and experience. Although she has only recently started working in the water and wastewater field, she realizes that the industry offers many opportunities. In the coming year, she looks forward to continuing to learn and work at the Bradford West Gwillimbury WTTP. "It is a great job with great benefits and a great group of people," says Nesland. "For now, this is where I want to be."

OCWA OPERATIONS CHALLENGE TEAMS COME OUT ON TOP IN COMPETITION!

Jen Bitten, Process & Compliance Technician, Georgian Bay Hub, Ontario Clean Water Agency; Bev Mollard, Regional Operations Manager, Southwest, Ontario Clean Water Agency; Dennis Rau, Mechanic/Operator, Stratford Hub, Ontario Clean Water Agency

Recent Operations Challenges have earned two teams from the Ontario Clean Water Agency top overall rankings. First stop was the April 2011 WEAO Operations Challenge in Toronto, where the OCWA Jets placed first overall and the OCWA Flangetastic Four placed third. Then, in May, the two teams once again competed at the New Jersey Water Environment Association (NJWEA) **Spring Fling Invitational Operations Challenge,** held in Atlantic City. The OCWA Jets – in their third year at this Regional event – placed first overall, while OCWA's Flangetastic Four – also in their third appearance – took second place overall.

This was quite the accomplishment for members of these two teams, each of which had one new member this year. The OCWA Jets, made up of OCWA employees from the Waterloo Region, have earned the privilege of competing in October's WEFTEC 2011 Operations Challenge in Los Angeles, where they will compete among 30 teams in Division 2 from across North America.

The Flangetastic Four, who hail from the Georgian Bay area, will compete in April 2012 at WEAO in Ottawa.

Tim Swan (left) and Richard Junkin (right), from OCWA's Flangetastic Four, take part in the lab event simulating an E.coli Membrane Filtration procedure.

OCWA would like to acknowledge the tremendous effort put forward by both the OCWA Jets and the Flangetastic Four, both during the intense ongoing training and the actual competition. We are proud to have such knowledgeable and quick-thinking individuals within our agency, and we look forward to cheering on our OCWA Jets as they take on their competitors in Los Angeles.

OCWA Jets

Coaches: Dennis Rau/Bev Mollard
Marcel Misuraca
Michael Paola
Alan Robdrup
Tom Nicol

Flangetastic Four

Coach: Jen Bitten
Richard Junkin
Doug Macham
Mark McConachie
Tim Swan
Brad Hoover

The OCWA Jets Show Their Winning Form – from left to right: Tom Nicol, Marcel Misuraca, Alan Robdrup and Michael Paola.

HOW FIT IS IT? A REVIEW OF THE GREEN ENERGY ACT AND THE FEED-IN TARIFF PROGRAM FOR WATER AND WASTEWATER PROJECTS

Juli Abouchar and Joanna Vince of Willms & Shier Environmental Lawyers LLP

The *Green Energy Act* was enacted on May 14, 2009. Over the months that followed, a number of new regulations and amendments were drafted and declared in force. On October 1, 2009, the Ontario Power Authority began accepting applications under the Feed-In Tariff (FIT) program. The FIT program was the most highly anticipated component under the *Green Energy Act*.

In the fall of 2009, we wrote in this publication about the potential that the FIT program could hold for the water and wastewater industry. Now, two years later, the FIT program is set to undergo a comprehensive review by the OPA. In this update article, we assess the growing pains and the impact of the *Green Energy Act* and the FIT program on the water and wastewater industry.

The *Green Energy Act*[1] and its associated regulations contemplated a number of sources of renewable energy. These include wind, solar, biomass, biogas and water. This article will focus on renewable energy projects that use biomass and water to generate electricity.

Definitions, rates and contract lengths

Biomass is defined in regulations under the Electricity Act and incorporated by reference in the FIT contract as "organic matter, other than source separated organics, that is derived from a plant or animal and is available on a natural renewable basis." This definition includes sewage biosolids and waste from the operation of a sewage works, subject to the Ontario Water Resources Act. However, the sewage must be available on a natural, renewable basis.

Biomass also includes a number of other materials, such as waste from harvesting or processing agricultural products and forestry products; organic waste from a greenhouse, nursery, garden centre or flower shop; pulp and paper biosolids; and waste from food processing.

Biofuel is defined as "a liquid fuel made solely from biomass."[2] Since the definition of biomass includes sewage biosolids and waste from a sewage works, biofuel generated from these sources is eligible for the FIT program.

During the initial introduction of the FIT program and the regulations under the *Green Energy Act*, there was much discussion and uncertainty about whether sewage biosolids and residual sludge from wastewater treatment plants would be included within the definition of 'biomass' and, as an extension, biogas. While the regulations are clear that sewage biosolids are within the definition of biomass, it is noteworthy that the Ontario Power Authority website for the FIT program describes bioenergy as "residual materials from forestry operations..., waste matter from agricultural production and animal livestock activities, and by-products of food-processing operations."

Using sewage biosolids from wastewater treatment plants to generate renewable energy could turn a form of waste into a source of revenue for resource challenged wastewater treatment plants. However, uptake of the FIT program for biomass and biogas projects has been slow.

Biomass projects available under the FIT program can range from less than 10 MW to greater than 10 MW. Rates for projects range from 13.0 cents/kWh to 13.8 cents/kWh, based on the size of the project, with an additional 0.4 cents/kWh for community projects and 0.6 cents/kWh for projects with Aboriginal participation. Contracts are for a period of 20 years.

Biogas projects under the FIT program can range from less than 500 kW to over 10 MW. Rates range from 10.4 cents/kWh to 16.0 cents/kWh, based on the size of the project. Biogas projects are also eligible for the same rate increase as biomass projects, where there is community or Aboriginal participation. As with biomass, biogas projects are for a period of 20 years.

Sizes of waterpower projects under the FIT program can range from less than 10 MW to a maximum of 50 MW. Smaller 'run of the river' or 'very low head turbines' water power projects have little impact on the environment. However, larger projects on greenfield sites may have more significant environmental impacts. Rates range from 12.2 cents/kWh to 13.1 cents/kWh, with an increase of up to 0.6 cents/kWh for community projects and 0.9 cents/kWh for projects with Aboriginal participation. Contracts are for a period of 40 years.

Waterpower, biogas and biomass projects are eligible for increased rates for production during peak periods. Projects are subject to a peak performance factor of 1.35 for peak hours and 0.90 for off-peak hours. This creates an incentive for biomass, biogas and waterpower projects to produce the largest amount of electricity during peak hours, while avoiding or limiting electricity production during off-peak hours.

Applications made and contracts granted

To date, the vast majority of both applications and FIT contracts are for solar and wind power projects. Out of a total of 8,076 applications at the time of writing, only 26 have been for biomass projects. Of these 26, five were rejected or withdrawn. To date, three biomass projects, totalling 18 MW, are under development. Biogas projects have received more attention,

with 44 applications for biogas projects. To date, there are four biogas projects in operation, totalling 2 MW, with 16 projects, totalling 17 MW, under development. One wastewater to energy project has been in commercial operation since 2006 – the 1.6 MW Hamilton Digester Gas Cogeneration Plant, under a 20-year Renewable Energy Supply I (RES I) contract with the OPA.

Water projects are faring better – 100 applications out of 8,076 have been for waterpower projects. From the 100 applications, 49 waterpower projects are currently under development. These 49 projects will add a total of 188 MW to the grid. In comparison, there have been over 7,500 applications for solar projects, totalling 7,449 MW. Wind projects have received greater attention and publicity, with 281 applications, totalling 11,561 MW. There are 57 wind projects under development, totalling 2,124 MW.[3]

It is unclear why there has been such a low uptake of biomass, biogas and waterpower projects compared to solar and wind. Mark Powell, CEO of the WaterPower Group has a straightforward answer, "It is harder – water power projects are more capital intensive and take longer to construct." While water power provides for a high rate of return after the pay-back period, the contracts are not well understood. In the case of biomass and biogas, a lack of projects initiated by wastewater treatment plants may be the result of a lack of clarity in the definition of biomass and, by extension, biogas.

Regulatory approvals

Biomass and biogas projects require a Renewable Energy Approval (REA). REAs were introduced as a "streamlined approvals process" for renewable energy projects. The REA has been controversial since its introduction because it removes municipal planning powers. REAs have been challenged in front of the Environmental Review Tribunal and the civil courts, primarily related to the citing of wind power projects. To date, REAs have withstood these challenges.

Water power projects remain under the previous approval system and are required to undergo a provincial and, possibly, a federal Environmental Assessment, no matter whether they are large or small. This is a more difficult and time consuming process. In some cases, such as for very low head turbines, it is unclear why a simplified approvals process is not available. Projects utilizing very low head turbines are generally installed on existing dams and have minimal impact on water flow, water levels and biological species. "Community-based low head water power projects actually have a positive carbon footprint," says Powell. Nevertheless, these projects must undergo the longer, more arduous approval process.

FIT evaluation

So, at the two-year mark, how is the FIT program doing?

The FIT Program and its associated regulatory approvals have suffered from numerous growing pains across all renewable energy sources, including complaints and concerns about grid capacity, connection delays and moving projects from the application stage to commercial operation. There have been challenges to the Renewable Energy Approvals, particularly as they relate to wind turbines. There has also been a lot of discussion around rates – too high or too low – that resulted in the Ontario Power Authority reducing rates for ground mounted solar projects outside of the review period. Additionally, in May 2010, the Ontario Power Authority decided to no longer allow behind-the-meter facilities under the FIT program. This change applied across all energy sources, however, behind-the-meter facilities would be particularly beneficial, where electricity would be used within the facility, such as for a wastewater treatment plants. This change may have deterred some potential applicants.

Of interest to readers of this publication however, is the comparatively small number of biomass and waterpower projects. This may be a missed opportunity. "Sustainable and responsible use of water is imperative for any business strategy," says Powell.

OPA's FIT review will be a good opportunity for those parties interested in generating renewable energy from wastewater treatment plants and existing dams to argue for conditions to encourage the development of these sustainable energy sources. ♦

End notes

1 O. Reg. 328/09, published in the *Ontario Gazette* on September 26, 2009.
2 *Ibid.*
3 Bi-weekly FIT and microFIT Report Data, as of July 22, 2011.

Juli Abouchar is an environmental law specialist certified by the Law Society of Upper Canada. She was assistant commission counsel to Justice O'Connor during the Walkerton Inquiry, serves as a member of the CTC Source Protection Committee, and is a director of the Ontario Clean Water Agency.

Joanna Vince is an associate at Willms & Shier Environmental Lawyers LLP. She has a B.Sc. (Hons) in biology and environmental science, a J.D., and a Certificate in Environmental Studies. She has commented to the province on numerous government regulations, plans and negotiations involving water issues.

Juli Abouchar

Joanna Vince

CHP ENGINE MAINTENANCE: KEEP IT SIMPLE

Although a combined heat and power (CHP) or cogeneration engine can combust digester biogas just as well as natural gas, using biogas creates different maintenance requirements for the engine. "The frequency is different," says Denis Gosselin of Toromont Caterpillar. "And because biogas has more toxins than natural gas, about 40% of the type of maintenance you do to the unit is different."

He explains that the fuel is not nearly as clean as natural gas, while delivering about a third of the energy. As a result, siloxane builds up more quickly inside certain components of the engine. "The industry has been misled as to what type of technology needs to be put in place to handle siloxane," notes Gosselin, who has worked with CHP motors for more than 20 years.

Some equipment sold to address siloxane build-up actually has a negative value-added impact on the business case for CHP engines that run on biogas. Their application results in much higher operating costs. In some cases, 10-25% of the energy produced is consumed to pre-clean the biogas.

"Those with the most sophisticated cleaning systems – at a significant capital cost – and those with no cleaning systems require a frequency of maintenance that is within 10% of each other," explains Gosselin, adding that spark plugs, for instance, will need to be changed 10% less often in a natural gas burning engine. "An additional cleaning device also creates cost related to chemicals, manpower, parasitic load loss and energy use." He recommends that, instead, biogas burning engine systems should be kept as simple as possible in order to provide the best value, and the focus should be on developing siloxane management expertise.

Toromont has invested considerable time in developing and perfecting CO_2 cleaning technology for engines. "Even though we may have to remove certain components of an engine slightly more frequently than when you install a quarter of a million dollar gas cleaning device, our processes ensure that we set the engine down one day and it is completely operational the next day," says Gosselin, noting that the fleet of engines he maintains has a 98% uptime.

Build-up of siloxane in the combustion chamber eventually results in a slight increase in emissions output. Bringing emissions back into compliance requires nothing more than regular preventative maintenance.

At the same time, the oil change interval frequency is normally greater than natural gas because of the consistency of biogas. The increased level of frequency can be counteracted by running a negative crank case ventilation system. "This involves extracting more air from the crank case than you are actually producing," explains Gosselin. "Running it in a negative quarter inch water column reduces the amount of contaminants mixing with the oil."

Siloxane also affects the cylinder heads. Most engines have anywhere from two to four of these valves. The siloxane in biogas is composed of fine airborne silica that coats combustion chamber components with an abrasive layer. Thus, components experience more wear and tear than they would if the engine were burning natural gas. "That means that these components will have to be cleaned or replaced more often," says Gosselin.

He points out that certain manufacturers build the components with alloys that better withstand the wear associated with using biogas. Gosselin recommends buying 'hardened engines' over investing in costly gas cleaning devices. "We all end up with the same end result of build-up in our engines," he points out, reiterating that cleaning the gas at the front end only slightly reduces the frequency of maintenance, not the need for it. Engines built to exclusively use natural gas may look the same on the outside, but they are more prone to damage from the eventual build-up. Such damage may even void the warranty.

The situations damage not only a particular installation, but the industry as a whole, by giving the impression that using biogas to run CHP engines is costly and problematic. In fact, with careful selection of components and an informed approach to maintenance, burning biogas for cogeneration can be a winning green energy solution for virtually any wastewater treatment plant.

INFLUENTS
OFFICIAL PUBLICATION OF THE WATER ENVIRONMENT ASSOCIATION OF ONTARIO

Is brought to you by the 2011 Communication Committee

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Cole Kelman – Publisher, Craig Kelman & Associates	Julie Vincent – WEAO
Jan Schade – Brook Crompton – Americas	Erin Longwroth, P.Eng. – AECOM Australia

The Communications Committee is looking for a member to represent the concerns of smaller communities in Ontario. If you are interested, please contact Pat Coleman at *pat.f.coleman@aecom.com*

CWWA – EFFECTING CHANGE

John Duong, M.Eng., P.Eng., CWWA Director Wastewater Planning Manager, Regional Municipality of Halton

Spring meeting

The Canadian Water and Wastewater Association (CWWA) held its spring meeting in Quebec City, Quebec, June 1-3, 2011. We were leaving the heat wave of the big TO and coming to the beautiful Quebec City. Surprisingly, the weather was just as warm in Quebec City, considering the forecast called for rain and cloudy conditions. Not to worry, rain and overcast was what we looked forward to for the remainder of the stay.

The meeting focused on Board governance. CWWA's Board re-committed to the policy governance model, and will be working at strengthening Board presence and activities, particularly links with CWWA members.

One Voice for Water

CWWA continues to examine ways of improving member services and benefits. We also recognize the potential to strengthen our presence as the national voice of Canada's water sector. As part of this initiative, CWWA hosted a One Voice for Water workshop in April 2011. The workshop included representatives from CWWA and our founding member associations (MAs) – ACWWA, RE, OWWA, WEAO, WCW and BCWWA – as well as representatives from the Canadian Advisory Committees of WEF and AWWA.

Discussion focused on ways to align our associations' common goals, and to leverage our collective voices to strengthen our presence in Ottawa. More work is needed to define this concept and determine how to make the vision a reality.

Wastewater Systems Effluent Regulations

The draft *Wastewater Systems Effluent Regulations* was first published under the *Fisheries Act* on March 20, 2010. The intent of these regulations are to set secondary treatment as the minimum level of treatment across Canada and to provide clarification for reporting. Environment Canada received 190 comments from stakeholders and interested parties. This included input from the CWWA and the Federation of Canadian Municipalities (FCM). The result is a delay to the regulations coming into force.

Environment Canada recently shared an advanced copy of the regulations with FCM and CWWA. CWWA's Wastewater and Stormwater Committee reviewed the revised regulations, and, overall, the committee was extremely pleased with the changes. They reflected the technical and financial barriers to implementation, while still maintaining the national objective of secondary treatment. We were especially pleased to see a revised compliance threshold, simplified CSO reporting, and the removal of environmental effects monitoring. Some concerns do remain outstanding, but the extensive revisions are a testament to CWWA and our Wastewater and Stormwater Committee's hard work, and to the value of CWWA membership.

Federal policy and legislative regulatory summary

- The Federal *Environmental Violations and Administrative Monetary Penalties Act,* which brought in administrative monetary penalties and more stringent quasi-criminal environmental duties for officers and directors under most Federal Environmental legislation, came into effect.
- As some human pathogens are used in labs, CWWA is monitoring the development of human pathogen guidelines by the Public Health Agency of Canada and the Canadian Food Inspection Agency.
- On April 13, the new *Release and Environmental Emergency Notification Regulations*, under CEPA, and *the Deposit Out of the Normal Course of Events*, under the *Fisheries Act*, were published and are now in force.
- CWWA submitted comments supporting the Canadian Environmental Assessment Agency's *Model Class Screening Report for Small Scale Water Quality and Habitat Improvement Projects* (January 2011).
- Environment Canada signed a promotional agreement with the US EPA on the WaterSense program. WaterSense is a labelling program that promotes third party certified water-efficient products. We look forward to collaborating more with EC on program implementation and communication with Canadian consumers.

Parliamentary bills

With the Conservative government winning a majority government, the 41st Session of Parliament opened in June. Parliament is currently adjourned for the summer, which has resulted in very few bills being introduced. Of those introduced, only one bill is of relevance to the water and wastewater sector:

C-237: An Act to amend the *Fisheries Act* (deposit in lakes) – First Reading. This private members bill proposes to prohibit the use of lakes for depositing deleterious substances. It would, for example, prohibit the deposit of any quantity of deleterious substance that will be authorized under the *Wastewater Systems Effluent Regulations*. As this bill conflicts with the purpose of the draft regulations developed by Environment Canada under the *Fisheries Act*, it is unlikely to proceed.

Approach for the management of biosolids

The Canadian Council of Ministers of the Environment (CCME) released a consultation document on a Canada-wide approach for the management of biosolids that was intended to determine public and industry opinions of the general path forward on beneficial use. The Biosolids Committee reviewed the questionnaire and the association submitted a response on behalf of our members. In general, CWWA was supportive of the approach outlined by the CCME. We used the opportunity to reiterate that the primary challenge municipalities face when attempting to implement beneficial use programs is the continued public and political resistance based on unfounded claims of negative health impacts. While the draft guidance document is a significant and much needed step forward in addressing these claims, many municipalities and system operators will continue to landfill (where

cost-effective) in order to avoid this difficult debate. We encouraged the CCME to show land application as a safe and environmentally sound practice and a preferred option.

International work

CWWA was successful in receiving Global Opportunities for Associations (GOA) funding from the Department of Foreign Affairs and International Trade (DFAIT). CWWA Executive Director Jennifer Jackson and staff member Adrian Toth recently led a trade mission with four private sector companies to Singapore and Kuala Lumpur (Malaysia) for the 2011 Singapore International Water Week (SIWW). The purposes of the visit was to (1) increase our membership, (2) explore potential sponsorship opportunities for CWWA, (3) develop partnership agreements with the Public Utilities Board and the Malaysian Water Association, and (4) raise our profile.

Canada was particularly well represented at SIWW with over 25 private and public exhibitors at the Canada Pavilion. DFAIT reps and Canadian companies highlighted their services to the world on July 4 by hosting a Canadian Water Technology Workshop and Partnering Forum.

CWWA promoted the association and met with other similar situated associations. These meetings provided insight into how other associations function, and fostered discussion of opportunities for future partnering and collaboration.

4th Canadian Wastewater Management Conference

CWWA hosted the 4th Canadian Wastewater Management Conference from May 17-19 in Toronto. The conference attracted nearly 150 delegates and offered two and a half days of informative and thought provoking presentations on the management of wastewater and biosolids. The highlight of the conference was an energetic Wastewater Research Funding Priorities Olympics, during the conference's gala dinner.

Energy Audit Seminar

In conjunction with the Wastewater Management Conference, the Energy Committee hosted a full-day seminar on energy audits and studies. Presentations included the energy audit process and examples of successful audit programs. The event was highly valued by all in-person and remote participants. Members discussed and suggested presentations for the next workshop on November 23 in conjunction with the 'Window on Ottawa.'

Upcoming events

- The **4th Canadian Workshop on Water Efficiency and Conservation** – October 18, 2011, Ottawa, Ontario – Albert at Bay Suite Hotel.
- The **Window on Ottawa** (WOO) will be held from November 24-25 at the Delta Ottawa City Centre Hotel. CWWA's two specialty workshops on water security and renewable energy will be presented in conjunction with the WOO on November 23. For the first time, CWWA will feature a trade show component and the Security and Emergency Management Committee will be organizing a half-day ICS training session on November 22 (afternoon). **CWWA will also be celebrating its 25th anniversary at the WOO – we will be celebrating our achievements and looking forward to the future, so save the date now!**

ACRONYMNS

CWWA	Canadian Water and Wastewater Association
BCWWA	British Columbia Water and Waste Association
WCW	Western Canada Water
WEAO	Water Environment Association of Ontario
RE	RÉSEAU environnement
ACWWA	Atlantic Canada Water and Wastewater Association
FCM	The Federation of Canadian Municipalities
CSO	Combined Sewer Overflow

UPDATE ON THE ONTARIO COALITION FOR SUSTAINABLE INFRASTRUCTURE (OCSI)

Carl Bodimeade, Chair, OCSI, Hatch Mott MacDonald

CSI brings together the combined resources of five well-established organizations to work toward sustainable infrastructure in Ontario. The Coalition comprises:

- *Municipal Engineers Association (MEA),*
- *Ontario Good Roads Association (OGRA),*
- *Ontario Public Works Association (OPWA),*
- *Ontario Water Works Association (OWWA), and*
- *Water Environment Association of Ontario (WEAO).*

The mission of the Coalition is the promotion of "Safe and Sustainable Infrastructure."

As some of you may know, the Ontario Coalition for Sustainable Infrastructure (OCSI) was originally formed in 2006. However, over the last few years, it has been somewhat quiet and low profile. I am pleased to report, though, that OCSI is now being re-launched with a focused mandate and with further support contributed by the five associations. To restate that mandate, OCSI's objectives are:

- to provide professional advice relating to infrastructure and to promote reasonable, workable legislation relating to that subject;
- to facilitate the sharing of information among member organizations and to coordinate their approaches to common issues;
- to be an authoritative and professional voice on infrastructure matters; and
- to be counted on by government for sound advice.

Each of the five constituent organizations will be represented in OCSI by their executive director, plus two Board-level representatives. Management of the affairs of the organization will be carried out by a committee comprised of a chair (myself), a vice-chair and an executive director.

It was recognized by all five constituent organizations that, for OCSI to be truly effective and achieve its objectives, it would be necessary to retain an executive director. I am pleased to report that Catherine Jefferson has agreed to join us in that role. Catherine has been involved with OCSI previously in her role as executive director of WEAO, so she is fully familiar with OCSI, its stakeholders and intended audience.

The vice-chair will be a rotating position, filled annually, among the five organizations. Please stay tuned for a further announcement on this.

One of the first action items for OCSI was to develop a Work Plan for 2011 and 2012. Key items of that work plan are:

- to take proactive positions on issues of interest to OCSI and its constituent organizations;
- to establish communication links and an ongoing dialogue with the Ministry of Infrastructure;
- to reach out to other organizations and identify common objectives and areas of collaboration;
- to monitor emerging issues, legislation and trends; and
- to raise awareness of the importance of sustainable infrastructure.

During the remainder of 2011, OCSI will also be identifying specific projects that could be executed in 2012.

The importance of long-term planning and good stewardship of Ontario's infrastructure is continuing to be recognized and it is encouraging to see the recent publication of 'Building Together,' the Ministry of Infrastructure's 10-year plan. OCSI has already written to Minister Chiarelli congratulating him on the development of this important document and offering OCSI's help in implementing the programs that will result.

Through articles such as this, I will keep you apprised of OCSI's progress. If you wish to know more about OCSI, please view our website at *www.on-csi.ca* or contact Catherine at *catherine.jefferson@on-csi.ca*. If you feel there are issues that OCSI should examine, please let the executive director of your respective organization know so that he or she can bring them to my attention.

COMPASSION, MUDDY BOOTS, AND CLEAN WATER *THREE WORLD WATER CORPS VOLUNTEERS SHARE THEIR EXPERIENCES IN THE FIELD*

Bill White, P.Eng. CH2M HILL

Water For People – Canada plays an important role in addressing the global water and sanitation crisis, and at the frontlines of Water For People's work are the dedicated volunteers of the World Water Corps (WWC). These professionals bring technical skills to places in the world where they are desperately needed.

Three WWC volunteers, Maria Sanchez-Rico of the Nuclear Waste Management Organization, Flor (June) Garcia-Becerra of CH2M HILL, and Guy Beauchemin of Pratt & Whitney Canada, sat down recently with Bill White, P.Eng. of CH2M HILL and WEAO's Water For People Committee to share their experiences.

WEAO: *Where did you go with the World Water Corps? What was your task?*

June: I went to Mexico to conduct the Mexico Scoping Study in April of 2007. The project required work before and after the visit to Mexico from December 2006 to June 2007. I was the team lead for that assignment.

Guy: My assignment was in Rwanda for two weeks in February 2011. Our team of four completed a baseline assessment in the area southeast of Kigali, the capital.

Maria: In April 2009, I went to northern Nicaragua for a two-week mapping and baseline assessment in the Wiwilí region. The data provided from mapping exercises is then used to plan, prioritize, and monitor Water For People programs. In Nicaragua, we did our work in collaboration with El Porvenir, a partner organization.

WEAO: *Tell us about your task – what was your team's objective, what was your role on the team?*

June: My team's objective was to scope projects in marginalized urban and peri-urban communities that could benefit from Water For People's capacity building model. The aim of this study was to explore the potential of Mexico as a program country. Before going, we met weekly online to divide the research and preparation work. I also made first contact with the Mexican researchers, activists and communities who were our partners.

Guy: Our WWC team included two water quality experts, to collect and analyze water quality samples from the existing water sources, and two survey experts. To collect data, WWC volunteers worked in partnership with Generation Rwanda students (formerly Orphans of Rwanda) and local government officials. The survey teams and water quality teams were assigned different areas each day. In-country staff pre-identified the community water points that required water testing. These points were tested for flow rate, temperature, pH, alkalinity, chlorine residual, total coliforms, *E. coli*, and other quality parameters. The team also surveyed community water points, public institutions and households to gather sanitation information

Maria: The 2009 assessment in Nicaragua covered a total of 70 communities in the municipality of Wiwilí, Jinotega. A team of 14 people was assembled. It included Water For People staff and volunteers, staff from El Porvenir and students from the University of Estelí in Nicaragua. I was teamed up with Andrew Britton from Water For People, and Carlos Lanuza, one of the university students.

Guy Beauchemin shares smiles with some new friends in Nicaragua.

Maria Sanchez-Rico hits the trails in Nicaragua.

June Garcia-Becerra and Stephanie Moore assess local infrastructure in Mexico with a community representative.

Collection of water supply and sanitation data was mainly done by filling out a thorough questionnaire for both the community households and the public institutions such as schools. The deputy mayor was also interviewed, sometimes with other leaders of the community.

WEAO: *What was especially challenging on your visit?*

Maria: The communities we visited were very remote and getting there required long hours of riding, walking and sailing on small riverboats, in hot and humid weather. At the end of the day, our hammocks seemed incredibly comfortable, thanks to the long hours on horseback!

June: We had long nights, so I could translate the conversations we had during the day and go over our findings. Going to impoverished, marginalized areas, knowing that we might not be able to help the Mexican communities, was very emotional and increased the significance of our work. When Mexico was not selected as a program country, it was very hard to inform the people that helped us and all of the communities that we met.

Guy: One challenge was finding the right 5-10 pre-selected water points with a driver and a guide, so that we could perform the sampling and testing. Microbiological testing was completed at the Water For People offices, and the basic parameters were tested on the spot.

WEAO: *What made you feel especially good about the work?*

June: Becoming aware of the water and sanitation issues gave me a new respect for people in these communities. I was inspired by them and became much more committed to my work and to environmental issues.

Guy: Water For People – Rwanda really appreciated our work and effort. Water For People – Denver chose the right personnel with different skills and experience. Our team leader, Monica Brown (from the Water For People staff), was great!

Maria: The enthusiasm of community members was one of the things that made me feel good. It was reaffirming to realize that the attitude of the communities was collaborative, not passive. The success and sustainability of Water For People's projects relies on collaboration between the organization and the communities involved. People at El Porvenir are doing a great job and have an amazing attitude and passion for what they do. It was also refreshing and encouraging to see the excitement of the students in improving the situation in their country.

WEAO: *Was there a special or funny story you would like to share?*

Guy: While collecting samples, we found ourselves out of gas in the middle of nowhere. It took several hours to get help.

Maria: When I was told we would use horses to get to places, I almost fainted. I was terrified (despite my best poker face) and the first day asked our guide for the tamest horse in town. He said "of course" and came back with a mule. I was probably bigger than the animal.

WEAO: *What would you say to someone looking to volunteer for the World Water Corps?*

Guy: You need to be in top shape for the assignment. My military service was useful: some environments were very challenging and you need to be very tough and resourceful. Understanding the country before the assignment is important. Any assignment and country has its own rules and history, and it is important to respect that.

Maria: If you feel that WWC is an opportunity you would enjoy, volunteer and go. I did not hesitate to say yes to a trip that promised sleeping in hammocks, harsh conditions, and 'bathrooms with views.' Do not expect to know all the details beforehand. While Water For People is very good at providing as much information as possible, one needs to always leave a bit of room for improvisation. It is part of the adventure.

WEAO: *Is there anything else you would like to tell us?*

June: It was a wonderful professional and personal experience. I would invite people to think about their own backyards and consider what things they can do today to reduce the pressure on our water and wastewater systems.

Maria: WWC is an excellent volunteer opportunity for people who may only have a couple of weeks available. Why not take your vacation from work to provide a little (but important) input to such a great cause?

Guy: If you have an offer, TAKE IT! GO! This is a lifetime experience. You will not regret it.

Water For People and the World Water Corps are always looking for new volunteers. To volunteer or for more information contact:
http://www.waterforpeople.org/about/offices/water-for-people-canada/
http://wwc.tap.waterforpeople.org/

EVERYONE....ARE YOU IN?
EVERYONE. EVERY FAMILY. EVERY SCHOOL. EVERY CLINIC.

Indra R. Prashad, P.Eng., President, Water For Peo

ater For People helps people in developing countries improve their quality of life by supporting the development of locally sustainable drinking water resources, sanitation facilities, and hygiene education programs. Water For People – Canada supports and promotes the mission of Water For People in Canada among the public and the water/wastewater community.

Everyone – a simple word that we use everyday in casual conversation. Water For People has taken that word and given it a more complex meaning, one that asks us to take part in a more serious conversation.

The EVERYONE campaign asks us to imagine a time when everyone – every family, every school, and every clinic – has access to safe water. We would like you to imagine a time when organizations like Water For People are no longer needed. Ambitious? Absolutely.

Just take a look at one of the countries that has made this pledge with Water For People. The Rwandan Government committed in October 2010 to have safe water coverage by the end of 2014 for 265,000 people in 494 villages in the Rulindo District. Safe water access for Everyone. Every Family. Every School. Every Clinic – *http://www.waterforpeople.org/everyone/rulindo-challenge.html*. Imagine.

Water For People has developed a unique model within the non-governmental organization (NGO) water and sanitation sector. We are not interested in providing 'handouts,' we believe in giving a hand up. We do not believe in 100% funding of projects, we believe that success is founded on empowering local communities and government to build and sustain their own reliable safe water systems. We do not have beneficiaries, we have partners.

Our commitment to sustainability is more than just words, we will stay and monitor all of our projects for at least 10 years, and we will not be satisfied with anything less.

We have developed a revolutionary tool to do just that – FLOW (Field Level Operations Watch). FLOW measures what is working...and what is not working. Data is collected and analyzed by a dedicated group – the World Water Corps – who volunteer their time at their own cost to travel to our program countries. Check our Water For People – Canada webpage and meet the Canadians who volunteer with the World Water Corps. You can also track our progress at *http://watermapmonitordev.appspot.com/*.

The Everyone Campaign, the commitment to monitoring and sustainability, Water For People's talented staff, the dedication of our local committees throughout North America, and our World Water Corps team have made Water For People an organization to watch in the NGO sector. We attracted the attention of the Bill & Melinda Gates Foundation that recently gave Water For People a $5.6 million grant for the Sanitation as a Business Program, and Ned Breslin, Water For People's dynamic CEO, was awarded the 2011 Skoll Award for Social Entrepreneurship.

All of this has happened because Water For People is changing the conversation about ending water and sanitation poverty, forever. So, are you interested in being part of this conversation? Are you interested in being part of Everyone?

Here is how you can join in:

- Take the Everyone pledge. Sign on at *www.waterforpeople.org/everyone*
- Sponsor a local committee event. Check our webpage regularly for up-to-date committee information
- Develop a workplace giving program and organize activities in your office to support the Everyone campaign
- Donate to Water For People – Canada to support Everyone initiatives in our 11 program countries of Malawi, Rwanda, Uganda, India, the Dominican Republic, Guatemala, Honduras, Nicaragua, Bolivia, Ecuador and Peru

For more information, go to Water For People – Canada's webpage: *http://www.waterforpeople.org/about/offices/water-for-people-canada/* or call (416) 499-4042 and ask for Joan Conyers *(jconyers@waterforpeople.org)*.

Upcoming sponsorship opportunities for WFP in Ontario include:

- WEAO Golf Tournament Events – September 2011
- OWWA/WEAO Slo-Pitch Tournament – September 2011
- WEAO Biosolids Technical Seminar – November 2011
- OWWA Ski & Snowboarding Day – February 2012
- OWWA/WEAO World Water Day gala event – March 2012
- OWWA/WEAO Curling Bonspiel – March 2012
- WEAO Evening of Dining and Dancing – April 2012
- OWWA Silent Auction – May 2012

OWWA Committee Co-Chairs:
Carolyn de Groot *cdegroot@London.ca*
Deborah Goudreau *dgoudreau@oxfordcounty.ca*

WEAO Committee Co-Chairs :
Don Hoekstra *dhoekstra6@msn.com*
Dean Whittaker *dwhittaker@tmig.ca*

CALENDAR OF EVENTS

SEPTEMBER 2011

Sept. 19-21 — *21st Annual Conference of The Compost Council of Canada* Delta Prince Edward Charlottetown, PEI

Sept. 20 — Board Meeting, AECOM Offices Mississauga, 9:30 a.m.

Sept. 20-21 — 2nd North American Conference on Ozone and Ultraviolet Technologies Fairmont Royal York Hotel, Toronto

Sept. 22 — 13th Annual WEAO Golf Tournament Scholarship Fundraiser, Shawneeki Golf Club Newmarket, 11:00 a.m.

Sept. 20-23 — 2011 WCW Annual Conference & Exhibition *http://www.wcwwa.ca/index.php/251*, Saskatoon

Sept. 25-27 — 6th National Residuals & Biosolids Conference HOSTED BY RESEAU Environnement, Centre des Congres, Quebec City

Sept. 28 — PWO SW Region Conference, W.I.S.H. Centre, Chatham, 8:15 a.m.

OCTOBER 2011

Oct. 6 — SCADA Performance Improvement Seminar Toronto Congress Centre, Dixon Road, Toronto 8:00 a.m.

Oct. 7 — CAWQ 26th Eastern Canadian Symposium on Water Quality Research Quebec City

Oct. 13 — Communications Committee Meeting, WEAO Office, Milton 10:00 a.m.

Oct. 15 — Great Canadian IceBreaker Westin Bonaventure, Los Angeles, CA, 7:00 p.m.

Oct. 15-19 — WEFTEC®2011 Convention Center, Los Angeles, California

Oct. 17 — Canadian Affairs Council Meeting, Convention Center, Los Angeles, California, 1:30 p.m.

Oct. 19 — Joint WEAO/OWWA Climate Change Seminar, La Toscana 3201 Highway # 7 West Vaughan, ON L4K 5Z7, TBA 10:30 a.m.

Oct. 23-25 — 2nd International Forum on Integrated Water Management, University of Sherbrooke, Quebec

Oct. 25 — Board Meeting, AECOM Offices Mississauga, 9:30 a.m.

Oct. 25-26 — Joint WEAO PWO/EOWWA CONFERENCE Ambassador Hotel Kingston

Oct. 28 — WWT&T Committee Meeting, AECOM Offices, Mississauga, 9:30 a.m.

NOVEMBER 2011

Nov. 4 — Submission Deadline for *INFLUENTS*

Nov. 7-8 — Biosolids Beneficial Use Seminar, CCIW, Burlington

Nov. 15 — Board Meeting, AECOM Offices, Mississauga, 9:30 a.m.

Nov. 16-18 — A.D. Latornell Conservation Symposium, Nottawasaga Inn Alliston, ON, TBA WEAO 25-Year Members Luncheon

DECEMBER 2011

Dec. 7 — WWT&T Committee Meeting, AECOM 5600A Cancross Court, Mississauga, 9:30 a.m.

Dec. 9 — Committee Chairs Group AECOM Office, Markham 9:30 a.m.

Dec. 13 — Board Meeting, TBA 9:30 a.m.

Dec. 14 — Government Affairs Committee, GENIVAR, Markham, 10:30 a.m.

Dec. 16 — *INFLUENTS* Release Date

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Avensys Solutions	22	888-965-4700	www.avensys.com
Biorem Technologies	53	800-353-2087	www.biorem.biz
Black & Veatch	36	905-747-8506	www.bv.com
C & M Environmental Technologies Inc.	7	800-570-8779	www.cmeti.com
C.C. Tatham & Associates Ltd.	8	705-444-2565	www.cctatham.com
Cancoppas Limited	19	800-595-0514	www.cancoppas.com
ClearTech	21,65,68	800-387-7503	www.cleartech.ca
Degremont Technologies	11	905-627-9233	www.degremont-technologies.com
DELCAN Water	17	905-943-0500	www.delcan.net
Dwyer Instruments, Inc.	9	800-872-9141	www.dwyer-inst.com
Eramosa Engineering Inc.	21	519-763-7774	www.eramosa.com
GENIVAR Ontario Inc.	21	905-475-7270	www.genivar.com
Greatario Engineered Storage Systems	65	519-496-8169	www.greatario.com
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Hach	29	800-665-7635	www.hach.com/canada
Halliday Products	15	416-503-7639	www.hallidayproducts.com
H2Flow Equipment Inc.	41	905-660-9775	www.h2flow.com
Hollen Controls Limited	65	519-766-1152	www.hollencontrols.ca
Hydro-Logic Environmental	65	905-777-9494	www.hydrologic.ca
Intersteam Technologies	33	905-526-1453	www.intersteam.com
ITT Water & Wastewater Canada	13	514-695-0100	www.ittwww.ca
John Brooks Company Limited	14,62	877-624-5757	www.fluidhandlingsolutions.com
John Meunier Inc.	37	905-286-4846	www.johnmeunier.com

Company	Page	Phone	Website
Kemira Water Solutions Canada Inc.	59	800-465-6171	www.kemira.com
Markland Specialty Engineering Ltd.	33	855-873-7791	www.sludgecontrols.com
Nelson Environmental	55	888-426-8180	www.nelsonenvironmental.com
NETZSCH Canada Inc.	20	705-797-8426	info@netzsch.com
Parkson Corporation	25	514-636-8712	www.parkson.com
Pollardwater.com	4	800-437-1146	www.pollardwater.com
Pro Aqua, Inc.	45	416-861-0237	www.proaquasales.com
RV Anderson Associates Limited	48	416-497-8600	www.rvanderson.com/sustainability
Sanitherm Engineering Limited	45	604-986-9168	www.sanitherm.com
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Simpson Environmental Corporation	65	905-332-7669	www.simpsonenvironmental.com
Smith & Loveless Inc.	22	905-528-3807	www.smithandloveless.com
Summa Engineering Limited	18	905-678-3388	www.summaeng.com
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Trojan Technologies	3	888-220-6118	www.trojanuv.com
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VL Motion Systems Inc.	47	905 842-0244	www.mastergear.ca
Waterloo Biofilter Systems Inc.	22	519-856-0757	www.waterloo-biofilter.com
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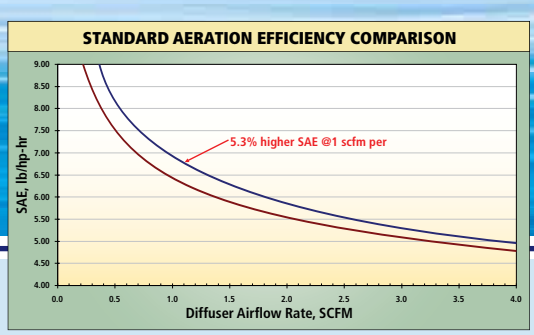

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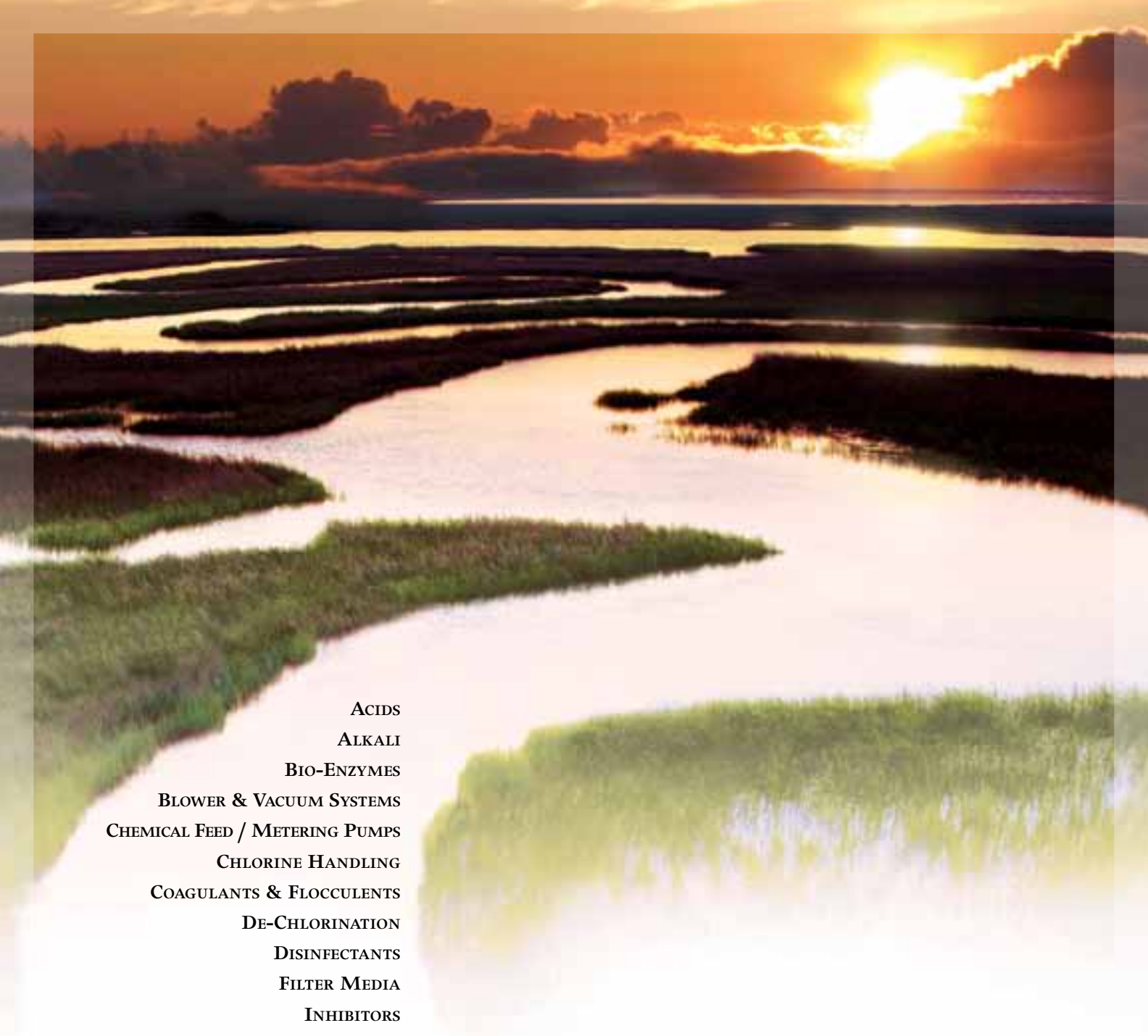

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