



WSCAC Meeting

Location: MWRA Facilities
Southborough, MA
December 12, 2017 – 10:00 A.M.

MEMBERS IN BOLD IN ATTENDANCE:

Whitney Beals, WSCAC Chair
Gerald Eves, PV Trout Unlimited
Martha Morgan, Nashua River Watershed
Kurt Tramosch, Wayland Wells
Terry Connolly, Town of Ware
Jean McCluskey, Mission-Focused Alliance
William Copithorne, Town of Arlington

Martin Pillsbury, MAPC
Andrea Donlon, CRWC
Michael Baram, WSCAC
Paul Lauenstein, NepRWA
Bill Fadden, OARS
Janet Rothrock, League of Women Voters

NON-MEMBERS IN ATTENDANCE:

Lexi Dewey, WSCAC staff
Andreae Downs, WAC staff
Israel Alvarez, MWRA

Heidi Waugh, WSCAC staff
Steve Estes-Smargiassi, MWRA
Bill Kiley, BWSC

WSCAC BUSINESS AND UPDATES

Lexi Dewey began the meeting by informing the committee and guests that Whitney Beals has completed his tenure as the WSCAC Chair. Lexi thanked Whit for his years of commitment and leadership, noting the great work Whit has done while chairing the committee. Whit stated that he has enjoyed his time on WSCAC—not just his time serving as Chair—but his overall time working with the group on interesting projects. Whit thanked everyone for their tremendous support and teamwork.

Whit explained that moving forward, Executive Committee members would serve as the Chair of WSCAC in two-year stints. Michael Baram will serve as the next Chair beginning in January 2018.

Whit stated that there were two sets of minutes requiring a vote—the October and November Meeting Summaries. After hearing no recommended changes or additions, Bill Fadden made a motion to accept the minutes as distributed. Kurt Tramosch seconded the motion. All voted in favor with the exception of Bill Copithorne, who abstained from the vote.

The MWRA's Carbon Footprint *By Steve Estes-Smargiassi*

Steve Estes-Smargiassi began his presentation by explaining that the MWRA is in the midst of updating its Greenhouse Gas Inventory for the calendar years of 2015 and 2016. Therefore, he

expected this presentation to reflect a preview of the information. Once the Inventory is finalized, Steve will provide WSCAC with a copy of his updated presentation.

Steve then posed the following rhetorical question: why do we care about MWRA's carbon footprint? We care because greenhouse gases create climate change. As an environmental agency, this area of focus is a big deal. The Authority wants to understand what it contributes—as a water and wastewater utility serving the region—in terms of greenhouse gases so that it can understand its impact, reduce its impact, and adapt to climate change.

Steve explained that the metric that he would use throughout the presentation is referred to as 'CO₂ Equivalents.' There are seven gases that are important to consider. There are only five that show up in water and wastewater operations. Three of them are big players in terms of volume and multipliers. The Authority focuses its efforts on the big players. Methane, for instance, is twenty-five times more potent than carbon (with respect to its effect on the climate). Nitrous Oxide is similarly 'off the scale' because it is almost three hundred times more potent than carbon. The Authority, therefore, pays close attention to these gases even though they are smaller contributors in terms of total pounds.

Steve then explained what it means to take inventory of the MWRA's greenhouse gases. The Authority looks backwards (to the year 2006), as well as forwards, in order to identify the major sources and establish trends. In order to take an inventory, the Authority looks at each facility in order to figure out what is going on. In addition to identifying the major sources producing gas, the Authority wants to manage the gases. Steve explained that the inventory allows the MWRA to identify opportunities to reduce their greenhouse gas emissions. Creating an inventory also allows the Authority to establish objectives.

Steve stated that the MWRA published a report two years ago that documented greenhouse gas emissions from 2006 to 2014. Israel Alvarez is finishing the last two calendar years of data. Moving forward, the goal is to do an annual update in the summer. The major idea, Steve said, is that the Authority is following standard protocols. This allows the Authority to compare their data with other group's data and determine whether they are more or less efficient.

Kurt asked if waste heat is included in the inventory. The wastewater treatment process warms the ocean—Kurt classifies this as waste heat. Steve said that in the grand scheme of things, such warming is tiny in comparison to the impact of the gases that the Authority releases in doing the movement and treatment. Steve is not aware of anyone who is looking at the warming of the water—it is not part of this analysis. This inventory looks strictly at gases. Steve explained that MWRA's sustainability considerations include energy use (from all sources), greenhouse gases, water efficiency, recycling, green energy production, and climate change adaptation.

Completely tracking one's impact on the environment is nearly an insurmountable problem, Steve stated. Steve explained that "buckets" are used to approach the problem. Scope One—which other folks refer to as a bucket—is the first area of focus. Basically, it is comprised of things that the MWRA burns: natural gas, propane, digester gas combustion, digester gas flaring, oil, diesel, and gasoline. Scope Two consists of the greenhouse gases associated with the production of the electricity the MWRA purchases. Scope Three consists of a bunch of other stuff, and it begins to get pretty esoteric. Most organizations require consideration of Scope One and Scope Two.

Kurt asked if the Authority considers the life cycle of things—for example, a wind turbine in Charlestown has at least a year and a half of carbon costs on the footprint before it even goes into place. Steve said the short answer to that is no—the impact of building the wind turbine belongs to someone else’s carbon footprint in the current international inventory protocols.

Whit questioned the year in which the Global Warming Solutions Act passed. Steve stated that it passed in 2008. Whit reasoned that the Act passed about a year after the beginning of MWRA’s data set. Steve then explained that the Authority intends to go back and document years prior to 2006, but the Authority chose 2006 because they had complete data for the year and wanted to get things moving forward.

Steve explained that over the last several years, the MWRA has seen some substantial reductions in their carbon footprint as the Authority continues to think about energy efficiency and greenhouse gas capture. He stated that with respect to Scope One and Scope Two, the Authority is doing very well. Direct energy, which includes—among other things—electricity, diesel, and natural gas, represents about eight-five percent of the Authority’s greenhouse gases. Electricity alone represents about forty-six percent. Natural gas represents about seventeen percent. Diesel includes vehicle use and process use—such as running an emergency generator on diesel. Steve stated that every building, every electric bill, every natural gas bill has its home—so the Authority can work its way back by location and figure out the source of the gas. The inventory, Steve explained, is a tool. The inventory allows the Authority to go back, look at the details, and determine where improvements can be made.

Paul noted that earlier in the presentation, Steve stated that methane is twenty-five times more potent than CO₂. Paul stated that that conversion is variable depending on the timeframe. For example, Paul stated, one hundred years could be twenty-five times, but twenty years could be eighty-five times. Steve replied, yes. Steve believes his figure relates to a longer term. He stated that the Authority should incorporate that into the report.

Steve continued to explain that a large piece of the natural gas is sludge pellet production. Heating buildings also contributes to the natural gas numbers. Diesel is variable depending on the use of the combustion turbine generators at Deer Island.

Lexi asked if the treatment at Carroll Water Treatment Plant is accounted for under the electricity category. Steve replied yes. The largest piece at Carroll is electricity, but there is also natural gas and diesel.

Steve continued to state that when the Authority generates a kilowatt hour of electricity with diesel at Deer Island, it has a bigger greenhouse gas impact than buying the same electricity from the grid because the grid generates electricity more efficiently (from a greenhouse gas perspective) than the Authority. In 2010, there was a very wet spring. The Authority ran the generators for several weeks during that spring. When the Authority has high rain fall and high flow, it does not want Deer Island to stop. All large plants are designed to run—they are not designed to stop and start. It can take hours to go from off to running at full speed. If Deer Island were to lose power during such a period, the wastewater would go into the environment. So, when the Authority is concerned about the reliability of power—and when demand is high—the Authority runs the backup generators. The same protocol is followed at Carroll Treatment Plant.

Whit asked if the Authority follows a particular rule of thumb. Steve replied that there are two separate issues. The first question that must be asked is: how much flow is there? The second question is, what is the likelihood of the grid going down? Thunderstorms, therefore, are different than regular rainstorms. High wind events are different than low wind events. A number of considerations contribute to making the decision to run the backup generators. Steve explained that the Authority is concerned about greenhouse gases, but also considers the financial cost. Typically, it costs more to run the backup generators than it does to buy power.

Paul asked if it would be possible to replace the diesel with a gigantic battery. Steve said from a practical perspective, no. The Authority has begun to look at battery storage, but batteries are very, very expensive and very, very big. Moreover, every time you use a battery, you add another layer of complexity to your operating system.

Kurt asked if when power drops at Deer Island, does steam pressure generation and the back pressure is lost as well? Steve replied no. At Deer Island, there are two sets of generators. There are steam turbine generators and they represent a small fraction of the Authority's total generation capacity. The majority of the Authority's generation capacity comes from two jet turbine powered generators, each of which is capable of powering the entire plant. The Authority runs the steam turbine generators and the combustion turbine generators during the storm—but it's the combustion turbine generators that are replacing the grid.

Andreae Downs asked if the Authority could save money by being connected to natural gas pipelines instead of using diesel. Steve said there are a lot of "ifs" involved, but if the gas pipeline had the capacity to reliably provide for the emergency generators, the Authority would probably use that as its primary source. Steve said matters of reliability would have to be considered. Moreover, there is no natural gas available at Deer Island.

Steve continued to state that electricity purchases represent the Authority's single largest line item with respect to greenhouse gases. Overtime, the Authority has cultivated a decent downward trend—about twenty percent. The tail end of the downward trend is attributed to the Authority's use of diesel, Steve said. Steve explained that a kilowatt of electricity turns into greenhouse gases with an emissions factor, which is made up of all the emissions factors of all the plants that contributed electricity to the grid. This is particularly complicated. There are five or six factors that must be considered in the process.

When we think about energy reductions with respect to wastewater, the easiest way to save energy is to make less. Moving and treating less wastewater reduces energy use. Paul noted that the presentation refers to lower annual wastewater flows. Paul asked Steve to clarify the distinction between wastewater flows and drinking water flows. Steve said the impact of wastewater is almost nine times greater than the GHG impact of drinking water.

Steve said an important thing to keep in mind is the Authority's overall job: to provide safe drinking water to customers and conduct environmentally appropriate wastewater treatment. If the Authority does a better job, it might be doing a worse job in terms of energy use, which means the Authority would be doing a worse job. For instance, in 1985, the Authority had less of an ability to reliably move flows out of the collection system to Deer Island. That means that on a wet day—more than 600 mgd of flow—everything beyond the 600 mgd went some place other than Deer Island. An environmental success story is that now, when it rains, the Authority can get somewhere between 1.2 and 1.3 mgd of wastewater to Deer Island. But what does that mean from a greenhouse gas perspective? The Authority

is using energy to pump that it previously did not use. Such use accounts for one of the factors that the Authority considers in understanding its greenhouse gas emissions. Likewise, on the drinking water side, the Authority is doing a great deal more to make the water safe, such as ozone and UV treatment. Similarly, the Authority's energy use has increased. As a result, the Authority has had to be even more efficient to compensate for the fact that it is doing a better job of its core job. Steve concluded to state that in terms of reductions, the Authority has seen improvements in refrigerants, natural gas, and diesel. The major takeaway is that the Authority is being more efficient in its use of electricity.

Steve then transitioned to a discussion of the ways in which the Authority reduces its footprint. The first example Steve discussed was insulating the pipes at water pump stations. Steve explained that the water is cold, all year long. During the winter, the temperature of the water can make the building barely habitable—the building must be heated. Even in the summer, the cold water pipes are an issue. The Authority must dehumidify the building or else the pipes create large puddles. Insulating the pipes makes a big difference in terms of energy use at the pump stations.

Next, Steve discussed a process-related reduction effort. At Deer Island, the Authority adds oxygen at the end of the process. The Authority makes pure oxygen—it freezes the air to separate the oxygen out from the rest of the gases. It is a very, very energy-intensive process. Once the pure oxygen is made, it is blown through giant blowers and it bubbles through the wastewater. To the extent that any of the oxygen is not being used—the bubbles are too big, for instance—that is a waste, in terms of energy use. The Authority went in and changed the oxygen sensors and changed the programming so that the Authority only uses as much oxygen as is actually needed; by conducting better monitoring, the Authority positions itself to use energy more efficiently.

On the drinking water side, the Authority has seen similar savings in a different way. The Authority adds—for corrosion control purposes—sodium carbonate to the water to raise the pH and alkalinity. When the plant was built, the Authority had four seventy-five horsepower motors to run the mixers, which ensured that the chemical was fully dissolved. An energy auditor went through the plant to look at everything that hums and asked if the motors were as efficient as they could be and what would the payback be for making the motors as efficient as possible. The Authority knew it would see some improvement if it made the motors more efficient, but realized it would see a one hundred percent improvement if it eliminated the mixers altogether. Towards the end of a calendar year, the Authority ran the plant without the mixers and determined that the chemical dissolves pretty well on its own. The Authority notified its regulators of the change and ran the plant for an entire year without using the mixers. The Authority met its targets and decided to remove the mixers permanently. This change represents a couple hundred thousand dollars a year in energy savings.

Bill Kiley asked what percentage of MWRA's electricity use is attributable to its large windmill in Everett. Israel Alvarez replied that the Charlestown wind turbine has a 1.5 megawatt capacity and it generates about 3.5 million kilowatt hours of electricity per year. Steve said that the Authority likes the turbine because it is a spinning symbol of its green efforts. The Authority makes its real green energy in hydroelectric generation, because water is heavy.

Paul asked if the Authority considers a cost factor when it does its math on the payback it receives for creating GHG reductions at Deer Island—is there a cost factor the Authority can put on its reduction of CO₂ emissions? Steve replied no, currently there is not. In the Authority's analysis, GHG reductions will be listed as a benefit, but the Authority does not currently have a monitoring metric—but the Authority tries to track this in its conversations.

Kurt asked if there is any off-peak pumping to an elevated reservoir on the system, or any potential for such a practice. Steve said that the Authority does engage in this practice. He explained that the primary benefit of doing so saves dollars—there is not necessarily a greenhouse gas benefit.

Steve continued to state that the Authority burns the gas it generates (roughly the equivalent of five million gallons of diesel per year) to heat Deer Island. If the Authority was not using the methane to heat the plant, it would require a great deal of diesel fuel to warm parts of the plant.

Steve then briefly spoke about renewable energy. The goal is to generate green energy when the Authority can do so cost-effectively. The Authority generates green energy with solar panels, wind turbines, and by hydro-power. Steve said it was important to note that the Authority generates green power—particularly with respect to hydro—as a byproduct of its primary operations. The Authority does not operate the system to generate electricity. If the Authority is going to make a transfer, it does so because it needs to for water supply purposes. If the Authority can generate electricity as part of the transfer, it will. But at all times, the primary focus is water supply.

Steve concluded his presentation on the Authority's carbon footprint. He then transitioned to discuss several MWRA updates. First, he stated that the Authority is still recovering from the drought—the Quabbin Reservoir is just above eighty-five percent capacity. At this time of the year, the target is eighty-five percent. Odds are, Steve reasoned, that the Reservoir will stay at “normal” as we progress into 2018, but there is about a twenty-five percent chance that the Reservoir may coast down into “below normal.” Second, Steve informed the Committee that the Wachusett Pump Station project is still underway and in good shape.

Next, Steve stated that he presented an update to the MWRA Board about lead. In September and October, the Authority conducted its annual lead testing. The numbers were a little bit higher than they have been in previous years, but overall, the system is still doing well. The ninety-eighth percentile was at nine parts per billion. For the last four or five years, Steve explained, the Authority has been running in the five to nine parts per billion range. So, the MWRA is in the noise, but in the upper end of the noise. Four communities were above the individual action level: Quincy, Winthrop, Medford, and Melrose were all above. The Authority is looking closely at it. While the goal is to be as close to zero as possible, there is variability in the testing, such as households deciding against allowing the Authority to come back and test year after year. Steve referred the Committee to the [relevant MWRA Staff Summary](#).

Janet Rothrock asked if lead poisoning is a reportable diagnosis, and if so, is there any effort to look at the places where the kids live and look for clustering? Steve replied that yes—all lead blood levels are reported to the state. The state has a complete data set. The long-term trend indicates a ninety percent reduction in blood lead levels. Steve explained that there are different benchmarks, but if a child is above ten micrograms per decimeter, the state conducts a mandatory visit. If a child is above five, that household is offered a visit. The state historically looked primarily at dust and paint, and held the position that water was not a big deal. Now however, the state is offering every household (where a child has elevated blood lead levels) the opportunity to test their water. The household itself must do the sampling (and putting the test bottle in the mail back to the Authority, for example). So far, the data has shown that most households are below one part per billion. A small number were somewhat elevated, and only one out of 160 samples was above fifteen (the trigger for additional action). The Authority's goal is for children to have no lead in their blood—so even if the proportion of lead in a child's blood attributable to water is small, this is something the MWRA is working to eliminate.

Janet said that one of the major sources for kids in Boston—at least several years ago—was the constant repainting of the Tobin Bridge. Whit added that the bridge must now be wrapped if and when it is painted.

Paul thanked Steve and Israel for a fantastic presentation. He stated he is thrilled that the MWRA is taking its carbon footprint seriously, monitoring it, and doing so much to reduce it. Steve replied that Paul will see more progress moving forward. The Authority is putting more energy into energy efficiency. Paul made a further comment that there is an issue now about whether to increase the infrastructure to bring gas to New England. It is a multibillion dollar question. The Attorney General prepared a report that compares the cost of expanding the capacity/storage with the cost of meeting our energy needs through “demand response,” which is what the MWRA does through demand efficiency. The report indicates that the cost of meeting our energy needs with demand response is quite a bit less than with constructing a new pipeline. Steve added that we must consider our ability to improve our efficiency in comparison to our need to take energy uses offline.

Lexi asked Steve when the Committee could expect an update on the tunnel. Steve replied the Authority still has some matters to sort through, so the WSCAC should expect that it will be some time before an update.

The Committee thanked Steve for his informative presentation and update.

WSCAC’s next meeting will be held on Tuesday, February 13, 2018 at the MWRA Facilities in Southborough. Please visit the WSCAC [website](#) for more information.