Summary Meeting Notes: Municipal Corporate Energy Efficiency Workshop, September 16th, 2016

Workshop Proceedings

Case Study Presentations

- Saleh Daei, City of Brampton: Transit Facility Retrofit (pdf of presentation) (video of presentation)
- Alex Chapman, City of Guelph: High Fives, Face Palms and Body Blows (pdf of presentation) (video of presentation)
- Bernie McIntyre, Mayor's Megawatt Challenge: Capturing the Community Centre Energy Efficiency/Conservation Potential (pdf of presentation) (video of presentation)
- Adam McMullin, City of Barrie: The Band-Aid Effect: The Business Case for Facility Recommissioning (pdf of presentation) (video of presentation)

Financing Energy Efficiency Retrofits Presentations

- Grant Kozlik, City of Toronto (pdf of presentation) (video of presentation)
- Tom Chessman, City of Hamilton (pdf of presentation) (video of presentation)
- Tim Stoate, Toronto Atmospheric Fund (pdf of presentation) (video of presentation)

Google Corporate Energy Managers Community of Practice Google Group Instructions

Here are the instructions for joining the group from Alex in Guelph (thanks for the instructions and setting up the group Alex).

To join the Google Group, click here and click the "Request" button. If you don't already have a Google profile, you'll need to create one here. (This is not the same as creating a Gmail account.)

You will also want to decide how to be notified when other members post content in the group as follows:

1. Click the "My settings" button in the top right corner
2. Click "Membership and email settings"

3. Next to “Email used for your membership”, select your preferred email address. (If the email address you want to use is not listed, it is not in to your Google profile. For instructions on how to add it, click here and click the “Alternate emails” heading.)
4. Next to “Email delivery preference”, select your desired option. So far it’s been unusual to have more than one or two posts per day, so leaving the default (“Notify me for every new message”) won’t make much of an impact on your inbox.

Case Study #1: Saleh Daei, City of Brampton: Transit Facility Retrofit

In 2014 Brampton’s Master Plan committed the City to reduce its energy consumption by 30% by 2021; thus far a 10% reduction has been achieved. Brampton’s Corporate Conservation and Demand Management Strategic Energy Program incorporated the reduction target from the Master Plan.

Brampton has 150 facilities and 700 utility accounts to deal with. Each facility receives its energy data summary on a quarterly basis to inform them about their energy consumption and how far along they are towards reaching their energy reduction target.

The City also has a recommissioning program running on four year cycles that target the top 25 buildings to reduce their energy consumption. Many facilities are adopting Building Automated Systems (BAS).

The main focus is on:

- (Re)training staff every two years to keep them updated on the newest energy efficient technologies and practices.
- Applying for projects and incentives (about 1million dollars in capital funding has been invested thus far).
- Consulting with facility members before changes are executed.

Utility costs since 2010 went up from 11 million dollars to 20 million dollars (electricity was a major factor and because Brampton is one of the fastest growing city in Ontario so facilities are being added and expanded).

Capital funding is dependent on the business case being presented which includes financial and energy-based savings, the amount of GHG saving potential, and the eligible incentives. However individual projects do not have to go to council individually, a total budget is approved and then each project has to present a business case in order to access the energy efficiency funds.

Clark and Sandalwood Transit Stations Case Study

Both are public transit garages where buses are stored overnight and checked for maintenance and repair, it is a facility that is used 24/7 by unionized workers so there is the need to work with both the facility and the union in order to gain the needed buy-in and support. The financial energy savings was one of the main motivating factors to get the facility and union on board. Building a strong relationship and having constant communications with facility staff is essential.

Operational changes that resulting in the most energy and financial savings include:

- Moving the heating temperature setting from 18 degrees Celsius to 15 degrees Celsius (There is an estimated 3% savings for each degree reduced)
- Managing HVACs to make sure that not all were running at the same time.
- Changes in light levels was a bit challenging because it is strictly regulated for safety reasons—different levels of light intensity was the issue (alternating areas of bright and dark spots during the night time), the solution to solve these "blind spots" was to purchase wide angle bulbs/lens, brighter light bulbs were not necessary. For union reports, light measurements were taken before and after the project implementation. If the city does not estimate a 50-60% reduction in energy savings for lighting fixtures, the city is very hesitant to take on upgrading the lights.
- The Clark Station facility has solar panels on the roof of the building, which the facility staff really like.
- The plan for 2017-2018 is to incorporate more fans, changing the automatic doors to 'high speed,' and remove unit heaters.

The Sandalwood case study also implemented all the above mentioned changes but there were two main differences from the Clark Case Study:

- There were mechanical design flaws: The exhaust fans were only located at one end of the facility. The facility was extended and exhaust fans were not added. Therefore, there was an air distribution problem.
    - All the exhaust fans don't run at the same time (unless it is rush hour) they are turned on one at a time.
    - Once the garage doors are open, there are sensors that turn the heaters off. These are the only sensors that were installed.

    The solution: HVLS fans were added, which the facility members liked.

- There was also an overdesign in lighting. Consequently, around 100 lights were unscrewed. Dimmable lights were added and were favoured by the facility members as they did not like the idea of motion sensor lighting.

  Maintaining doors closed was successful due to strong personal relationships with facility workers and their understanding of basic energy conservation practices.

- It is important to provide options for facility managers for example for light switching they were given 10 different options and were told to choose 3 for their facility. This approach worked.

  There were 60 space heaters running, 25 were disconnected during the night. Only the sections where the maintenance workers are working are now heated using infrared—there was no need to have the entire garage heated.

No follow up report was needed to show what the resulting savings were; the savings are based on the business case developed for the retrofit. But the energy use for all facilities is continually tracked so that we can see if something is not running as expected.

Case Study # 2: Alex Chapman, City of Guelph: High Fives, Face Palms and Body Blows

Context: In 2007, a Guelph Community Energy Plan was adopted and the Corporate Energy Management Plan was implemented afterwards to ensure that the City leads by example. Energy audits were conducted in 2011 and policies and actions followed in 2012.

Watson Road: A Lessons Learned Case Study

Actions Implemented:

- Solar Thermal panels were installed but were not awarded a FIT contract.
- The “Big-ass fan” was installed to improve air circulation
- An energy audit was done beforehand and light bulbs were changed to LED.
- There is an emphasis to work with the facility members because they have access to their own independent capital that could save the city money if co-operation ensues.

Issues:

- The organization in charge of the facility’s renovations did not consult with the facility’s current air circulation infrastructure when changes were made; as a result there was an imbalance of hot and cold air distribution.
- Heat Recovery Ventilator: It was not installed properly therefore there wasn’t the expected energy efficiency benefits from the technology
- There wasn’t sufficient discussion with facility managers. A lighting upgrade had taken place within the facility two years prior to the retrofit and as such lighting savings were not as estimated in the original plan.

Sleeman Centre - The Happy Retrofit

- A lighting retrofit to LEDs took place. The Centre is a broadcast arena so lighting is of critical importance and again there was the need to work with the facility to ensure their concerns were addressed.
- The controls on refrigeration were changed to four ¼ capacity units to ensure flexibility for what was needed rather than having to go over capacity.
- The goal was to obtain a 10 year pay-back, which results should be able to achieve.
- There was a very good media coverage for the work that was done in the Sleeman Centre so that added to the project's success and helped build energy efficiency awareness.
- Issues: There was a wiring problem where the adaptive lighting installed could not exceed 50%, this was corrected however.

West End Community Centre

- Multipurpose community centre retrofits included: dehumidification plant upgrades and LED upgrade. The contractor was already on site for the dehumidification plant, so it made it easy to give them another project without having to fill out another mobilization application.
- The change in lighting was well received by library staff.
- Dimmers were limited to only two settings; the facility managers was wary of providing too many options.

Evergreen Senior Centre

- They used an air desertification fans and high bay lights in the gym. HVAC and light fixture changes are also to be undertaken, as well as better ventilation and exhaust system for the kitchen.

River Run Centre (Performing Arts Centre)

- LED lighting retrofit
- Consultations with staff was essential, there was talk to put heaters in the change room but this idea was over turned because facility members did not think it was necessary.

Lessons learned:

- Always communicate with facility staff, hear their issues and realize they need to be on board to get maximum results from retrofit.
- Listen to the performance expert (if you have one). *General tip: if a contractor cannot give you assurance, do not follow through with the decision.
- If you have a contractor that is specialized and knows what they are doing, if possible use them across all the facilities that can benefit from their specialization. This is to avoid getting into a situation where a contractor takes on a project that may not have enough experience with. It does however often lead to more procurement work but

until you have first hand or (second hand knowledge from someone else who has used them for that technology) that may be the better option. This is one of the benefits of the Corporate Energy Managers Community of Practice Google Group (email list serve). See beginning of meeting notes for how to join the Google Group.
- If you are able to spend some extra money on purchasing your own energy meter to take your own measurements at a lower scale than your existing meter can provide this would better enable you to track your savings and can often be a worthwhile investment especially for higher energy use components within the facility.

Guelph had an energy revolving fund for energy retrofits but those funds were reallocated and Guelph is now looking at a new energy dedicated fund that could be financed via the streetlighting retrofit that would take the avoided costs and creating a new self funding energy fund.

Business Case strategies:

- Always illustrate a baseline, business as usual case to compare to determine avoided costs.
- Alex used an increase of 7% per year for his baseline (due to electricity costs) and an increase of 2% for maintenance costs. All calculations are based on these conservative estimations.
- Figure out what your avoided costs will be at various levels of achieving your energy savings to always present a win-win situation in front of council.
- The initial investment was 7 million dollars which helped generate a total of 20 million dollars in savings

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Case Study # 3: Bernie McIntyre, Mayor's Megawatt Challenge: Capturing the Community Centre Energy Efficiency/ Conservation Potential

TRCA has been working to

- Kortright Centre has been an information hub for energy efficiency and energy conservation practices through model homes, community district energy, largest renewable energy training, study for energy technologies in our green innovation park. There are two sustainable houses there already, but in partnership with a new development there will be seven more houses added to the park.

- Interest in end result: environmental gain, how to create livable, sustainable and resilient communities.

2002, TRCA they decided to take a different approach and work with the private sector to change the way energy efficiency potential is measured—focusing on the data instead of what practices (measures) could be implemented on a building to get the most energy savings.

The Community Centre Challenge: aims to identify, recognize and document the most energy efficient community centres, how?

- Focusing on "data" –there should be an emphasis on comparing between buildings of similar function in order to establish; a bench mark comparison between all facilities; to highlight best practices; and create achievable/realistic targets for facilities to undertake.

Conservation potential: The difference in measuring the current energy performance of a building and comparing it to the targeted energy use (the top 25% energy efficient buildings in Ontario).

Energy Savings Potential (The incentive you want to drive home to your targeted audience): Electricity savings potential, gas savings potential, total energy savings potential, and avoidable GHG emissions.

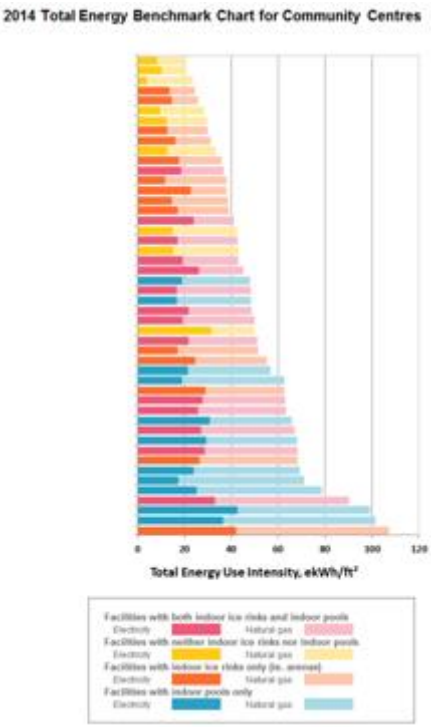

Figure 1 The bars are color-coated based on the different components incorporated in the community centres (pools, libraries, ice rinks etc.). This graph demonstrates the varying range of energy use within each type of community centre and the conservation potential between the top 25% energy efficient buildings and the energy guzzling buildings.

- The goal is to make this methodology (Measuring conservation potential) to become a standard in order to access deep savings- and answer the fundamental question of how much energy should be building be using?
- Energy efficient targets become achievable because they are not dependent on leading edge technology, it is based on buildings found throughout the province that are already have shown to be 25% more efficient than the facility in question.
- There is a focus on *energy saving potential* at the portfolio level; it becomes too expensive if all the buildings in your municipality need to have an audit. All this process requires is a description of what the community centre is comprised of (whether it has a pool, a library, an ice-rink) and the amount of energy used annually.
- This program recognises and awards buildings that participate; the next award ceremony is in 2021.

Buildings	Electricity Savings Potential		Gas Savings Potential		Total Energy Savings Potential		Indoor Area	Avoidable GHG Emissions
	%	$/yr	%	$/yr	%	$/yr	ft2	kg/yr
TOTAL: 48 facilities	24%	$ 2,331,452	30%	$ 714,723	27%	$ 3,046,175	3,176,910	6,997,106

Figure 2 Energy Savings potential based on 2014 Utility data for 48 facilities

There is more information on various saving measure by energy component a municipality could choose from when considering decreasing energy use within a community centre.

Case Study #4: Adam McMullin, City of Barrie: The Band-Aid Effect: The Business Case for Facility Recommissioning

Recommissioning is the process of investigating the facility's system, equipment and operations in order to improve building performance.

A consultant was used to provide a third party utility consumption analysis which later works with the municipality to see where the energy savings are.

Allandale Recreation Centre

Multi-use, built in 1983, the gas usage increased to $500,000+ and rising! The recommissioning started in July 2015 and finished in March 2016, this case study will focus on the pool.

Band-aid effect: occurs when the fundamental cause for an issue is overlooked

The issue: Chloramine smell that is linked to an air circulation problem

The band-aids: dedicated exhaust fan that would suck the air out when the chloramine smell was prevalent. The dedicated exhaust fan would suck the air from outside but this would be a problem because in the winter, the cold air would not be conditioned and would freeze the heating coil. The exhaust fan and the desert air exhaust unit would then be running at the same time--this lead to a cascade of technological issues that still did not even manage to solve the chloramine smell!

The fundamental problem: There was an imbalance of air circulation flow within the building. The chloramine smell was occurring in the dead zone of air circulation.

Why the challenge in figuring this all out?

- Complex, sophisticated equipment that facility operators do not fully understand

- Lack of staff time to investigate fundamental issue and the desire to look to easy "band-aid" fixes
- The staff priorities of comfort over-ride the issue of increased gas consumption costs when customers complain about temperature or smell
- Original commissioning shortcomings

Solutions:

- New controller & sequence of operations
- Recirculation mode implemented when pool is unoccupied instead of being run 24/7
- Air balancing
- Undoing previous band-aid "solutions" and subsequent issues that arose

Energy reduction/costs of equipment, control work and recommissioning fee= $20,000 in savings. A payback of 2.4 years.

The total savings would have =33,000 in cost avoidance! Plus additional non-quantifiable costs of: increasing capacity (ingrains interaction between municipal members and facility workers and establishes a framework for resolving future issues), increases involvement of operator in learning more about mechanical functionality of equipment, reduces maintenance costs,, and improves occupant comfort.

Lessons learned:

- Recommissioning is a key building management function
- Follow the decisions up the stream to see where there are likely to have been issues that have reared their heads in the past that could undermine the way the facility and the operation staff require energy.
- Enables increased communication between operations/facilities/energy staff
- The more recommissioning that is done the less need there is for audits over the longer term

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Financing Energy Efficiency Retrofits: Grant Kozlik, City of Toronto

There are two types of programs the city provides to promote energy efficiency retrofits:

1. Energy Conservation & Demand Management: this program is directed towards city owned buildings.
2. Sustainable Energy Plan Financing Program: broader in scope as it could incorporate City Agencies (ex. Exhibition Place), city corporations (social housing), city divisions (demand response, and non-profits).

The loans are based on “Recoverable debt:” the city issues a bond and collects the money to fund the retrofit program through a third party. This money does not contribute to the debt the municipalities are allowed to have since it is based on the loans being‘re-payable’ through the energy savings accumulated by the project. City divisions do not require securities but if the borrowing entity is considered outside of City Division, then a security would be necessary (ex. not for profit, co-op situation).

What the city provides is a loan at low interest rates, the parameters are:

- It is able to finance up to 100% of capital costs of the energy retrofit
- There has to be a pay-back of energy savings of 20 years or less, there are risk mitigation strategies to minimize risk
- The interest rates are fixed at the City’s cost of borrowing
- Interest rates and the repayment period of the loan only applies when the project gets completed and is fully operational
- There is also a flexibility of when you are able to pay (monthly, quarterly, or annually) to ensure that you are able to pay back the city when you are experiencing energy savings

The business case: it is assumed that there would be an escalation factor of 5% for energy costs, which is good because that would mean that the payback periods would not take an excess amount of time.

The city is also accepting projects with combined measures (decreasing natural gas and electricity) to ensure the highest potential of GHG reduction and a robust business case.

Challenges:

- The loans are based on recoverable debt, some divisions might be hesitant to accept because they would have to pay interest (the money does not come from the capital budget).
- The loans are dependent on the scale of the project; it incorporates how many people and work you need in order to run the project successfully.
- To have a successful project, senior leadership support and buy-in is essential—they would be able to sway any resistance against the interest rate (if there are issues with paying interest) and could lead to implementing policy.

The City used to have an energy revolving fund to finance energy retrofits but these were limited to city divisions and it was often required to protect that fund from other uses. Recoverable debt doesn’t require this as it is outside the City’s budget. The City is also working on other pilot programs that are based on reserve funding which would consider different parameters and end consumers. (Home energy project on home/residential sector (HELP) in buildings over ten stories (Tower Renewal) are undertaken via a different financing method).

Tom Chessman, City of Hamilton

Some of the community energy efforts have included district energy (which is in the downtown core area of Hamilton). Water and waste water facility in Hamilton is the biggest energy user. If you are not monitoring and managing your water, you are not managing your energy—they go hand-in-hand.

The City of Hamilton was planning on changing their bus fleet from CNG with Diesel; this meant that the operating budget would have increased substantially. This resulted in making the switch from the diesel direction to the natural gas direction for transit buses.

The city focuses on two areas concerning energy: energy engineering activity (projects and renewable operations) and Utilities Management (deals with regulation, rates, billing—managing peak days, class A accounts)

**There needs to be an understanding between the terms “savings” and “avoided costs” because electricity rates increasing these two terms often get confused and people question how there can be savings/avoided costs when energy budgets are increasing. There can be some value coming from putting our heads together to determine how we can better communicate the energy costs story. Unit costs, budget and consumption being brought together is important and identifying these components and better communicating that at council especially would be of significant value.

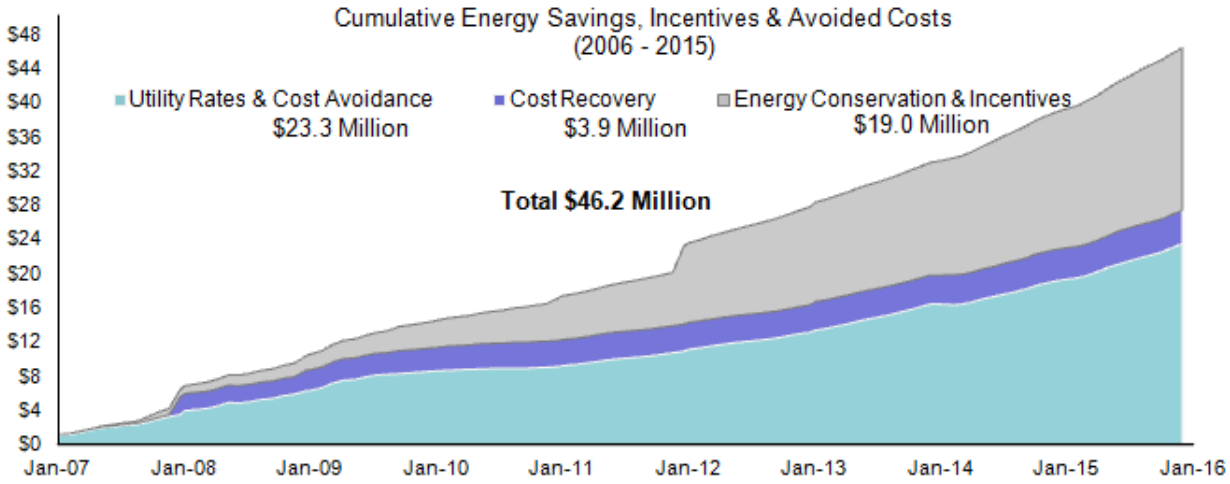

Figure 3 Graphs like the one above, are very useful to illustrate the implications of energy cost increase, the impacts of energy conservation & Incentives, and the financial savings of such projects

Hamilton Renewable Power Inc.

Owns the co-generator for the Woodward Water & Waste Water Facility that extracts methane gas and reuses this renewable energy source in which they are able to sell back to the grid as heat/energy—it is a 1.6 Megawatt co-generation unit that runs behind the meter so it doesn't affect the load of the plant which runs at about 8 – 10 MW. Some of the challenges include: the flow of the methane isn't static and does fluctuate a bit. The unit was from New Zealand and (while the units are used in many places around the world) our colder winters have required some adjustments to address frozen pipe issues. One of the main issue the utility had was ensuring that moisture level from the cleaned up gas was the right level to avoid measure making its way into the pipes. The gas that goes into the system offsets the amount the City uses. The carbon value with the new cap and trade and the movement towards Renewable Natural Gas may open up the market. With the natural gas buses there is the possibility of being able to run our buses on renewable natural gas over time. This may also up new markets for compost and sewage.

Financing Retrofits:

Easy: pay for the project and walk away

Slightly more complex: use the savings generated from the project to pay off the capital cost and interest if funding came externally, or use the incentives for investing in internal reserves to fund future projects.

Once the capital has been paid, the savings can be directed towards; lowering operating budgets, funding an internal reserve, or combining budget reduction and direct money into savings.

The only drawback to transferring the incentives to a reserve is that the payback period would take a bit longer.

- Billing recovery always mentioned in the policy: when a billing error occurs or a rate adjustments happens, for more than one year, the money (savings) pay for the operating budget for the current year, but the previous year's funds will be allocated to the reserve.

  "Current year recoveries will be returned to client budget, previous year recoveries will go to reserve"

The energy reserve can be used for retrofits, cost mitigation (pricing increases) or when projects fail to attain the expected savings at the start of the project.

Tim Stoate, Toronto Atmospheric Fund

Toronto Atmospheric Fund: an independent non-profit agency of the City of Toronto that has been a Green Bank for 25 years. It has worked with a variety of interest groups to incubate and invest in urban solutions to climate change. TAF also provides consulting work to make sure that your project gets funded, if not by them, they would be able to find another medium.

Sister company called Efficiency Capital Corporation that is the sole licensee for this particular financing method **Efficiency Savings Performance Agreement.** ECC is responsible for all the administrative and customer-relations duties for all the retrofit transactions.

Barriers to investing in energy efficiency:

- Mismanagement of capital
- Subversion to debt, which you would have to consider when investing in energy efficiency
- Doubt that energy savings would actually occur based on failed promises from the market place

It is important to communicate the reason for implementing energy efficiency: you are diverting increased energy costs and avoiding capital costs. Perspective: Look at energy efficiency as a Net Present Value positive investment.

NET PRESENT VALUE: the present value of the cash generated by the investment above and beyond the original capital invested

All projects are different and there is no one solution that can be applied to all projects. To be successful in getting a return on investments and capital assets, TAF undergoes an intensive evaluation and monitoring process to ensure the success of all projects. **50% of all energy efficient projects fail due to failing to maintain retrofit applications.**

TAF focuses on energy efficiency first and is currently considering renewable energy. Renewable energy infiltration will occur after energy efficiency has already been incorporated in a project.

Evaluation of the Business case: The net present value, a life cycle cost analysis (TAF does not go too into depth, they look at the first ten years since that is how long they get involved in the program) and the payback (should not be the sole measure to consider funding a project). TAF only funds projects that are able meet their payback time requirements—this is comparative and dependent on each project).

To mitigate risk, the project's risk get analyzed by internal TAF engineers, at least two third party senior engineers, an additional engineer at a insurance company, and by an underwriter.

This ensures numbers makes sense and nothing is overlooked. The engineers have signed off and so their credibility of the success of the project is also on the line (this results in only using the best equipment available, and regular monitoring and maintenance of quality equipment)

TAF is not limited to financing projects in the City of Toronto it can finance projects anywhere in southern Ontario.

Understanding Energy Budgeting

There are different factors to consider:

- Rates
- Energy consumption
- Fixed costs
- Budget available

This is a very time intensive procedure; luckily there are many software opportunties/third party organizations that specialize in estimating streamlining energy costs for future references. It has also been expressed that municipalities have been able to utilities on cases where facilities had been overcharged.

It is essential to be able to illustrate the changes of energy cost over the years in order to validate an inevitable budget increase for the energy sector of your municipality. This becomes very helpful when presenting in front of council.

Next Steps

- Share Contact List

- Make a survey based on which Energy Management software would be best for a municipality to use:
    - What are the subsequent fees?
    - What are the projected savings from using this software vs. not having it at all
    - What is the size of the municipality using this software?
    - What is the size of municipal facilities or accounts using this software?

- During future workshops , it would be a good idea to:
    - More Case Studies of retrofit Projects
    - Communication of energy/financial stories/energy budgeting and avoided cost/energy savings
    - Client/department engagement

- People engagement and behavioural savings
- Measurement and verifications
- CCAP: Interaction synergies

- There is a preference for face-to face meetings. Perhaps on a quarterly basis and in varying locations. Try to find opportunities for people too far away to make it to the physical meetings to participate. There is the possibility of doing case studies via webinar so that energy managers from further away can benefit as well. That would enable the workshop time to focus on discussions and sharing of lessons learned.