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CITY OF MOOSE JAW SASKATCHEWAN

Climate Action Plan Progress Update

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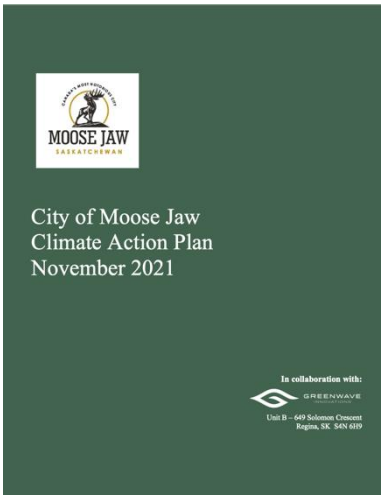
Climate Action Plan Progress Update

This report provides a progress update as it relates to the actions detailed in the City of Moose Jaw's Climate Action Plan established in late 2021. Specifically, this report will focus on the progress made towards achieving the greenhouse gas (GHG) emission and water waste reduction targets set forward within the plan.



The primary goal and achievement of the 2022 calendar year was to deploy the electrical sub-monitoring systems into the City's 10 (9 community buildings plus 1 water treatment plant) largest energy consuming facilities. These 10 facilities make up approximately 48% of the City's total corporate emissions with electricity consumption being the largest carbon footprint contributor.

This report will also provide progress updates on the natural gas and water sub-monitoring integrations, public engagement dashboard deployments, as well as showcase the efficiency measures already implemented, and highlight the lengthy list of opportunities currently being investigated.

Accomplishments and Updates: 2022 Calendar Year

Installation of the electrical sub-monitoring systems across the 10 facilities was started in early 2022 with the first facility, Yara Centre, coming online in March. By October 2022, 9 out of 10 targeted buildings were successfully installed with the last building, Moose Jaw Events Centre, now mostly online with an expected completion timeframe of March 2023. Overall, the physical installation of the electrical sub-monitoring went very well with only slight schedule adjustments required due to delayed network connectivity readiness. With data validation now complete, there are 550 permanent, unique monitoring points reporting minute by minute electrical consumption data across all monitored facilities. This accurate and granular consumption data is the key to identifying and evaluating all future energy efficiency opportunities and being able to implement proactive maintenance strategies.

During the installation process, and through preliminary discussions with the facility operators, Greenwave's engineering team has gained a better understanding of building function and operations while analyzing the electrical performance data. This aided in the creation of an Energy Conservation Activity (ECA) Tracker, attached as Appendix 'A', now being shared between Greenwave and City of Moose Jaw project team members. The recommissioning (no and low cost) and capital efficiency expenditures are identified and evaluated within the tracker with both teams being able to access, assess, update, and track the results of implemented activities. The ECA tracker is essential for project coordination and will be utilized as the primary tool for tracking utility savings and GHG emission reduction results throughout 2023 and beyond.

There are currently over 50 items identified in the City's ECA tracker including heating, ventilating, air conditioning, and refrigeration scheduling change opportunities as well as several capital projects such as lighting replacements and lighting control retrofits. The next step will be to calculate the return on investment (ROI) and carbon footprint reductions for these capital expenditures. All of these non-capital and capital opportunities are currently being discussed and evaluated for implementation with actions being tracked in the ECA. The most recent ECA tracker is included along with this progress report submission.

With the sub-monitoring systems in place, the ECA tracker is also being utilized to accurately measure and verify the results of several capital efficiency projects already underway. In 2022, PV (solar) systems were added to Yara Centre, City Hall, and Moose Jaw Events Centre. An LED lighting retrofit at Yara Centre was completed as well. While modeling tools were used to estimate the renewable generation (solar) and consumption reductions (LEDs), The sub-monitoring systems were able to be used to accurately quantify results.

While there is not quite a full year of sub-monitoring data, the three solar projects are projected to generate 285,156 kWh of annual production. This will reduce corporate emissions by 0.94% of the 2019 baseline period. The solar deployment at the Moose Jaw Event Centre is partially complete however, full deployment will bring emission reductions close to the 1.2% projected. The Yara Centre's LED lighting retrofit has witnessed valuable utility savings and reduced the building's overall consumption significantly. Combined, the three solar and single LED dedicated capital projects' annual projected reductions will achieve 370,836 kWh, 267 tonnes CO_2e, and $41,150.

Another significant contributor to reaching the GHG emission reduction targets established over the 2019 baseline period is the 2021/2022 replacement of the blowers at the Hoffman Blower House. As this was substantially completed in March 2022, we are approaching a full year's data since all four blower replacements and have quantified the reductions and savings to date. Since the 2019 baseline, the Hoffman Blower House has achieved annual reductions of 40.5%, 1,661,100 kWh, 1,399 tonnes CO_2e, and $149,500 in consumption savings for the building. Overall, this project helped attain 6.5% of emissions reductions for the City of Moose Jaw's total corporate portfolio.

While the natural gas and water sub-monitoring integration was not completed in 2022, nor were they planned to be, the strategies, collaboration and approvals required to complete this work are in place. This was a significant accomplishment in 2022 as part of the data-driven Climate Action Plan.

Natural Gas Sub-Monitoring: 2023 Integration

The integration of natural gas sub-monitoring will establish the City of Moose Jaw as an innovator in the energy management sector. In collaboration with SaskEnergy, designs were created, tested, and approved in 2022 that will allow real-time consumption data to be captured directly off the existing natural gas utility meters. With two pilot projects completed to

date, these 10 buildings represent one of the first deployments of this innovative approach in the province.

As of February 2023, we are pleased to report that two facilities, Moose Jaw Events Centre and City Complex, have already completed the integration with a third facility, Kinsmen, nearing completion. The stamped engineer drawings for the remaining seven buildings have been approved by SaskEnergy with supplies ordered and installations pending. Barring any hardware delays, it is expected that all remaining installations will be completed by the end of Q2 2023.

This initiative will assist in the identification of non-capital recommissioning opportunities, the analysis of capital expenditures, and the future evaluation of electrification projects.

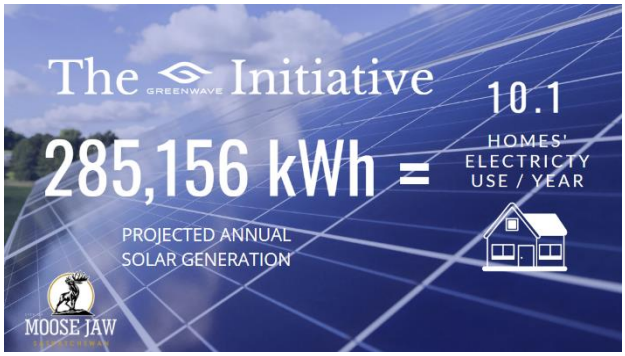
While helping support the City of Moose Jaw's Climate Action Plan, a significant life safety enhancement will be implemented through the real-time leak detection and notification system to be implemented in the second half of 2023. A leak anywhere on the gas distribution lines inside or outside the building is expected to be detected within minutes.

Water Sub-Monitoring: 2023 Integration

The preparation work for the water sub-monitoring has been completed in 2022 and we now await the City of Moose Jaw's water meter upgrades. Once the water meter retrofits have been completed, the water sub-monitoring solution can be seamlessly integrated. Not only will this granular consumption data aid in identifying conservation opportunities, but it will provide real-time alerting functionality to immediately detect future water leaks or bursts. The intention will then be to demonstrate this risk and loss reduction innovation at the time of insurance renewal with the hopes of securing premium reductions.

Public Engagement Dashboards: 2023 Integration

The first public engagement dashboard was successfully installed in January 2023, at the front entrance of City Hall. There are 10 additional locations to be installed within the following three locations: Kinsmen Sportsplex, Yara Centre, and PlaMor Palace. Greenwave has secured materials for the remaining 10 locations and anticipates all displays to be installed in March 2023. This network of digital screens will be used to showcase Moose Jaw's Climate Action Plan and highlight the successes being achieved toward reaching the City's goals.



Grant Funding Opportunities – 2022 & 2023 Applications

One of the primary funding programs being targeted to assist with emission reduction projects is the Green Municipal Fund (GMF) Community Buildings Retrofit (CBR) program being delivered through the Federation of Canadian Municipalities (FCM).

The CBR program is funded by a $167-million federal investment in FCM's Green Municipal Fund. This initiative supports Canadian municipalities in undertaking retrofits and other upgrades to lower emissions by improving energy performance, lowering operating costs and extending the life of community assets. These investments are intended to help communities decrease emissions generated by existing community buildings such as arenas, pools, and libraries as well as recreation and cultural centres.

There are 5 different funding streams under the CBR program that the City and Greenwave are pursuing:

1. Community building monitoring and analysis grant

This stream supports municipal projects that track energy use of existing community facilities over time, compare the energy performance of their buildings to similar buildings in other municipalities and identify opportunities to save energy. It is intended for community building owners who do not have a building monitoring and analysis system in place. Most projects will include a portfolio of buildings to support the business case for ongoing monitoring and analysis costs.

Funding available: Grant for a maximum of $25,000 to cover up to 80% of eligible costs.

Status: A grant application was submitted under this stream in April 2022 and went through a peer review process in May/June 2022. On August 16, 2022, the City received confirmation that $25,000 in funding was approved.

The additional $25,000 is being used towards the installation of electrical, natural gas, and water sub-monitoring solutions at the Moose Jaw Public Library and Museum & Art Gallery.

2. Community building recommissioning grant

This stream aims to help identify opportunities to reduce whole-building energy use by up to 5-15% (with higher savings possible), extend equipment life and reduce maintenance costs. There are four typical stages of a recommissioning project:

- Planning – identify candidate buildings, define goals/objectives for the project, assemble the team and procure a service provider, and develop a recommissioning plan, including projected costs and savings. Note that buildings with equipment that is broken or in need of major upgrades generally do not make good candidates for this type of recommissioning.

- Investigation – understand how and why building systems are currently operated and maintained to identify issues and potential improvements and select the most cost-effective improvements for implementation.

- Implementation – implement selected measures and monitor results through metering, utility bills and trends log review.

- Hand-off and persistence strategies – complete a final report summarizing each improvement, findings and recommendations, including sequence of operation and operating intent; conduct facility staff training; hold a project hand-off meeting; generate a post-recommissioning energy performance rating; and develop persistence strategies including the next recommissioning plan or an ongoing commissioning plan.

Funding available: Grant for a maximum of $55,000 to cover up to 60% of eligible costs

Status: Greenwave will be working with the City to submit a grant application under this stream in 2023. The project identified for this grant opportunity is the existing consulting contract the City has with Greenwave Innovations. The $110,000 annual value of this contract will allow the City to apply for the full $55,000. If successful, $55,000 of the funding that was budgeted in 2023 for the Greenwave consulting contract can be re-directed to further energy reduction measures within City facilities.

3. Study: GHG reduction pathway feasibility

This stream aims at helping municipalities determine the best approach to achieving near net zero community recreational and cultural facilities by achieving at least 50% GHG reductions within 10 years and 80% GHG reductions within the next 20 years.

Studies will include feasibility work to support near-term and long-term capital projects while mapping out a course to extend asset life and reduce cost of ownership (i.e., the total capital, operating and maintenance costs over the building's remaining useful life).

Funding available: Grant for single building: Grant for a maximum of $65,000 to cover up to 80% of eligible costs Grant for Portfolio of buildings: Grant for a maximum of $200,000 to cover up to 80% of eligible costs (cost per building cannot exceed $65,000)

Status: Greenwave will be working with the City in 2023 to identify potential opportunities under this stream. Once the opportunities are finalized, a pre-application will be submitted to the CBR program to determine if the projects qualify. If the pre-application is successful, the City would include the projects in its 2024 capital plans and proceed with the next phase of the application process.

4. Capital project: GHG impact retrofit

This stream allows municipalities go ahead with a retrofit of a community building that will allow them to achieve a minimum 30% GHG emissions reduction compared to baseline emissions.

Funding available: Combined loan and grant for up to 80% of eligible project costs for a maximum of $5 million per project. Up to 25% as a grant and the remainder as a loan

Status: Opportunities under this stream will be further explored in late 2023 and 2024.

5. Capital project: GHG reduction pathway retrofit

This stream funds projects that are allowing municipalities to make significant reductions in energy-use and GHG emissions by retrofitting community buildings over time. This funding enables the implementation of longer-term, multi-measure retrofit capital projects that contribute to a GHG reduction pathway.

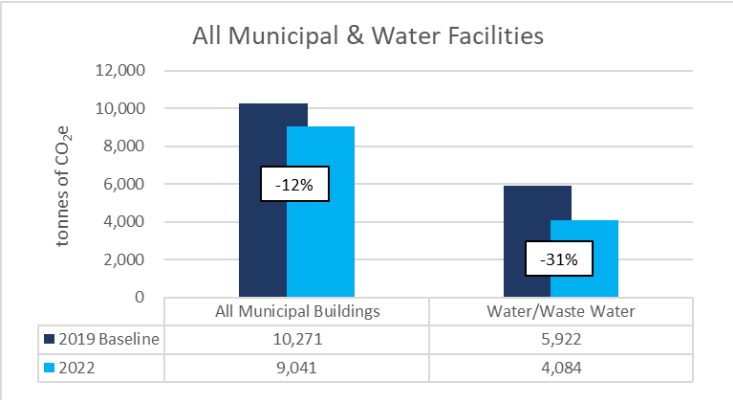
Funding available: Combined loan and grant for up to 80% of eligible project costs for a maximum of $5 million per project. Up to 25% as a grant and the remainder as a loan

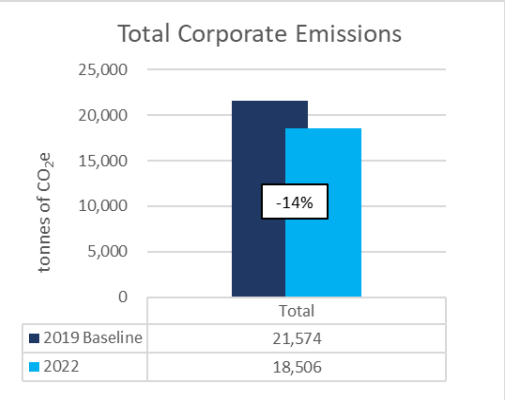
Status: Opportunities under this stream will be further explored once the GHG reduction pathway and feasibility studies are completed for each building.

Summary

Overall, the project team is quite pleased with the progress made in 2022 towards reaching the 2025 and 2030 goals set forward in the City of Moose Jaw's Climate Action Plan.

With the electrical sub-monitoring systems in place, the GHG emission reductions from the solar deployments and capital upgrades have been accurately quantified. These efforts, and the reduction in Saskatchewan's electrical carbon intensity, have seen Moose Jaw's total corporate emissions reduce by 14.2% in 2022 over the 2019 baseline period. This is significant progress towards reaching the 2025 target of 20% reductions.





The goal of 2023 will be to complete the natural gas and water sub-monitoring integrations while analyzing and implementing the opportunities identified in the ECA tracker. The priority will be to implement all non-capital energy efficiency measures and prioritize the capital projects that will demonstrate a positive utility savings ROI and provide significant contributions towards the City's GHG emission reduction targets.

The 2023 launch of the public engagement dashboards will allow the project team to engage Moose Jaw's residents and visitors on the City's climate action journey as progress continues to be made towards the 2025 and 2030 goals.

APPENDIX A - ENERGY CONSERVATION ACTIVITY (ECA) TRACKER

Summary of Wins

	Location	Square Feet	Current Investigative	# of Wins Achieved	Annual Reductions												Reductions to Date									
					Power Reductions				Demand		Natural Gas Reductions				Water Reductions			Power Reductions			Demand		Natural Gas Reductions			Water	
					kWhs	%	CO2e mt	$	kVAs	$	ft3	%	CO2e mt	$	₴	%	$	kWhs	CO2e mt	$	kVAs	$	ft3	CO2e mt	$	₴	$
1	City Complex	56,220	7																							
2	City Hall, Police Station	80,562	11	1	28,476	3.2%	17.7	$2,563										18,239	11.3	$1,642							
3	Cultural Centre	53,790	14																							
4	Golden Ticket Sports Centre	38,260	7																							
5	Kinsmen Sportsplex	66,273	19																							
6	Library, Museum	102,100	0																							
7	Mosaic Place	210,000	1	1	147,600	5.9%	91.5	$13,284										24,190	15.0	$2,177							
8	Operations Building WWTP	0	5																							
9	Pla-Mor Palace	88,130																								
10	Yara Centre	105,971	4	2	194,760	28.0%	120.8	$17,528	355	$7,767								145,167	90.0	$13,065	184	$4,013					
Portfolio Summary			**68**	**4**	**370,836**	**4.7%**	**229.9**	**$33,375**	**355**	**$7,767**	**0**	**0.0%**	**0.0**	**$0**	**0**	**0.0%**	**$0**	**187,596**	**116.3**	**$16,884**	**184**	**$4,013**	**0**	**0.0**	**$0**	**0**	**$0**
Reductions with no Investment					6,516	0.1%	4.0	$586	0	$0	0	0.0%	0.0	$0	0	0.0%	$0	0	0.0	$0	0	$0	0	0.0	$0	0	$0
Reductions with Capital Expenditure					364,320	4.6%	225.9	$32,789	355	$0	0	0.0%	0.0	$0	0	0.0%	$0	187,596	0.0	$16,884	184	$4,013	0	0.0	$0	0	$0

Portfolio's Detailed Summary

Item #	Facility	Measurement Point	Building Area Served	Equipment Information	~ Action Date	Action Taken	Capital Expenditure?	Power Reductions (kWh)				Billed Demand Reductions (kVA)			Total Reduction Since Action	
								Distributed Monthly Reductions	Total Reduction Since Action	Total mt CO2e Reduced Since Action	Total Money Saved Since Action	Distributed Monthly Reductions	Total Reduction Since Action	Total Money Saved Since Action	CO2e mt	Money Saved
1	City Hall, Police Station	Solar	Mains	25 kW Solar Inverter System	2022-May-11	25 kW Solar Inverter System Implemented	Yes	1,830	18,239	11.31	$1,642				11.31	$1,642
2	Mosaic Place	Solar Inverters	Mains	135 kW Solar Inverter System	2023-Jan-06	135 kW Solar Inverter System Implemented	Yes	12,300	24,190	15.00	$2,177				15.00	$2,177
3	Yara Centre	All Field Level Lighting	Field Level Lighting	Field Level Lighting include Panel BX remaining circuits	2022-Sep-01	LED Retrofit and Lighting control by zone upgraded	Yes	7,140	44,268	27.45	$3,984	30	184	$4,013	27.45	$7,997
4	Yara Centre	Solar	Mains	99.88 kW Solar Inverter System	2022-Apr-07	99.88 kW Solar Inverter System implemented	Yes	9,090	100,899	62.56	$9,081				62.56	$9,081

Energy Conservation Tracking: City Complex							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	LPC	Offices	Lights & plugs	~identify the require overnight load and shut down all nonessential equipment/lighting ~	LED retrofit to update lighting fixtures from fluorescent lights to LEDs		
2	LPB	Offices	Exterior Lights, Lights, Plugs, air compressor	~ ~	LED retrofit to update lighting fixtures from fluorescent lights to LEDs		
3	Panel E	North West Shop Lighting Panel	Mostly lights and door controls, one heater	~Potential for motion sensors ~	Identify typical occupied hours How many days/week is someone called into the shop overnight? Is there a regular staff that is occupying the shop overnight or is the typical night crew on-call? Is there seasonal employee scheduling differences (e.g. Summer 8am-5pm // Winter 8am-6am due to snow removal) Tenant/employee survey for night staff		
4	100A Disconnect Above Splitter 2	Shop	Looks like majority lighting with some plugs on it	~Potential for motion sensors ~ Identify area served	Identify typical occupied hours How many days/week is someone called into the shop overnight? Is there a regular staff that is occupying the shop overnight or is the typical night crew on-call? Is there seasonal employee scheduling differences (e.g. Summer 8am-5pm // Winter 8am-6am due to snow removal) Tenant/employee survey for night staff		
5	Not Labeled Panel	Exterior	Exterior lights	~ ~			
6	LPD		Some of everything: boilers, lights, plugs, exhaust fans, heaters	~Identify the baseload of LPD to minimize overnight consumption ~Turn off all non-essential/non-emergency equipment			
7	Panel F		Mostly lights, some plugs, east and west heaters	~ ~			

Energy Conservation Tracking: City Hall & Police Station							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	400A W Chiller	All	400A W Chiller	Investigate off-hour cycling load - Evaluate the chiller set points - Utilize free cooling from air handlers (if applicable) Only utilize one stage overnight to maintain loop temp	They had a packaged unit upgrade and now we are missing the condenser consumption which was created using a virtual channel manually - connect CTs to account for this Josh - "I believe the unmonitored power is north and south pumps"		
2	FS-1 & FR-2	Police side	FS-1 & FR-2 - Police Ventilation	Dial back ventilation to potentially unoccupied zones - Utilize radiant heating (if available) to maintain temperature set points			
3	Panel A	1st & 2nd Floor Lights (maybe Police side)	1st & 2nd Floor Lights (maybe Police side)	As a part of the automation control upgrade data to be utilized to justify: - Lighting control system - Implement motion sensors in low occupancy area - LED upgrade (if applicable)	Police (Panel A) and City Hall (Panel T): may want to explore a lighting control system that accommodates occupied areas of the building for a future project		
4	Panel T	City Hall Side Lighting (1st-4th Floor)	City Hall Side Lighting (1st-4th Floor)	As a part of the automation control upgrade data to be utilized to justify: - Lighting control system (capital) - Implement motion sensors in low occupancy area	City Hall (Panel T): Implement a lighting shutdown schedule with building occupants. We can explore a manual lighting load investigation to work together to make an incentive activity (floor vs floor tenants) as discussed. Police (Panel A) and City Hall (Panel T): may want to explore a lighting control system that accommodates occupied areas of the building for a future project		Tenants - Manual lighting shut down
5	Panel E		Refrig, Microwave, Photocopier, Plugs, Polygraph, M57 EXH. Fan, Surveillance Recept, Data Rack Plugs, Server Room Plugs, Vending Machine, Pac Poles	Identify what contributes to the baseload - Evaluate all non-essential/emergency equipment for controllability to shut off while the building is unoccupied - Evaluate efficiency upgrades			
6	Panel G		Receptacles (3rd Floor, Exterior, Elec/Em. Rm), Boilers, Lights (Indicating & Plenum), Humidifier, Diesel Flow Solenoid, Police Data Rack, M15 Unit Heater, M16 Hot Water Pump, Control Power, AC Service Rm, Com Cent UPS 1-3	Identify what contributes to the baseload - Evaluate all non-essential/emergency equipment for controllability to shut off while the building is unoccupied - Evaluate efficiency upgrades			
7	Panel D	Police side	Lights (police areas), unit heaters, main floor lights, fire alarm, receptacles	Identify what contributes to the baseload - Evaluate all non-essential/emergency equipment for controllability to shut off while the building is unoccupied - Evaluate efficiency upgrades			
8	Solar	Mains	25 kW Solar Inverter System	~ ~	Need to update average savings once in may once a full years data is available.	2022-May-11	25 kW Solar Inverter System Implemented
9	P2	Heating Water Pump		~ ~			
10	P3	Standby Hot Water Pump		~ ~			
11	P10	Glycol Heating		~ ~			

ENERGY CONSERVATION ACTIVITY (ECA) TRACKER

Energy Conservation Tracking: Cultural Centre							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	AHU-1 Supply Fan	Theatre	Air handling unit to the theatre are	~Based on lighting patterns the building is almost always vacant by 11pm We should look to have both air handlers to shut down by or slightly before 11pm ~	Investigate the 24/7 runtime Why is the fan not following the BMS schedule (to ask Johnson Controls)		
2	Supply Fan 2 (SF-2)	AHU-2	Supply fan 2 and return fan 2	~Currently the start-up on AHU-2 is 5am (we should be able to push this back between 1-2 hours) ~ Based on lighting patterns the building is almost always vacant by 11pm. We should look to have both air handlers to shut down by or slightly before 11pm			
3	Return Fan 2 (RF-2)	AHU-2	Supply fan 2 and return fan 2	~Currently the start-up on AHU-2 is 5am (we should be able to push this back between 1-2 hours) ~ Based on lighting patterns the building is almost always vacant by 11pm. We should look to have both air handlers to shut down by or slightly before 11pm			
4	Dehumidifiers			~ ~	Upgrades/replacement occurring in early 2023 Track changes when this occurs		
5	Chiller		air cooled Chiller is being replace in 2023	~ ~			
6	P4		Chilled Water Pump 3 HP	~Compare existing to potentially new pump efficiencies ~	replacing in 2023		
7	P4A		Chiller Water Pump 3 HP	~Compare existing to potentially new pump efficiencies ~	replacing in 2023		
8	P9		Cooling coil recirc pump (AHU-1) 0.75 HP	~Compare existing to potentially new pump efficiencies ~	replacing in 2023		
9	P11		Cooling coil recirc pump (AHU-2) 0.75 HP	~Compare existing to potentially new pump efficiencies ~	replacing in 2023		
10	Panel 2D		lights, receptacles, unit heater, fans	~ ~	Due to the current variable occupancy of the building motion sensors can be valuable for this facility Especially in building areas like the theatre that see unexpected occupancy that may not turn the lights off after rehearsals/events		
11	Panel 2B		lights, receptacles, force flow	~ ~	Due to the current variable occupancy of the building motion sensors can be valuable for this facility Especially in building areas like the theatre that see unexpected occupancy that may not turn the lights off after rehearsals/events		
12	Panel 2F		lights, receptacles, exhaust fan, copy room	~ ~	Due to the current variable occupancy of the building motion sensors can be valuable for this facility Especially in building areas like the theatre that see unexpected occupancy that may not turn the lights off after rehearsals/events		
13	Panel 2C		lights, humidifier, kitchen, coolers, laundry	~ ~	Due to the current variable occupancy of the building motion sensors can be valuable for this facility Especially in building areas like the theatre that see unexpected occupancy that may not turn the lights off after rehearsals/events		
14	Panel 2G		lights, unit heaters, force flows, DHW, boilers	~ ~	Due to the current variable occupancy of the building motion sensors can be valuable for this facility Especially in building areas like the theatre that see unexpected occupancy that may not turn the lights off after rehearsals/events		

Energy Conservation Tracking: Golden Tickets Sports Centre							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	Panel A	Viewing area, Gymtastiks, old ice area	Lighting for viewing area, tennis, Gymtastiks, "Ice"	Accurately identify and update lighting breakers per zone/area Encourage tenants/patrons to turn off all lighting after their activity is complete (currently 2 days a week some degree of lighting is being left on overnight) LED lighting upgrade (where applicable: basketball court already upgraded) Include in grant application Potential to install lighting switches and label them appropriately per area/zone that they feed (currently breaker switches are the only controls) Opportunity for other lighting controls (illuminated per zone on schedules, implement more zone division to minimize loads per zone activity)			
2	Panel B	Lower Hall Lights	Lower Hall Lights	Accurately identify and update lighting breakers per zone/area Encourage tenants/patrons to turn off all lighting after their activity is complete (currently 2 days a week some degree of lighting is being left on overnight) LED lighting upgrade (where applicable: basketball court already upgraded) Include in grant application Potential to install lighting switches and label them appropriately per area/zone that they feed (currently breaker switches are the only controls) Opportunity for other lighting controls (illuminated per zone on schedules, implement more zone division to minimize loads per zone activity)			
3	Panel C	Kitchen Hall	Kitchen Hall Lights	Accurately identify and update lighting breakers per zone/area Encourage tenants/patrons to turn off all lighting after their activity is complete (currently 2 days a week some degree of lighting is being left on overnight) LED lighting upgrade (where applicable: basketball court already upgraded) Include in grant application Potential to install lighting switches and label them appropriately per area/zone that they feed (currently breaker switches are the only controls) Opportunity for other lighting controls (illuminated per zone on schedules, implement more zone division to minimize loads per zone activity)			
4	Panel D		Emergency Lights, Exit Signage, Gymtastiks, Basement, Boiler Room	Accurately identify and update lighting breakers per zone/area Encourage tenants/patrons to turn off all lighting after their activity is complete (currently 2 days a week some degree of lighting is being left on overnight) LED lighting upgrade (where applicable: basketball court already upgraded) Include in grant application Potential to install lighting switches and label them appropriately per area/zone that they feed (currently breaker switches are the only controls) Opportunity for other lighting controls (illuminated per zone on schedules, implement more zone division to minimize loads per zone activity)			
5	Water Tower Meter System	None	City in general water tower for metering buildings	~Determine power consumption increase since the tower water meter system has been added to the facility (please provide the date that this was installed – the antenna for water meters that is read for consumption at multiple locations) ~			
6	Rooftop Unit		Equipment to be installed in 2023	~This is something we will monitor when it is installed Inform us when the installation begins Greenwave to help set up RTU schedule and qualify loads and consumption increases on building ~			
7	Exterior/Envelope replacement		Project for 2023 Includes windows, doors, roof and dehumidifier	~Potential to include in grant applications ~			

Energy Conservation Tracking: Kinsmen Sportsplex							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	F1 Pool Supply Fan	Pool air handling unit 1	Pool air handling unit 1	~ The pool area must be maintained at 28 degrees Celsius ~ can unoccupied setback temperatures be implemented ~ In the summer can fans run less frequently to only serve ventilation for humidity control in the space ~ Potential VFD and setback control opportunities on Pool fans	~ Potential VFD and setback control opportunities on Pool fans		
2	F3 Pool Return Fan	Pool air handling unit 1	Pool air handling unit 1	~ The pool area must be maintained at 28 degrees Celsius ~ can unoccupied setback temperatures be implemented ~ In the summer can fans run less frequently to only serve ventilation for humidity control in the space ~ Potential VFD and setback control opportunities on Pool fans	~ Potential VFD and setback control opportunities on Pool fans		
3	F2 Pool Supply Fan	Pool air handling unit 2	Pool air handling unit 2	~ The pool area must be maintained at 28 degrees Celsius ~ can unoccupied setback temperatures be implemented ~ In the summer can fans run less frequently to only serve ventilation for humidity control in the space ~ Potential VFD and setback control opportunities on Pool fans	~ Potential VFD and setback control opportunities on Pool fans		
4	F4 Pool Return Fan	Pool air handling unit 2	Pool air handling unit 2	~ The pool area must be maintained at 28 degrees Celsius ~ can unoccupied setback temperatures be implemented ~ In the summer can fans run less frequently to only serve ventilation for humidity control in the space ~ Potential VFD and setback control opportunities on Pool fans	~ Potential VFD and setback control opportunities on Pool fans		
5	Panel HB	Pool-side and common area lighting	Pool-side and common area lighting Panel. Serves the main lobby, corridors, changerooms, crawlspace, admin area, concession, and outside	~ Potential LED lighting upgrade ~ Can a unoccupied lighting schedule be implemented to reach a 1.5 kW baseload?			
6	Panel HA	Pool deck lighting	Pool deck lights (east, South, Middle, West, Hot tub)	~ Potential LED upgrade ~			
7	Pool Filter Pumps (5) P11 P12 P13 P14 P15	Main pool	P11 to P15 are pool filter pumps	~ Potential VFD and other control opportunities on pool filter pumps ~	In order to determine if VFDs or unoccupied setbacks (even running fewer pumps at once) are viable options, we would need to calculate the flow rate of pumps to ensure that the pool is getting 3 full water exchange cycles. We would also need to carefully monitor the PH and other chemical levels in the pool to ensure safety and satisfaction to the body of water		
8	Leisure pool circ. Pumps P17 & P18	Main leisure pool	Water circulation pumps for the main pool	~ Potential VFD and other control opportunities on pool filter pumps ~	In order to determine if VFDs or unoccupied setbacks (even running fewer pumps at once) are viable options, we would need to calculate the flow rate of pumps to ensure that the pool is getting 3 full water exchange cycles. We would also need to carefully monitor the PH and other chemical levels in the pool to ensure safety and satisfaction to the body of water		
9	Main heating circ pumps P2 & P3	main pool	Pool heating pumps that run in a lead/lag (alternating)	~Potential VFD opportunity ~			
10	Slide Circ pump P24	Water slide pump	Water slide pump	~ Can the slide pump be turned off for the majority of the day when it is not being used for public leisure swim and lesson teaching ~			
11	Pump 28 Pump 29 Pump 30	unknown	unknown	~ Potential VFD and control/setback opportunity ~			
12	Compressor 1	Rink/Ice surface	Primary compressor	~ Unoccupied setbacks for ice surface temperature to be maintained at ~			
13	Compressor 2	Rink/Ice surface	Secondary compressor	~VFD opportunity for soft, slow start and control peak demand/load ~ Demand limiter opportunity to allow soft, slow start and load			
14	Brine Pump 2	Rink brine pump for ice	Primary brine pump	~ Unoccupied setbacks for ice surface temperature to be maintained at ~ Potential VFD opportunity			
15	Brine pump 2	Rink brine pump for ice	Secondary brine pump is used for the initial flood of the ice in September	~ ~			
16	Lighting Panel 6A/6L	Rink Lighting	LED lighting panel for the rink and rink seating/viewing area	~Implement a lighting practice to turn off lighting between rink activities and flooding ~Potential for lighting controls/setting lighting to illuminate at different levels (activity level vs rink flooding/Zamboni/maintenance level) ~			

Energy Conservation Tracking: Kinsmen Sportsplex continued							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
17	Dehumidifier - West	West rink area	Serves the rink on the west side nearest to the exterior building walls Primary dehumidifier (I also believe it was recently replace/upgraded)	~ Determine humidity setpoints ~ Adjust humidity setpoints to match the east dehumidifier ~			
18	Dehumidifier - East	East rink area	Secondary dehumidifier nearest to the lobby that separates the rink from the pool	~ Determine humidity setpoints ~ Adjust humidity setpoints to match the east dehumidifier ~			
19	***Real ice upgrade comparison***	See status / comments section	***The rink moved to a "Real ice surface" and CMJ would like an energy usage comparison performed to see savings or increases in consumption and cost***	~ ~	~ Moose Jaw team to send Greenwave rough project dates & natural gas bills for corresponding dates (2020 vs 2023) ~ If we can let's avoid the billing periods that may have been affected by covid ~ Real ice should use less gas but has more tedious maintenance practices ~ Josh to review historical bills and compared power and natural gas consumption metrics		

Energy Conservation Tracking: Library/Museum							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	Chiller CH1		Chiller CH1	Potential to eliminate off-hour consumption and reduce off-hour chiller cycling - Implement/adjust setback temperature set points - Expand temperature set point bandwidth - Implement a demand limiter to control and reduce chiller consumption upon start up			
2	Chilled water pumps P9B, P9A		Chilled water pumps P9B, P9A	Possible VFD/efficiency upgrade to minimize load during the winter & shoulder seasons			
3	Panel 2D - Lighting		Panel 2D - Lighting	LED upgrade (ROI to be calculated) - Potential for control/motion sensors			
4	Panel E24		Panel E24	Include these lighting fixtures in the future LED upgrade			
5	MUA 1		MUA 1	Scheduling opportunity to reduce run-time while the building is unoccupied - VFDs or efficiency upgrades (if applicable)			

Energy Conservation Tracking: Mosaic Place							
Item #	**Measurement Point**	**Building Area Served**	**Equipment Information**	**Investigative Opportunities**	**STATUS- Comments**	**~ Action Date**	**Action Taken**
1	Solar Inverters	Mains	135 kW Solar Inverter System	~ Monitor status of full project completion ~	Estimated based on a 135kW system rather than a 200kW system and a Yara Centre ratio: Mosaic kWh = (Yara AVG Daily kWh)*(135kW System)/(100kW System) Need to hook CTs to solar or measure the difference (virtual channel) once everything at Mosaic is up and running	2023-Jan-06	135 kW Solar Inverter System Implemented

ENERGY CONSERVATION ACTIVITY (ECA) TRACKER

Energy Conservation Tracking: Operation Building WWTP

Item #	Measurement Point	Building Area Served	Equipment Information	Investigative Opportunities	STATUS- Comments	~ Action Date	Action Taken
1	HP-401A		HP-401A	Predictive and preventable alerts - Power factor decline - Runtime alerts - Potential VFD or efficiency upgrade			
2	MCC-703 - Remaining Circuits		MCC-703 - Remaining Circuits	Stagger start the heat pump compressors to reduce peak load and demand upon start-up - Potential VFD (if applicable) or demand limiter opportunity - Additional sub-monitoring would allow for critical asset alerting in the future			
3	AHU-1 MUA		AHU-1 MUA	Scheduling opportunity to reduce run-time while the building is unoccupied - VFDs or efficiency upgrades (if applicable)			
4	EF-1		EF-1	Scheduling opportunities reduce runtime during OFF hours - Possible VFD Upgrades			
5	LP-707		LP-707	Shut off all non-essential/emergency lighting overnight - LED upgrades (if applicable) - Potential for motion sensors in low occupancy areas			

Energy Conservation Tracking PlaMor Palace

Item #	Measurement Point	Building Area Served	Equipment Information	Investigative Opportunities	STATUS- Comments	~ Action Date	Action Taken
1				~ ~			

Energy Conservation Tracking: Yara Centre

Item #	Measurement Point	Building Area Served	Equipment Information	Investigative Opportunities	STATUS- Comments	~ Action Date	Action Taken
1	All Field Level Lighting	Field Level Lighting	Field Level Lighting include Panel BX remaining circuits	Compare data to the activity schedule to confirm the use of stage 2 lighting - LED upgrade - Exa Energy Consulting analysis to be discussed	Continually evaluated and calculate LED retrofit and lighting controls savings (to date and annual expected savings) -Month to month comparisons as more data is collected -Quantify demand reductions (the power factor of panel BX increase to unity once the lighting upgrade took place) -The actual demand change could be as high as 62.4 kVA reduction (include load decrease and power factor improvement) Controls upgrade was completed on December 15th, 2022	2022-Sep-01	LED Retrofit and Lighting control by zone upgraded
2	Panel AX Remaining		Panel AX Remaining	Identify lighting control and occupancy of dressing rooms, exercise rooms, and lounge - Implement motion sensors (if applicable) - LED upgrade - Exa Energy Consulting analysis to be discussed	Explore the potential opportunity and potential savings of implementing motion sensors in this location - track/evaluate occupancy and frequency of tenants		
3			RTU-1 & RTU-2	Evaluate unoccupied set points that trigger both RTUs to run overnight during the cooling & heating seasons			
4			Condensing Units	Investigate zone schedules & set points - Reduce operation of low occupancy/vacant zones throughout the day			
5	Panel 2A		Panel 2A	Identify what contributes to the operating load (manual investigation) - Determine conservation or efficiency opportunity			
6	Solar	Mains	99.88 kW Solar Inverter System	~Continue to track the solar inverter generation ~	Update savings after a full year has gone by	2022-Apr-07	99.88 kW Solar Inverter System implemented