

High Performance Civic Building Approach

ISSUE

Civic Buildings account for 40% of the corporate greenhouse gas emissions. Targets for greenhouse gas (GHG) emissions set by City Council in 2017 include a 40% reduction for the City of Saskatoon (City) by 2023, and a total reduction of 80% by 2050. The City continues to grow, requiring new support for infrastructure and facilities, and when a building is added to the portfolio, total emissions increase.

Preparation of the High Performance Building Policy considers how to best reduce emissions impact and manage operational costs, and how to design, construct and operate buildings over and above the existing standards. What options should be considered to inform the High Performance Civic Buildings Policy, to set a path towards achieving net-zero energy ready civic facilities and achieve other benefits to improve building quality, user health and well-being, rising utility costs, and to prepare for changes to Canada's Building Code?

BACKGROUND

History

At its meeting held on [January 29, 2018](#), City Council approved the recommendations, in part:

1. That the Administration continue to develop a High Performance Civic Building Policy utilizing the principles outlined in this report;
2. That until a High Performance Civic Building Policy is approved by City Council, the Administration document how the design and construction of all new City-owned facilities respond to these principles, with the goal of compliance unless a documented lifecycle cost analysis demonstrates this is uneconomic.”

For a complete summary of resolutions and background, refer to Appendix 1 - Background Summary.

Current Status

The City currently directs the design and construction of new Civic buildings in accordance with the principles of a high-performance building approved in the January 29, 2018 City Council report. The City owns and operates the following LEED rated buildings:

- Fire Station #8 – LEED Certified
- Access Transit – LEED Certified
- Saskatoon Police Service Headquarters – LEED Silver
- Civic Operations Centre – LEED Certified

Public Engagement

While public engagement was not part of the formal scope of work for this project, multiple stakeholders were engaged who are involved in design, delivery, regulation, policy development and management of the City's building portfolio including: Facilities, Technical Services, Building Standards, Saskatoon Fire, Recreation and Community Development, Urban Design, Saskatoon Land, Finance, Saskatoon Light and Power, and Saskatoon Water.

City of Saskatoon's Current Approach

To advance the Council resolution from 2018, the High Performance Civic Building Policy (the Policy) is being developed, which is expected to be complete in Q4 2021. The purpose of this report is to confirm direction on the concepts that create the foundation for the Policy including LEED Certification and energy and air tightness targets.

The Policy is being developed in combination with an Administrative Procedure (the Procedure) which will provide specific details and implementation guidance. The Procedure will:

- Clarify the requirement details listed in the Policy;
- Provide guidance to civic staff on how to follow the Policy; and
- Include recommendations on other environmental concepts that are not mandatory.

The recommendations in this report provide further clarification for the preparation of the Policy and will guide other documents and implementation details such as the Procedure.

The policy will also reference the City's approved accessibility standards and requirements for access to drinking water. These items are being included as per recommendations from Facilities Management and City Council respectively.

Approaches in Other Jurisdictions

Over 15 municipalities across Canada have adopted green building certifications and energy targets through sustainable building policies. The City of Edmonton adopted their first Sustainable building policy in 2007 that includes LEED standards and energy performance targets. Further work was carried out at the provincial level in BC, with the development of their energy step code. This allows over 70 local governments to reference energy performance targets within their policies or bylaws. The federal government recently announced targets to ensure new federal buildings are net-zero, and work continues on the National Building Code to improve and regulate energy usage. Appendix 2 - Energy and Air Tightness Background provides additional information on municipal and Federal targets.

Decisions and Approvals

To provide further direction for the preparation of the Policy and the Procedure, this report:

- 1) Reviews options and provides a Policy recommendation for the level of LEED Certification;
- 2) Recommends approval of mandatory LEED credits where Council decisions have set direction, to be detailed through the Procedure; and
- 3) Reviews and provides a Policy recommendation for Energy and Air Tightness Targets.

Approval #1: LEED Certification Level

This approval reviews options for the level of LEED certification for application in the Policy. As buildings currently account for 44,704 tonnes CO₂e of corporate GHG emissions, consideration for high performance buildings is a significant part of Saskatoon's Climate Action. The 2009 *Greenhouse Gas Management Plan* specifies the goal of achieving LEED Certification for all new civic facilities.

To achieve the principles for high performance civic buildings approved in the 2018 report to council, LEED remains the preferred approach. The internationally recognized third-party certification program guides sustainability goals and tracks progress, with provisions for:

- Location and transportation;
- Sustainable sites;
- Water efficiency;
- Energy and atmosphere;
- Materials and resources; and
- Indoor environmental quality.

LEED version 4 for Building Design and Construction is applicable to buildings with a minimum gross floor area of 1,000 ft² or 93 m². There are four levels of certification: Certified, Silver, Gold, and Platinum, which are tracked through credits in the LEED scorecard. Projects must complete 12 mandatory prerequisites and have the selection of 46 optional credits. Each level of certification requires more of the possible points; the minimum score is 40 points (LEED Certified) and the maximum score is 110 points (LEED Platinum).

The LEED program is continuously evolving, and each new version becomes more rigorous than the previous. This allows the program to adapt to the marketplace and ensure that environmental performance is advancing.

OPTION 1A: LEED Certification Level: CERTIFIED

LEED Certified is the City's current practice for new buildings. LEED Certified is the lowest level of certification requiring 40-49 points. While this level is the easiest to attain, it would also result in the lowest performing structure with the fewest co-benefits and would not ensure that the high performance building requirements and performance defined in the 2018 report are met.

OPTION 1B: LEED Certification Level: SILVER

LEED Silver certification is in the mid-range of achievement and requires 50-59 points. Silver provides a better opportunity than Certified to meet the high performance

principles set out in the 2018 report. As mentioned above, that since LEED continuously evolves, the requirements for LEED Silver will advance, driving further performance improvements.

OPTION 1C: LEED Certification Level: GOLD

LEED Gold is the second highest certification target and requires an achievement of 60-79 points. Gold would require advanced achievement in all areas of LEED with dedication to innovation from the project teams. The achievement of 60+ points may be more difficult for some projects due to site locations.

Approval #2: Additional mandatory LEED credits

This decision considers additional mandatory LEED requirements for Saskatoon's LEED certification. The LEED rating system requires training and experience to ensure the desired project outcomes are achieved; knowledge is required to understand the credits and to be able to select those most appropriate for a project.

This report recommends approval in principle for additional mandatory LEED credits in the Policy, which would then be detailed in the Procedure and updated as Council decisions are delivered in relevant areas, such as renewable energy, active transportation, waste management, water conservation, etc. Additional mandatory credits would not require a greater number of points to achieve the LEED certification Level – such as 50-59 points for Silver – it is meant to instead define specific, limited credits to mandate council-directed outcomes.

With direction in the Policy, mandatory credits would be identified from relevant City Council decisions and then formalized by the Policy project team and stakeholders. For example, Construction and Demolition Waste management is eligible for 2 points in the Materials and Resources category. When Recovery Park is operational, consideration for creating a mandatory LEED requirement for this item could occur. Other mandatory credits that could develop over time and with further coordination include:

- Water conservation requirements in alignment with the Water Conservation Plan currently under development;
- Renewable energy in alignment with the Renewable Energy Strategy currently under development;
- Electric vehicle charging requirements in alignment with development of the EV Fleet strategy and implementation; and
- Amenities to support bicycle use in alignment with active transportation goals.

While there would be some loss of flexibility for the project team, additional mandatory credits would:

- Give project managers a starting point/direction in alignment with Council decisions;
- Align building construction projects with other current civic work (i.e. Low Emissions Community Plan, renewable energy strategy, water conservation, green infrastructure, waste diversion);
- Align project resources with the City's objectives; and

- Improve consistency between projects for construction, materials, maintenance and operations.

Once the Procedure (including detail on the additional mandatory credits) has been prepared, protocol for review and approval by the Executive Leadership Team would be followed. Building this detail into the Procedure allows for revisions in alignment with Council approvals, without returning to City Council to amend the broader Policy.

Approval #3: Options for Energy and Air Tightness Targets

This approval reviews options for building energy and air tightness targets in addition to the LEED certification requirement. The Policy creates a pathway to achieve the goal of net-zero energy ready and the following options explore how quickly City Council would like to see that goal being met.

This report proposes that energy targets for new civic buildings are set *in combination* with LEED certification to ensure that GHG emissions and energy efficiencies are clearly defined and can be tracked and achieved alongside the broader benefits attained through the LEED certification system. While LEED certification includes six areas of environmental performance, because of the points system, it does not inherently produce energy efficient buildings. To achieve this through LEED alone, the project team directing the design of the building must select the points for energy efficiency and seek to achieve them.

In 2016 the Government of Canada published the *Pan-Canadian Framework on Clean Growth and Climate Change (Canadian Framework)*. The Canadian Framework is Canada's plan to meet emission reduction targets, grow the economy, and build resilience to a changing climate. The plan commits Provinces and Territories to adopt a series of model building codes requiring increasingly higher levels of energy efficiency. Under the plan, by 2030, every new building constructed in the country will be required to meet a net-zero energy ready level of performance.

Saskatchewan adopted the *National Energy Code for Buildings (National Energy Code) 2017* on January 1, 2019. The *National Energy Code 2020* is expected to be published December 2021, with Saskatchewan adopting it within a year of release. It also introduces progressive energy performance tiers as a new path of compliance. The introduction of performance tiers is a significant change for the National Energy Code; however, the tiers are not mandatory and the highest tier is not at a level that would be considered net-zero energy ready.

The Low Emissions Community Plan Action #1 states, "Apply energy efficiency standards (build to Passive House) to all new municipal buildings," with a milestone target where all new City buildings are built to this target starting in August 2019. It is important for the City to set targets to not only achieve our own GHG emission reduction targets but to be ready for the Canadian Framework goal of net-zero energy ready buildings. Appendix 2 – Energy and Air Tightness Background provides more information.

Energy target options for the Policy are based on information from multiple sources including existing City Energy Use Intensities and Passive House criteria. Energy Use Intensities is the total annual building energy consumption divided by the building area.

It is a useful metric to compare energy use of buildings that are different sizes and represents the buildings total energy use including electricity and gas consumption. More information is provided in Appendix 2.

Net-zero energy ready buildings are constructed using the same methodology as Passive House and aim to achieve similar results in energy and air tightness performance. Passive House is mentioned in the LEC plan, however net-zero energy ready achieves similar outcomes. For goal clarity, net-zero energy ready is selected as the target for the Policy because it best aligns with the Federal Government’s goals and the anticipated parameters around future Federal funding opportunities. To understand the pathway mapped in the following options, the goal for net-zero ready is defined through Energy Use Intensity of 120 ekWh/m² and air-tightness of 0.5 L/(s·m²) @ 75pa, or 75% better than the National Energy Code 2017.

Options for net-zero emissions (as opposed to net-zero energy *ready*), and net-zero carbon (carbon neutral), are not being brought forward at this time, but they could be considered as future progressions in the evolution of the Policy.

OPTION 3A: Status Quo: National Energy Code

This option is the status quo, requiring compliance with the minimum standard defined in the 2017 National Energy Code for Buildings adopted by the province of Saskatchewan. In this option the Policy would adjust with legislated code changes as they are adopted, as the minimum compliance requirement.

Table 1: National Building Code – Minimum Standard

	Step 1
	2022+
Status Quo	NECB

Air Tightness Target (L/(s·m ²)) @ 75Pa	NECB
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OPTION 3B: 15-YEAR TIMEFRAME

This option uses a 15-year timeframe to achieve net-zero energy ready. There are four steps specified in this option. Each step includes an energy target and an air tightness target. Step 1 targets start with a 25% reduction over code or a 25% reduction over existing City building Energy Use Intensity. The additional steps are set to achieve net zero energy ready in Step 4, or 2036. Specific Energy Use Intensity targets were only set for offices and fire stations due to available performance data and guidelines for these building types. Targets for other building types are specified as percent better than code. This option allows for performance targets to be gradually increased over time, allowing for capacity and knowledge building. The airtightness targets have been aligned with the energy targets.

Option 3B does not prepare the City for compliance with anticipated changes to Federal Canadian Framework requirements in 2030.

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Table 2: 15-year timeframe to reach net-zero ready

	Step 1	Step 2	Step 3	Step 4
Energy Use Intensity (ekWh/m ²)	2022-2025	2026-2030	2031-2035	2036+
Offices	300	200	150	120
Fire Station	275	185	150	120
Other	25%*	50%*	60%*	75%*

**Percentage better than National Energy Code 2017*

Air Tightness Target (L/(s·m²)) @ 75Pa	1.25	1	0.75	0.5
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OPTION 3C: 5-YEAR TIMEFRAME

This option uses a 5-year timeframe to achieve net-zero energy ready. There are two steps specified in this option. Similar to Option 3B, the stepped approach allows the City to build capacity and knowledge but over a reduced timeframe. Step 1 targets were set based on a 50% reduction over code or a 50% reduction over existing City building Energy Use Intensity. Step 2 targets are at a net-zero energy ready level of performance, required by 2026. The airtightness targets have been aligned with the energy targets. Option 3C prepares the City for compliance with anticipated changes to Federal Canadian Framework requirements in 2030.

Table 3: 5-year timeframe to net-zero ready

	Step 1	Step 2
Energy Use Intensity* (ekWh/m ²)	2022-2025	2026+
Offices	200	120
Fire Station	185	120
Other	50%*	75%*

**Percentage better than National Energy Code 2017*

Air Tightness Target (L/(s·m²)) @ 75Pa	1.0	0.5
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OPTION 3D: NET-ZERO ENERGY READY

This option requires the City to begin building to net-zero energy ready facilities in 2022. The energy and air tightness options specified are at a net-zero energy level. Option 3D prepares the City for compliance with anticipated changes to Federal Canadian Framework requirements in 2030, and it is the only option that adheres to the principle set out in LEC Action #1.

Table 4: Net-zero energy ready effective 2022

	Step 1
Energy Use Intensity (ekWh/m ²)	2022+
Offices	120
Fire Station	120
Other	75%*

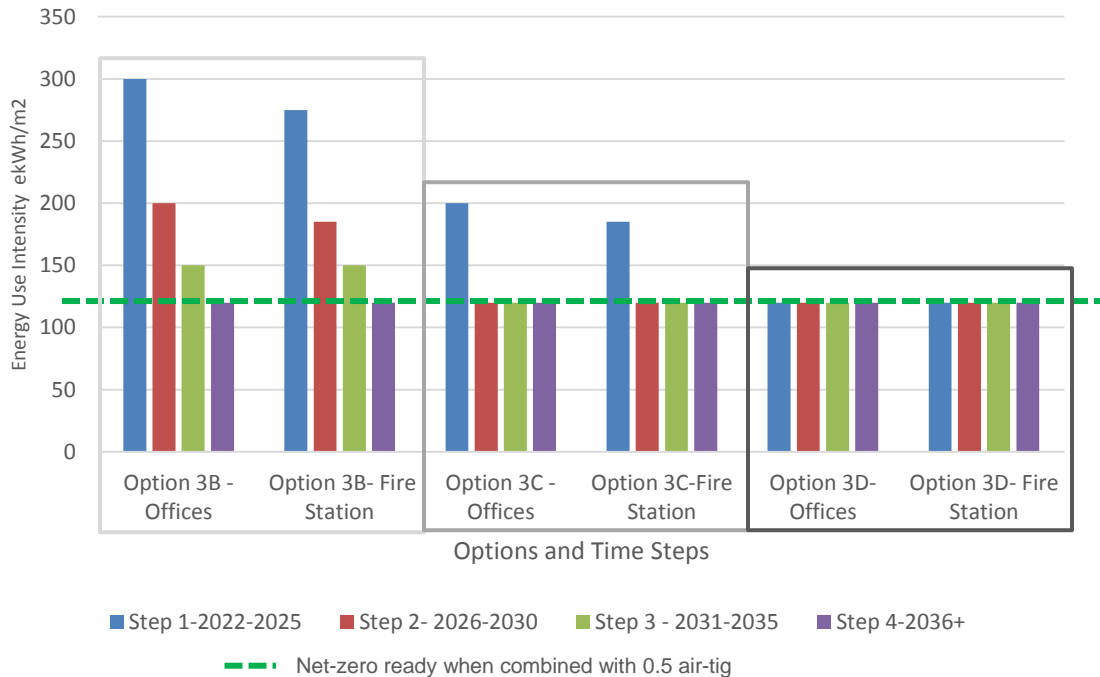
**Percentage better than National Energy Code 2017*

Air Tightness Target (L/(s·m²)) @ 75Pa	0.5
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Chart 1 summarizes the Energy Options 3B, 3C and 3D. The green dashed line indicates the Energy Use Intensity resulting in net-zero energy ready, with Option 3D requiring this in Step 1: 2022-2025. Option 3C requires net-zero energy ready by Step 2: 2026-2030, and Option 3B requires net-zero energy ready after 2036 (step 4). Option 3A: Status Quo is not included in this summary as it does not meet the net-zero energy ready target.

Chart 1: Options Summary – Energy Use Intensity to Options and Steps



RECOMMENDATIONS

That the Standing Policy Committee on Environment, Utilities and Corporate Services recommend to City Council that:

1. That Option 1B – LEED Silver Certification is defined as the minimum standard for the design and construction and major renovation of applicable buildings in the High Performance Civic Building Policy;
2. Mandatory LEED credits for the construction of new civic buildings are permitted in the High Performance Civic Building Policy; and
3. The energy and air tightness targets and timeline recommended in Option 3C are included in the High Performance Civic Building Policy.

OPTIONS RATIONALE

Recommendation #1: LEED Certification

Option 1B: LEED Silver certification is being recommended for the Policy, which would replace the previous City Council direction for LEED Certified. Application of LEED Silver as the minimum standard for new civic buildings would provide structure and set performance standards and accountability to ensure that the principles of a High Performance Civic Building are met as outlined in the 2018 parameters.

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Project teams may choose to pursue higher levels of certification if it makes sense for the project, however LEED Gold is not recommended as a minimum level at this time. LEED certification is continuously improving and has evolved since 2012, therefore, the newest version of LEED (v4) is more rigorous to achieve. Achieving LEED Silver in v4 is considered equivalent or better than achieving Gold in previous versions. As LEED evolves the requirements for LEED Silver will advance, driving further performance improvements.

By including the requirement for LEED Silver in the High Performance Civic Building policy, the city would benefit through:

- Corporate alignment. Provides a program for achieving improved environmental performance in six key areas that aligns with many City goals;
- Flexibility. Allows adaptability for a selection of broadly defined credits that can be catered to individual projects;
- Tried and tested in Canada. LEED certification is globally recognized and widely used across Canada in over 27 municipalities;
- Accountability. Projects are verified by a third-party accredited professional using performance data;
- Triple Bottom Line. Supports projects to implement sustainable and healthy building practices to realize environmental, economic, social and community benefit;
- Value and Efficiency. Helps buildings consume fewer resources, reduce operating costs, increase value and create safer and healthier environments for its occupants; and
- Healthy and Safe. Helps buildings use toxin free materials to deliver cleaner indoor air to improve productivity, focus, and reduce respiratory illnesses of its occupants.

Approval #3: Energy and Air Tightness Targets

The energy and air tightness targets specified in Option 3C are being recommended for the Policy, as they align with Federal goals of achieving net-zero energy ready by 2030 and are consistent with the LEC Action #1. The targets reconfirm the City's commitment to constructing energy efficient buildings and provide leadership within the community.

The recommended Option 3C provides a stepped approach which allows the City to begin at a more manageable level of difficulty, provides time to come up with innovative energy efficient designs, budget for new projects, and further explore external funding opportunities.

With Option 3C, the City is better positioned to achieve the benefits of setting energy targets including:

- Reduced energy consumption and GHG emissions;
- Lead by example for the community;
- Align with *Pan-Canadian Framework on Clean Growth and Climate Change* goal to be net-zero energy ready by 2030; and
- Align with goals set out in the Low Emissions Community Plan.

FINANCIAL IMPLICATIONS

Appendix 3 – Financial Implications, provides more detail on the capital and life cycle cost information associated with the recommendations.

Expect Higher Upfront Capital Costs

When planning new construction at this time, some additional capital costs must be considered to progress from traditional building construction to high performance. The magnitude of this cost is dependent on the level of performance, such as the level of LEED certification and energy reduction targets. Based on the recommendations from this report, the estimated incremental capital cost ranges from 5% - 14%. For a building that costs \$10 Million to construct, the incremental cost would range from \$500,000 - \$1,400,000. Exceptional COVID construction and material costs are not included in this range.

Return on Investment

Research shows that the incremental costs associated with constructing a high-performance building would be recovered through financial benefits. Financial benefits include lower operating costs, utility savings, and reduced demand on municipal infrastructure. The City of Edmonton commissioned a comprehensive economic business case comparing different LEED certification levels (Appendix 3). The study used the Sustainable Return on Investment (Sustainable ROI) analysis methodology in addition to the typical Financial Return on Investment (Financial ROI) approach. The Sustainable ROI calculation monetizes non-cash benefits and costs including greenhouse gases, air contamination, stormwater, potable water, health and productivity, and transportation. The findings include:

- The aggregate Financial ROI of pursuing LEED Silver over standard construction are overwhelmingly positive, generating 3.6 times more lifecycle benefits than costs, paying for the costs within 8 years, and generating roughly \$2.7M in net financial benefits.
- The aggregate Sustainable ROI of pursuing LEED Silver over standard construction are positive, generating 6.7 times more lifecycle benefits than costs, paying for the costs within 5 years, and generating roughly \$5.9M in net benefits.

Over time, better systems integration and trades' skill and capacity development could rebalance the capital cost differential for high performance buildings. Local and Civic implementation of net-zero energy ready buildings will also help to better understand Saskatoon's actual capital costs and the scale of operational efficiencies over the long-term compared to similar, conventional facilities.

ADDITIONAL IMPLICATIONS/CONSIDERATIONS

Capacity Building and Leading by Example

Further clarity on incremental costs and operating benefits could be gained by requiring net-zero energy ready investigation on all new building designs, with the intent of completing one or more net-zero ready pilot project before the implementation of the mandatory requirement.

By requiring all designs to pursue net-zero energy ready as a design option, we gather knowledge towards net-zero ready implementation. Energy capital and operating impacts can be projected and compared to the status quo approach in the design phase which would inform the design recommendation and provide clarity on the operating impacts and resource requirements. This work is critical to incentivize change in the building industry and would serve to promote capacity development in local architects, engineers, and the trades.

With direction to proceed with the Policy and anticipated Federal changes to step up to net-zero ready by 2030, work to develop the new technical requirements, resource needs and analyze budget and operating adjustments is required. Council could consider pursuing a net-zero ready new construction initiative ahead of the timeframes approved for the Policy to pilot and refine our approach and methodology. In proceeding with a net-zero energy ready new construction in the near-term, the City has an opportunity to lead-by-example and help to build capacity in corporate processes as well as Saskatoon's construction industry. Furthermore, long-term sunk-costs in lower-performing, inefficient facilities would be avoided by piloting a higher-performing building instead.

Triple Bottom Line

The project team completed an initial Triple Bottom Line assessment using the City's *Triple Bottom Line (TBL) Decision Making Tool* to comply with *Council Policy C08-001 – Triple Bottom Line*. A final TBL analysis will be completed once the Policy and the Procedure are completed.

Social Benefits

LEED buildings provide credits for areas of improved indoor air quality, natural light, low-emitting materials, acoustics, lighting quality and thermal comfort. Improved space quality provides benefits and a sense of well-being to staff and the public and reduces staff sick days.

Net-zero Emissions and Carbon-neutral Performance Goals

While options to take the City to net-zero *ready* are explored in this report, net-zero emissions is not recommended for the City at this time but should be considered in the future when the electrical grid is cleaner. Carbon Neutral is not currently recommended due to the readiness of the local workforce, supply chains for building products, and the high GHG emission factor of the electrical grid.

Operations and Maintenance

High performance buildings need to be monitored for performance and outcomes, and with operational procedures potentially adjusted to optimize the building performance. Operations and maintenance, commissioning, automated building management systems, lighting, set-points and user behavior can often make a significant impact on a

building's performance. Two business cases have been prepared to advance the operations of existing buildings. The High Performance Existing Buildings program would develop an initiative for implementation of an environmental assessment and certification project. The second initiative is to formalize and expand the Civic Energy Management program resulting in an integrated plan for technical and organizational actions, which would complement the implementation of the High Performance Civic Building Policy, the Facility Improvement Project: Energy Performance Contract, and identify opportunities for further improvements to the existing Civic building portfolio.

NEXT STEPS

These decisions define and guide the preparation of the High Performance Civic Building Policy, which is planned for presentation to City Council in Q3, 2021. To accompany the Policy, work to complete the Administrative Procedure and other required tools and support for implementation of the Policy will be prepared at this time.

APPENDICES

1. Background Summary
2. Energy and Air Tightness Background
3. Financial Implications

Report Approval

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