COMMUNITY INFRASTRUCTURE & STRATEGIC GROWTH – AGENDA REPORT

Meeting Date: 24 September 2024

Subject: Energy and GHG Performance Guidance on Municipal New Construction

Directorate: Corporate Services and CFO

Issue:

The Community Infrastructure and Strategic Growth Standing Committee is being asked to provide guidance regarding the energy and GHG performance of new City-owned constructions.

Policy / Council Direction:

Committee and subsequent Council direction is sought to establish criteria for new builds. These criteria are to be used for structures not yet in the design phase and will be incorporated into a corporate sustainable policy at a later date.

Background:

With a Corporate Energy and GHG Reduction Strategy in place but in the absence of a corporate sustainable building policy and an updated AirdrieONE Sustainability Plan, guidance is sought regarding the energy and GHG performance of new City-owned construction.

Through its AirdrieONE Sustainability Plan (2011) and Corporate Energy and GHG Reduction Strategy (2023) the City has set aspirational goals to reduce its corporate greenhouse gas emissions five per cent per year over the next five years through a lifecycle costing approach that identifies, assesses and implements potential energy and GHG reduction projects in City-owned buildings and operations.

The most up-to-date National Energy Code for Buildings (NECB 2020), referenced in the latest National Building Code – Alberta Edition [NBC (AE) 2023] do not capture life-cycle cost impacts and is already outdated with respect to *Canada Green Buildings Strategy.* However, the NBC (AE) 2020 sets energy performance tiers replicating the British-Columbia approach through the BC Energy Step Code.

The BC Energy Step Code sets a more than 50% annual energy consumption reduction target compared to the reference building for a net zero energy (NZE)-ready commercial or

institutional building (Figure 1, Tier 4) while the NECB 2020 sets a 60% reduction as a minimum (Figure 2, Tier 4).

In the context of new construction planning, the City has not budgeted so far to get from architects and engineers alternative, low GHG emitting design options for its new library, NE firehall and SW recreation centre. This decision implied the default design option was the NECB 2020 Tier 1, the level adopted by the Government of Alberta. However, life-cycle costing of various low carbon building options is currently not included within Tier 1. The lifecycle cost impacts of higher Tiers represents a significant endeavor that architectural and engineering firms do not undertake, unless tasked by their client to do for an extra fee. The City does currently not ask designers to conduct life-cycle costing analysis to assess the long-term net value of energy upgrades, i.e. the total cost of ownership of its new facilities.

With that level of performance, the City **cannot apply for energy efficient buildings grant funding** from the Federation of Canadian Municipalities (FCM) Green Municipal Fund (GMF) nor the federal government. Such funding programs now require new constructions to be built net zero energy (NZE) or NZE-ready (Tier 4) to get maximum funding. While design and construction costs of a new NZE facility are currently known to be higher, the City does not know what those costs actually are (with a range going from 0% to 30% depending on the construction approach, site and facility type).

Figure 1: BC Energy Step Code Energy Reduction Targets (Commercial & Institutional Buildings)

Table 10.1.2.1.
Energy Performance Tiers
Forming Part of Sentences 10.1.2.1.(1) and (2)

Energy Performance Tier	Percent *Building Energy Target*(1)	Percent Improvement(1)
1	≤ 100%	≥ 0%
2	≤ 75%	≥ 25%
3	≤ 50%	≥ 50%
4	≤ 40%	≥ 60%

Figure 2: NECB 2020 Tiered Energy Reduction Targets (Commercial & Institutional Buildings

Options

By establishing a *Sustainable Buildings Policy*, the City of Airdrie could set a Tier 2, Tier 3 or Tier 4 energy performance as a requirement for its corporate buildings, which are relative reductions of 25%, 50% or 60%, respectively, compared to business-as-usual construction (Tier 1). The details around how those targets are achieved can be fully left in the hands of architects and engineers, who will use their creativity to propose the most cost-effective solutions through a detailed parametric design study that would allow the City to make sounder, life-cycle based investment decisions regarding its corporate emissions. Through such a study, the design team optimizes lifecycle costs for various building system options and land on a few recommended solutions, from which the City can select the best.

A parametric design study is estimated to increase **design** costs by 3% to 4. For instance, a consultant who presented to City staff in September 2023 suggested that such a study that assesses different NZE design scenarios would cost a bit less than $0.5M for the new SW rec centre, or a 3% increase in the design budget. **Construction** cost increases could not be estimated at this very early stage.

While a Tier 2 performance target might be achievable by the building designer without a parametric study, the uncertainty in design parameters and options will likely be transferred into higher construction costs at the next stage. If the City is not ready to build to NZE or NZE-ready (Tier 4) and still want to make progress in its corporate GHG reduction goals, the best value that is proposed consist in the following:

- **set a Tier 2 performance design construction requirement as a minimum; and**
- **conduct and budget for a parametric study with lifecycle costing at the design phase.** The study would include four design and construction scenarios:
    - Tier 1 (business-as usual reference scenario);
    - **Tier 2;**
    - **Tier 4 (NZE-ready);**
    - **NZE (Tier 4 with RE systems installed)**.

With that information, the City will be able to make an informed decision about building a Tier 2, Tier 4 or NZE facility.

Other Alberta Municipalities

See the *Energy and GHG Performance Guidance of New Constructions_Additional Context* appendix.

Business-as-Usual Risks

Since approximately 2017 and especially with the US *Inflation Reduction Act* (IRA) introduced in 2022, the heating, ventilation and air conditioning (HVAC) and sustainable building industry is seeing a massive transformation. Investments in cleaner buildings and energy options are rapidly advancing. By continuing to rely on the NECB Tier 1 and install soon-to-be outdated heating, cooling and control solutions, the City puts itself at risk of not being able to service those systems in as little as 15 years, since little investment is anymore made by HVAC manufacturers in standard GHG-emitting systems. While those systems can be installed for cheap in the short term, they will come with high operational, maintenance and replacement costs in the future. Building and system retrofits with prohibitive costs will be needed as soon as those systems reach their life end in 12 to 20 years and will strain further the City finances in the mid-term.

NZE facilities are being designed today in Alberta so it is not a concept that out of reach for the City of Airdrie. NZE designs require energy and GHG modeling to be a very early component of the development process. Once a building site, orientation and roof shape have been selected, there are several NZE design options that become out of reach.

Administration Recommendation:

Administration recommends that the 25% (NECB Tier 2) energy consumption reduction requirement compared to business as usual for its larger (>600 m^2), standard commercial and institutional constructions, classified as NBC (AE) Part 3 buildings be used.

Atypical facilities such as lift and pump stations are excluded from this classification but could be assigned another relevant performance target. The City could update this target to a higher performance Tier before the NBC (AE) 2032 comes into force and mandate then NZE-ready design and construction. With this option, the City most likely **cannot** apply for FCM nor federal funding for energy efficient buildings

Alternatives/Implications:

1. Set a Tier 2 performance design minimum construction requirement and then at Council's discretion, depending on the project size and scope, conduct and budget for a parametric study with lifecycle costing at the design phase. For a large facility like the SW Recreation Centre, this study is estimated to cost an additional $500,000 in budget dollars. The study would provide great value when it comes to making progress on GHG reduction goals on a very large, public and long-term municipal structure.
2. Set a 60% (NECB Tier 4) energy consumption reduction target. With this option the City **can** apply for FCM and federal funding for energy efficient buildings.
3. Set a Third-party certification requirement (e.g. LEED Gold or Platinum, Passive House or CaGBC Zero Carbon), with a life-cycle cost assessment determining the best option.

This approach is valuable in the short term, will be costly for minimal extra value in the long term, it should be pursued for up to two building designs and then the City should decide which certification becomes required for future buildings.

Budget Implications:

Depending on the options chosen, setting a Tier 2 standard may have no immediate capital budget implications. There likely would be some savings in future operating costs with a more efficient building than building as per the base standards.

Communications and Engagement:

N/A

Recommendation:

Administration recommends that the Community Infrastructure and Strategic Growth Committee receives the information as presented and recommends to Council to:

1. adopt the National Energy Code for Buildings (NECB) 2020 Tier 2 energy consumption reduction standard for commercial and institutional construction greater than 600 m2 as classified in the National Building Code – Alberta Edition [NBC(AE)] Part 3 into the design of City structures moving forward; and

2. direct Administration to develop a sustainable buildings policy for Council approval by (date).

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Attachments:	#1:Energy and GHG Performance Guidance of New Construction Additional Context